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# EU and Portuguese Cycling Strategy for Sustainable Urban Mobility

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**Abstract.** Sustainable mobility has become a central topic for reflection and debate when defining active urban policies. In opposition to traditional mobility focused on private cars, sustainable urban mobility aims to respond to society's travel needs of comfort, safety, and time with healthy, environmental-friendly, and economical solutions. Soft mobility modes, especially cycling, are an alternative capable of reversing the trend on private car use in urban areas. Cycling has been playing an important role in urban sustainable development in the last decade, being one of the main strategies of urban mobility plans. The present study presents a review of the main European Union (EU) and Portuguese cycling strategies. The methodological approach includes the collection and analysis of the main EU and Portuguese documents discussing the challenges and options for urban mobility, especially those focused on cycling. These strategies aim to promote the use of bicycles on commuting trips and the reduction of greenhouse gas (CO<sub>2</sub>) emissions, thus contributing to a more sustainable urban environment and healthier communities, the main objectives of the EU's cycling strategies. Conclusions point out that it was mainly in the last 10 years that specific plans for the promotion of the use of bicycles and other soft modes emerged in Portugal, but only in the last 5 years, financing conditions were created to support municipalities in this task.

## INTRODUCTION

According to the World Business Council for Sustainable Development, sustainable mobility can be defined as the ability to meet society's need to move freely, gain access, communicate, trade and establish relationships without sacrificing other essential human or ecological values, today or in the future [1]. The pursuit of this vision can be achieved by adhering to fundamental principles such as preserving the natural environment, maintaining the health and safety of human beings, meeting the population's travel needs, supporting a healthy economy, aiming at social equity and the well-being of all, minimizing infrastructure, access and mobility costs, and ensuring energy efficiency and the long-term viability of transport systems.

For the European Union (EU) Council of Transport Ministers, the concept of sustainable mobility must comprise the following principles [2]:

1) Respond to the basic needs of access and development of citizens, companies and society, in a safe way and compatible with human health and environment preservation, while promoting equity within and between generations;

- 2) Be affordable, operating fairly and effectively, offering different transport choices, supporting a competitive economy and a balanced regional development;
- 3) Limit emissions and waste within the planet's ability to absorb them, using renewable energy at its generation rate and non-renewable energy at its substitution rate, minimizing the impact on land use and noise pollution.

More operationally, the Transportation Association of Canada [3] defines a sustainable transportation system as a system that meets the access needs of the present generation, allows future generations to meet their own access needs (which will grow because of economic growth and rising populations), is powered by renewable (inexhaustible) energy resources, does not pollute air, land or water beyond the planet's ability to absorb/cleanse (especially CO<sub>2</sub>), is technologically possible and economically and financially affordable as well as supports a desired quality of life and also local, national and global sustainable development goals.

Thus, urban mobility is an unavoidable theme in city planning and citizens' quality of life debate. It requires a global view of the territory, namely its characteristics and constraints.

The central issue in the search for more sustainable development has been the substitution of motorized transport modes. To achieve more efficient and less polluting mobility systems, in the last decade, cities have been implementing policies supported by sustainable urban mobility plans to influence the citizens' modal choice, such as using bicycles, especially when integrated with other transport modes, such as public transports.

However, for a real change in behaviours, it is necessary to create conditions for this transition to occur, namely in terms of cities' spatial organization and their infrastructures, which should be suitable for soft modes of circulation. Regarding the cycling mode, the planning and design of cycling networks must meet the basic principles of continuity and coherence and must ensure safety to encourage citizens to use them, that is, they must be adequate and suitable for cycling travel [4, 5].

This article aims to present the evolution of the main strategies to promote cycling mobility at the EU and Portuguese levels as well as the main strategies and support programs promoted by the EU and how Portugal has been responding to this challenge.

This paper is organized as follows. The first section presents how the concept of sustainable mobility is understood by several entities, how cycling can contribute to achieving more sustainable levels of urban mobility, the purpose of the study and the structure of the paper. The following section, EU Cycling Strategy, presents the evolution of the main documents that support the main strategies for promoting and implementing cycling at the EU level. In the section Portuguese Cycling Strategy, a review on how Portugal reacted to the European guidelines is presented, namely with the documents supporting cycling mobility, strategies and incentives promoted by the central government to increase cycling share. Finally, the section Discussion and Conclusion compares the evolution of Portuguese cycling strategies with the EU ones and deals with the main conclusions of the study.

## **EU CYCLING STRATEGY**

In recent decades, the European Commission (EC) has been stimulating the development and application of new alternatives for sustainable urban mobility and innovative solutions through its policies, structural and investment funds, and research and innovation financing programs.

The development of the EU's current urban transport policy has a long history spread in several documents which discuss the challenges and options for intervention in urban transport. A summary of some of these documents was presented in the Green Paper "Towards a new culture of urban mobility", in 2007, which defined a European agenda for urban mobility, concerning the responsibilities of local, regional and national authorities on the subject, and opened a debate on the best way to develop a new urban mobility culture in Europe [6]. Five priority challenges were defined: cities and towns decongested, greener cities and towns and smarter, affordable and safer urban transports.

The Green Paper was complemented in 2009 with the definition of specific actions incorporated in the Action Plan for Urban Mobility [7]. This plan included an implementation calendar and identified responsibilities intending to respect the Subsidiarity Principle. The Plan presented 20 measures and instruments to support the formulation of policies at the local, regional and national levels for the planning and management of urban transport. These measures were organized in six themes responding to the main challenges that emerged from the Green Paper consultation (Promoting integrated policies; Focusing on citizens; Greening urban transport; Strengthening funding; Sharing experience and knowledge; and Optimising urban mobility), thus addressing new forms of mobility including electric modes and the safe use of bicycles as an alternative transport mode.

In 2011, the EC published the White Paper Roadmap for a single European transport area [8], presenting a vision for a competitive and sustainable transport system, including clean urban transport and daily commuting. In the

roadmap, the EC adopted 40 concrete initiatives to create a competitive and sustainable transport system. Among the initiatives, two make explicit reference to the use of the bicycle for the promotion of more sustainable behaviours. These relate to the importance of promoting the use of bicycles as an alternative to private cars and also to the need for special attention to road vulnerable users, including cyclists, as a way of approaching the “zero deaths” goal in road accidents until 2050 [8].

In December 2013, the Urban Mobility Package [9] was published by the EC to reinforce support measures in the transportation area, recognizing that urban mobility is mainly a responsibility of relevant actors at the local level. The central element of the Urban Mobility Package is the document “Moving together towards competitive and resource-efficient urban mobility” complemented by the annex “A concept for Sustainable Urban Mobility Plans (SUMP)” and working papers on urban logistics, regulation of urban areas’ access, development of intelligent transport systems (ITS), urban road safety and impact assessment. The SUMP fosters a balanced development and a better integration of the different urban mobility modes, including cycling, supported by guidelines which provide local authorities with recommendations on how to implement strategies for sustainable mobility and development of urban areas.

In the following year, the 2014 Paris Declaration “City in Motion” [10] adopted by the Pan-European Transport, Health, and Environment Program (THE PEP) clearly recognized the benefits of cycling in sustainable economic development, reducing transport-related emissions and promoting more efficient transport [11]. It also initiated the development of a Pan-European Master Plan for Cycling Promotion supported by guidelines and tools to assist cycling policies at the national level.

In 2015, an Informal Transport Council also recognized the bicycle as an environmentally friendly transport mode, urging the Commission to take a set of measures that included the integration of the bicycle in multimodal transport policy, the elaboration of a EU strategic document on cycling and establishment of a European Cycling focal point to serve as one-stop-shop and facilitate the exchange of good practices [12]. The same document also encouraged initiatives that include cycling in urban, local or regional projects, both as an efficient transport mode and a recreational activity.

Also, the Amsterdam Pact - Urban Agenda for the EU adopted in 2016 [13], within the framework of the meeting held with the Ministers of the Member States, considered urban mobility as one of the priority themes, with a special focus on soft mobility, which includes travel by bike.

According to the European Strategy for Low-Emission Mobility of 2016 [14], urban transport is responsible for 23% of the EU's greenhouse gas emissions, making its reduction urgent in the near future (by mid-century, 60% lower than in 1990). To achieve this reduction, the encouragement of modal shift to active travel, namely cycling, and shared mobility schemes, like bike-sharing, is presented in the section on the action by cities, underlining the importance of local action and Sustainable Urban Mobility Plans (SUMP) in enabling and encouraging cycling.

The 2017 Opinion of the European Committee of the Regions - An EU Roadmap for Cycling established a set of policy recommendations, among which the inclusion of an EU Roadmap for Cycling in the Commission’s Work Programme 2018, in order to respond to “the growing demand for coordinated action at the EU level to help unlock the well-documented environmental, health and economic benefits of cycling; while ensuring that within this roadmap there are actions that allow the raising of awareness and the dissemination of such benefits, in order to create a habit or culture of cycling” [15]. It also advised the EC to embrace a target of doubling cycling share across the EU Member States over the following 10 years (from approximately 7-8% bicycle trips to around 15%), and to conduct a comprehensive cost-benefit analysis to estimate the investments and other measures needed to understand the potential for cycling in the EU transport modal split in the long-term (2030/2040/2050). Strong academic evidence that investment in cycling infrastructure comes with a benefit-to-cost ratio of at least 5:1 is also pointed out, and relevant economic benefits are also presented: the creation of local jobs in bicycle manufacture and retail trade, repairs, infrastructure construction or maintenance; revenues with cycling tourism; public health improvements due to increased physical activity and less air and noise pollution; less traffic congestion leading to a decrease in blocked roads, delays, lost working hours, and wasted fuel; and more efficient land use. The same document also supported the development of a Pan-European Master Plan for Cycling Promotion by its Member States, the WHO (World Health Organization), UNECE (United Nations Economic Commission for Europe) and other stakeholders.

In the same year, the European Cyclists Federation (ECF), supported by several other organizations, developed the “EU Cycling Strategy - Recommendations for achieving green growth and effective mobility in 2030” [16]. The EU Cycling Strategy was designed to inspire the EC to develop its own European Cycling Strategy, to eliminate fragmentation in the development of relevant policies in the EU institutions and avoid inefficiencies in expanding local cycling strategies. This document set the following four central objectives [16]:

- 1) Cycling must be an equal partner in the mobility system;
- 2) Increase cycle use across the EU by 50% in 2019/2020 – 2030 (on average);

- 3) Halve the rates for killed and seriously injured cyclists (in km cycled) in 2019/2020 – 2030;
- 4) Increase EU’s investment in bicycles to € 3 billion in the period 2021-2027 and € 6 billion from 2028-2034.

In 2018 the first objective was reached. The bicycle was recognized as an equal mode of transport in the “Graz Declaration”, which also included the development of a European strategic support framework to promote active mobility and the integration of active mobility into current and future funding schemes and European funding [17].

In 2019, the European Parliament and the Council of the European Union amended Directive 2008/96/EC on road infrastructure safety management (RISM) resulting in Directive (EU) 2019/1936 [18]. This new Directive included indicative elements of network-wide road safety assessments and road design quality requirements, specifying in article 6B the protection of vulnerable road users (including cyclists, pedestrians, and users of powered two-wheelers). Their protection should be accomplished mainly with the training curricula for road safety auditors and through the definition of national updated guidelines, including technological improvements for the protection of vulnerable road users.

In the following year, the EC published the 2020 Sustainable and Smart Mobility Strategy – putting European transport on track for the future [19], presenting various milestones to show the European transport system’s path towards sustainable, smart and resilient mobility. In the roadmap, the EC identifies 10 flagship areas with an action plan that supports the 2030 climate target plan. Among the initiatives, two explicit references to the use of the bicycle for the promotion of more sustainable behaviours are made in initiatives 35 and 37. These relate to the importance of increasing cycling mode share to archive zero emissions and zero road fatalities, and political and financial support with provisions for first/last mile healthy mobility solutions.

Recently, the first supranational document on cycling policy transcending the EU was adopted in May 2021, as part of the Vienna Declaration, named the Pan-European Master Plan for Cycling Promotion [20]. The plan politically acknowledged the growing importance of cycling and provided guidance at a national level to support cycling through central government policies. The plan’s main objective is the increase of cycling modal share with the overall target of double cycling levels by 2030. The plan focused mainly on developing a trans-European cycling network based on minimum infrastructure quality international standards, implementing innovative road signs to facilitate cycling, increasing national transport budget allocation to cycling and on the provision of relevant baseline data in order to monitor progress in implementing the master plan.

According to [21], there is currently no official EU Cycling Strategy. However, as can be proved by the above-mentioned documents, there are many resources available to support the process of promoting cycling and implementing cycling infrastructure. Most of these resources have been developed with EU co-funding, prepared at the EU level or by other stakeholders within Europe.

On the other hand, a European Cyclists’ Federation (ECF) study [22] states that, with the adoption of the Pan-European Master Plan for Cycling Promotion in 2021, 54 countries in the pan-European region are politically bound to develop and implement a national cycling strategy by 2030. The ECF study, based on data from 47 European countries, showed that 23 countries have adopted a national cycling strategy at some point in time, 13 of these have cycling strategies currently in force, and the other 10 have strategies that expired and need updating. Of the remaining 24 countries analyzed in the report that have never implemented a cycling strategy or similar policy document (around half of the total), only 5 are in the process of developing such a strategy for the first time. The study also points out that some of the most popular interventions contemplated in national cycling strategies focus on intermodality (18 countries), changes to traffic codes (15 countries) and implementation of a national cycling network (13 countries). The time span of most strategies matches the country’s government term (8 cases), a ten-year period (6 countries), a seven-year period (3 countries) and Northern Ireland has a 25-year strategy.

## PORTUGUESE CYCLING STRATEGY

Over the last 15 years, national plans and strategies with relevant guidelines concerning urban mobility, with a special focus on soft modes, have been approved by the Portuguese authorities.

In 2005, the ECOXXI sustainability education program, implemented in Portugal by the European Blue Flag Association (ABAE) and directed mainly to municipal technical staff and decision-makers (considered privileged agents to promote sustainable development at the local level), recognized that the creation of objectives and indicators to measure progress and establish goals to be achieved constitutes a relevant tool for the application of the sustainable urban development pillars: social, environmental and economic [23, 24]. The program operationalization involved the identification of 21 local sustainability indicators covering a set of key domains including sustainable mobility (indicator 18). This indicator consists of five sub-indicators [25] of which the incentive to soft/active modes stands

out. This sub-indicator is measured by the description of the three main actions/measures to encourage soft/active modes implemented by a given municipality in the last three years. As examples of these actions/measures, it is possible to highlight the promotion of pedestrian and cycling accessibility, the accessibility improvement to trip generation poles and transport interfaces on foot and by bicycle, the articulation of the cycle network with other transport modes and the existence of public bicycle sharing systems (bike sharing).

In 2007, Law no. 58/2007 [26] approved the main instrument of the Portuguese territorial management system, the first National Program for Spatial Planning Policy (PNPOT), which became the framework reference for other programs and territorial plans and a guiding instrument for strategies with territorial impact. Framed in the specific and strategic objectives of the program, a set of priority measures were established. These measures included the development of sustainable urban transport plans that aimed at reinforcing the use of public transport and non-motorized mobility and improving the air quality, particularly in densely populated areas.

In the same year and under the European Union Strategy for Sustainable Development principles [27-28], the Portuguese Sustainable Development Strategy (ENDS 2015) and its Implementation Plan [29] were also approved. ENDS 2015 was the benchmark for the application of Community funds in the period 2007-2013. In the strategic objectives and priorities defined by ENDS 2015, the most relevant vectors in the area of accessibility and mobility were:

- 1) "More sustainable mobility contributing to the reduction of air pollutants emissions and noise, particularly in Urban Centres", from the strategic priority "Economic growth more efficient in the use of energy and natural resources and with less impact on the environment, namely in climate change";
- 2) "Incentives for development of sustainable, requalified and memory cities", from the strategic priority "Cities attractive, accessible and sustainable", in which public spaces and buildings accessibility to citizens with reduced mobility interventions are proposed.

In 2009, Resolution no. 3/2009 of the Portuguese Parliament [30] recommended the creation of a working group to elaborate, approve and present a national plan for the promotion of bicycles and the use of other soft transport modes. The resolution established 6 objectives:

- 1) The establishment of verifiable goals such as the increasing percentage of cyclists in Portugal by 2012;
- 2) The development of campaigns and awareness-raising strategies and education actions for the use of soft transport modes;
- 3) The reinforcement of school resources to support the learning of traffic rules and how to safely use bicycles and other soft mobility modes;
- 4) The promotion of dialogue and reflection between entities and different governance and responsibility levels involved in the promotion of soft modes;
- 5) Support research projects and the implementation of pilot projects in national urban space aiming to improve the integration of soft mobility modes and its interaction with public transport systems;
- 6) The promotion of cycle touring.

The resulting Portuguese plan for the promotion of the use of bicycles and other soft modes was published in 2012. The "ciclAndo – Promotion of bicycles and other soft modes" plan targets were "(...) public and private entities, associations, as well as the individual citizen, presenting innovative strategies, proposals and recommendations, with the objective of promoting the use of soft mobility modes, understood as reduced speed travel/transport modes that use less space and have lower impacts on traffic and emissions, such as walking or trips using bicycles, skates, skateboards, scooters or other similar modes, viewed as an economic, social, environmental added value and as a real alternative to private cars." [31]. The document developed the following vision for Portuguese mobility and transport policy [31]:

- 1) Value the use of bicycles and walking as practices for the daily movement of citizens, integrated into the transport system, thus giving priority to sustainability criteria and economic, environmental and social efficiency;
- 2) Enhance the use of bicycles and walking with urban public policies encouraging sustainable mobility as protective of public space and citizens' health and well-being.

As it can be seen in Table 1, this vision was anchored in 2 structuring strategic objectives framed in 5 areas of action with 17 operational goals.

TABLE 1. Strategic objectives, areas of action and operational objectives of ciclAndo plan [31]

Strategic objectives	Areas of action and operational goals
<b>A. Placing cycling and walking at the center of citizens' daily lives</b>	<b>I. The mobility paradigm/ The change</b> 1. Promote “combined mobility” and the integration of soft modes in the travel chain, articulating them with other public transport modes. 2. Promote a travel matrix more favorable to soft modes and the citizens' participation in the choice of sustainable mobility options. 3. Encourage companies and trip generating poles to promote the use of soft modes among employees, visitors and suppliers.
	<b>II. The public space/infrastructure/equipment</b> 4. Review and adapt legislation and regulatory norms (land use, urbanization, construction, traffic, other) to promote soft modes. 5. Introduce the concept of traffic calming in the design and management of public space. 6. Create pedestrian and cycling networks with safe and comfortable circulation conditions. 7. Articulate the cycling networks with parking infrastructures in buildings and public spaces and with other support infrastructures.
	<b>III. Innovation/Economic activity/Value creation</b> 8. Stimulate research and development (R&D) in the area of soft modes. 9. Streamline the productive chain linked to soft modes. 10. Make the bicycle accessible to citizens. 11. Associate soft modes with economic, tourist and leisure activities.
<b>B. Educating for sustainable and soft mobility</b>	<b>IV. The school/Public health</b> 12. Promote the education and training of children and young people on soft and sustainable mobility (in a school context). 13. Stimulate the development of “Walk & Bike to School” community projects. 14. Promote the teaching of driving bicycles and trivialize their presence in public spaces.
	<b>V. Training and skills/Sensitivity</b> 15. Strengthen technical skills in transport and mobility management. 16. Develop a strategy to raise awareness of local policy makers about mobility management. 17. Develop a communication strategy aiming at valuing the use of soft modes by citizens.

In the same year, the Portuguese Guidelines for Mobility [32] defined a national strategy for sustainable mobility through a reference frame addressing issues related to territory, accessibility, transport and mobility. Eleven guidelines for mobility were established aiming to:

- 1) Define and guarantee adequate transport accessibility levels to all citizens;
- 2) Establish an efficient configuration of the accessibility system;
- 3) Economic support as a guarantee of supply stability;
- 4) Improve the citizen's quality of life by reducing the negative impacts of mobility (social, environmental and economic);
- 5) Create good conditions for non-motorized modes, particularly for walking;
- 6) Promote a rational use of individual motorized modes;
- 7) Ensure public transport services of good quality and with appropriate technical characteristics defined according to demand;
- 8) Integration of land use and transport policies;
- 9) Promote the physical, fare, logical and institutional integration of the different mobility system components;
- 10) Improve the transport and mobility system information available to citizens;
- 11) Ensure public participation in decision-making processes associated with mobility.

The guidelines were included in a set of instruments, plans and programs constituting what the Portuguese Institute for Mobility and Land Transport (IMTT) called the “Mobility Package”. The package also contains a guide for accessibility, mobility, and transport in municipal spatial planning, a guide for preparing mobility and transport plans, a collection of technical/thematic brochures to support the preparation of mobility and transport plans, including a brochure on the principles for cycling networks planning and design, a guide for the elaboration of trip generating poles mobility plans and guidance on urban logistics.

In 2015, the Green Growth Commitment was approved by the Council of Ministers with Resolution no. 28/2015 [33]. A national strategy for the promotion of development centred on the value creation from the conciliation of sustainable economic growth, the country's competitiveness and its international affirmation as a reference for green growth was defined. This

strategic document highlights the need to find alternatives to private car use and the importance of promoting the bicycle as a particularly efficient urban mobility mode, increasing its share in urban trips and its articulation with public transport modes.

Three years later, the Portuguese program for the interconnection of municipal cycling networks, designated Bikeable Portugal 2030 (PC2030) [34], was published aiming to promote cycling public policies in the context of urban and interurban short distances trips. The program's main objective was the identification of a set of favourable cycling scenarios in mainland Portugal, which may come to integrate an inter-municipal connectivity plan. The program is composed of three subprograms:

- 1) Subprogram 1: Interconnection between relevant urban settlements.
- 2) Subprogram 2: Structuring cycle paths between contiguous relevant urban settlements.
- 3) Subprogram 3: Structuring cycle paths between isolated relevant urban settlements.

The program considers municipalities as drivers of change in view to sustainable mobility based on assertive management of transport infrastructure and the dissemination and motivation of citizens towards a culturally multimodal citizenship.

In view of the fulfilment of national and international commitments assumed by Portugal in the field of sustainability, which include the Paris Agreement on Climate Change and the Sustainable Development Goals adopted by the United Nations, the National Strategy for Active Cycling Mobility 2020-2030 (ENMAC) [35] was approved in 2019 by the Portuguese Council of Ministers. Constituting an integrated strategy in the area of mobility, ENMAC established the following vision and mission [35]:

Vision: "A 'proudly active' country where walking and cycling are safe and widely practised, thus constituting an accessible and attractive mobility option, and maximizing benefits for health, economy, employment, environment and citizenship".

Mission: "Encourage and generalize cycling in everyday and leisure trips, making active mobility the most popular way to travel short distances, enhancing synergies with public transport throughout the national territory and significantly improving the Portuguese quality of life".

This strategy recognizes cycling as a fundamental part of the mobility chain, becoming progressively accessible, diversified, safe and adapted to the population's needs. ENMAC foresees to reach 10 000 kilometres of cycle paths by 2030, built through several investment initiatives, including € 300 million from the PC2030 Program (in 2018, the existing network was 2062 km long), a cycling modal share of 7.5% in national territory and 10% in cities (in 2014, national cycling share was 1%) and the reduction of road accidents involving cyclists by 50% (in 2019, 2344 accidents with cyclists were reported).

The ENMAC foresees the implementation of 51 measures that are organized into 6 strategic dimensions: framework and legislation, research and development, intervention axis #1 - infrastructure and intermodality, intervention axis #2 - training and support, intervention axis #3 - culture and behaviours and monitoring and evaluation.

Following the Paris Agreement on Climate Change and the Sustainable Development Goals, the Portuguese Government also launched in 2019, the Roadmap for Carbon Neutrality 2050 (RNC2050) [36]. According to this document, by 2050, between 8% and 14% of short-distance mobility is expected to be made using low-impact or active mobility, considered one of the 5 main decarbonization drivers in the transport sector.

In 2020, the normative document for application to urban streets - Issue III - Geometric characteristics for non-motorized traffic streets was published [37]. This normative includes a chapter on cyclable roads, covering typologies, design and measures to be applied in specific situations (such as the beginning and end of cycling lanes, intersections, access to garages and parking lots), being considered as a support document for ENMAC implementation.

Pursuing Carbon Neutrality until 2050, in 2021, the Portuguese government launched regulation to financially support the acquisition of low-emission vehicles [38] and the implementation of bike park systems [39]. The incentive for the acquisition of low-emission vehicles allocates financial support for individual persons and companies considering specific criteria. The supported low-emission vehicles include cargo bicycles, with or without electrical assistance (typology 3), city bicycles, two-wheel motorcycles and electric mopeds (typology 4) and conventional city bikes (typology 5). The financial support for the implementation of bike park systems aims to encourage the acquisition and installation of equipment for parking bicycles in places served by cycle paths, where "bicycle use" is notorious or in places where such use is intended to be stimulated, such as transport interfaces, schools, health services and other public services.

Finally, at the end of 2021, the government approved the National Climate Basic Law (Law no. 98/2021) [40]. In article 50, the compromise of Sustainable Mobility to promote cycling and pedestrian active mobility is assumed through:

- 1) Development and implementation of national, regional, and local mobility strategies for active cycling and walking;
- 2) Development of the intermodality of public transport, integrating the use of the bicycle;
- 3) Encouraging the purchase and use of bicycles;
- 4) Offer of public bike-sharing systems;
- 5) Availability of safe cycling networks and infrastructures.



Portugal	Europe
ECOXXI sustainability education program [23, 24, 25]	
2005	
2006	
- Law n.º 58/2007: National Program for Spatial Planning Policy (PNPOT) [26]	- Green Paper -Towards a new culture of urban mobility [6]
- Portuguese Sustainable Development Strategy (ENDS 2015) [29]	
2007	
2008	
- Resolution n.º 3/2009: Recommendations for the national plan for the promotion of bicycles and others smooth transport modes [30]	- Action Plan on Urban Mobility [7]
2009	
2010	
2011	- White Paper: Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system [8]
- ciclAndo – Plan for the promotion of bicycles and other soft modes [31]	
- Portuguese Guidelines for Mobility [32]	
2012	
2013	- Together towards competitive and resource-efficient urban mobility [9]
2014	- Paris Declaration - City in motion: People first [10] - From Amsterdam to Paris and beyond: the Transport, Health and Environment Pan-European Programme (THE PEP) 2009-2020 [11]
Resolution n.º 28/2015: Green Growth Commitment [33]	
2015	- Declaration on Cycling as a climate friendly Transport Mode [12]
2016	- Urban Agenda for the EU - Pact of Amsterdam [13] - A European Strategy for Low-Emission Mobility [14]
2017	- An EU Roadmap for Cycling [15] - EU Cycling Strategy - Recommendations for achieving green growth and effective mobility in 2030 [16]
Bikeable Portugal 2030 [34]	
2018	- Graz declaration - Starting a new era: clean, safe and affordable mobility for Europe [17]
- National Strategy for Cycling Active Mobility 2020-2030 (ENMAC) [35]	
- Roadmap for Carbon Neutrality 2050 (RNC2050) [36]	- Directive (EU) 2019/1936 [18]
2019	
Normative document for application to urban streets - Issue III - Geometric characteristics for non-motorized traffic streets [37]	- Sustainable and Smart Mobility Strategy - putting European transport on track for the future [19]
2020	
- Regulation to support financially the acquisition of low emission vehicles and for the implementation of bike park systems [38, 39]	
- National Climate Basic Law (Law 98/2021) [40]	- Pan-European Master Plan for Cycling Promotion [20]
2021	

**FIGURE 1.** Timeline of EU and Portuguese strategies and policies for the promotion and implementation of cycling mobility

## DISCUSSION AND CONCLUSION

Figure 1 presents the evolution timeline of the strategic documents and policies that support the promotion and implementation of cycling, as a measure to promote more sustainable development through interventions at the urban mobility level.

From what was presented in the previous sections, it is possible to verify that the EU's concern with urban mobility issues and its sustainability emerged with greater expression at the beginning of the 21st century.

Several important documents focused on urban mobility were developed in the last 15 years [6-8, 13, 14]. These strategic documents evolved from the discussion on the best approach to be considered in order to improve urban mobility, to the definition of guidelines for a less polluting, smarter, safer, competitive and resource-efficient transport system, resulting in a vision for sustainable urban mobility across the EU [8-10].

Concrete measures to support the application of national, regional and local urban mobility policies, including mentions to cycling promotion, were published in 2009 [7], and most of the analyzed documents recognize the importance and responsibility of local actors and the relevance of changing commuting mobility behaviours as a way of achieving cleaner and more sustainable mobility [8, 14]. Other two important actions supported the development and application of mobility policies and strategies in the EU: the emergence of the Sustainable Urban Mobility Plan (SUMP) concept in 2013 [10] and the inclusion of the bicycle in multimodal approaches in 2015 [12].

Of the considered documents, the first ones with a specific focus on promoting the use of bicycles to create a cycling culture in the European space appeared in 2017 [15, 16]. Recognition of the bicycle as an equal partner in the mobility system, definition of specific objectives for the increase of bicycle use, decrease of cyclists fatalities and serious injuries, and investment, as well as the definition of minimum standards for infrastructure design, were addressed more recently in [16-18]. These aspects were also reinforced in the 2020 Sustainable and Smart Mobility Strategy [19], with special emphasis on the cycling mode and on the promotion of mobility solutions for the first/last mile.

It is still possible to state that the EU's experience in the field of cycling mobility allowed expanding the territorial space targeted with the bicycle promotion plans. Evidence of this is the 2021 Master Plan for Cycling Promotion [20], which considers similar objectives to those defined in the EU strategies to develop a Trans-European cycle network.

Additionally, it is possible to conclude that the entire documentary framework produced in the EU on urban mobility and cycling resulted in the implementation of a significant number of national cycling strategies in European countries, as verified by the ECF in [22].

Regarding the Portuguese case, a greater political and social awareness of environmental and safety issues in sustainable urban development can be seen at the beginning of the XXI century. These considerations include concerns about urban mobility and its sustainability and an increase in active mobility promotion [23-25].

In the first decade, legislation and strategies were developed to define priorities for sustainable urban development and mobility policies implementation, focused on less polluting modes and constituting a reference for application to European funds [26, 29].

Recognizing the importance of educating citizens on the use of sustainable and active modes in their daily journeys, there was, since 2009, an emergence of specific legislation with guidelines for technicians and local authorities to promote and normalize urban mobility, including active mobility and cycling infrastructures [29, 31, 32, 37].

In 2015, the government established a commitment for the promotion of national green growth in which cycling importance, as a particularly efficient urban mobility mode, is highlighted, aiming to increase its share in urban trips and its articulation with public transport modes [33].

By 2019, two more documents were published to promote cycling public policies, thus recognizing cycling as a fundamental part of the mobility chain, specifically for urban and interurban short distances trips [34, 35].

These documents defined objective targets to be reached by 2030 and presented measures to achieve them in different strategic dimensions. The promotion of these measures was carried out through new 2020 regulations to financially support the acquisition of low-emission vehicles and bike-park systems [38, 39]. All mentioned documents are in line with a growing political and social concern about climate change [36, 40].

Based on the analyzed documents, it is possible to conclude that at present Portuguese local authorities have a broad framework to promote the use of cycling through several legal tools for the definition of sustainable municipal and inter-municipal mobility policies, for the design of infrastructures, and more recently, financial instruments to encourage bicycle acquisition and infrastructure intervention.

Comparing the European and Portuguese regulations, there is an increase in official cycling documents from 2015 onwards at the European level and from 2018 in Portugal, showing some degree of maturity in implementing and encouraging the use of this mode of transport.

However, it was possible to verify a concern with the legal framework to promote cycling in Portugal prior to the main European documents, which may be due to the tradition of manufacturing and using bicycles in some areas of the country, such as in Aveiro and its surroundings. In general terms, Portugal has followed EU policies and strategies with an average 3-year span between the Portuguese and EU regulations and recommendations.

Finally, it is also noted that in response to the economic crisis triggered by the Covid-19 pandemic, the Portuguese Government presented, in 2021, the Portuguese Recovery and Resilience Plan (PRR) [41] that constitutes the reference for the application of several policy instruments to adopt in the near future, such as the Multiannual Financial Framework (Portugal 2030) and the Next Generation EU (designed to boost the EU's economic and social recovery). Despite all the aforementioned plans and initiatives to promote active mobility, the Portuguese PRR does not mention active mobility, cycling or walking. The scope of coverage of sustainable mobility in the Portuguese PRR is too restricted as it only considers public transport and excludes the reduction of private car usage in the climate transition equation. Such omissions can compromise the international and national commitments that the Portuguese Government has assumed, such as the Paris Agreement on climate change, the Bikeable Portugal 2030 Strategy, the National Strategy for Cycling Active Mobility 2020-2030 (EMNAC) and the Roadmap for Carbon Neutrality 2050.

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