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NEW CHALLENGES FOR XXI CENTURY CITIES

Global warming, ageing of population, reduction of energy consumption, immigration flows, optimization of land use, technological innovation

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TeMA Journal was established with the primary objective of fostering and strengthening the integration between urban transformation studies and those focused on mobility governance, in all their aspects, with a view to environmental sustainability. The three issues of the 2024 volume of TeMA Journal propose articles that deal the effects of global warming, the ageing of population, the reduction of energy consumption from fossil fuels, the immigration flows from disadvantaged regions, the technological innovation and the optimization of land use.

TeMA is the Journal of Land Use, Mobility and Environment and offers papers with a unified approach to planning, mobility and environmental sustainability. With ANVUR resolution of April 2020, TeMA journal and the articles published from 2016 are included in the A category of scientific journals. The articles are included in main scientific database as Scopus (from 2023), Web of Science (from 2015) and the Directory of Open Access Journals (DOAJ). It is included in Sparc Europe Seal of Open Access Journals, and the Directory of Open Access Journals.

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The cover image shows railway street in Hanoi, Vietnam (Source: TeMA Journal Editorial Staff).

TeMA. Journal of Land Use, Mobility and Environment offers researches, applications and contributions with a unified approach to planning and mobility and publishes original inter-disciplinary papers on the interaction of transport, land use and environment. Domains include: engineering, planning, modeling, behavior, economics, geography, regional science, sociology, architecture and design, network science and complex systems.

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REVIEW NOTES – Urban strategies, programmes and tools

Strategies and instruments for active mobility: European overview

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Abstract

Starting from the relationship between urban planning and mobility management, TeMA has gradually expanded the view of the covered topics, always remaining in the groove of rigorous scientific in-depth analysis. This section of the Journal, Review Notes, is the expression of continuously updating emerging topics concerning relationships between urban planning, mobility and environment, through a collection of short scientific papers written by young researchers. The Review Notes are made of four parts. Each section examines a specific aspect of the broader information storage within the main interests of TeMA Journal. In particular, the Urban strategies, programmes and tools section presents the different strategies and tools for active mobility implemented internationally.

The purpose of this review is to provide an overview of the instruments and strategies implemented in Europe to encourage active mobility. In addition, some solutions to promote active transport implemented in several European cities have been reported. These initiatives represent an opportunity for European communities to act in a necessary, indispensable and continuous process of improving urban mobility in the direction of environmental sustainability.

These measures, enhanced by dedicated tools such as SUMPs, promote behavioral change and support mobility planning, setting active mobility as a winning strategy to improve city life and urban efficiency.

Keywords

Walking; Cycling; Europe; Urban strategies; Urban tool.

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1. The European commitment to sustainable mobility

The cities of the future must be designed for people, with modern and sustainable transport infrastructure that can meet the needs of an increasing urban population, which must connect to places and people, and access services and opportunities.

Although at a more measured pace than in the past, urbanization is inexorably advancing throughout the world, including Europe. In 2021, almost 75% of EU inhabitants lived in urban settings, including cities, towns and suburbs, and this share is set to increase (Eurostat, 2022), and the increase in urbanization also involves changes in the way people move and thus new paradigms of mobility.

Thanks to the European Green Deal (EGD) and the Sustainable and Smart Mobility Strategy (SSMS), the EU is at the forefront of the fight against climate change, with the ambitious goal of reducing greenhouse gas emissions in the transport sector by 90% by 2050, compared to 1990 levels (EC, 2022).

The SSMS, presented by European Commission (EC) in 2021, putting European transport on track for the future, pursuing three main objectives: 1) *Sustainable Mobility;* 2) *Smart Mobility;* 3) *Resilient Mobility* (Fig.1).

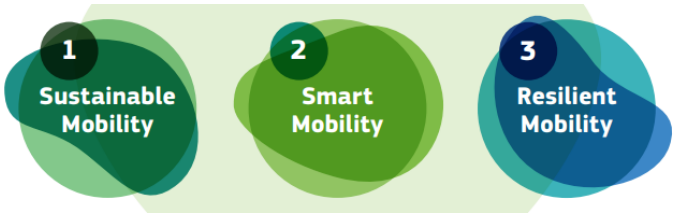

Fig.1 Objectives of the European "Sustainable and Smart Mobility Strategy"

These strategies outline the path for a more robust and sustainable European transport system that can overcome future crises. In addition, new technologies and innovations can help shape and create the conditions for profound changes in mobility policies and models.

"As set out in the 2030 climate target plan, increasing the modal shares of collective transport, walking and cycling, as well as automated, connected and multimodal mobility will significantly lower pollution and congestion from transport, especially in cities and improve the health and well-being of people" (EC, 2020).

The seamless multimodality made possible by digital solutions is crucial in urban and suburban areas, so innovative solutions are being strengthened, such as the integration of different transport services into a service accessible on demand, known as "Mobility as a Service", MaaS (D'Amico, 2023a).

For a zero emissions future, in addition to investing in technologies, a collective commitment is required, which also requires a profound transformation of individual and social behavior (Martinelli, 2024).

Active mobility modes like walking and cycling, which are low-cost and emission-free ways to get around, can bring a variety of benefits to society, including decarbonizing transportation, reducing air and noise pollution, alleviating congestion, and improving health.

In the framework of the EU for urban mobility, a boost to the promotion of sustainable mobility and more on a human scale (rather than a car) came mainly with the introduction of the Sustainable Urban Mobility Plan (SUMP) an instrument presented within the EU's Efficient and Green Mobility Package of 2021 (D'Amico, 2024).

A particular emphasis on the promotion of active travel modes, such as walking and cycling are also specified within the updated concept of SUMP, published in March 2023 as part of Commission Recommendation on national SUMP support programmes.

An important step forward for the promotion of active mobility in Europe is also taken with the proposal for a revised trans-European transport (TEN-T) network Regulation published in December 2021. The proposal introduces the figure of cycle corridors within the TEN-T network, proposes integration with multimodal urban nodes, the promotion of charging infrastructure for electric vehicles (such as bicycles, scooters and e-scooters) and the establishment of dedicated funding for active mobility.

Active mobility is a priority for the European Union and also its road safety policy, "Vision Zero" (reducing road deaths by 2050), plays an important role in its promotion; in fact, "Vision Zero" focuses on vulnerable road users, such as pedestrians and cyclists, in all aspects of the "safe system" approach.
The EU also supports research and several funding programmes for the implementation of the European Green Deal in various sectors, from energy, transport and digital; among the funding involving active mobility, there are for example: "European Structural and Investment Funds (ESIF)", and the "Horizone Europe" and "LIFE" programmes. These funds support a wide range of interventions, to create a sustainable and healthy European economy and environment.
In addition to these general programmes, the European Commission support initiatives and campaigns to raise awareness of sustainable mobility. In February 2023, the European Parliament adopted a resolution on the development of an EU Cycling Strategy, which has been concretized in the "European declaration on cycling" (2024) which serves as a strategic compass for existing and future European policies and initiatives relating to cycling. An annual event that sees more and more participants is the "EUROPEANMOBILITYWEEK" the European Commission's awareness campaign on sustainable urban mobility; this event promotes behavioral change in favour of active mobility, public transport and other clean and intelligent transport solutions.
These initiatives represent an opportunity for European cities to act in a necessary process, indispensable and continuous improvement of urban mobility in the direction of environmental sustainability combined with local economic growth and the quality of life of cities.
The implementation of these policies, together with other Community acts, can help to create a safer, sustainable and accessible transport system for all European citizens.

2. Active mobility measures undertaken in European cities

By setting clear priorities and implementing concrete measures, European cities, including through the SUMP tool, are taking action to promote a more sustainable and resilient urban mobility, favoring the promotion of active modes.
There are several measures and initiatives put in place by different cities to plan new urban developments in order to prioritize soft mobility. Surely the most widespread investment is in dedicated infrastructure, creating networks of safe and comfortable bike paths and pavements, pedestrian areas and limited traffic areas, reducing architectural barriers; among the prerogatives of some cities there is also to promote active mobility and at the same time enhance and redevelop existing urban areas (D'Amico, 2024; D'Amico, 2023b; Pellicelli et al., 2022).
Active mobility is an important opportunity for European cities to become more sustainable, liveable and humane. In a European ranking of 2022, Helsinki established itself as the city with more space for pedestrians and cyclists, with a score of 69%. Amsterdam and Copenhagen follow closely with 64% and 63% respectively (Statista Research Department, 2023).
Amsterdam is considered one of the most bike-friendly cities in the world and thanks to the many bike paths the city has an extensive and well-connected network so most citizens usually travel by bike. The city of Copenhagen has also invested heavily in creating infrastructure for active mobility, with over 400 km of bike paths, a very efficient bike-sharing system, and also boasts one of the best multimodal public transport systems in the world (known for affordable rates and wide opening hours). Granada is another exemplary model of European city on a human scale, where pedestrian mobility is valued and promoted as a healthy and sustainable lifestyle; this is confirmed by the "Pan-European evaluation and classification of the city on urban mobility for livable cities" (2022) where it is the city with the highest percentage of pedestrian street network (57.6%).
The goal of European countries is to encourage a change in the mobility habits of citizens by making urban spaces more friendly for pedestrians and cyclists. The following are some solutions for the promotion of active

transport implemented in different European realities; the measures vary from city to city, depending on the characteristics of the territory, the context, the needs of citizens and the objectives defined in the various planning instruments.

Madrid – SPAIN

Fig.2 "BiciMAD" the electric bike sharing system in the city of Madrid

Madrid, the capital and most populous city of Spain, is promoting public transport and active mobility in a bid to reduce air pollution and heavy car traffic. The city is fighting for a more sustainable mobility and to respect the limits of polluting emissions imposed by the EU through the "*Madrid 360 Strategy*", presented in September 2019.
The main objective of the Strategy is to define a series of objectives and measures to reduce the emissions of the city of Madrid, taking into account the needs of mobility and social, economic and territorial development, maintaining "at all times a global vision (360º) and long-term" (Madrid 360, 2019).
The city aims to cut greenhouse gas emissions by 65% by 2030 and achieve climate neutrality by 2050, establishing itself as a pioneer in the ecological transition.
The city of Madrid is doing its part to locate the European Green Deal, through plans to turn the city into a low-emission zone and to promote micro mobility and shared mobility.
In 2022, the Spanish capital approved the final text of the "*Madrid 360 Sustainable Mobility Plan*", its new Sustainable Urban Mobility Plan (PUMS) that defines the framework for the development of the city's mobility policies until 2030.
More and better public transport is a key component of the PUMS which plans to expand the network of priority lanes for buses and the metro network. The city also started the first free electric bus lines in the city: the "Zero Lines" (zero emissions, zero costs for users) (Eurocities, 2021).
The Plan devotes ample space to active mobility, as 35 km of new bike lanes are planned by 2050, supported by 20,000 parking spaces for bicycles and personal mobility vehicles. Micromobility will be enhanced through the implementation of 300 micromobility hubs and, at the same time, the city's electric bike sharing system, "BiciMAD", will be expanded to 10,000 bicycles. Additionally, Madrid is implementing low-emission zones, the whole city will be declared a LEZ (Low Emission Zone) in 2025 (CIVITAS, 2024). These developments, together with other measures, bring the city closer to its climate goals, while promoting sustainable mobility and public transport.

Paris – FRANCE

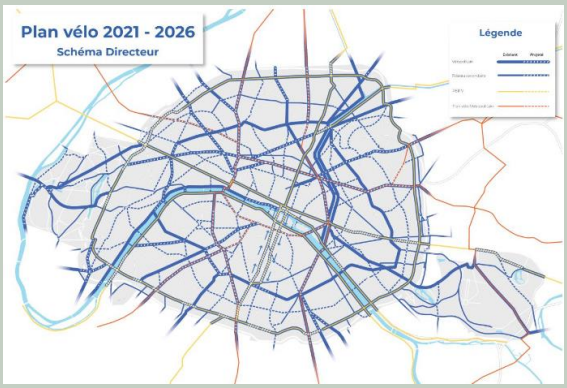

Fig.3 Map of Paris "Plan Vélo 2021-2026"

The bicycle is a means of transport that Parisians have long been adopting. The pandemic allowed the City to test policies and interventions that directly address issues of transport emissions, noise pollution, and public health, all the while creating infrastructure that is more reflective of the needs of its people.
Starting in 2014 with the "Plan vélo 2015-2020", the city of Paris launched a massive and unprecedented investment plan to facilitate the use of bicycles. In fact, between 2014 and 2021, 300 km of cycle paths and 52 kilometers of temporary routes were set up ("pop-up" lanes created during the pandemic), bringing the Paris cycle network to more than 1,000 km in length.
To amplify the transformation of the city in favor of cycling, Paris committed in 2021 to a new phase that took shape with the new "*Plan Vélo 2021-2026*" which aims to make the city of Paris 100% cycle-friendly. This ambition translates into concrete actions on several fronts, including the strengthening of infrastructure dedicated to bicycles, the creation of safe parking and the modernization of the cycling system in the entire metropolitan area (Plan Vélo-Ville de Paris, 2021).
The "*Plan Vélo 2021-2026*" provides for the construction of 130 km of new slopes and 52 km of temporary tracks made permanent; it is also promoted the guarantee of a secure parking through the installation of more than 100000 racks, in private and public spaces (especially near stations and intermodal points).
The city's political commitment is aimed at reshaping streets and public spaces for the needs of people rather than cars. In fact, by 2026, the City plans to reclaim one out of every two on-street parking spaces for new trees, playgrounds, and bike and shared mobility facilities.
Paris won the 2023 Sustainable Transport Award (STA) for the city's innovative efforts to promote inclusive and active mobility, expand cycling and pedestrian infrastructure, and reclaim urban space for public use (ITDP, 2023).

Sofia – BULGARIA

Fig.4 The "Green Ring" Project of Sofia

Sofia is the capital and largest city of Bulgaria, with 1.26 million inhabitants. Being in the center of the Balkan Peninsula, it is halfway between the Black Sea and the Adriatic Sea. It is the fastest growing city in Bulgaria, attracting considerable numbers of commuters and daily tourists.
The city of Sofia continued growth and development, however, puts pressure on its transport infrastructure, as well as undermining its liveability.
To address these challenges, in 2019, the City Council adopted the *Sustainable Urban Mobility Plan* (SUMP) which aims to reduce congestion and transform the city's mobility by making it more ecological and sustainable. The strategic document for the period 2019-2035 responds to 4 main requirements:
- Eco-friendly;
- Realistic;
- Financially secured;
- Measurable.

To promote active mobility choices, the city has planned a series of investments to make walking and cycling alternatives feasible and attractive. In this regard, the PUMS has provided for better maintenance of pedestrian paths (with the priority resurfacing of pavements near schools, hospitals, markets, administrative buildings and cultural institutions), an expansion of the cycle network (which goes from the current 55.5 km to 160 km by 2025) and the activation of electric bicycle rental services (Sofia City PUMS, 2019).
Among the key projects of the PUMS is the "Green Ring", a 30 km green ring consisting of a park and a bike path that surrounds the city center. The park will be used by about 250,000 people and will connect 30 neighborhoods, helping to improve the active mobility of the entire city (EU Urban Mobility Observatory, 2023a).
In order to further improve the conditions for walking and cycling, parking rates will be further increased, public transport (bus, tram and metro) will be improved and shared mobility will be encouraged.

In addition, the city developed the "Sofia Coin mobile app" that measures the distance traveled using active modes, measure the emissions saved for each trip and reward virtuous users with free tickets for public transport and discounts for other micromobility services.

Oslo – NORWAY

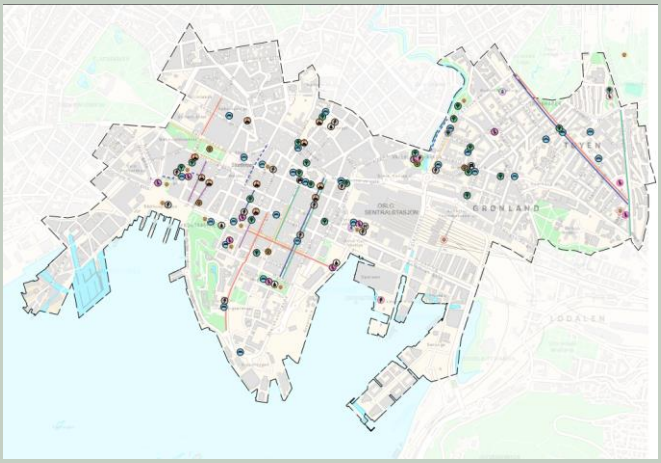

Fig.5 Delimitation of the area of the "Car-free Liveability Program" of Oslo, with mapping of implemented measures in the period 2017 - April 2022

Oslo's population is one of the fastest growing in Europe, with an increase of 30% since 2000. With a current population of 680,000 and another 30% increase in population expected by 2040, the city intends to implement measures that will manage the impact of this growth on the environment and climate. Norway is not part of the European Union, but is part of the European Economic Area (EEA) and shares many rules with EU Member States.
In 2014, the survey "Public Space Public Life" (PSPL) found that, despite its compact structure, several urban areas needed improvement in terms of connectivity and usability, especially with regard to pedestrian and cycling mobility and the quality of the spaces themselves (EU Urban Mobility Observatory, 2021).
In response to these challenges, Oslo kicked off the "*Car-free Liveability Program*" to turn the city into a greener, more vibrant and inclusive place, aiming to drastically reduce traffic and private car space in the city centre.
The initial intention of the program to ban the central area of the city to most vehicles, met with opposition mainly from businesses; for this reason, the city has made its approach more gradual by aiming to have as few vehicles as possible in the city center.
In phase one of the "*Car-free Liveability Program*", on-street parking spaces were removed within the central Ring 1 and so were some parking spaces in surrounding areas, to introduce measures that encourage liveability and pedestrianism (temporary and permanent): such as playgrounds, green areas and street furniture (such as benches, water taps, public toilets). In the following phases of the programme, the changes to the traffic routes were implemented further, imposing some closures of central roads, increasing the pedestrian network and cycle paths.
Meanwhile the City Council of Oslo, in 2018, commenced the implementation of its "Action Plan for increased City Life 2018-2027", which provided the strategic orientation for the implementation of the "*Car-free Liveability Program*" and the city's zoning plan, which was adopted in 2019 (EU Urban Mobility Observatory, 2021).

Brussels – BELGIUM

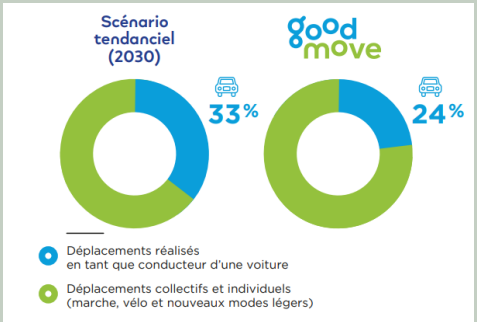

Fig.6 Ambition of the "Goog Move" Plan to reduce the movements that take place with individual motorised vehicles in Brussels

Brussels-capital region is home to 1.2 million inhabitants, residing in 19 different municipalities in the region. Centrally located in Belgium, the region attracts a significant number of daily commuters from the large metropolitan area, which includes about 2.5 million people, or 20% of Belgian inhabitants. Often labelled "the capital of Europe", Brussels is home to many EU institutions, attracting economic and political actors and an international workforce (EU Urban Mobility Observatory, 2020).
"*Good Move*" is the Regional Mobility Plan (2020-2030) for the Brussels-Capital Region (BCR), approved in 2020 by the Brussels Government. It defines the main political orientations in the field of mobility. The aim of this plan is to improve the living environment of the people of Brussels, while supporting the demographic and economic development of the Brussels-Capital Region.
"*Good Move*" won the prestigious 8th European SUMP Award (Sustainable Urban Mobility Plan) awarded in 2020 as part of the annual competition of the European Commission on the topic "Safe Walking and Cycling" (Bruxelles Mobilité, 2021).
This plan is the result of a wide-ranging four-year participatory process involving all stakeholders in Brussels: mobility and institutional partners, municipalities, the economic and associative world as well as citizens. "*Good Move*" adopts a transversal approach to mobility, with an action plan divided into six focus:
- *Good Neighbourhood:* to regulate mobility in neighbourhoods and improve the quality of life of residents;
- *Good Network:* organising transport networks and ensuring efficient service;
- *Good Service:* to offer the inhabitants and users of the Region a range of integrated services;
- *Good Choice:* guiding individual and collective choices without harming the freedom of each individual;
- *Good Partner:* ensure partnership governance of the mobility plan;
- *Good Knowledge:* update mobility data and regularly evaluate the Good Move plan.

These focuses embody the transversality of the chosen approach and involve a concomitant implementation in order to achieve the expected results. From these six "focus" have emerged 50 action sheets, a true programmatic tool for controlled mobility in the Brussels-Capital Region.
One of the first actions delivered by "*Good Move*" was to introduce a default region-wide speed limit of 30 km/h, with only a few exceptions for the main traffic arteries (EU Urban Mobility Observatory, 2023b).
The aim of the plan is to reduce the proportion of car journeys from one third to one quarter (Fig.1) and thus to encourage the majority use of active modes for short (walking) and medium-distance journeys (cycling and micro-mobility); and public transport, to ensure that they take on a larger part of the medium (5 km to 10 km) and long (more than 10 km) journeys (Bruxelles Mobilité, 2021).

3. Conclusion

In recent years, as part of a broader commitment to public health and urban liveability cities are working to take measures to reduce socio-spatial inequalities, pollution and vehicular congestion, at the same time promoting pedestrian and cycling mobility (D'Amico, 2024). At the same time, the European Union encourages and helps cities to develop policies aimed at achieving EU objectives regarding the fight against climate change and the creation of an efficient and sustainable transport system; it does so through funding and various integrated strategies and policies to address the set of environmental and urban challenges that affect cities as a whole. Action at EU level, as well as the mobilisation of European resources, can make a significant contribution to supporting local, regional and national initiatives.
Sustainable Urban Mobility Plans (SUMPs) are a driving force for European urban mobility policy, providing a framework for innovation and integration of new mobility services with low environmental impact, to accelerate the transition to zero-emission, sustainable and intelligent mobility. The shift from vehicle-based mobility to bicycle-based and walking-based mobility has many benefits for individuals and society at large, improving the health, environment, safety and liveability of cities. Many European cities, as highlighted in this study, are investing in walking and cycling, encouraging the creation of sustainable infrastructure such as cycle paths, pedestrian lanes and pedestrian areas, which in turn improve the quality of urban spaces. These measures, enhanced by dedicated tools such as SUMPs, promote behavioral change and support mobility planning, setting active mobility as a winning strategy to improve city life and urban efficiency.

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Fig.2: https://www.bicimad.com/;

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Fig.5: https://www.oslo.kommune.no/byutvikling/bilfritt-byliv-2016-2023/#gref;

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