European Committee of the Regions

Commission for Territorial Cohesion Policy and EU Budget

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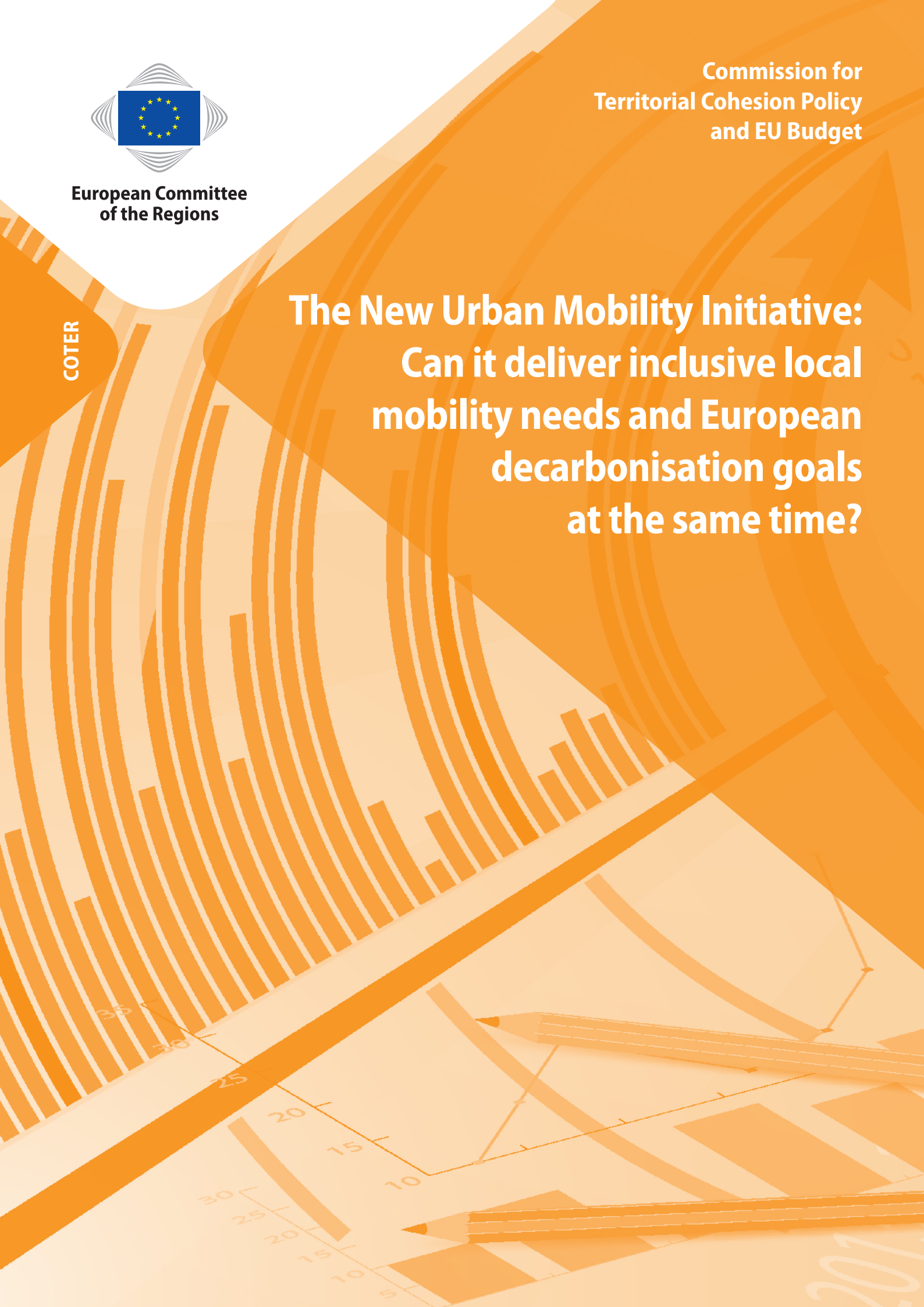
The New Urban Mobility Initiative: Can it deliver inclusive local mobility needs and European decarbonisation goals at the same time?



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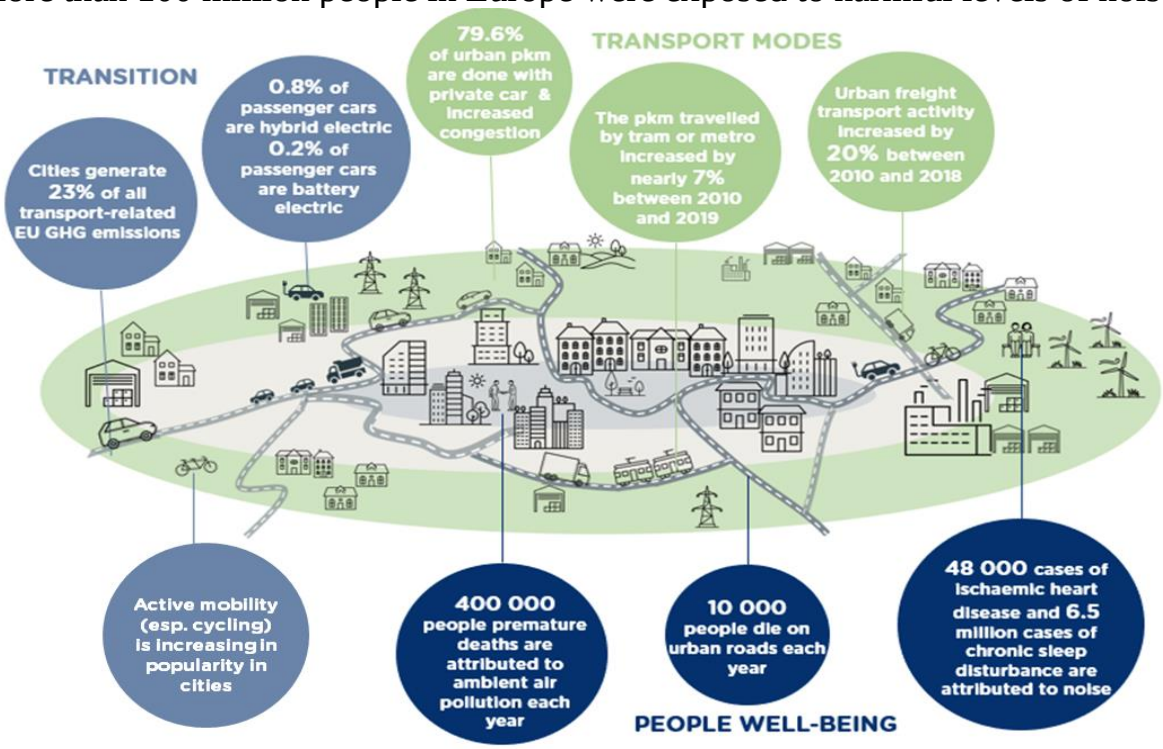
1. Introduction

Urban areas are the centre of economic and societal activity in the European Union (EU). Currently they are the home of 70.9% of the EU population with this number expected to grow to 83.7% by 2050.[1] As a result of the high concentration of people and their important economic role, urban areas are a major source of greenhouse gas (GHG) emissions. Transport contributes to this significantly with cities generating 23% of all EU transport related GHG emissions.[2] While the situation differs across the EU, a large share of cities struggles with poor air quality. For example, 15% of the EU urban population was exposed to concentrations of PM_{10} (particulate matter with a diameter of 10 µm or less) above EU standard in 2020.[3] Annually over 400 000 premature deaths are attributed to ambient air pollution.[4] Car passenger travel remains the dominant transport mode, accounting for over 70% of total passenger transport in 2018[5], while there has been a small uptake in public transport use (e.g. tram and subway) in the past decade.[6] Urban freight transport activity increased by nearly 20% between 2010 and 2018.[7] Congestion remains a serious problem in many parts of the EU[8] and more than 100 million people in Europe were exposed to harmful levels of noise.



[1] https://transport.ec.europa.eu/system/files/2021-12/SWD_2021_470.pdf
[2] Ibid.
[3] https://www.eea.europa.eu/publications/air-quality-in-europe-2020-report
[4] https://transport.ec.europa.eu/system/files/2021-12/SWD_2021_470.pdf
[5] https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:52021SC0047
[6] https://op.europa.eu/en/publication-detail/-/publication/14d7e768-1b50-11ec-b4fe-01aa75ed71a1
[7] https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:52021SC0047
[8] https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=53246

In 2019, recognising the need to take more decisive action towards tackling climate change, the European Commission introduced the **European Green Deal**, which set out a roadmap for making the EU climate neutral by 2050. This led to the adoption of a set of key actions in the areas of climate, energy, transport, etc., aimed at revising existing or introducing new legislation fit for reducing GHG emissions by at least 55% by 2030, compared to 1990 levels. More specifically, the Green Deal foresaw the implementation of new strategic documents, action plans and an Investment Plan that will mobilise at least EUR 1 trillion of sustainable investments over the following decade.

As transport accounts for 25.8% of all GHG emissions in EU-27 and these emissions have been steadily increasing over the past decade[9], one of the key areas of focus of the Green Deal is **accelerating the shift to sustainable and smart mobility**. Specifically, it set out the goal of reducing transport-related emissions by 90% by 2050, boosting multimodal transport, utilising automated and connected multimodal mobility and increasing production and deployment of sustainable alternative transport fuels. To achieve this goal, the European Commission adopted the **Sustainable and Smart Mobility Strategy**[10] in 2020, which outlines its vision and planned steps for transforming the EU transport system. It includes an action plan interlinking 3 objectives of making transport sustainable, smart and resilient, 10 flagships and 82 initiatives, which will guide the Commission's work in the next few years. The Strategy also sets out 14 milestones that it aims to achieve. In relation to urban mobility, the vision and the milestones foresee that:

100 European cities will be climate neutral and all large and medium-sized cities that are urban nodes on the Trans-European Transport (TEN-T) network will have their own sustainable urban mobility plans (SUMPs)[11] by 2030.

At least 30 million zero-emission cars and 80 000 zero-emission lorries will be in operation on European roads by 2030.

Automated mobility will be deployed at large scale by 2030.

Seamless multimodal passenger transport will be facilitated by integrated electronic ticketing and freight transport will be paperless by 2030.

[9] EU transport in Figures – Statistical pocketbook 2021 https://op.europa.eu/en/publication-detail/-/publication/14d7e768-1b50-11ec-b4fe-01aa75ed71a1

[10] https://ec.europa.eu/commission/presscorner/detail/en/ip_20_2329

[11] A Sustainable Urban Mobility Plan is a strategic plan designed to satisfy the mobility needs of people and businesses in cities and their surroundings for a better quality of life. It builds on existing planning practices and takes due consideration of integration, participation, and evaluation principles. (ELTIS, 2019)

Nearly all cars, vans, buses as well as new heavy-duty vehicles will be zero-emission by 2050.

The TEN-T network will be fully operational and multimodal by 2050.

The death toll for all modes of transport in the EU will be close to zero by 2050.

The share of active transport modes, such as cycling, should continue to grow. This should be aided by the doubling of the current safe bike infrastructure, which is to reach 5000 km by 2030.

To deliver on these objectives, the European Commission released a **Package for Efficient and Green Mobility** in December 2021, which included the new **Urban Mobility Framework.**[12] The latter aims to align the EU urban mobility strategy with the ambitions of the European Green Deal and the Sustainable and Smart Mobility Strategy and builds on the lessons learned from the **Urban Mobility Package**[13] **(UMP)**. Introduced in 2013, UMP was one of the more decisive steps towards a common EU urban mobility approach, which aimed **to reinforce the support to European cities** for tackling urban mobility challenges by sharing experiences, showcasing best practices, and fostering cooperation; engaging with Member States; providing targeted financial support and supporting research and innovation. SUMPs, along with coordinated public and private sector actions in the areas of urban logistics, urban access regulations, urban road safety and urban intelligent transport systems, were central aspects of the package. UMP identified a number of measures to be implemented at EU or Member State level.

In 2020, the package was subject to an **evaluation**[14], which concluded that while it had made some contributions towards its original objectives, action on sustainable urban mobility was still urgently needed to achieve ambitious climate and environmental targets and commitments. It also found that EU support and funding had been important for capacity building, sharing of experience, fostering collaboration and cooperation and implementation of urban mobility measures in cities but UMP had not managed to engage with Member States as intended. Similarly, while the evidence suggested that SUMPs had made an important contribution to the evolution of mobility planning at the city level, significant work was needed to ensure the implementation and quality of SUMPs. A marked need to improve the collection of urban mobility data due to the lack of systematically collected comprehensive, coherent and comparable data at the city level was also recognised. These findings, accompanied by the conclusions of the

[12] https://transport.ec.europa.eu/system/files/2021-12/com_2021_811_the-new-eu-urban-mobility.pdf
[13] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52013DC0913
[14] https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:52021SC0047

Court of Auditors report on Sustainable Urban Mobility in the EU[15] that there is no clear trend towards more sustainable modes of transport and that no substantial improvement is possible without Member States' commitment, reinforced the need to introduce a more ambitious and concreate approach.

The Urban Mobility Framework set out to do that by addressing some of the above-mentioned challenges. Importantly, it complements the proposal for revised guidelines for the TEN-T network, according to which **the largest 424 EU cities[16] (urban nodes) on the TEN-T network should adopt a SUMP by 2025 and collect relevant data** covering, at minimum, GHG emissions, congestion, number of deaths and serious injuries caused by road crashes, modal share for all modes, and access to mobility services as well as data on air and noise pollution in cities. With respect to urban nodes, it also foresees the development of transhipment hubs and multimodal passenger hubs, including park and ride facilities to improve first and last mile connections and enhance long-distance connectivity capacity. This aims to better integrate urban nodes in TEN-T to reach an effective, EU-wide and multimodal transport network across the EU.

To further improve the implementation of SUMPs and to strengthen the involvement of Member States, the Commission will publish **a Recommendation to Member States on a national programme to support regions and cities in the roll-out of effective SUMPs** and will complement and streamline the current SUMP guidelines. It will place a much stronger emphasis on sustainable solutions including active, collective and public transport and shared mobility. In parallel, the Commission will reinforce its funding and policy support for public transport and will consider the mandatory provision of operators' real-time data. **A stronger link between Connecting Europe Facility and Horizon Europe funding and SUMP** implementation is also planned with a priority being given to projects, backed by SUMPs and calls to applicants with SUMPs, respectively.

In response to the findings of the UMP evaluation, the Framework foresees the streamlining of the existing **sustainable urban mobility indicators (SUMI)** and launching a programme to support the collection of data to monitor the progress achieved by TEN-T urban nodes towards sustainable urban mobility.

Recognising the growing importance of **micromobility** and the need to **protect vulnerable road users**, the Commission published a dedicated SUMP Topic Guide on the safe use of micromobility devices to help urban mobility planners and local authorities with the safe deployment of new devices and with their support will prepare rules on the safety of micromobility devices and will also develop guidance on quality infrastructure requirements for vulnerable road users.

[15] https://www.eca.europa.eu/en/Pages/DocItem.aspx?did=53246
[16] Effectively covering all cities with more than 100 000 inhabitants.

Another important objective of the Framework is achieving **zero-emission city freight logistics and last-mile delivery** by focusing on the deployment of zero-emission solutions, making a proposal to revise the CO2 emission performance standards for heavy-duty vehicles and integrating sustainable urban logistics plans (SULPs) within the SUMP framework. Moreover, it also places significant emphasis on **making urban transport resilient, environmentally friendly, and energy-efficient** by introducing obligations to put in place efficient, interoperable and user-friendly recharging and alternative fuels refuelling infrastructure for electric and hydrogen vehicles. To contribute to the Sustainable and Smart Mobility Strategy milestone of having at least 100 EU climate-neutral cities by 2030, the Framework states that the Commission will provide EUR 359.3 million funding under Horizon Europe during the period 2021-2023 for the initial implementation phase of the Climate-neutral and Smart Cities mission.[17]

The Framework also foresees a number of measures aimed at improving the digitalisation of mobility services, fostering innovation and raising awareness and supporting capacity building. Importantly, the **Expert Group on Urban Mobility** will be redesigned to open participation to local authorities, city networks and social partners.

While it is essential to work towards meeting the objectives and needs for action expressed in the Green Deal, the Sustainable and Smart Mobility Strategy and the new Urban Mobility Framework, it is important to explore how they could be reconciled with the **principle of subsidiarity** - one of the core principles of European Law. Local and regional authorities implement 70% of EU legislation and 70% of climate mitigation measures[18], which underscores their importance in delivering the decarbonisation ambitions of the European Commission. Defined in Article 5(3) of the Treaty on European Union[19], the principle guides the sharing of competences for policy and law-making between the European, national and regional and local levels. According to the principle, decisions which do not fall under the exclusive competence of the EU should be taken as closely as possible to the citizens and the Union should take action only when it is more effective for it to do so.

Depending on the administrative structure of each Member State, urban mobility falls under the jurisdiction of national, regional and/or local authorities, as it requires a more place-based approach, which accounts for the local specificities of each territory. Coordination and cooperation among Member States and cities and concerted effort within each Member State is, however, required to meet the

[17] This is one of the EU missions, signifying key areas of work the Horizon Europe research and innovation programme for the years 2021-2027, which aim to

[18] https://www.lag21.de/files/default/pdf/Portal%20Nachhaltigkeit/europa/portal-n-uberarbeitung/cemr-2020-green-deal-recs.pdf

[19] https://eur-lex.europa.eu/resource.html?uri=cellar:2bf140bf-a3f8-4ab2-b506-fd71826e6da6.0023.02/DOC_1&format=PDF

overarching European level decarbonisation goals. As such, the main objective of this report will be to look into the interlinkages between the local dimension and the European dimension of urban mobility planning to reach local and higher-level objectives for environmental, social, and economic development, while accounting for the principle of subsidiarity.

2. Climate goals and local mobility: what to expect from the "green urban mobility"

In this chapter, we first analyse transport modes with the largest potential to contribute to decarbonisation goals, also pinpointing related social, economic and health benefits. This chapter then explores in what way an EU framework could support cities in tackling some of the main challenges they face and should address if they are to contribute to the overarching goal set at EU level to achieve climate neutrality by 2050. The main solutions available to cities and their perceived effectiveness are explored, as well as the main needs cities have in designing and implementing these solutions.

First, the whole discussion should be considered with several issues in mind:

- **It is estimated that 23% of transport CO2 emissions occur in cities.**[20] Improving urban mobility can, therefore, contribute to a significant reduction in the GHG emissions from transport.

- **Road transport is responsible for 71.7% of total GHG emissions from transport.**[21] Road transport GHG emissions are mainly due to cars, followed by heavy duty trucks and buses: passenger cars and motorcycles account for the largest share of emissions (62%), followed by heavy duty trucks and buses (26%) and light duty trucks (13%).[22]

- **The first and last mile issues are considered as the key to sustainable urban transport.**[23] Local governments must deal with last and first mile connection issues both regarding passenger transport and freight.

- **Sustainable mobility is not only about how transport is designed, but also about how cities and public spaces are planned.** For instance, Transit Oriented Development (TOD) is a best practice in spatial planning, aiming at densifying cities around limited walking distance from transportation axis. This contributes to reducing urban sprawl. TOD can help in reducing GHG emissions by 36% through the proper planning of transportation and buildings.[24]

[20] EC, 2016a — according to the EU reference scenario 2016, based on PRIMES-TREMOVE model developed by the National Technical University of Athens (ICCS-E3MLab)
[21] https://www.eea.europa.eu/data-and-maps/daviz/share-of-transport-ghg-emissions-2#tab-googlechartid_chart_13
[22] Statistisches Bundesamt, 2021
[23] EEA Report No 18/2019Transport and environment report (TERM) 2019
[24] Ali et al., 2021

- **Road transport is one of the main sources of air pollution in Europe with particulate matter, nitrogen dioxide and ground level ozone causing the most significant harm to human health.**[25] As previously mentioned, 400 000 premature deaths are attributed to ambient air pollution each year. Consequently, by reducing life expectancy and economic productivity and increasing medical costs, air pollution has a significant economic impact.[26] Road transport is also linked to noise pollution which is found to contribute to 48 000 cases of ischaemic heart disease.[27] Reducing air and noise pollution associated with urban transport and encouraging active mobility are measures that contribute positively to the health of EU citizens.

2.1 Decarbonisation potential of existing urban transport modes

In this section, we will provide scientific data on the decarbonisation potential of the transport modes that are relevant within the urban context, namely road transport, including active mobility, and rail.

2.1.1 Public transport

According to most of the experts interviewed in the context of this report, **public transport should be the backbone of urban investments aimed at reducing GHG emissions** in European cities. Public transport infrastructure can contribute to a modal shift and represent a viable and relatively cheap alternative to car trips. As stressed by an expert from European Passenger Federation, an attractive, reliable, and integrated transport network is more likely to contribute to a modal shift and traffic reduction. It is crucial to stress that the decarbonisation potential of public transport is strongly linked to its features. In particular, the scientific literature highlights the decarbonisation potential of both transit buses and urban rail transit.

Although being classified as transport road vehicles, **transit buses** offer a less polluting alternative to individual passenger cars.[28] Their effectiveness and reliability depend on several factors, such as the presence of dedicated bus lanes, the quality of bus fleet and network, as well as the transit frequency.[29] In many European cities, buses are still significantly impacted by congestion. One way to tackle these weaknesses is the implementation of Bus Rapid Transit (BRT), aiming at combining higher capacity and speed with the flexibility and lower cost of a bus system. In 2016, BRT lanes were present in 14 EU countries and 56

[25] ELTIS, 2019
[26] EEA, 2020
[27] EC, 2021. EU Urban Mobility State of play
[28] APTA, 2008
[29] Georgiadis G. et al., 2014.

cities.[30] Electric buses have higher potential than standard buses for reducing GHG emissions. For example, after implementing a fleet of electric and hybrid buses, the overall carbon footprint of transit buses was considerably reduced (up to 37%) in a sample of three Norwegian cities.[31]

Urban rail transit (notably tram, light rail, and suburban rail) is unanimously acknowledged as one of the motorised transports that contributes to GHG emissions in cities the least. A study by the EEA highlighted that an average passenger travelling by car emits 101g CO2 /km, against 28g/km when travelling by tram or train.[32] Evidence also shows that, compared to standard buses, a tramway system can save up to 75% of GHG emission.[33] Moreover, urban rail can carry on average 200 to 350 passengers per vehicle (against 30 to 100 by buses[34]). It is also important to note that rail can strongly contribute to reducing other negative externalities generated by cars, including congestion. Trams and light rail, for instance, often have dedicated lanes. This reduces the portion of road dedicated to other vehicles and offers a valid alternative to individual cars. An increase in the supply of urban rail transport leads to less congestion, shorter travel times, and reduced air pollution. European mid-sized cities with a new rail system have on average 7% less congestion, 1% less travel time and 3% less pollution than cities with no urban rail systems.[35] During an interview, a practitioner from the Municipality of Vienna stated that urban rail networks improving connections between suburbs tend to be the most effective in reducing GHG emission and traffic congestion.

2.1.2 Active mobility

Walking and cycling are undoubtedly the least polluting transport modes, with close to zero emissions. These modes are also acknowledged for their space efficiency and little degradation to roads and public infrastructures. One interviewee from European Cyclists' Federation stated that **"active mobility is one of the few actions led by citizens that can have direct and immediate impacts on GHG emission reduction in European cities".** On the other side, city level programmes are more effective than encouraging active mobility on the individual level (such as health campaign, for instance).[36]

[30] Intelligent Transport.: https://www.intelligenttransport.com/transport-articles/17045/bus-rapid-transit-in-europe/
[31] K. W. Lie et al., 2021.
[32] EEA, 2014. https://www.eea.europa.eu/data-and-maps/daviz/specific-co2-emissions-per-passenger-3#tab-chart_1
[33] S. Carrese et al., 2013
[34] Transdev, 2013. http://www.codatu.org/wp-content/uploads/Chili-MLT-20131.pdf
[35] X. Fageda, 2021
[36] Audrey S. et al., 2019.

Recently, new micro-mobility vehicles emerged in European cities, operating at speeds below 25 km/h.[37] This term includes several modes that are not only based on human activity, but also have electric motors, such as dock-less two-wheelers (bikes and e-scooters), electric mopeds and other personal mobility devices. A Life Cycle Assessment[38] of e-scooters in use in major European cities concluded that e-scooters with swappable batteries generate 34.7 g CO2 equivalent emissions per person per kilometre across the full lifecycle. On the other hand, a new petrol car would generate between 200-350g CO2e/km per person per kilometre.[39] The use of e-bikes is rapidly increasing throughout the EU. They allow for longer distances and steeper gradients to be covered. According to the European Cyclist' Federation, e-bikes have a higher average manufacturing carbon footprint than conventional bikes, at 134kg CO2 compared to 96kg. They also emit 1.5 g GHG/ km, compared to 0g by conventional bikes.[40] Nevertheless, e-bikes have an even higher potential for contributing to behavioural change, since perceived downsides such as distance and physical efforts are mitigated.

2.1.3 Shared mobility

This umbrella term encompasses a variety of transportation modes. When related to passenger car, three typologies exist that are presented below.

Car-sharing is a type of car rental. Unlike traditional car rental, it is designed for short periods of time and limited distances. These cars (generally electric) are usually spread around the city in reserved parking. A reduction of the annual total mobility-related GHG emissions caused by car-sharing participation has been observed in some cities. For example, this reduction has been estimated to be between 3 and 18% in three different European and North American cities (Amsterdam, San Francisco, and Calgary).[41] However, it is important to consider that ride-hailing services are used in both competing and complementary circumstances to public transport. As showed by a study conducted in six American (Houston, Washington DC, New York City) and European cities (Amsterdam, Stockholm, and Warsaw) only between 20 and 40% of ride-hailing trips do not have a viable public transport alternative.[42] Hence, between 60 and 80% of ride-hailing trips can potentially replace trips previously done using public transport.

[37] EC, 2021
[38] A methodology to assess environmental impacts of a product or service at all stages of the life cycle
[39] Twisse F., 2020 : https://www.eltis.org/resources/case-studies/rise-micromobility
[40] https://www.bikeradar.com/features/long-reads/cycling-environmental-impact/
[41] L. Amatuni et al., 2020.
[42] UCS, 2020.

Ride-hailing companies, through websites and mobile apps, match passengers with drivers of vehicles (notably Uber). According to the Union of Concerned Scientists[43], an individual (non-pooled) ride-hailing trip can be up to 47% more polluting than a private car ride.[44] Moreover, individual ride-hailing does not contribute to congestion reduction. However, an electric, pooled ride-hailing trip can cut emissions by 68 percent compared to a private vehicle trip in an average car.[45] In other words, ride-hailing has potential for decarbonisation only as regards two factors: the number of passengers and vehicles electrification.

Carpooling is the concept of sharing a car to accommodate more than one person at a time, eliminating the need for riders to drive themselves in separate vehicles. In Europe, long-distance car-pooling has become increasingly popular over the past years, thanks notably to BlaBlaCar (which counted more than 80 million users in 2020). Carpooling is generally used for domestic travels, well beyond the urban scale. Nevertheless, it also has high potential for mitigating congestion and reducing GHG emissions in cities, in particular when replacing every-day trips from the suburbs to the city centre. Evidence showed that five employees commuting every day to work through carpooling can save between 5.7 and 38.8 kg CO2 per week depending on the distance and the type of vehicle.[46]

Other forms of shared mobility are spread throughout EU cities, such as bike sharing and e-scooters. 80% of European cities offer some type of shared mobility, with bike sharing being by far the most predominant (63%). E-scooter sharing is present in 50% of the cities and station-based car sharing in 40% of cases. Free-floating car-sharing is available in 39% of the cities while e-bike sharing in 30%.[47]

2.2 Innovative solutions available to cities

Most of European local and regional governments have implemented a diverse range of solutions to tackle transport emissions and pave the way for decarbonisation. The following solutions will be reviewed in this section:

- Urban Vehicles Access Regulations (UVAR)
- Use of cleaner public transport
- On-demand transit
- Sustainable urban logistics and last mile deliveries
- Increased share of electric vehicles (EV)

[43] A non-profit science advocacy organisation based in the US and focused on climate studies
[44] Cats et al., 2021
[45] UCS, 2020.
[46] B. P. Bruck et al., 2017

- Availability of efficient, interoperable, and user-friendly recharging and alternative fuels refuelling infrastructure
- The integration of digital solutions

2.2.1 Urban Vehicle Access Regulation (UVAR)

The term UVAR has been introduced by EU policies aiming at improving air quality in European cities. It includes measures such as Low Emission Zones, Parking Regulations, Congestion Charging Schemes (or Urban Road Tolls), Limited Traffic Zones and Pedestrian Zones (see figure 3 below). In this report, we will specifically focus on Low-Emission Zones, Pedestrian Zones and Congestion Charges.

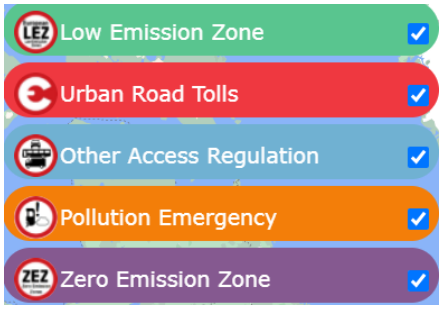
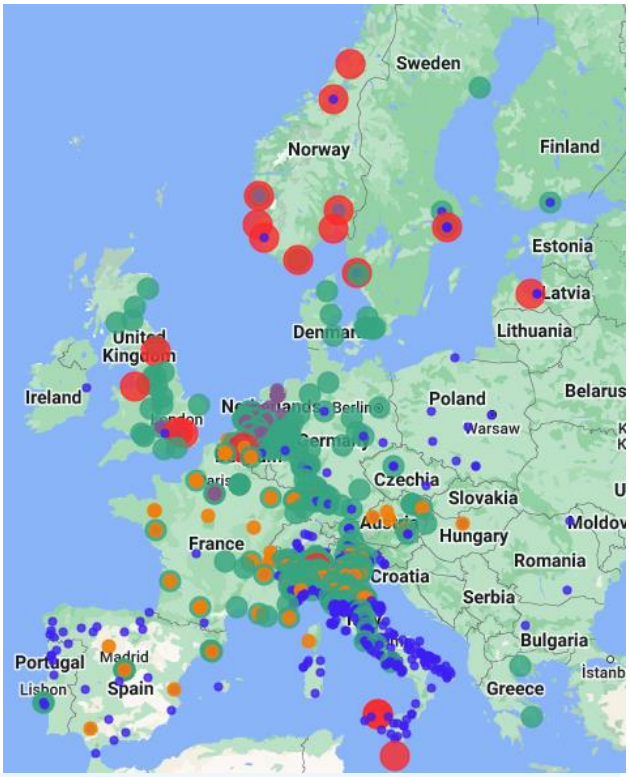


Figure 1. Types and distribution of UVARs in Europe.

Source: Urban Access Regulation



Policy objective	Type of UVAR
Improving air quality	Low-Emission Zone Pedestrian Zone Limited Traffic Zone
Congestion reduction	Congestion Charging Scheme Limited Traffic Zones
Historic centre preservation	Limited Traffic Zone Pedestrian Zone
Climate change mitigation	Low-Emission Zone Limited Traffic Zone Pedestrian Zone
Road safety	Pedestrian Zone Limited Traffic Zone Congestion Charging Scheme
Redistribution of road space	Pedestrian Zone Limited Traffic Zone
Raising revenues	Congestion Charging Scheme

Figure 2. Benefits and types of UVARs (Source: authors based on European Platform on Sustainable Urban Mobility Plans, 2019).

For instance, there are about 250 **Low Emission Zones** (areas where access is restricted due to the emissions of certain road vehicles) in the European Union. They are mainly concentrated in Germany, the Benelux, Denmark, and Northern Italy. LEZs can be applied to different types of vehicles (Light Duty Vehicles/Heavy Duty Vehicles) and based on European Emission Standards (from Euro1 to Euro 6) and the upcoming Euro 7. Main targets are diesel vehicles, which can be banned or charged upon entrance. LEZ may restrict access 24/7, only during weekdays, or only during winter season. Evidence based on cities in four Member States (Germany, Italy, the Netherlands, Denmark) and the UK shows that LEZs contributed on average to the reduction of 7% of PM10 annual concentration.[48] At the level of the European Union, however, there is no clear evidence of the extent to which LEZ can contribute to decarbonisation. The magnitude of the reduction in pollutants ranges from no discernible effect to a reduction of 32% (in this case of nitrogen dioxide - NO_2 - pollution in Madrid Central).[49] This variability is mainly due to the specificity of restrictions (e.g., enforcement measures, size of the area) and geographic factors, such as weather and relief. There is an agreement that effective LEZs should also cover light-duty vehicles and be extended to peripherical areas.[50] LEZs are usually phased in, with increasingly strict standards over time. Occasionally stricter rules applied in different and usually concentric areas may lead, for the sake of communication and comprehension by road users, to different sub-type names such as Ultra Low Emission Zone (ULEZ) in London or Zonas de Bajas Emisiones de Especial Protección (ZBEEP) - special protection LEZ in Madrid. When only zero emission vehicles are allowed, the LEZ becomes a Zero Emission Zone (ZEZ).

In the last two decades, **pedestrian zones, the first and oldest UVAR typology,** are another typology of UVAR that has progressively changed the urban landscape in European cities. Indeed, according to an officer from Eurocities, pedestrian zones are an effective instrument to achieve decarbonisation, notably in small and mid-sized towns, contributing to modal shift towards active mobility such as walking and cycling.

Pontevedra, in Spain, has implemented one of the first car-free areas in 1999. The number of cars passing daily through the historical centre fell from 28,000 in 1999 to 0 nowadays.[51] According to urbanaccessregulation.eu, this measure also led to a 70% reduction of CO2 emissions. Pontevedra benefited from a new attractiveness resulting in an increase in the number of residents living in the city centre (from 73,000 to 84,000 in 20 years).

[48] Holman et al., 2015.
[49] Transport & Environment, https://www.transportenvironment.org/wp-content/uploads/2021/07/2019_09_Briefing_LEZ-ZEZ_final-1-1.pdf
[50] Transport & Environment, https://www.transportenvironment.org/wp-content/uploads/2021/07/2019_09_Briefing_LEZ-ZEZ_final-1-1.pdf
[51] The Guardian, 2018. https://www.theguardian.com/cities/2018/sep/18/paradise-life-spanish-city-banned-cars-pontevedra

Last, **congestion charges** (or congestion pricing) aim at reducing the number of vehicles on urban roads through surcharging. This measure can be limited to peak hours or extended to the whole duration of the day. From an economic theory perspective, congestion pricing uses the price mechanism to make travellers conscious of (and charged for) the negative externalities they create through congestion.[52] This measure has been implemented in London and few other European cities, including Milan, Stockholm, Gothenburg, Riga, Valletta and Znojmo (Czech Republic). In Milan for instance, congestion charging has contributed to modal shift towards low-emission transport modes, such as bike-sharing (from 5% to 12% daily).[53] Nevertheless, critics maintain that congestion pricing should consider impact on low-income population and avoid uneven restrictions among cities. In this regard, it is essential that clear communication on charging details (fees, areas, and specific times) is provided by local authorities to all residents and tourists. Congestion pricing also leads to increased fiscal revenues for municipalities. In London, the net budgeted revenue for the Congestion Charge as a whole was £232 million in 2021.[54] This income can be used for new investments in low-emission public transports and green infrastructures. According to a study[55], using revenues from congestion charging to expand green spaces strongly increases public acceptance.

In general, UVARs are at the forefront of solutions aiming at achieving decarbonisation in European cities. However, they can also be a threat to social inclusion and have severe impacts on the everyday life of low-income populations. For this reason, it is essential to offer good alternatives to using cars in cities before implementing restriction measures. In other words, UVARs cannot work without promoting clean and healthy alternatives and strengthening public transport. Similarly, incentives to buy electric or low-emissions vehicles should be put in place for those who cannot live and work without cars. According to an expert from Eurocities, the lack of national framework on UVARs can threaten systemic enforcement. Moreover, an expert from EPTO stressed the need to better communicate and emphasise the benefits of LEZ and pedestrian zones on quality of life, businesses, and health.

[52] EC, 2012. https://ec.europa.eu/environment/integration/research/newsalert/pdf/296na2_en.pdf
[53] OECD, 2019 : https://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ENV/WKP(2019)2&docLanguage=En
[54] https://www.london.gov.uk/questions/2021/0586#:~:text=Transport%20for%20London%20(TfL)%20forecasts,million%20for%20this%20financial%20year.
[55] EC, 2015 : https://ec.europa.eu/environment/integration/research/newsalert/pdf/using_revenues_from_congestion_charging_to_expand_green_spaces_increases_public_acceptance_428na5_en.pdf

2.2.2 Cleaner public transport (electric and hydrogen buses)

Investments in new automotive technology contributing to cleaner public transport (notably electric and hydrogen buses) have been pinpointed by many interviewees and researchers as one of the most effective solutions that cities can put in place to immediately decrease GHG emissions (together with encouraging active mobility). For instance, the purchase of low- and zero-emission buses has been rising in recent years. 16% of new urban bus purchases in Europe were zero-emission in 2020, compared to 12% in 2019.[56] The Netherlands topped the chart, with 81% electric buses. As figure 5 shows, hydrogen buses still represent a small share of urban buses purchase in Europe. While being responsible for low GHG emissions (8kg of hydrogens to drive 100 km vs. 40 litres of diesel for a conventional bus) they are also considered as very expensive, with roughly twice the price of diesel.[57]

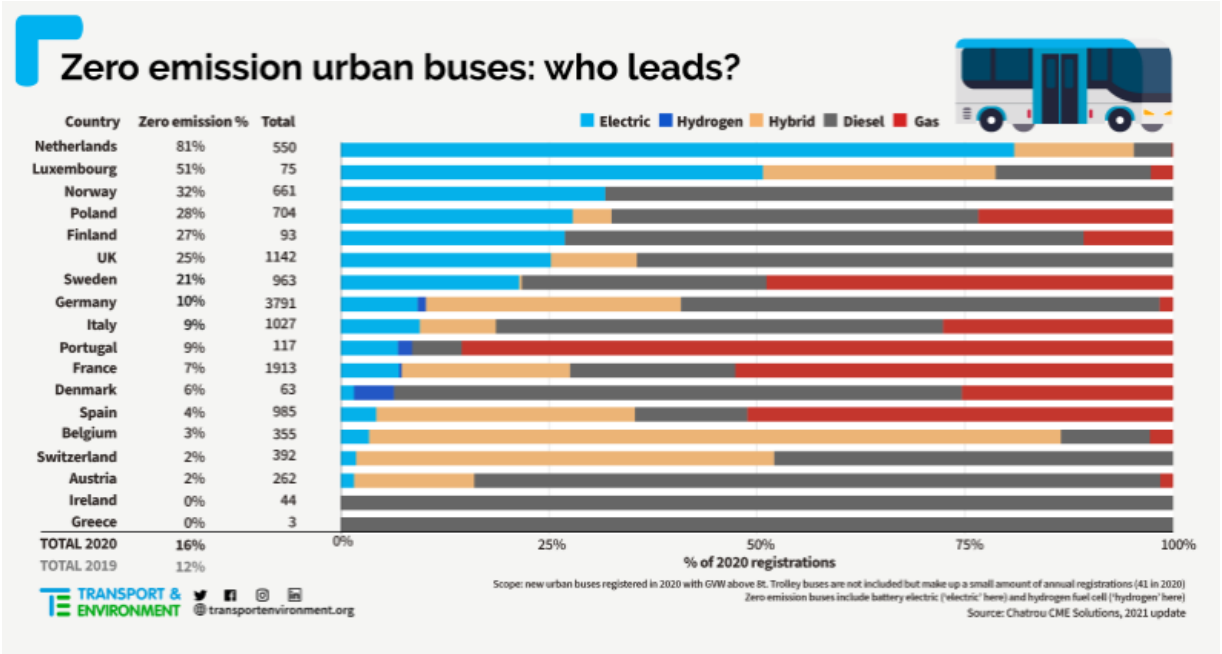


Figure 3. Share of zero emission urban buses purchased in 2020 in 18 EU Member States

2.2.3 On-demand transit

At the crossroads between fixed stop public transport bus services and ride-hailing, on-demand transport has been tested in few European cities, among which Berlin (through the private service Via). This concept lets passengers order, through a smartphone app, a minibus to a virtual bus stop, together with other passengers. This on-demand, shared service can provide transport links from residential areas both to workplaces and to multimodal hubs. In this regard, on-demand transport might potentially contribute to reducing last mile and first mile obstacles, notably from/towards peri-urban and rural areas. Furthermore, evidence from the US shows that on-demand transit could help cities reduce

[56] Transport & Environment, 2020
[57] https://ec.europa.eu/regional_policy/blog/detail.cfm?id=11

traffic by 15% to 30% [58](while, on the other hand, ride-hailing companies might worsen it).

Another important aspect to consider is municipalities' size. Indeed, in small and mid-sized towns often lacking financial resources, low demand can justify the reduction of public transport services. But cutting down on the bus lines can enhance a vicious cycle of both low demand and low supply, leading to a massive use of private vehicles. On-demand transit in smaller municipalities might tackle the issue of low-demand and provide a cost-efficient public transport service.

Vallirana, a residential municipality on the outskirts of Barcelona (Spain), launched in 2019 a new on-demand transport service called *Shotl*. Its goal was to tackle the low cost-efficiency of traditional bus lanes and provide extensive connections within the whole municipality. Citizens and users can book their departure and arrival point through a mobile app and pay directly on the bus. Considering that the part of the ageing population in Vallirana might have difficulties in understanding how the mobile app works, the Municipality also offered a telephone number. On only one year, ridership figures have multiplied by up to four times compared to the number of passengers that were using the traditional system.[59]

2.2.4 Sustainable urban logistics

Urban freight transport is essential to the functioning of cities' economies (waste, food, parcels, etc.). Moreover, the COVID-19 pandemic has contributed to a strong increase in online shopping. Consumer e-commerce deliveries have grown by 25% in 2020 due to the pandemic, and this increase in last-mile deliveries is likely to persist.[60] These activities have a severe impact on congestion and air quality. According to FCE (Foresight Climate & Energy),[61] freight transport represents a large component of traffic in cities (10-15%) as well as air pollution. It accounts for up to 25% of carbon dioxide emissions from transport and 30-50% of nitrogen oxide and fine particles.[62] Heavy freight vehicles travelling on urban roads also cause more damage than their lighter counterparts. A standard 44 tonne Heavy Goods Vehicle (HGV) causes 136,000 times the damage to road infrastructure than an average car.[63] Lastly, the new logistic sprawl trend (a concentration of logistic platforms in suburban areas) leads to increased soil

[58] Smart Cities World : https://www.smartcitiesworld.net/news/news/on-demand-microtransit-could-help-reduce-city-traffic-by-30-per-cent-4764
[59] On-demand mobility in small towns, 2019 : https://www.youtube.com/watch?v=EtR2OT56gBg
[60] https://www.weforum.org/press/2021/04/covid-19-has-reshaped-last-mile-logistics-with-e-commerce-deliveries-rising-25-in-2020/
[61] FCE, 2021. https://foresightdk.com/transforming-urban-deliveries-for-zero-emission-cities/
[62] Ibid.
[63] Urban Transport Group, 2022 : https://www.urbantransportgroup.org/system/files/general-docs/UTG%20Delivering%20a%20greener%20future%20FINAL.pdf

sealing and loss of agricultural and natural land.[64] It has been counted that, only in Paris metropolitan region, the change in location patterns of parcel transport terminals has caused an addition of 15,000 tons per year of CO2 emissions.[65]

Innovative **solutions** aiming at decarbonising urban logistics have been experimented throughout European cities. These solutions mainly tackle last-mile deliveries (from logistic hubs to final delivery addresses).

- The development of Urban Consolidation Centres (where freight can be dispatched and delivered by appropriate vehicles), could rationalise deliveries and reduce inefficiencies
- The strengthening of urban rail freight and, when possible, waterborne freight, might reduce GHG emissions and use existing infrastructures to access urban centres.
- The integration of parcel lockers into mobility hubs and transport interchanges would allow people to collect their parcels close to where they live and work.
- The electrification of delivery vans can actively contribute to urban logistics decarbonisation.
- The use of cargo bikes. A single cargo bike replacing a diesel transporter saves 5 tons of CO2 per year. E-cargo bikes have been found to cut carbon emissions by 90% when compared to diesel vans, and by 33% when compared to electric vans. The city of Stuttgart, in Germany, has developed "a second level of distribution", where vans from the outskirts stop at the edge of the inner city and load to cargo bikes. To make the delivery process more efficient, the city is also testing the use of car parks for the reloading. Through an app, riders can book available slots, usually early in the morning and at night.
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Figure 4. A DHL e-cargo bike in Stuttgart (Germany). Source: Eurocities

[64] Dablanc & Rakotonarivoa, 2010
[65] ECF, 2020 : https://ecf.com/news-and-events/news/e-commerce-delivery-emissions-could-increase-30-without-intervention#:~:text=Cargo%20bikes%2C%20on%20the%20other,free%20city%20logistics%20by%202030.

Other innovative solutions that are not commonly available in European cities yet, such as Urban Air Mobility (UAM) and Connected and Automated Vehicles (CAV) will be discussed in Part 4 (Foresight Analysis).

2.2.5 Electric vehicles (EVs)

Although electric cars registrations are surging, accounting for 11.4% of newly registered passenger vehicles in 2020, they only represent 1% of passenger cars on European roads. Based on a study by the International Council on Clean Transport[66] on several European countries and on a sample of urban areas, the share of electric vehicles is growing the fastest in the Nordics, the Netherlands, Germany, and France (see figure 7).

EVs are undoubtedly less polluting than petrol and diesel cars, which emit almost 3 times more CO2 than the average EU electric car (+63%).[67] However, most of the experts agreed that EVs can only be considered as "one piece of the puzzle", meaning that they can only partially contribute to decarbonisation goals. In fact, they still take a considerable space on roads, with impacts on how well the public transport system operates, as well as on public space use and safety (EVs are generally heavier than conventional cars). Moreover, even with a rapid increase in the number of electric vehicles, diesel and oil cars would stay on European roads for decades. For these reasons, traffic reduction is the most effective measure to reach decarbonisation goals, then followed by an increase in the number of electric vehicles. Urban areas should be at the forefront of traffic reduction, since because of their density, they offer valid alternatives to individual passenger cars. To put it simply, electric vehicles are a necessary but not sufficient condition to achieve transports' decarbonisation.

[66] The International Council of Clean Transport, 2021.
[67] Transport and Environment, 2020

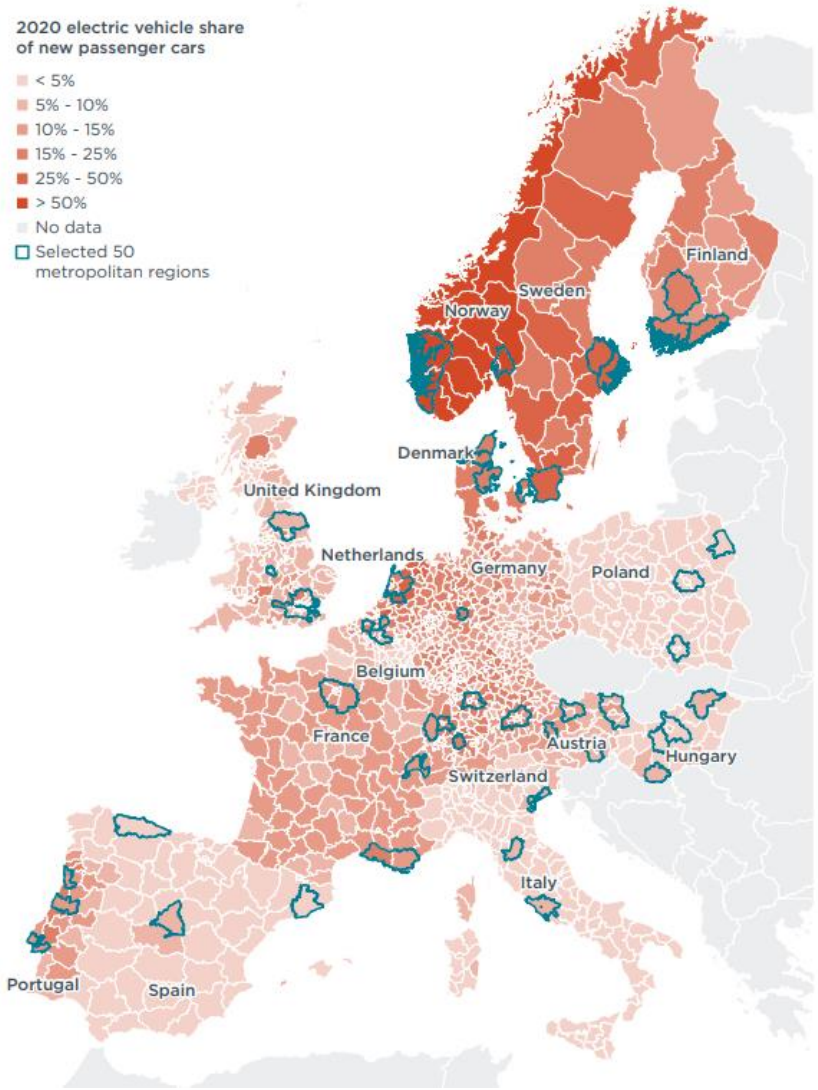


Figure 5. Share of new electric passenger car registered in 2020 in selected European countries. Source: International Council on Clean Transport, 2021.

2.2.6 Alternative fuels

To strengthen the presence of zero- and low-emissions vehicles in European cities, the Fit for 55 Package foresees the rollout of public charging and hydrogen refuelling stations for cars, vans, and trucks. Member States must install charging and fuelling points at regular intervals on major highways, at every 60 kilometres for electric charging and every 150 kilometres for hydrogen refuelling. In particular, hydrogen refuelling stations will be made available to both light duty and heavy-duty vehicles in every urban node by 2030. Before the same year, recharging points for electric heavy-duty vehicles will be installed in every urban node and at every safe and secure parking area.[68]

[68] EC, 2021. Make transport greener

2.2.7 Digitalisation

To a large extent, digitalisation is embedded in the innovative solutions that were previously discussed. The Mobility as a Service (MaaS) concept is the umbrella term for digitally enabled mobility solutions: MaaS providers allow users to plan, book and pay mobility services (cars, scooters, bikes) through digital channels, shifting from private-owned modes towards the concept of mobility as a service.

From a local and regional authorities' perspective, there is a growing debate on the role of public policies in grasping and maximising the impacts of digitalisation opportunities. For example, LORDI (LOcal and Regional Digital Indicators) are a set of indicators developed by ESPON and the Committee of the Regions to measure the degree of digitalisation of cities and regions in terms of infrastructures and services. Some of these indicators are relevant within the transport sectors, such as the percentage of sectors covered in innovation hubs and the percentage of areas incorporated within the local data platform. Indeed, data and innovation can say a lot on local and regional authorities' capacity in offering innovative and reliable transport modes. According to EPF, European regions and municipalities should invest in digital intermodal ticketing system, allowing users from different providers and transport modes to purchase tickets in centralised platforms.

Nevertheless, an expert from UITP warned that digitalisation is not a solution per se, and that there should be a wide diversity of indicators (other than digitalisation) to measure the success of SUMPs and, more generally, the new UMF.

2.3 Governance schemes

Sustainable urban mobility is a process that must be built based on strong cooperation between citizens, public authorities (at different levels) and private actors. In fact, because of the specificity of each city, sustainable urban mobility solutions are more effective when implemented according to local context and needs. But at the same time, the EU must ensure that the different outputs and overarching objectives are consistent throughout European cities. In this regard, the reflection on urban mobility should consider and design the most suitable governance adjustments, as well as a fair distribution of competences. Figure 6 sums up the features of different governance levels involved in urban mobility in most of European countries.

Table 1. Competences and instruments of EU, national, regional and local level, when dealing with urban mobility

Governance level	Competences	Instruments
EU level	Provides EU guidelines (UMF)	Cohesion Fund
National level	Provides national guidelines on urban mobility strategies and objectives. Contributes to financing urban mobility at local level	Several Member States have established frameworks and support mechanisms for the development of mobility plans and projects for their respective local authorities. However, these can vary significantly.
Regional level	Is in charge of regional rail transport (suburban and regional trains). In largest EU countries, regions manage ESIF.	Regional development plans
Local level	Has the main competences in urban mobility in most of EU countries. Complexity can arise in cases of metropolitan regions due to the geographical variety and number of municipalities concerned	➢ Local public transportation operators ➢ Urban Mobility Plans (more or less integrated into SUMPs)

2.3.1 Citizen engagement and financing strategies at the heart of sustainable mobility

Interviewees from ECF, POLIS and EPTO pinpointed the issue of resistance to change as an obstacle: behavioural change appears to be relatively slow when it comes to transport, and both citizens and decision-makers do not immediately acknowledge the benefits of car-free modes. The need for strong political leadership is acknowledge.

Other experts highlighted the difficulties in setting up new institutional cooperation, and notably public-private partnerships. It also seems that some local authorities struggle in selecting and financing the most appropriate solutions, in a context where new transport services are rising. In other words, cities need to find

the good balance of affordable investments between a broad range of private, public, shared, but also, active and motorised modes. According to DG MOVE, cities and towns encounter difficulties that are both related to lack of funding and human resources. It also might be challenging to navigate among different funding opportunities (at regional, national, and above all European level). A consultation conducted by the Committee of the Regions on the new UMF also showed that synergies between different funding opportunities are often unexplored (as highlighted by the Assembly of European Regions). National campaigns (in several languages) providing support for capacity-building and better communication on funding opportunities could be useful in this regard.

2.3.2 The need for a suitable and consistent regulation at the EU-level

Among the interviewees, there is a consensus that regulation at EU-level should target shared mobility service providers, such as Uber, Lime-S, FlexiCar, Jump Bikes and others. According to an expert from POLIS, the new mobility paradigm imposed by MaaS actors strengthens a consumer – provider relationship in mobility. This dimension should be tackled by EU policies, for instance, in relation with standardisation, label, security, and privacy. In this regard, data availability, shareability and usability raise big concerns. The network Eurocities has a clear position on the issue, highlighting the fact that cities and EU institutions should build an environment in which shared mobility solutions and MaaS supports public policy goals, and in which a dialogue on data transparency is enhanced.[69] For this reason, many stakeholders at EU-level involved in urban mobility[70] stressed the need for interoperable standardised interfaces and formats ensuring data collection and exchange between cities.

Another regulation could be put in place on the use of public space. Indeed, scooters, bikes and car charging cables are more and more present in public spaces (notably pavements), leading to inconvenience for pedestrians. In this regard, shared mobility solutions and MaaS providers might be legally bound to negotiate with local authorities on the use of public space. This measure, at the crossroads between EU and local regulation, could for instance see the premises of dedicated spaces for parking. Regulations can be used to restrict parking in sensitive areas, such as pavements, historic monuments, parks, market squares and bicycle lanes. The main goal of these measures would be for local and regional authorities to be in control of such private services and strengthen the public good dimension.

The transition towards active mobility has been highlighted by ECF as the potential object of an EU regulation. In fact, a set of measures such as the integration of Eurovelo in TEN-T network, the creation of mandatory parking lots for bikes in private and public buildings, as well as the funding of more Horizon

[69] Eurocities, 2019. The path to sustainable urban mobility.
[70] Joint stakeholder statement on the EU's Urban Mobility Framework.

Europe projects focused on biking might be a way to generate local impact in terms of zero-emission mobility.

According to the Council of European Municipalities and Regions (CEMR), an EU regulation should target the modernisation of public infrastructures, paving the way for new and innovative transport modes.[71] Public transport is then considered as crucial in connecting urban nodes to TEN-T network. When consulted by the Committee of the Regions on the new UMF, LuxMobility pinpointed the need for more flexible public transport, through extended timetables and strategic partnerships with schools and employers.

EU policies could also target urban logistics actors and delivery companies, for instance by setting quotas for the purchase of electric light-duty vehicles.

Last, EU legislation could discourage, or make illegal, the practice of company cars. As pinpointed in a study published by Transport & Environment[72], 96% of the cars the companies are running on diesel or petrol, hence contributing to climate change and air pollution. The report also shows that in the European Union €32 billion are currently spent on company car subsidies (notably through VAT reduction).

2.3.3 EU decarbonisation goals and the principle of subsidiarity

The Sustainable and Smart Mobility Strategy milestone of having at least 100 EU climate-neutral cities by 2030 has been acknowledged by an interviewee from DG MOVE as an example of good balance between an increasing involvement of the EU in mobility policies and a sufficient room for manoeuvre left to cities. However, the need to collect data at the local level is only partially tackled. The necessity to introduce more funding opportunities on active mobility has been stressed by several experts.

As stated by the European Committee of the Regions, these frontrunners cities should be used as "innovation hubs".[73] Based on their experience, replicable solutions might be scaled-up for other European cities, and lessons learnt might become a basis for EU-level roadmaps towards climate neutrality of cities. Indeed, such milestone cannot be successfully achieved without a transparent and effective coordination between the local, regional, national, and European level.

Experts from POLIS and CIVITAS see SUMPS as a key instrument to strengthen subsidiarity, giving local authorities sufficient flexibility to design place-based mobility solutions without mandating. Nonetheless their effectiveness largely

[71] CEMR, 2020. Local and regional governments' contribution to the European Green Deal.
[72] Transport & Environment, 2020.
[73] CoR, 2020.

depends on their factual adoption and implementation. If SUMPs are not spontaneously developed by cities, obligation and conditionality might be a solution. It is also crucial that Member States work on strengthening collaboration and partnership between the local, regional, and national authorities. In fact, conflicts and disagreement between subnational and national governments might represent an obstacle for the implementation of smart and sustainable mobility solutions.

In the next part, challenges related to SUMPs development are further investigated.

3. Sustainable Urban Mobility Plans (SUMPs)

Sustainable Urban Mobility Plans (SUMPs) have become an important part of urban mobility in the EU. They are defined as "strategic plans designed to satisfy the mobility needs of people and businesses in cities and their surroundings for a better quality of life", which "build on existing planning practices and takes due consideration of integration, participation, and evaluation principles". [74] They are developed on voluntary basis and are non-binding in nature.

SUMPs were a central element of the Urban Mobility Package and have grown in popularity and in number ever since. However, it is generally challenging to pinpoint the exact number of SUMPs as the SUMP database[75] relies on self-reported data and is thus not considered to be fully reliable. Additionally, some plans are not necessarily packaged as standalone strategies and the lack of a standardised definition of the term SUMP makes it sometimes difficult to differentiate these plans from other plans.[76] Nonetheless, there are over 1000 SUMPs currently in place.[77] This indicates that a large number of medium and large cities do not have a SUMP yet.[78]

The SUMP cycle foresees public participation and stakeholder involvement, expert consultation, integration of transport modes and the wider functional urban area, cooperation across institutional boundaries, and continuous monitoring and evaluation. In short, the SUMP concept aims at altering local urban mobility planning practices from a traffic-centred, predict and provide approach into people-centred demand management planning.[79] It focuses on the process rather than on the content. This means that while SUMP development and implementation are guided by a number of principles, the content of each SUMP is determined by those involved in its development. For instance, a recent fact-finding study, which explored a sample of 125 EU cities, found that 42% of the sampled cities had a high compliance with the principles of the EU SUMP Guidelines, 49% had a medium compliance and 9% had a low compliance.[80] Similarly, the European Court of Auditors found that "there was limited take-up of the Commission's guidance on the part of many Member States and cities – notably in terms of preparing Sustainable Urban Mobility Plans".[81] Practice suggests that local needs and specificities are reflected in the SUMPs. At the same

[74] ELTIS (2019). Guidelines for Developing and implementing a Sustainable Urban Mobility Plan.
[75] https://www.eltis.org/mobility-plans/city-database
[76] EC, 2021. Fact-finding study on status and future needs regarding low- and zero-emission mobility.
[77] EC, 2021. EU Urban Mobility State of play
[78] EC, 2021. Fact-finding study on status and future needs regarding low- and zero-emission mobility.
[79] Werland, 2020
[80] EC, 2021. Fact-finding study on status and future needs regarding low- and zero-emission mobility.
[81] ECA, 2020. Sustainable Urban Mobility in the EU

time lack of standardisation represents a possible risk in terms of quality of SUMPs. In fact, there are reports that the levels of SUMP implementation and quality vary significantly across the EU.[82]

It is important to note that the development of an effective SUMP is a significant undertaking. The associated costs vary substantially depending on the size of the city, the scope of the plan, the level of external assistance involved, and the availability of data and previous studies, with data collection and transport modelling representing the costliest aspects of a SUMP.[83]

To account for that, a number of resources and tools have been developed and made available to LRAs over the past few years. They are hosted on a dedicated platform, the European Platform on Sustainable Urban Mobility Plans, and include:

- Self-assessment tool[84], which enables planning authorities to evaluate the SUMP of their city or functional urban area, or to assess and improve planning activities if there is no SUMP in place.

- Guidelines for developing and implementing a SUMP, as well as topic guides and practitioner briefings. The former is widely known, used and translated in multiple EU languages. The latter target various aspects of mobility planning and aim to support LRAs in tackling urban mobility challenges. Some of them are of significant relevance for achieving decarbonisation goals (see guides/briefings highlighted in blue below).

Topic Guides[85]:

- Harmonisation of Energy and Sustainable Urban Mobility Planning
- Sustainable Urban Logistics Planning
- Electrification: Planning for electric road transport in the SUMP context
- UVAR and SUMPs: Regulating vehicle access to cities as part of integrated mobility policies
- Linking transport and health to SUMPs: How Health supports SUMPS?
- Funding and Finance of Sustainable Urban Mobility Measures
- Integration of Shared Mobility Approaches in Sustainable Urban Mobility Planning
- The Role of Intelligent Transport Systems (ITS) in Sustainable Urban Mobility Planning
- Mobility As a Service (MAAS) and Sustainable Urban Mobility Planning

[82] EC, 2021. Evaluation of the 2013 Urban Mobility Package (SWD (2021) 48 final)
[83] Ibid.
[84] https://www.eltis.org/resources/tools/sump-self-assessment-tool
[85] https://www.eltis.org/mobility-plans/topic-guides

- Public Procurement of Sustainable Urban Mobility Measures
- Urban Road Safety and Active Travel in Sustainable Urban Mobility Planning
- Sustainable urban mobility planning in metropolitan regions
- The Poly-SUMP Methodology: How to develop a Sustainable Urban Mobility Plan for a polycentric region
- Addressing gender equity and vulnerable groups in SUMPs
- Planning for More Resilient and Robust Urban Mobility
- Sustainable Urban Mobility Planning in Smaller Cities and Towns
- Sustainable Neighbourhood Mobility Planning
- Safe use of micromobility devices in urban areas

Relevant practitioner briefings[86]:

- Supporting and Encouraging Walking in Sustainable Urban Mobility Planning
- Supporting and Encouraging Cycling in Sustainable Urban Mobility Planning
- National support frameworks for Sustainable Urban Mobility Planning: National SUMP Supporting Programmes

Moreover, the EU has been providing support through various projects, such as ENDURANCE, SUMPS-UP and BUMP among others, aimed at assisting cities and regions with developing SUMPs by facilitating networking, training, mutual learning and sharing experiences and best practices.[87]

3.1 SUMPs and decarbonisation

As noted above, the scope and level of ambition is unique to each SUMP and, as a consequence, so is its potential to contribute to carbon emissions reduction. In other words, the measures a city or a region chooses to implement as part of their respective plan (i.e., whether they choose to make public transport more accessible, affordable and attractive, to promote active mobility and/or to integrate specific urban access regulations) determine the extent to which a SUMP could contribute to decarbonisation. Nonetheless, there are indications that SUMPs have the potential to contribute to air quality improvement[88,89], reductions in car use, and increased public transport use[90] – all of which are linked to

[86] https://www.eltis.org/mobility-plans/practitioner-briefings
[87] EC, 2021. Evaluation of the 2013 Urban Mobility Package (SWD (2021) 48 final)
[88] Pisoni et al., 2019.
[89] Lopez-Ruiz et al., 2013.
[90] ELTIS, What are the benefits of Sustainable Urban mobility Planning. https://www.eltis.org/mobility-plans/12-what-are-benefits-sustainable-urban-mobility-planning

decarbonisation. Moreover, while it is not possible to establish causation, 9 out of the 10 cities with the lowest level of air pollution have a SUMP in place.[91]

However, there are indications that there is room for improvement. A joint statement issued by some of the main stakeholders at EU level suggests that in the future SUMPs should go beyond traffic management and work toward climate-neutrality by placing more emphasis on creating an accessible and attractive public transport and incentivising active mobility.[92] This sentiment is also expressed in the Urban Mobility Framework, which adds that more needs to be done for related aspects, such as multimodal information systems and smart ticketing. The Framework also foresees the use of less polluting transport and enhanced use of collective and shared mobility. A SUMP-related challenge identified both in the previously mentioned fact-finding study[93] and interviews with representatives of CIVITAS and Eurocities is also extending planning activities beyond urban boundaries, which is viewed as one the main aspects of a good SUMP process.

3.2 SUMPs and the Urban Mobility Framework

Just as the Urban Mobility Package, the new Framework places significant attention on SUMPs. To stimulate the development and implementation of new plans, it states that the revision of the TEN-T regulation may require all urban nodes to adopt SUMPs. Furthermore, a stronger link between the Connecting Europe Facility and Horizon Europe funding and SUMPs is also planned in the future with a priority being given to projects backed by SUMPs and calls to applicants with SUMPs, respectively. This suggests that SUMPs would, in effect, be mandatory for urban nodes and cities, which wish to qualify for this type of financing. This makes it important to explore whether the principle of subsidiarity would be upheld.

In general, the SUMP concept is flexible as planners are able to set the scope and ambition of their plans, thus allowing them to design and adopt SUMPs, which account for their local needs. As noted by a representative of DG MOVE, SUMPs are viewed as an example of the principle of subsidiarity with the concept and guidance provided by the European Commission and the prioritisation and application done at local level. However, there is a concern that in some instances the adoption of SUMPs may become an administrative formality to meet a requirement or to get access to funding.[94] This suggests that some SUMPs may not be implemented in practice and will not contribute to the EU decarbonisation

[91] Eurocities, 2019. The path to sustainable urban mobility.
[92] Joint stakeholder statement on the EU's Urban Mobility Framework, 2021.
[93] EC, 2021. Fact-finding study on status and future needs regarding low- and zero-emission mobility.
[94] ECA, 2020. Sustainable Urban Mobility in the EU

goals, as there are currently no plans to check the quality and implementation of SUMPs to confirm eligibility or compliance. The fact-finding study recommends exploring the possibility of introducing a SUMP certification or voluntary peer review schemes. However, it is also not clear whose responsibility it may be to do so with one interviewee noting that it should not be the European Commission's and another stating that some Member States have assessed implementation, but it is not a widespread trend, as not all national authorities may have the resources or jurisdiction to do so.

In any case, the evidence from both desk research and interviews suggests that there is a need to monitor SUMP implementation and effectiveness. Developing and using monitoring and evaluation schemes and employing external quality control assistance are important factors in this respect.[95] However, while monitoring and evaluation is one of the main SUMP principles, it often does not take place, nor does it relate to an initial baseline.[96] It is suggested that there should be a concerted effort to collect data relative to clear evaluation targets (e.g. carbon reduction) and indicators (such as SUMI), allowing to assess progress.[97] According to a representative of Eurocities and the European Cyclists' Federation, this would make SUMPs more comparable to one another, while representatives of CIVITAS and DG MOVE added that it would also help understand whether a given SUMP is effective and would make plans better in the future. It has also been recommended that reporting of cities and Member States on the development and implementation of SUMPs, as well as on progress and challenges, should be incentivised.[98]

Linking access to EU financing to SUMPs was generally viewed favourably among interviewees. However, while a strict compliance with the SUMP principles will not be mandatory, there is a concern that this requirement may result in administrative burden and discrimination against those with fewer resources.[99] Similarly, a representative of Eurocities noted that it may result in supporting those who are already frontrunners. Additionally, while linking access to European structural and investment funds has been considered in the past[100] and was viewed as a potentially effective approach by some interviewees, it is not discussed in the Urban Mobility Framework.

[95] EC, 2021. Evaluation of the 2013 Urban Mobility Package (SWD (2021) 48 final)
[96] EP, 2020. Sustainable and smart urban mobility.
[97] EC, 2021. Fact-finding study on status and future needs regarding low- and zero-emission mobility.
[98] Joint stakeholder statement on the EU's Urban Mobility Framework, 2021.
[99] EP, 2020. Sustainable and smart urban mobility.
[100] EC, 2021. Evaluation of the 2013 Urban Mobility Package (SWD (2021) 48 final)

3.3 Support for LRAs

It is important to acknowledge that some cities lack the necessary resources to prepare, implement and monitor SUMPs effectively. Given the potential of SUMPs to contribute to EU decarbonisation goals, among other benefits, LRAs should be supported in this process. Interviewees noted that it is vital that they are provided with technical and financial support at EU and national level.

In that respect, the Urban Mobility Framework states that EU support through capacity building (training local authorities, promoting the concept) will be continued. Similarly, it foresees further reinforcement of funding and policy support for public transport. The Framework also notes that the European Commission will publish, by the end of 2022, a Commission Recommendation to Member States on the national programme to support regions and cities in the roll-out of effective SUMPs. It will include an upgraded SUMP concept and it will set clear priorities targeting active, collective and public transport and shared mobility (including for urban-rural linkages), fully integrating resilience aspects as well as Sustainable Urban Logistics Plans (SULPs), based on zero-emission vehicles and solutions.

Furthermore, national authorities also have a prominent role to play. In the Framework, the Commission calls on Member States to put in place a national long-term SUMP support programme, supported by a national programme manager. It is suggested that the programme may include legal, financial and organisational measures to help build capacity and implement SUMPs in compliance with the SUMP guidelines. While the exact role and set up of the programme is not fleshed out yet, a representative of DG MOVE noted that the Framework envisages a better integration of the SUMP community and national authorities and suggested that the national programme manager may have a role in ensuring the quality of SUMPs. In general, the development of national frameworks that reinforce governance and legal dimensions of SUMPs, dedicated funding lines and knowledge centres have been found to be effective tools.[101,102]

Lastly, it is important to note that SUMPs are local in nature and therefore can influence only a subset of the factors that affect emissions associated with urban mobility.[103] Measures taken at national or EU level, which influence aspects such as transport demand and technology, as well as fuel efficiency and fuel quality, complement the potential effect of SUMPs.

[101] Eurocities, 2019. The path to sustainable urban mobility.
[102] Werland, 2020.
[103] Pisoni et al., 2019.

4. Urban nodes and the TEN-T

Urban nodes are an essential component of the trans-European transport network (TEN-T). According to the *planning methodology for the trans-European transport network (TEN-T)*[104], they are the basis for shaping of the network, of the core corridors and of the cross-border sections. Together with transport nodes they are the start and end points of mobility along the TEN-T for both passenger and freight transport. They are transit nodes and interconnecting hubs for the exchange between local, metropolitan and regional mobility with long distance traffic. According to Regulation (EU) 1315/2013, there are currently 88 core urban nodes along the core network and corridors. Nearly all of them involve an airport, most of them involve a rail-road terminal, and many of them are city ports. As mentioned previously, the core urban nodes are likely to become 424 upon revision of the TEN-T Regulation[105], including all national and regional capital cities as well as NUTS 3 capital cities and other urban centres with more than 100,000 inhabitants. Cities on the TEN-T network are seen as potential enablers of sustainable, efficient and multimodal transport through:

- The improvement of the TEN-T infrastructure in urban areas, including roads and rail lines, stations, sidings, junctions, etc.

- The improvement of rail and road links directly interconnecting the TEN-T network with a transport node and possible alternatives to solve capacity issues.

- Improvement of the interconnections between transport nodes and transport modes in urban and metropolitan areas i.e., initiatives relating to regional, suburban, metro or tramway lines (and interchange facilities located on their alignment) which are directly interconnecting to at least one TEN-T transport node in the urban area, where services are operated towards other TEN-T nodes.

- Promote interconnection between different transport modes and sustainable transport solutions for both passengers and freights, i.e., ICT, ITS, clean fuel (or other sustainable transport and mobility) initiatives that are implemented in core urban areas or at a territorial scale involving at least one core urban area. These may also include any other soft or administrative measure for the promotion of integrated transport and mobility in core urban area towards Mobility as a Service solutions (including for instance passenger's rights, etc.).

[104] https://ec.europa.eu/transparency/regdoc/rep/1/2013/EN/1-2013-940-EN-F1-1.Pdf
[105] https://transport.ec.europa.eu/news/efficient-and-green-mobility-2021-12-14_en

- Mitigation of negative effects of long-distance traffic along the TEN-T transiting urban areas, i.e., corridor rail and road bypasses, implemented to mitigate environmental impacts associated with issues on the existing TEN-T sections.

In order to be more effective in supporting the development of the TEN-T network within the framework of the Sustainable and Smart Mobility Strategy, under the new TEN-T Regulation core urban nodes are required to have multimodal passenger hubs, including park and ride facilities, to improve first and last mile connections and to enhance the necessary capacities for long-distance connectivity via rail and other transport modes in and between cities. They also need to have multimodal freight terminals in place to ensure sustainable urban logistics. Also aimed at supporting governance in promoting the integration of urban and metropolitan areas in the TEN-T, urban nodes will be also required to develop their Sustainable Urban Mobility Plan (SUMP).

Four examples are presented overleaf summarising strategies and solutions adopted by core urban nodes to enhance their integration into the TEN-T. Factsheets are structured according to the key implementing areas identified in the 2018 Baltic-Adriatic Corridor Work Plan urban nodes flagship project[106]:

- Land use and infrastructure
- Intermodal operations and information provision
- Governance and management

The Barcelona Infrastructure and Spatial Integration Strategy, the Rotterdam Cityport Initiatives, the Budapest Agglomeration Railway Strategy, and the Helsinki-Tallin Twin City Tunnel are furthermore examples of the four clusters identified in the 2019 PROSPERITY CIVITAS initiative survey on the maturity of national levels concerning SUMP, recalled in the study *National Support Frameworks for Sustainable Urban Mobility Planning*[107] by the European Platform on Sustainable Urban Mobility Plans (Eltis) [108]:

- Forerunner countries and regions (Barcelona)
- Active countries and regions (Rotterdam)
- Engaged countries and regions (Budapest)
- Inactive countries and regions (Tallin)

[106] https://ec.europa.eu/transport/sites/transport/files/3rd_bac_work_plan_-_final_webversion.pdf

[107] https://www.eltis.org/sites/default/files/national_support_frameworks_for_sustainable_urban_mobility_planning.pdf

[108] https://www.eltis.org/mobility-plans/european-platform

Local and regional context appear determinant for the effective integration of urban nodes into the TEN-T towards a more inclusive and decarbonised European transport area. Specificities in urban morphology and land use patterns, physical constraints and geopolitical location as well as size and structure of functional areas all matter in defining effective solutions for the planning, development, management and monitoring of urban mobility systems. Common targets may be better achieved if associated with flexible approaches, top-down measures leaving room to bottom-up practices.

According to the representative from DG MOVE, there are 3 key challenges for a better integration of urban nodes into TEN-T network:

- **Governance**: Urban nodes should be part of the TEN-T corridor FORA, participate in the urban nodes working group that some corridors already have, be actively involved in the discussions.

- **Financing**: The changes being proposed mean that more urban nodes would be eligible for funding. What has been defined for the upcoming CEF is not higher than before, although expectations are higher. This could hamper the correct integration of urban nodes.

- **Urban nodes scope**: The scope of what concerns urban mobility/local needs and long-distance transport is not clear and both are often interlinked.

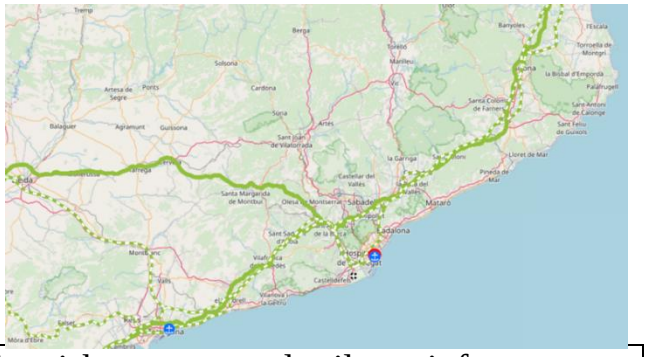
In terms of the opportunities, the funding available is also an opportunity to better support the urban nodes and their integration with TEN-T. Other programmes as DG EAC and DG REGIO could support also training activities to urban nodes. Related to governance there is also an opportunity for the exchange of ideas and best practices. This would improve both SUMPs effectiveness and efficiency. Urban nodes could team up to buy equipment and therefore lower the costs. By being involved in the corridors' governance, urban nodes could benefit from a special status and have more access to local/regional and national funding, as they support TEN-T.

4.1 Barcelona Infrastructure and Spatial Integration Strategy

Municipality of Barcelona

Population (2021)	1,621,000
Area (km2) (2021)	101,9
Population density (/km2) (2021)	15,992
GDP - Catalonia (2019)	224 million
GDP – ES512 Barcelona (2019)	75 million

SUMP framework status for Spain: Forerunner countries and regions



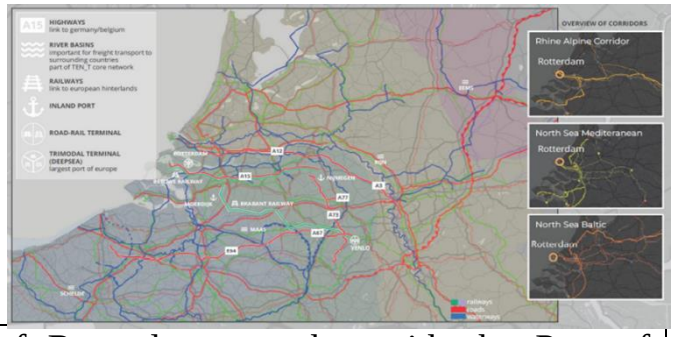
Land use and infra-structure	Coordinated by the Spanish state-owned railway infrastructure manager (ADIF), it is currently under construction a **connection between the La Llagostera multimodal and the Mediterranean Corridor**. The main objective is to transform the Llagostera terminal into one of the key nodes in Spain for international freight traffic.
Intermodal operations and information provision	The Government of Catalonia, ADIF, Ports de l'Estat and the Port of Barcelona have approved in October 2020 a protocol to develop a **new southern road and rail access to the Port of Barcelona**. This Project, located in the Mediterranean Core Network Corridor, aims to boost the intermodality of the Port of Barcelona, as well as its role as a logistics hub in the northeast of Spain. After thirteen years, this action resumes the constructive solution established in the study report on this issue already approved in October 2007, taking it as a basis for redesigning the project. The project is under development and work is expected to begin in July 2022. The **Barcelona-La Sagrera station** is the new multimodal hub under construction that aims to become the central station for northern and eastern Barcelona. The station, coordinated by the public company Barcelona Sagrera Alta Velocitat, will integrate high speed, local railways, urban and intercity buses, taxi, bicycles and private vehicles. Becoming the largest building in the city, it is expected to handle 100 million passengers per year, enhancing both the city's mobility and Barcelona's position as a key node in the Mediterranean corridor. The station is expected to be fully operational by 2025.
Governance and management	**Barcelona Regional** is a public agency for strategic planning, urban planning and infrastructure in metropolitan area of Barcelona. The agency is headed by the Barcelona City Council and has the participation of another nine public shareholders, including l'Àrea Metropolitana de Barcelona, the Port of Barcelona and ADIF.

4.2 Rotterdam cityport initiatives

Municipality of Rotterdam

Population (2021)	651,631
Area (km2) (2021)	217.55
Population density (/km2) (2021)	2995
GDP - South Holland (2019)	71,884. 76
GDP - NL33C Groot-Rijnmond (2019)	169,015.98

SUMP framework status for The Netherlands: Active - well-established urban transport planning framework that incorporates SUMPs with some support from national/regional level.



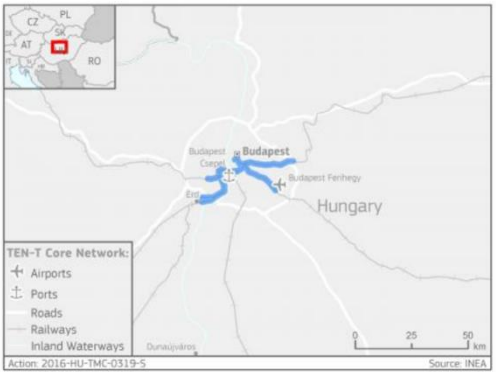
Land use and infra-structure	The municipality of Rotterdam, together with the Port of Rotterdam (port authority), intend to transform the **Waal-Eemhaven** area in Rotterdam from a deep-sea terminal to a short-sea container terminal, with a higher amount of freight transport via road. It will have impacts on the port area and on the connection with Rotterdam. The development of the Waal-Eemhaven, although still in process, is an example that takes into account liveability, accessibility and safety issues, as well as infrastructure, logistic and spatial planning aspects. **Theemsweg Trace for railfreight** aims to remove the bottlenecks in the rail freight access of the main port Rotterdam connecting three core network corridors (Rhine Alpine, North Sea-Mediterranean and North Sea-Baltic). It creates an alternative route to avoid Caland Bridge, consisting of double track railway section. Besides having a positive impact in accessibility, it also impacts the connection of the city and the functional area from a logistics perspective, as well as the connection with other urban nodes from the corridors.
Intermodal operations and information provision	The **Rotterdam world Gateway** (and its upgrade) provides the port with a sustainable, high volume multimodal container terminal, enabling efficient transport to and from the European hinterland. It aims to have the highest modal shift ratio for a container terminal in Europe with optimal terminal layout for processing high volumes at high efficiency between all transport modes.
Governance and management	**The Bereik! Organisation** is a cooperation of national, regional and local infrastructure authorities with the purpose to develop a network wide traffic management strategy that keeps the Metropolitan Area of Rotterdam / The Hague moving. The organisation is responsible for traffic and transport management and focuses on improving accessibility and connectivity.

4.3 Budapest Agglomeration Railway Strategy

Budapest Metropolitan Area

Population (2021)	1,771,865
Area (km2) (2021)	525.2
Population density (/km2) (2021)	3,374
GDP - Pest (2019)	15,339
GDP - Budapest (2019)	54,093

SUMP framework status for Hungary: Engaged - an urban transport planning framework is in place that incorporates SUMPs (or equivalent document) without a support from the national/regional level - merely as a way of accessing infrastructure funds.



Land use and infra-structure	At the end of 2021 the Hungarian Government adopted the ***Budapest Agglomeration Railway Strategy* (BAVS)**. BAVS envisages the entire agglomeration and all surrounding settlements to be fully connected to the capital city by train by 2040. The strategy comprises 60 measures for the upgrading of the railway infrastructure defined in the Budapest SUMP (2014-2030) as well as the procurement of new trains. These include construction of a new tunnel and a new bridge on the Danube, development of a new metro line, extension of the existing railway lines and rehabilitation of more than half of the existing tracks. A modernisation programme of the railway stations also started in 2019. Urban regeneration initiatives on railway land are also foreseen for future implementation.
Intermodal operations and information provision	The strategy foresees the implementation of an integrated timetable involving suburban and local rail, metro, tramway and bus services. The attractiveness and competitiveness of public transport modes will be also increased by the adoption of an integrated tariff scheme. Intermodality will be supported by developing park and ride facilities at interchange stations as well as integrating stations and stops into bicycle networks within Budapest. The connection to the Ferenc Liszt International Airport will be improved with 16 additional stops.
Governance and management	The strategy was elaborated thanks to the support of the Connecting Europe Facility. Its development involved the Prime Minister's Office, the Ministry of Innovation and Technology, MÁV Magyar Államvasutak Zrt. (Hungarian State Railways) and the Budapest Development Agency. The City of Budapest was also involved in the elaboration of the strategy together with local municipalities. Consultation processes also involved user's associations and the wider public.

4.4 Helsinki-Tallin Twin-city tunnel

Municipality of Tallin

Population (2021)	448,770 (1,316,757)
Area (km2) (2021)	159.37 (715.48*)
Population density (/km2) (2021)	2,816 (3,034.62*)
GDP - Estonia (2019)	28,112 (60,381*)
GDP - Tallin (2019)	35,050 (91,241*)

*Helsinki

SUMP framework status for Estonia: Inactive - moving towards an approach to sustainable urban mobility planning with very limited or no examples of SUMPs (or equivalent document).

Land use and infra-structure	On April 26, 2021, Finland of understanding (MoU) on cooperation in the transport sector and exchange of information. The focus of the MoU are the following transport interrelated initiatives: Helsinki-Tallin tunnel, Rail Baltica, Trans-European Transport Networks, and North Sea–Baltic core network corridor. Integrating the tunnel into the TEN-T will serve as a new freight gateway to Europe and make Helsinki and Tallin capitals a single twin-city.
Intermodal operations and information provision	The MoU emphasises the need to coordinate the development of the mobility systems of Finland and Estonia towards a more sustainable and integrated multimodal regional transport area. The location of the two cities along the itinerary of the Rail Baltica and North Sea–Baltic Sea European Transport Corridor provides the twin-city with a unique opportunity to be interconnected to Central Europe via a high-quality and sustainable transport infrastructure. The project is also expected to contribute to the interconnection between the transport nodes in the cross-border region, to promote intramodality.
Governance and management	The development of the Helsinki-Tallin Tunnel involves a number of institutions and stakeholders from Finland and Estonia including Finnish and Estonian Ministries and Governmental Agencies, the Cities of Tallinn and Helsinki, as well as the Union of Harju County Municipalities, and the Helsinki-Uusimaa Regional Council. Further to national and local institutions, the project brings also together representatives of transport nodes, regions, and the state authorities responsible of national transport policy and economic development. A SUMP was elaborated in Tallin, which was finalised in 2019. Also according to the local authorities this will need to be harmonised with the Helsinki transport plans, to jointly address the planning and management of cross-border traffic between the twin-cities.

5. Foresight Analysis

This chapter is intricately linked to the findings from the previous chapters and aims to highlight some of the most important challenges and opportunities for local and regional authorities in the next 10 to 20 years and to the way in which they can best prepare to address or capitalise on them. It also aims to identify how the European Committee of the Regions could play an effective role in supporting the relevant authorities in the future.

5.1 Long-term opportunities and challenges

Urban mobility fulfils a basic need in enabling citizens to integrate into society and the labour market. In a context of socio-economic, environmental, and geopolitical upheavals and uncertainties, local and regional governments face crucial challenges requiring strategic and integrated actions.

In this section, we will mention three main long-term trends that will likely shape the landscape of urban mobility in the next 10-20 years.

Energy transition at the time of new geopolitical conflicts: The climate crisis is unquestionably the main driver for change towards a zero-emission mobility. Following the Russian invasion of Ukraine, the need for a rapid energy transition has never been stronger. As stated by experts from EPTO and ECF, the ongoing war is having severe impacts on the price of oil and gas, strengthening the agenda towards a climate neutral EU by 2050. However, the transport sector in Europe is still very dependent on fossil fuel (93% in 2017[109]). Cities are at the forefront of the transition towards zero-emission transport, being particularly hit by collateral threats such as air pollution and congestion. Local and regional governments are grasping the benefits of low-emission mobility modes, such as active mobility and clean public transport. In particular, walking and cycling represent a both cost-efficient and clean alternative to fossil fuel. Electromobility has also been identified by experts as one of the key solutions to tackle transport emissions, notably when applied to shared mobility and public transport. Nevertheless, it can be argued that the generalisation of electric passenger cars will not fully address social and spatial negative externalities. In general, we can assert that the ongoing geopolitical conflicts at the time of climate crisis compel us to rethink future-proof transport modes, with a particular attention to the resilience of individuals and society.

[109] BioEnergy International, https://bioenergyinternational.com/eu-transport-still-overly-dependant-on-fossil-fuels/

Rapidly and continuously changing mobility needs: The COVID-19 pandemic has dramatically changed behavioural and attitudinal trends in urban mobility. The use of public transport and shared vehicle services decreased, while more and more citizens preferred private vehicles and bikes, but also walking.[110] A study based on 106 urban areas in the EU highlighted that in 2020 an average of 11.5 km of provisional pop-up bike lanes had been built per city, and that cycling increased between 11 and 48% on average compared to 2019[111] Moreover, the generalisation of telework (that lasted well beyond the strict lockdown measures) led to a decrease in the mobility demand, especially in commuting. At the same time, as showed in Chapter 1, e-commerce and freight delivery are likely to keep growing in the future. These two trends lead to a major change in the way local and regional governments must design urban mobility policies. On the one hand, new working behaviours contribute to the decrease of traditional commuting habits and use of public transport. On the other hand, last mile freight distribution is becoming an essential service. The unpredictability of new trends (telework, e-commerce, fuel prices on the rise, etc.) urges local and regional governments to be part of the game and anticipate such challenges.

Digitalisation as an enabler for decarbonisation: The emergence of new technologies can enable decarbonisation: shared mobility devices, ride-hailing apps and electronic vehicles enhanced a new mobility paradigm that allowed users to go beyond the model of car-centric society and, as a consequence, car-centric cities. According to a representative of the municipality of Vienna, technological improvements in individual cars can also contribute to decarbonisation and improved urban road safety (e.g. automatic speed limitation). Additionally, the smart collection and use of data on mobility is key when implementing tailored transport solutions (on-demand buses, car sharing, etc.). However, these positive impacts are likely to come with systemic challenges: the first is technological lock-in, when successful digital solutions are deployed at scale and corner market share, but to the detriment of both other solutions and consumer welfare; the second is exacerbation of the digital divide, as access is inadvertently limited for some people (the most vulnerable or older ones); finally, increased vulnerability, as greater reliance on digitalisation solutions exposes users to cyberthreats and system failures.

[110] European Parliament, 2020, https://www.europarl.europa.eu/RegData/etudes/IDAN/2020/652213/IPOL_IDA(2020)652213_EN.pdf
[111] Kraus K., Koch N., 2021

Urban Air Mobility (UAM) and **Connected and Automated Vehicles** (CAV) are good examples of technological solutions in which the three challenges are embedded.

On the one hand, UAM relies on delivery drones, unmanned aerial vehicles equipped with an automated navigation system that can deliver parcels directly to the customer. For example, drones are already being used to transport organs and blood between Belgian hospitals.[112]A study by McKinsey[113] shows that in a scenario where 13% of parcels are delivered by drones, the GHG mitigation potential reaches between 0.05 and 0.12 MtC02 (metric tons of carbon dioxide equivalent), which can be considered as a low decarbonisation potential. Moreover, it is important to stress that by the time drones will reach a significant penetration rate in the market, transport in Europe might have been substantially electrified.

On the other hand, CAVs are enabled by a centralised, AI-equipped software platform. The application of CAVs to road freight transport could optimise vehicle operations, increase safety of travel, and maximise fuel efficiency. A study shows that the decarbonisation potential of platooning and efficient driving through CAVs is estimated at around 24-38 MtCO2 [114](sensibly more than UAM).

Despite the role of these new freight transport modes in reducing polluting road vehicles, there are concerns beyond their potential to contribute to decarbonisation. According to an expert from the POLIS network, it is crucial to integrate EU safety and security certifications, to ensure, for instance, privacy compliance and consistent air traffic regulation process. He noted that there is a significant discrepancy between the expectations of the industry and policymakers regarding the timeline of the roll-out of these technologies, suggesting that cities are unprepared for the rollout of UAM in their territory. Similarly, it was noted that it is currently not clear whose responsibility it is to regulate them. In this regard, an effort is needed to set up a governance model before new technology solutions are widely introduced, but also to identify the most relevant and beneficial uses for which UAM and CAV can be mobilised.

Rethinking city and transport planning: Another overarching issue identified by the interviewees is the need to better integrate city and transport planning and policy and, as cities grow, to design urban areas in a way that necessitates shorter trips, made by using active modes of transport, thus making car use in cities obsolete.

[112] The Brussels Times, 2019. https://www.brusselstimes.com/63748/new-drone-network-service-will-transport-blood-and-tissue-between-belgian-hospitals-emergency-antwerp
[113] McKinsey, 2016
[114] Wadud, MacKenzie and Leiby, 2016

Four scenarios for urban mobility in 2030

Based on the wide range of above-mentioned factors (energy transition, changing needs and new technologies) four scenarios[115] for urban mobility in 2030 have been identified:

- The "Grumpy old transport" scenario, in which the use of privately-owned car does not decrease, and shared mobility services are attractive only to a narrow segment. This slow transition is due to consumers 'reluctance in waiving individual and seamless transport modes. Lacking supportive policies, the rise of innovative mobility solutions is dismissed.

- "At an easy space" scenario, in which moderate changes are detected. Restrictions to mitigate congestion and pollution are introduced. The purchase of EVs increase, but privately-owned traditional cars (complemented by public transport) remain the dominant transport mode.

- The "Mine is yours" scenario, in which major changes are predicted. Shared mobility modes and MaaS providers increase and shape the market. Door-to-door travel are generalised through micromobility. Users are open to new mobility options and massively decrease their use of private cars. The share of EVs rises.

- In the "Tech-eager" scenario, technological advances affect the transport process as well as travel behaviour. Automated and Electric Vehicles go hand-in-hand. Public transport, which also integrates shared mobility, remains one of the most effective means of transport. The decrease in the number of cars leads to land use change (e.g. green areas). Supportive policies allow the smooth application of technology.

5.2 The role of public authorities in implementing enabling technologies

As stated by a representative of CIVITAS, it is vital that LRAs act as drivers for innovation, integrating the offer of new and traditional mobility services within local transport policies.

As shown in chapter 1, new mobility services radically changed the landscape of urban mobility, through a shift from infrastructure to interface. In other words, the added value of the new urban mobility paradigm is not anymore fully related to

[115] Miskolczi et al., 2021

massive investments in lanes, streets, and rails, but in putting consumers in touch with different providers, through specific devices.

Nevertheless, a crucial challenge concerns the role of LRAs in this relation, as a guarantee of public interest. Experiments and pilot projects should better integrate national frameworks, solutions and tools developed in order to allow greater economies of scale for the benefit of investing local authorities. To some extent, it can be claimed that public involvement in MaaS solutions is an effective way to mitigate the three systemic challenges related to technological upheavals (lock-in, digital divide and vulnerability).

In the face of these developments and challenges, the collected evidence suggests that the added value of CoR is the effort in transmitting EU initiatives and concepts to local realities (importantly, in the local languages languages) and at the same time advocating for EU legislation that sufficiently accounts for local needs and subsidiarity principle. One interviewee noted that the regions within the EU are so diverse, and their goals and challenges are so varied that they are difficult to reconcile, making it important for COR to try to foster them and to inform the European Commission of the challenges and perceptions at local and regional level. Some interviewees claimed that the CoR should communicate using local channels and media to better inform local and regional authorities on the available opportunities (funding or otherwise). The role of the CoR in facilitating the exchange of experience and knowledge between local and regional governments (i.e. by publishing guides in EU languages, organising conferences, publicising best practices) was stressed by ECF and EPF.

An expert from Eurocities pinpointed the role of CoR in analysing whether the obligations in transport policies (such as the adoption of SUMPs) comply with the principle of subsidiarity. Moreover, the CoR should emphasise the role of European regions and, for instance, advocating for the upscaling of SUMPs to SRUMP (Sustainable Regional and Urban Mobility Plans), considering the regional scale as more suitable to address mobility issue and to exchange best practices.

According to an expert from POLIS, the CoR should monitoring EU legislation and be the key institution involving cities and regions at every step of policymaking.

6. Conclusions and recommendations

This chapter includes the key conclusions and recommendations of this study.

Key trends

The future of urban mobility will be marked by multimodality, innovation and digitalisation. It is crucial that cities implement and encourage both low-emissions public transport services and innovative sharing mobility solutions. Facilitating the diffusion and availability of alternative clean fuels and interchanging facilities around the backbone of public transport corridors will also be key with respect to decarbonisation. Digitalisation and big data will be critical for demand management and monitoring purposes and for planning and monitoring resilient infrastructure and services. Used safely and responsibly, as a tool and not as a target, digitalisation will be a primary instrument to improve social equality, targeting the solution of current gender, generational, and urban/rural-periphery disparities/difficulties.

An integrated approach is necessary to strengthen the link between urban planning and transportation. Evolving into carbon neutral, safer and healthier cities will require fostering behavioural change and integrating active mobility (especially, cycling) in the urban street landscape by making it attractive and easy to use. This should be paired with a reduced car use in urban areas by implementing measures such as car-pooling, effective use of UVARs and rethinking some common practices such as company car culture, which may be undermining the efforts made by LRAs. This would have a positive effect on human health both due to the physical exercise but also as a consequence of the reduced air and noise pollution. Moreover, cleaner, high frequency and high-quality public transport, and in particular urban rail transit, which is one of the motorised transport modes that contributes to GHG emissions in cities the least, can also contribute significantly to urban regeneration and decarbonisation. Furthermore, SUMPs show potential to contribute to the EU decarbonisation goals. This potential is determined based on the scope, ambition and consistent implementation and monitoring and evaluation of each plan and the ability to take into account local specificities. Importantly, the SUMP concept is sufficiently flexible to allow LRAs to account for local needs and challenges. Additionally, they need to receive continued technical and financial support from both national and EU level. It is important to ensure that all LRAs have equal access to EU financing should the adoption of a SUMP become a prerequisite.

Connecting regions shall remain the ultimate target of European policies on transport and mobility for an inclusive mobility. The benefits from the development of a Single European Transport Area and of a European Maritime

Space will be more evident if the completion of an interoperable and high-quality European infrastructure is made available to all citizens, minimising differences in terms of accessibility within the EU and its regions. The presence of core urban and transport nodes should be valorised in regional contexts as an opportunity for the regions, Member States and the EU to pursue not only the targets of the Sustainable and Smart Mobility Strategy, but more generally the European Green Deal objectives and the United Nations Sustainable Development Goals.

Urban logistics and freight transport in general have a huge impact on urban traffic and air quality and it should be tackled. The raising popularity of online shopping and home deliveries in recent years, especially as a result of the COVID-19 pandemic, have put a significant strain on urban areas and have made working towards meeting decarbonisation goals more challenging. A number of solutions, such as the use of Urban Consolidation Centres, which optimise deliveries, integration of parcel lockers into mobility hubs, electrification of delivery vans and use of cargo bikes have already been implemented or piloted in EU cities and should be popularised and scaled up to address this issue.

Leadership and governance

Public authorities need to engage in a dialogue with new private mobility providers, to explore possible ways of fruitful cooperation and thus best respond to the current challenges of urban mobility. While the public sector should not leave public policy to the private sector (whose role is not to define and guarantee such policies), it cannot ignore the initiatives of the private sector and the growing involvement of customers in the real time fruition of shared mobility services and MaaS.

Better integration of urban nodes into TEN-T network is an opportunity for LRAs to reinforce and fund their sustainable mobility policies, while accounting for local specificities and needs. By being involved in the corridors' governance, core urban nodes can better contribute to the integration of long-distance and first and last mile passenger and freight transport. This is important, as many cities struggle with planning beyond the city boundaries and harmonising the rules at regional level and many rural areas and villages lack easy access to their nearest large town or city. In this respect SUMPs might well extend beyond the administrative borders of cities, functional urban areas involving a whole region or even more regions and cross-border territories, also according to the operations and impacts of the transport nodes therein located. Financing is a very important aspect with respect to urban nodes both with respect to the expected requirement to develop and implement SUMPs in all urban nodes and in terms of having the sufficient conditions to ensure effective integration into the TEN-T network.

The European Committee of the Regions has an important role to play. By informing LRAs of relevant developments and opportunities via local channels and in local languages and transmitting information about local challenges and drivers to the European Commission, it has the ability to improve the take-up of EU initiatives and concepts and facilitating the feedback loop between local, regional, national and EU levels. CoR also has a role in facilitating the exchange of experience and knowledge between local and regional governments (i.e. by publishing guides in EU languages, organising conferences, publicising best practices).

Aspects of effective urban mobility governance

Urban mobility governance encompasses a complex network of stakeholders and functions. To fully understand the urban mobility governance structure, it is important to explore the main categories of stakeholders (see Figure 7 overleaf).

Source: Ramboll, based on The Shift Project work on mobility decarbonisation (2021-2022)

Figure 6. Relevant stakeholders within the urban mobility governance framework

Below, we present the four main functions of the stakeholders as identified as part of this study.

Capacity building

It could be challenging for policymakers to stay informed of all relevant developments and opportunities at EU and national level, as well as with the latest scientific and technological solutions and innovations. For this reason, supporting capacity building and exchange of experiences and best practices, as well as the use of clear and easily accessible communication channels are important for supporting effective urban mobility governance. The European Commission has an important role to play in this respect as it has been engaged in such activities for years – they have generally been well-received and should be continued. Similarly, national authorities need to ensure that local and regional policymakers have the relevant resources and access to opportunities to perform their tasks.

Data governance

Data is essential for measuring progress and making improvements accordingly. In this respect, it is important to further refine and implement SUMI and to monitor the effectiveness of SUMPs within and across urban areas, and it should be encouraged and supported. In this respect, the European Commission should continue its planned work on SUMI and should ensure that LRAs, with the support of national authorities, have the necessary resources to collect and monitor data and to ensure that changes are implemented accordingly.

Data is also growing in importance within the context of delivering mobility services that meet the needs of EU citizens. In this respect, the safe and responsible handling of data is paramount and should be of very high priority. With citizens supplying data and businesses handling it, policymakers at EU and national level should provide further clarity regarding data ownership and safety.

Multi-level planning and regulation

Urban and regional transport planning should be well-integrated within the wider national and EU transport and mobility context, as well as with other policies and plans (climate plans, urban planning, housing policy). National and regional policymakers need to be engaged in harmonising the different policies, ambitions and plans. The EU is responsible for setting a clear strategy for the decarbonisation of urban transport, which should be coupled with a buy-in among and support from national and regional authorities, whose role is translating the EU ambitions to the local context and introducing new regulatory instruments to reinforce the existing urban mobility toolbox should be fostered. Similarly,

organisations such as the CoR and some of those interviewed in the context of the study play a key role in shaping the relevant work and in enabling the functioning of the governance framework.

Implementation and financing

The implementation of EU and national urban mobility strategies and policies would be very challenging without the use of the necessary technical and financial tools. EU funding (e.g. CEF and Horizon 2020 funding, urban mobility infrastructure projects financed by ERDF) is essential in this respect and should be continued, while ensuring that it goes towards the most effective projects.

In view of these findings, it is important to reflect on the main question of this study on the interlinkages between the local and the European dimension of urban mobility in working towards reaching the decarbonisation objectives set out in the European Green Deal, the Sustainable and Smart Mobility Strategy and the new Urban Mobility Framework, while accounting for the principle of subsidiarity. Urban mobility planning is a complex issue, which requires a tailor-made approach which accounts for the local needs and specificities of each context and, as shown in Figure 7, involves a diverse network of stakeholders engaged in multi-level governance. It is clear from the findings that the European Commission plays a key role in setting a common vision and goals, enabling capacity building, and providing technical and financial support. It should also be noted that, in some regards, more specific precisions from the EU level could have the potential to trigger the policy changes which are essential at LRA level for the delivery of the mobility transition, but which may otherwise be difficult to deliver in practice. This must be carefully reconciled however with the nature of urban mobility as a decidedly local issue which will continue to rely primarily on the work of LRAs, with closer and more direct cooperation with the national and EU levels becoming an increasingly essential prerequisite for delivering the intended changes within the target timeframe. In their role in defining and enacting policies, LRAs must be able to actively engage with the relevant public authorities (national and regional/EU), and increasingly with private actors in order to adapt to ever-changing needs and technological trends. Our assessment of developments in the urban mobility sector reflects the changing role of LRAs in this context, where the pace of innovation is increasingly placing them at the forefront of designing and coordinating local policies in response to the rapidly changing urban mobility landscape. As guarantors of the public interest, EU, national and local and regional authorities together have the competences and tools required to define the form of service-related policies. Exploiting the full potential of innovation here will require a new vision of growth and public service, the encouragement of co-governance and a new vision of mobility. Finally, according to the findings, institutions such as the COR should continue to facilitate the two-

way transmission of initiatives, concepts and experiences between the EU and the LRA levels in order to help ensure an enabling framework where EU initiatives sufficiently account for and are supportive of local needs and efforts, and to foster exchange of experience and knowledge between LRAs.

7. Annex I (presentation of the main findings and recommendations)

Provided separately.

8. Annex II (bibliography)

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