EU Urban Mobility Observatory

UVAR AND SUMPS

Regulating vehicle access to cities as part of integrated mobility policies

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IMPRINT

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Guide to the reader

This document provides guidance on Urban Vehicle Access Regulations (UVARs) within the framework of Sustainable Urban Mobility Planning (SUMP). It aims to help cities understand how UVARs can be effectively integrated into the SUMP process as part of a wider strategy to promote sustainable and inclusive mobility.

The guide explains how UVARs, such as Low-Emission Zones (LEZ), congestion charging or pedestrian access restrictions, can help cities achieve cleaner air, safer streets, more efficient use of public space and an improved quality of life for residents. It highlights the importance of linking access regulations with broader urban mobility objectives, citizen engagement and monitoring processes.

The guide is based on the concept of SUMP, as outlined by the European Commission's Urban Mobility Package[1] and described in detail in the European SUMP Guidelines (third edition)[2]. It follows the updated concept for SUMPs introduced in the 2023 National SUMP Support Programme (NSSP) Recommendations (COM 2023/550), which provide the latest framework for coherent, integrated and inclusive urban mobility planning across Europe. The SUMP Guidelines are currently being updated to reflect this new approach[3].

SUMP is a strategic and integrated approach for dealing with the complexity of urban transport. Its core goal is to improve accessibility and quality of life by encouraging a shift towards sustainable mobility. SUMP promotes fact-based decision-making guided by a long-term vision for sustainable mobility. This requires a thorough assessment of the current situation and future trends, a widely supported common vision with strategic objectives, and an integrated set of regulatory, promotional, financial, technical and infrastructure measures whose implementation should be accompanied by reliable monitoring and evaluation. Unlike traditional planning approaches, SUMP places particular emphasis on citizen and stakeholder involvement, policy coordination between sectors (transport, land use, environment, economic development, social policy, health, safety, energy, etc.), and close cooperation across different levels of government and with private actors.

This guide, together with other thematic SUMP documents, contributes to a growing European knowledge base that supports cities in developing and implementing sustainable urban mobility strategies. This knowledge base is regularly updated with new guidance and examples of good practice, which are available through the European Commission's Urban Mobility Observatory portal: https://urban-mobility-observatory.transport.ec.europa.eu/index_en

[1] Annex 1 of COM(2013) 91.

[2] Rupprecht Consult - Forschung & Beratung GmbH (editor), Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan, third edition.

[3] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32023H0550&qid=1744907287945#anx_1

Executive Summary

Urban Vehicle Access Regulations (UVARs) are increasingly used by European cities to address congestion, air quality, climate objectives, road safety and urban liveability. Measures such as low- and zero-emission zones, congestion charging, limited traffic zones and pedestrian areas are now widespread. As their scale and impacts grow, UVARs can no longer be treated as standalone regulatory tools but must be embedded within comprehensive Sustainable Urban Mobility Plans (SUMPs).

This Topic Guide provides updated guidance on integrating UVARs into the SUMP framework, reflecting major policy, regulatory and technical developments since 2019. It responds, in particular, to the 2024 recommendations of the Expert Group on Urban Mobility (EGUM), the reinforced SUMP framework introduced by the 2023 National SUMP Support Programme (NSSP) Recommendation, and the revised TEN-T Regulation, which strengthens SUMP obligations for urban nodes and emphasises planning at the functional city level. Together, these developments call for more coherent, predictable and inclusive approaches to vehicle access regulation aligned with EU objectives on climate neutrality, digitalisation, competitiveness and social fairness.

The guide frames UVARs as part of a balanced package of 'push and pull' measures within SUMPs. When combined with improvements in public transport, walking, cycling and urban freight solutions, UVARs can support behavioural change, modal shift and more efficient use of urban space. At the same time, UVARs may raise concerns related to equity, accessibility, business continuity and public acceptance. These issues require early stakeholder engagement, proportionate impact assessment and the design of appropriate complementary measures.

Structured around the SUMP principles and planning cycle, the document offers practical guidance on how to address UVARs during preparation and analysis, strategy development, measure planning, and implementation and monitoring. It also highlights key cross-cutting topics, including governance, urban freight, occasional visitors, funding and the future evolution of UVARs in an increasingly digital and interoperable mobility system.

Overall, this Topic Guide supports cities in designing UVARs that are transparent, user-friendly and aligned across administrative boundaries, contributing to cleaner, safer and more accessible urban mobility systems.

1. Introduction

1.1. About this document

This revised Topic Guide responds to the evolving European policy and regulatory context for UVARs and their integration within SUMPs. Since the publication of the first edition in 2019[4], both the planning framework and the technical landscape for UVARs have evolved substantially.

The update is driven by the work of the Expert Group on Urban Mobility (EGUM)[5], which established a dedicated UVAR subgroup to advance coordinated approaches to city access management across Europe. Its 2024 recommendations[6] call for updated guidance aligned with the revised TEN-T Regulation and the new SUMP-planning obligation for 431 urban nodes on the TEN-T network to develop and implement SUMPs. While the TEN-T Regulation does not mandate the planning of UVARs, it emphasises that SUMPs should take a functional-city perspective, extending planning considerations beyond administrative boundaries. Where cities choose to include UVAR-related measures within their SUMPs, these should be developed coherently with national frameworks and EU-wide objectives. EGUM's recommendations therefore underline the importance of integrating UVARs more systematically into local mobility planning—where relevant—and ensuring that access management supports wider EU priorities on climate neutrality, digitalisation, competitiveness and social fairness, while remaining efficient, equitable and predictable for businesses, freight operators and citizens.

The 2024 EGUM UVAR Recommendations also underline the need for an updated guide on integrating UVARs into the SUMP framework. This revised Topic Guide responds to that need by supporting cities in balancing congestion reduction, air-quality improvements and business continuity in line with the revised TEN-T requirements and the reinforced SUMP framework.

Purpose and focus of this revision

The revised guide aims to:

- Clarify the motivation and context for updating the previous (2019) edition, demonstrating how UVARs have evolved from isolated local measures to essential components of integrated, SUMP-based mobility planning that extends beyond city boundaries.
- Translate the EGUM UVAR Recommendations and new policy expectations into practical guidance for planners, outlining how to integrate UVARs throughout the SUMP cycle, from analysis and strategy development to

[4] https://urban-mobility-observatory.transport.ec.europa.eu/system/files/2023-11/uvar_and_sumps.pdf

[5] https://transport.ec.europa.eu/transport-themes/urban-transport/expert-group-urban-mobility_en

[6] https://transport.ec.europa.eu/document/download/f7926735-a48b-4be3-b0a0-189420b8e0f8_en?filename=EGUM-Recommendations-UVAR.pdf

measure planning, implementation and monitoring.

- Reflect the updated SUMP concept introduced by the 2023 Recommendation on NSSPs[7], ensuring coherence between national frameworks, local action and European objectives.

Key policy and strategic developments since 2019

Since the first guide was published in 2019, several key policy and regulatory developments have reshaped the context in which cities design and implement UVARs. These developments take place within a broader vision of multimodal connectivity and sustainable urban transport, guiding how cities integrate UVARs into wider mobility planning.

- The Smart and Sustainable Mobility Strategy (SSMS)[8] and the 2021 New Urban Mobility Framework (UMF)[9] set the overarching direction for Europe's transition towards cleaner, digital and more inclusive transport systems. The UMF provides the strategic framework for urban mobility and includes specific recommendations on the design, governance and interoperability for more efficient UVARs. It emphasises the need for coherent approaches across Europe to ensure that local access regulations support the EU's wider objectives on climate neutrality, digitalisation, competitiveness and social fairness.
- The 2024 EGUM UVAR Recommendations[10] provide an updated reference framework that outlines best practices and possible actions for establishing and operating UVARs. The 2025 EGUM Work Programme, including the *City Access for Businesses Subgroup*, will build on this work by addressing the specific challenges faced by businesses, freight operators and the tourism sector in relation to UVARs and other city and beyond city boundaries related topics.
- The 2023 NSSP[11] Recommendations update the SUMP concept and its eight principles, providing a harmonised methodological and institutional framework that strengthens the integration of UVARs into SUMPs.
- The Letta Report (2024)[12] 'Much More Than a Market – Speed, Security,

[7] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32023H0550&qid=1744907287945#anx_1

[8] https://transport.ec.europa.eu/document/download/be22d311-4a07-4c29-8b72-d6d255846069_en?filename=2021-mobility-strategy-and-action-plan.pdf

[9] https://transport.ec.europa.eu/system/files/2021-12/com_2021_811_the-new-eu-urban-mobility.pdf

[10] https://transport.ec.europa.eu/document/download/f7926735-a48b-4be3-b0a0-189420b8e0f8_en?filename=EGUM-Recommendations-UVAR.pdf

[11] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32023H0550&qid=1744907287945#anx_1

[12] https://european-research-area.ec.europa.eu/sites/default/files/documents/2024-

Solidarity', provides a comprehensive reflection on how the Single Market must evolve into a fairer, greener and more digital space. It highlights the growing importance of city access regulation for the functioning of the Single Market, emphasising that fragmented information systems and inconsistent enforcement across borders risk undermining fairness and predictability for both citizens and businesses. The report calls for harmonised data flows, transparent communication and coordinated EU action, priorities that have also been emphasised by the European Commissioner for Transport.

- In parallel, the legislative environment affecting UVARs continues to evolve. The ITS Directive (2023/2661)[13], the Real-Rime Traffic Information (RTI) Delegated Regulation (2022/670)[14], the Cross-Border Enforcement Directive (2024/3237)[15] and the Single Digital Gateway (SDG) Regulation (2018/1724)[16] together establish important digital and operational frameworks for sharing, verifying and communicating access-related information. While the CBE Directive enables cross-border data exchange for specific violations—such as speeding, school-zone infringements, and non-compliance in bicycle and pedestrian zones—it does not currently cover LEZs or ZEZs. This gap continues to pose challenges for the exchange of vehicle data for vehicle compliance demonstration and enforcement. Both the SDG Regulation and the ITS Directive play a catalytic role in improving the availability and quality of UVAR-related road information. These instruments require Member States to make UVAR data available in machine-readable DATEX II format through National Access Points (NAPs), to publish access-related rules and procedures via the *Your Europe* portal, and to improve the interoperability and accessibility of UVAR information for road users. Collectively, they contribute significantly to the digitalisation and harmonisation of UVAR information provision across the EU.
- The growing social dimension of UVARs highlights the importance of equitable access, proportionality and the prevention of transport poverty. Policymakers are expected to complement access regulations with supportive and alternative mobility measures that safeguard travel options for vulnerable groups. Addressing these social implications is essential to ensure legitimacy, inclusiveness and public acceptance of UVAR policies.
- UVARs have enabled many European cities to comply with EU air-quality legislation, preventing premature deaths and reducing illness-related productivity losses. They help protect Europe's historic centres and cultural heritage, supporting

05/LETTA%20Report%20-%20Much%20more%20than%20a%20market_April%202024.pdf

[13] http://data.europa.eu/eli/dir/2023/2661/oj

[14] http://data.europa.eu/eli/reg_del/2022/670/oj

[15] http://data.europa.eu/eli/dir/2024/3237/oj

[16] http://data.europa.eu/eli/reg/2018/1724/oj

tourism and improving the quality of life for residents. In many cities, UVARs have also reduced congestion, saving millions of hours otherwise lost in traffic and contributing to a more efficient, liveable and attractive urban environment.

- The role of city access management is increasingly recognised as both an enabler of the internal market and a key factor affecting tourism due to their interconnection. The EGUM UVAR Recommendations (2024) underline the specific challenges this creates for UVARs, particularly regarding first- and last-mile access.
- The evolving landscape of citizen feedback shows that concerns about proportionality, fairness, enforcement and communication remain central to local debates on UVARs. Enhancing transparency, improving data accuracy and prioritising user experience will be essential for building public trust and securing long-term compliance.

Supporting EU initiatives and projects

This guide also builds on DG MOVE's extensive body of work and related EU research and innovation projects, which have progressively advanced the practice of UVAR implementation:

- The ReVeAL project (Regulating Vehicle Access for Improved Liveability)[17] (2019 – 2022) explored how UVARs interact with changing mobility patterns, governance structures, user expectations and technological innovation. The project developed practical tools, policy recommendations and case studies to support cities in integrating access regulations into SUMPs.
- The Dynaxibility4CE project[18] built on ReVeAL's findings by helping cities and regions respond to emerging mobility challenges, including UVARs, Mobility as a Service (MaaS) and Connected, Cooperative and Automated Mobility (CCAM), within a SUMP-based framework. The project supported pilot cities such as Kraków and Parma in testing dynamic access management approaches, improving coordination between UVARs and wider sustainable mobility goals, and developing transferable tools for other European cities.
- Complementary initiatives such as UVARBox (2020-2022)[19], UVARExchange (2021-2023)[20] and UVARTech Mapping (2023-2024)[21] have advanced the state

[17] https://civitas-reveal.eu/about/

[18] https://programme2014-20.interreg-central.eu/Content.Node/Dynaxibility4CE.html

[19] *User-friendly information tool on urban and regional access regulations schemes – Final report*, Publications Office of the European Union, 2025, https://data.europa.eu/doi/10.2832/897453

[20] *Preparatory action – User-friendly information tool on urban and regional vehicle access regulation schemes 2 UVAR Exchange – Final report*, Publications Office of the European Union, 2023, https://data.europa.eu/doi/10.2832/654463

[21] European Commission: Directorate-General for Mobility and Transport, AustriaTech, MAPtm, Panteia and TRT, *Mapping study on digital and technical solutions to enable more effective and user-friendly UVARs – Final report*, Publications Office of the European Union, 2025, https://data.europa.eu/doi/10.2832/7516051

of practice in digitalisation, cross-border data exchange and signage harmonisation. These initiatives have enhanced the interoperability of UVAR systems, enabling the provision of consistent, machine-readable and user-friendly information to citizens, logistics operators and service providers, as well as mapping technical and digital solutions to support user-friendly vehicle compliance demonstration for more seamless UVAR implementation.

Collectively, these initiatives have strengthened the European approach to UVARs, moving from conceptual development and stakeholder dialogue to practical implementation and digital integration. They demonstrate how the European Commission and its partners have built a shared foundation to support cities to design and manage UVARs in line with the SUMP process and broader EU objectives. Whilst the European Commission supports both road users and cities towards more efficient UVARs, the implementation and planning of UVARs falls under national and local competence under EU principles of subsidiarity.

Structure of this guide

Reflecting these policy and technical advances, this Topic Guide translates the accumulated knowledge into a practical framework for planners and decision-makers.

The guide begins by setting the scene, defining the UVAR concept and introducing a typology. It explains how UVARs relate to the policy objectives that cities aim to achieve (section 1.2) and describes their close interdependence with the SUMP process (section 1.3).

Chapter 2 places UVARs in the context of the eight SUMP principles.

Chapter 3 links UVARs to the SUMP cycle, covering preparation and analysis (3.1), strategy and development (3.2), measure planning (3.3), and implementation and monitoring (3.4).

Finally, Chapter 4 explores five cross-cutting UVAR-related topics: stakeholder ownership, acceptance and buy-in (4.1); UVARs and freight (4.2); UVARs and occasional visitors (4.3); UVARs and SUMP funding (4.4); and how UVARs might evolve (4.5).

The document concludes with a glossary.

1.2. What we mean when we talk about UVARs

UVARs can be broadly defined as 'measures to regulate motor vehicular access to urban infrastructure'. Several techniques and typologies have been adopted across urban areas to regulate vehicles' access to urban infrastructure[22].

In addition to physical interventions that either prevent vehicles from entering a street or defined zone (e.g., barriers) or slow all traffic within a zone (e.g., 30 km/h zones or

[22] COMMISSION STAFF WORKING DOCUMENT A call for smarter urban vehicle access regulations Brussels, 17.12.2013 SWD(2013) 526 final

woonerfs[23]), UVARs can also restrict or regulate some or all types of traffic through policy or pricing mechanisms. They can be grouped into five broad categories:

- Pricing: vehicles are charged to enter or travel within a defined area. Variations include urban road tolls, congestion pricing, cordon pricing, area pricing, and urban kilometre charges.
- Vehicle emissions: vehicles are regulated in a defined area based on their pollutant levels (e.g., Euro 3 and above; no diesel vehicles; etc.). Variations include Low-Emission Zones (LEZ), Ultra-Low-Emission Zones (ULEZ), and Zero-Emission Zones (ZEZ).
- Residential/historic centres: vehicles are restricted in a defined area based on the drivers' relationship to that area, such as residents, shop or business owners, etc. Variations include Italy's ZTL (restricted traffic zone) and Spain's superblocks.
- Pedestrian areas: all motor vehicles are prevented from entering a street or zone, while pedestrians are allowed. Typically, bicycles are permitted, and deliveries are allowed within a narrow time window. Variations include exceptions for bicycles, deliveries, maintenance vehicles, and a limited number of residents of the block or street.
- Lorry and/or delivery regulations and restrictions.

The design and implementation of UVARs fall under national competence (subsidiarity). Where local traffic restrictions are introduced, they must be proportionate and non-discriminatory. Moreover, proper planning with accompanying measures, impact assessments and public consultations with impacted stakeholders, is essential to ensure efficient, more seamless and user-friendly UVARs.

When UVARs are implemented, they should be integrated into a broader transport and mobility plan, with a local or regional SUMP serving as the ideal framework. UVARs should be designed not only as local instruments but as part of a coordinated approach that extends beyond the functional city, ensuring consistency with surrounding areas and regional networks. They support the promotion of sustainable mobility measures, help regulate traffic flows and contribute to compliance with air quality legislation, all of which are key SUMP objectives.

[23] https://www.woonerfgoed.nl/int/Childstreet_files/StevenSchepel.pdf

Best Practice Example

Stockholm's congestion charge: cutting traffic and improving air quality

UVARs in Stockholm (Sweden) have made the city more accessible – reducing queueing time by between 30% and 50%, and traffic volumes by between 20% and 25%. In addition, reductions in dangerous emissions such as carbon monoxide (14%), PM10 (13%) and volatile organic compounds (13%) have resulted in air quality improvements across the city

More information: https://urban-mobility-observatory.transport.ec.europa.eu/resources/case-studies/stockholm-achieving-sustainable-mobility-using-urban-vehicle-access-regulations_en

In the framework of SUMPs, the following ways of classifying UVARs can be useful as an example:

Table 1. UVARs classification

Scheme objectives	– Air quality improvement and noise mitigation – Congestion reduction – Road safety (linked to access control and traffic calming technologies) – Climate change mitigation – Quality of life and attractiveness – Redistribution of road space (linked to dynamic traffic management) – Raising revenues – Compliance with legal frameworks (air quality, emissions)
Targeted vehicles for compliance checking	– Vehicle pollutant/emission classes – Vehicle type categories (cars, vans, HGVs, two-wheelers) – Freight and service vehicles – Residents / authorised vehicles
Type of access regulation	– Emission-based access (LEZ, ULEZ, ZEZ) – Access restrictions (time-based, location-based, category-based) – Charging schemes (congestion, pollution) – Dynamic access (enabled through digital tech)
Time period	– Permanent (24 hours a day, 7 days a week) – Weekdays vs weekends – Seasonal – Peak times or partial day – Reactive (e.g. during high pollution episodes) – Occasional (e.g. during large events)
Technological options for implementation and enforcement **(often used in combination)**	Existing / widely used UVAR compliance technologies – Automatic Number Plate Recognition (ANPR) for vehicle license plate detection – most used compliance technology – ANPR linked to vehicle registration databases – Digital Permitting Systems – online portals – Electronic Tolling Technologies – Radiofrequency identification (RFID) / Dedicated Short Range Communications (DSRC) Tags plus ANPR – Physical Access Control (Bollards, Barriers, Gates)

- ANPR linked to mobile apps for parking
- Physical Access Control (Bollards, Barriers, Gates) – with or without ANPR
- Automated License Plate Readers (ALPR)

Emerging / potential future UVAR compliance technologies

- Smart tachograph
- Cooperative Intelligent Transport Systems (C-ITS)
- Extended Vehicle - ExVE
- EU sticker (virtual) + ANPR
- GNSS based monitoring (distance or time based)
- UVAR wallet
- EU Digital wallet
- App-commercial solutions
- Infrared images for identifying heatwaves from vehicles to determine if they are electric
- Deep learning/AI image-based vehicle recognition

Measures such as the pedestrianisation of neighbourhoods and city districts, as well as traffic circulation and road-space arrangements that limit through traffic, can support cities in designing urban mobility policies. UVARs have often been developed in order to preserve historical centres, mitigate traffic emissions, enhance liveability and reduce congestion. Historically, these objectives have frequently served as the starting point for UVAR implementation. UVARs can also enable the repurposing of public road space, e.g., to provide more space for bus lanes or amenities due to reduced congestion, or as an alternative means of limiting traffic or emissions.

Beyond restricting access, UVARs can also act as levers for behavioural change, encouraging shifts toward public transport and active mobility. By making car use less attractive in certain contexts — through pricing, vehicle restrictions or access limitations — and combining these measures with improvements in public transport, walking and cycling infrastructure, UVARs create incentives for more sustainable travel choices. This approach not only supports environmental and congestion-reduction objectives but also strengthens the overall effectiveness of the SUMP by aligning access management with modal-shift and liveability goals.

The following table presents the main UVAR types and illustrates how each can support different policy objectives.

Table 2. Policy objective and possible support UVAR

Policy objective	Type of UVAR
Air quality improvement	Low-Emission Zones (LEZ), Ultra-Low-Emission Zones (ULEZ) Zero-Emission Zones (ZEZ) Access restrictions based on emission class Time-window access for high-emitting vehicles
Congestion reduction	Congestion charging Area-based or cordon-based access restrictions Traffic-calming access rules Time-window restrictions Limited Traffic Zones (LTZ)
Climate change mitigation	Zero-Emission Zone Emission-based access restrictions Freight access regulations supporting zero-emission logistics
Noise mitigation	Night-time HGV restrictions Time-window delivery regulations Pedestrian zones Access restrictions on heavy vehicles
Road safety	Pedestrian zones Traffic-calming access restrictions HGV restrictions or time windows Access rules around schools or vulnerable locations
Redistribution of road space	Access restrictions that reduce traffic volumes Pedestrian zones Area-based vehicle limits enabling reallocation of space to active modes and public transport
Economic efficiency / business continuity	Dynamic access rules Time-window delivery regulations Clear, predictable access regimes for logistics and service vehicles
Revenue generation (where applicable)	Congestion charging Pricing-based access schemes Urban tolling
Quality of life	Any of the above, when combined with improvements to public space, active mobility and public transport

Cities are constantly adapting their appreciation of public space. With urban populations growing, economic activity expanding, greater space required for amenities, increasing mobility demands and the emergence of new mobility providers (with new vehicle concepts), urban space has become the city's scarcest resource. Regulatory measures are currently used primarily to address congestion, air quality and noise issues. However, as the need for mobility grows, so does energy consumption. In parallel, cities and countries across Europe are pursuing climate neutrality in transport, which is leading to an increased focus on promoting modal shift. This transition is giving rise to a new generation of UVARs, which are increasingly being implemented and refined across European cities.

Best Practice Example

Smart Ways to Antwerp: keeping the city accessible

Modal shift targets of European cities. By 2030, the greater Antwerp transport region (Belgium) including one of Europe's largest ports, aims at a modal share of 50% sustainable trips for persons and freight. The Antwerp figures are based upon the projected growth of mobility in view of the available infrastructure: Antwerp is going through a substantial road infrastructure investment programme, but even then, the infrastructure will only cope with demand if a large number of private motorised trips are shifted to more space- and energy-efficient modes.

For more information: https://www.slimnaarantwerpen.be/en/about-us

They include kerbside management, dynamic space and pricing management; LEZ and ZEZ, as well as hybrid schemes that combine measures such as congestion charges with emission standards. Temporary or single-street level measures, such as cycle streets, living streets and school streets are not addressed in this document, which is more focused on traffic regulation schemes targeting several streets, neighbourhoods or entire city districts. While parking is one of the tools used to regulate access to urban areas, it is not included in this document, as it is comprehensively covered in a SUMP Practitioners Guide on Parking[24][25]. In the context of UVARs, where access is restricted, parking provision, parking policy and the parking control and payment system should be aligned and supportive of the UVAR.

[24] SUMP Practitioners Guide on Parking

[25] https://transport.ec.europa.eu/document/download/c4a12bc7-788a-4307-bc7f-64335927ff7d_en?filename=EGUM_Recommendations_Parking.pdf&prefLang=sl

1.3. Discussing UVARs in the framework of SUMPs

The central goal of a SUMP is to improve the accessibility within urban areas and to provide high-quality and sustainable mobility and transport to, through and within the urban area. A SUMP promotes the balanced development of all relevant transport modes while encouraging a shift towards more sustainable options. The plan puts forward an integrated set of technical, infrastructure, policy-based, and soft measures to enhance performance and cost-effectiveness in achieving the overall goal and specific objectives[26].

As noted earlier, the updated European policy framework — particularly the revised TEN-T Regulation and the 2024 EGUM UVAR Recommendations — reinforces the need for cities to plan and implement UVARs as part of comprehensive SUMP strategies that extend beyond the functional city. For practitioners, this means that UVARs can no longer be treated as isolated regulatory measures; they must be designed in coordination with wider urban-node objectives on greening, digitalisation and accessibility, ensuring alignment between local actions and national or European priorities. In practice, this reinforced framework requires UVARs to be planned from a wider connectivity perspective, taking into account first- and last-mile access, viable alternatives for those affected, the risk of transport poverty, and the need for predictable access that supports competitiveness in the Single Market.

There is a functional interdependency between SUMPs and UVARs. For a high-impact and sometimes controversial measure such as a UVAR, it is beneficial to implement it within the framework of an integrated, long-term plan. SUMPs provide the framework to ensure that the UVAR is embedded in supported by the city's coordinated and comprehensive transport policy. When planned and communicated jointly, this approach allows the UVAR to be developed with sufficient parking or improved public transport, encourages the use of sustainable modes or freight solutions, and supports measures to mitigate potential negative impacts, including socio-economic effects. This can support the overall acceptance and ownership of the UVAR scheme. In many urban areas, this also requires new forms of cooperation between municipal, regional and national authorities, as responsibilities and mandates for access management, enforcement and public transport are often distributed and not always clearly aligned.

At the same time, SUMP objectives can often only be achieved by introducing UVARs or other scaled access-management solutions that reduce the number or type of vehicles within a given area of the city. Integrated solutions combine 'pull and push' measures, pairing incentives and infrastructure for sustainable behaviour with measures that actively restrict undesired behaviour.

[26] https://urban-mobility-observatory.transport.ec.europa.eu/sustainable-urban-mobility-plans/sump-guidelines-and-decision-makers-summary_en

Although UVARs might originate from other policy fields, such as environment and climate, their implementation and effects are situated within the mobility sector and must therefore be aligned with SUMP principles of participation, monitoring and evaluation.

Practitioners should therefore consider how UVARs contribute to a balanced set of actions that support both environmental and economic goals — limiting congestion, improving air quality and ensuring business continuity — in line with the expectations for TEN-T urban nodes. Chapter 3 of this guide provides further operational guidance detailing how UVARs can be developed and managed throughout the SUMP cycle.

Examples of key objectives that can be achieved through UVARs include:

- Space reallocation for public transport, cycling, walking and other urban functions (e.g., green and public spaces, retail, businesses, and restaurants, bars).
- Road safety improvements, e.g., through time windows or zonal regulations for Heavy Goods Vehicles (HGVs) or by reducing traffic volumes or speeds, resulting in fewer crashes and fewer severe injuries.
- Air quality improvements through Low-Emission, Ultra-Low-Emission, Zero-Emission or Traffic Limited Zones, which help reach stipulated EU air quality standards or limits advised by the World Health Organisation (WHO) on emissions.
- Quality of life improvements through maintaining access to but reducing the ability to drive through a district (reduced permeability), e.g., the superblocks approach.
- Reducing congestion, also resulting in several secondary benefits, such as better air quality, lower energy use and less noise.
- Economic development by means of congestion relief, market creation for new freight operational models, etc.
- Noise reduction, such as through HGV restrictions at night or reducing traffic volumes.
- City image and improvement through an overall reduction of car dependency and use.
- Progress in working towards climate goals.
- Positive overall effects on public transport use, fleet characteristics, sustainable mobility and freight operations.

In practice, UVARs are rarely designed to address a single goal. Most schemes pursue several of these objectives simultaneously, reflecting the integrated, multi-level nature of sustainable urban mobility planning.

Best Practice Example

Vitoria Gasteiz: superblocks for people-centred mobility

The city of Vitoria Gasteiz (Spain) has introduced a Superblocks scheme aimed at enhancing mobility and improving citizens' quality of life by reducing the negative impacts of extensive private car use and promoting better use of public space. A Superblock is a delimited city area designed and regulated to ensure the safe co-existence of pedestrians, cyclists and private car traffic. The Superblocks scenario allocates up to 70 per cent of public space to pedestrians and cyclists. The scheme has demonstrated great potential to reduce levels of harmful emissions as well as noise levels.

For more information: https://www.urbanagendaplatform.org/best-practice/mobility-and-public-space-plan-vitoria-gasteiz

Best Practice Example

Groningen: traffic circulation plan for a cycling city

Groningen (the Netherlands) provides an early example of people-centred urban mobility planning. Its traffic scheme, first introduced in 1977, made it one of the first cities on the continent to implement the Buchanan principles, introducing the concept of road hierarchy and its connection to acceptable motorised traffic volumes and street design. This approach led to the restriction of through traffic in the city centre and the creation of a more bike-friendly environment. The traffic scheme can be seen as the starting point for Groningen's development into one of the most bike-oriented cites in Europe, with cycling accounting for around 60% of all trips.

For more information:
https://kennisbank.crow.nl/public/gastgebruiker/PARK/Effecten_van_parkeermaatregelen/7_Groningen-centrum/17530

2. The eight SUMP principles in the context of UVAR

To be effective, UVARs should be designed and managed within the wider framework of SUMP. The eight SUMP principles – as defined in Recommendation 2023/550 (C(2023) 1524)[27] – provide a consistent foundation for ensuring that UVARs contribute to sustainable, inclusive and well-integrated mobility systems within and beyond the functional city. The following section outlines how each principle applies specifically to UVAR planning, implementation and evaluation.

1. Clear and measurable goals and objectives

UVARs must be grounded in specific, transparent, and measurable objectives, such as improving air quality, reducing congestion, enhancing safety, mitigating climate impacts and supporting liveability. Clear objectives enable cities to choose proportionate measures, identify necessary accompanying actions (e.g. improved public transport, cycling provision or freight solutions), and communicate the purpose of the UVAR in a way that builds public trust and encourages compliance. Defining measurable goals also allows cities to assess effectiveness and adjust the scheme where needed.

2. Long-term vision and a clear implementation plan

While UVARs often address urgent problems—such as pollution exceedances or unsafe traffic conditions—they must fit within a broader long-term vision for sustainable, accessible and liveable urban environments. This includes a phased implementation plan with realistic timelines, transparent communication of milestones and consistency with wider SUMP strategies such as modal shift, digitalisation, and the reallocation of road space. Planning should anticipate effects beyond the immediate area and consider political cycles, ensuring continuity and predictability for residents, businesses and visitors.

3. Assessment of current and future performance

Effective UVAR design requires a proportionate, evidence-based assessment of existing conditions and projected future impacts. This includes analysing traffic patterns, air quality, safety data, accessibility, parking dynamics, freight operations, and socio-economic implications—both inside and beyond the regulated area. Scenario analysis, modelling and pilot schemes help cities test design options and anticipate unintended consequences such as traffic diversions or increased parking pressure. Early assessment strengthens acceptance and supports robust decision-making.

4. Integrated development of all transport modes while prioritising the most sustainable options

UVARs should be embedded in a multimodal mobility strategy that strengthens sustainable alternatives to restricted vehicle use. This means integrating access regulations with improvements to public

[27] L_2023073EN.01002301.xml

transport, walking, cycling, shared mobility, and MaaS. UVARs can act as a lever for behavioural change, but only when they are supported by attractive alternatives that maintain accessibility and equity. Integration should also ensure that reallocated road space supports buses, active modes, greening and public-realm improvements.

5. **Integrated approach to passenger mobility, urban freight transport and logistics**

UVARs impact both passenger and goods transport. A coherent SUMP-UVAR approach should therefore integrate passenger and freight mobility, covering service vehicles, last-mile logistics, delivery windows and zero-emission freight solutions. UVARs should facilitate efficient, predictable and socially equitable logistics operations while advancing climate and air-quality objectives. Measures such as freight consolidation centres, micro-hubs, clean fleets and coordinated access rules can help to reduce negative impacts on businesses and maintain essential services.

6. **Participatory approach and coordination with other relevant initiatives**

Public acceptance is essential for UVAR success. Planning should involve early and continuous stakeholder engagement, including residents, businesses, retailers, logistics operators, emergency services and neighbouring municipalities. UVARs should be coordinated with other local, regional and national initiatives such as parking policies, public transport plans, digitalisation strategies, TEN-T urban node requirements and environmental regulations. Clear, accessible communication—supported by digital navigation tools and interoperable data sharing—enables all users to understand and comply with access rules.

7. **Monitoring, review, reporting and quality assurance**

Monitoring and evaluation should be embedded from the start and aligned with the SUMP monitoring framework. Cities should track progress with clear indicators on air quality, congestion, safety, economic impacts, accessibility and user satisfaction. Monitoring must include neighbouring areas to capture indirect effects. Transparent reporting builds trust and accountability. Regular reviews allow cities to adapt exemption rules, enforcement procedures and accompanying measures, ensuring that UVARs remain fair, effective and proportionate over time.

8. **Guidance and support at European level**

UVAR planning increasingly relies on harmonised EU-level frameworks, particularly in areas such as digitalisation, signage, data standards, interoperable information provision and vehicle-compliance tools. The revised TEN-T Regulation, along with the ITS and CBE Directives and the Single Digital Gateway Regulation, sets common expectations for communicating, enforcing and integrating access rules within wider mobility systems. European-level guidance—including the work of the EGUM groups and NAPs—supports cities in designing UVARs that are consistent, predictable and user-friendly for residents and cross-border travellers alike.

3. SUMP steps for UVARs

3.1. Preparation and analysis

The first step of the SUMP cycle involves assessing UVAR measures through a comprehensive analysis of the current mobility system, clarifying whether and how UVARs can help address the city's key mobility challenges and support its SUMP objectives. This analysis should examine transport, environmental, social and economic dimensions in an integrated manner, identifying where access regulation can complement other SUMP measures as part of a balanced 'push and pull' strategy.

Given the evolving European policy context, including the revised TEN-T Regulation, which requires coordinated planning at the functional city level, the analysis should also consider how UVARs interact with broader territorial and functional dynamics. This is particularly important given the growing emphasis on greening, digitalisation and business continuity.

For every city, the preparation phase should investigate not only the problems to be addressed (e.g. congestion, air quality exceedances, unsafe streets, pressure on public space), but also the structural drivers behind them: commuting patterns across administrative boundaries, logistics flows, urban form, and socio-economic conditions influencing mobility choices. Particular attention should be given to how UVARs can balance limiting through-traffic or high-emission vehicles, improving air quality and safety, while ensuring essential access for people, business continuity and services remains both functional and fair.

ReVeAL tool 'AccessRegulationsForYourCity'

Decision support tool for implementing UVARs

AccessRegulationsForYourCity is a decision-support tool designed to assist cities considering the implementation of UVAR measures. It helps planners define UVAR schemes that are suited to the city's current context and aligned with its long-term mobility objectives.

It consists of 14 questions, which can be completed in about five minutes by a city representative with knowledge of the local mobility context and goals. Based on the responses, the tool filters the 33 UVAR 'building blocks', i.e., UVAR design measures identified in the ReVeAL project and suggests those which best suit the local situation. This makes it a practical first step in the assessment phase, as it helps cities quickly identify which UVAR options may be the most relevant to them.

For more information see: http://accessregulationsforyourcity.eu/tool/

In defining the expected impact of the UVAR, it is important to recognise that it can serve multiple purposes over time. While it can provide immediate solutions to urgent problems, such as air quality levels that violate safety standards, it can also generate long-term benefits, including modal shift, improved quality of life, and increased city attractiveness.

Moreover, UVARs can respond to diverse issues across different geographic scales and institutional levels, from municipal departments to cross-border authorities. For example, at the local level, they can support objectives such as the preservation of historic centres or the expansion of pedestrian areas in commercial areas. At the broader scale, UVARs can tackle challenges that extend across and beyond the city administrative boundaries, including poor air quality or congestion caused by peak-hour commuting.

In addition to identifying the prospective role of a UVAR in the urban mobility system, the analysis should also assess the availability of alternatives to private vehicle use. While a UVAR consists of charging, banning, or otherwise preventing certain vehicles from entering a designated zone, it can also reduce private vehicle trips outside the UVAR target area, as the modal choice for a trip is made at the point of origin. Encouraging a choice of modes other than the private car helps to reduce traffic not only within the UVAR target area, but throughout the whole city and beyond its administrative boundaries.

In the absence of viable alternatives, however, a UVAR can have negative boundary effects; for example, it can create parking pressures or displace traffic to just outside the zone. As such, it is important that attractive alternatives to driving are available or that they are implemented as complementary measures, allowing cities to reap the full benefits of UVARs and limiting negative externalities.

Planners should recognise that while UVARs deliver societal and individual benefits, they can also create direct or indirect financial disadvantages and raise social inclusion concerns. These impacts often affect low income, car-dependent individuals living outside the urban centre. At this stage, specific attention should be given to assessing whether viable alternatives to private vehicle use are available to all groups affected by UVAR, and how benefits and burdens are distributed. Based on this, complementary measures (discussed further in section 3.3.) can then be devised accordingly, to compensate those who would need to significantly alter behaviour, and especially to support the financially vulnerable or at risk of social exclusion.

Lastly, in the set-up stage, the city's readiness for UVAR should also be assessed within the national context from both a technological and legal standpoint. This includes reviewing the existing legal framework and regulations governing vehicle monitoring and identification, as well as examining whether the city already has technology or ITS systems in place that could support the deployment, compliance assessment of vehicles and enforcement of the UVAR.

In parallel, the baseline analysis should consider differences in UVAR design and

implementation across Member States, as these can strongly influence local feasibility and public acceptance. For example, Italy has about 600 Limited Traffic Zones[28], Germany has more than 35 Low-Emission Zones[29], and only a few cities, such as Stockholm, Milan and Gothenburg, have congestion charging schemes.

Enforcement practices also vary widely, with ANPR systems commonly used in Italy and Sweden, while many Eastern European cities still rely on stickers or manual checks. Furthermore, vehicle classifications are not consistent across countries. These differences can create confusion for residents and visitors and should be taken into account as part of the problem definition.

Guiding questions for the analysis set-up

Guiding questions to assess the suitability of UVAR to address the city's mobility issues

- What kind of change is expected to be triggered? And where?
- What is the scale of the area in which you want to implement these changes?
- If you are considering challenges across the whole functional city, what existing inter-municipal coordination structures can be leveraged?
- Are the policy priorities clearly defined? Is the legal context in place for UVARs? How can the UVAR be financed?
- What types of vehicles or users will be affected by the UVAR (long/short distance commuters, students, access to residential or commercial areas, large or small deliveries, residential or commercial delivery, etc.)? What is the attitude to and availability and current uptake of alternatives to private vehicle use? How is this affected by demographics and the socio-economic situation of the travellers?
- Which mobility / accessibility (or other) issue(s) may arise from the implementation of the UVAR? What unintended impacts are possible? What is planned over the coming years in terms of improvements in this regard?
- What data is available for the city to take informed decisions? How connected are the users and the vehicles using the urban road network? Are there technology or ITS systems in place (owned by the city) that can be used to deploy the UVAR?

In this context, local authorities are invited to carry out an impact assessment that examines the expected effects of the measure from an environmental, social and

[28] https://www.mit.gov.it/normativa/autorizzazioni-per-le-zone-traffico-limitato-ztl-ai-comuni

[29] https://gis.uba.de/website/umweltzonen/#uwz

economic perspective. The depth and complexity of this assessment should be proportionate to the type of UVAR under consideration. A small pedestrian area, for example, may require a simple qualitative appraisal supported by qualitative scoring, expert judgement or targeted stakeholder input. By contrast, larger-scale schemes (such as LEZ or congestion charging zones) may justify more detailed assessments, including quantitative modelling, cost–benefit analysis or multicriteria evaluation, where suitable tools and data exist.

The aforementioned analysis should review the broader SUMP objectives and incorporate targets and indicators that reflect both the current performance of the urban transport system and the expected impacts of future measures. Understanding how the mobility system performs today is essential for identifying which actions can deliver the changes needed to achieve the policy goals set by the SUMP. The analysis should also consider the wider sustainable mobility objectives and include indicators that highlight the most problematic areas of urban mobility in relation to those objectives.

Best Practice Example

Dutch zero-emission zones for freight (ZEZ-F): cost–benefit analysis

In 2025, 14 Dutch municipalities introduced zero-emission zones for freight (ZEZ-F) as part of their urban logistics decarbonisation policies. The expected impacts were evaluated through a cost–benefit analysis covering:

- **Air pollution and carbon emissions** (NO_2, PM10, PM2.5, CO_2) within the regulated area, monetised through avoided health-related costs.
- **Business costs** associated with fleet transition, comparing diesel vs. electric vans via total-cost-of-ownership. This required tracking the number of freight trips within the zone and their length.
- **Municipal costs**, including ANPR infrastructure, signage, and digital enforcement systems.

Additional impacts were assessed qualitatively, including **accessibility changes** (e.g., detours in delivery tours), **effects on public space and liveability, business climate implications, traffic safety, innovation dynamics, and changes to national fuel-tax revenues**.

For more information:
https://www.opwegnaarzes.nl/media/pages/gemeente/kennisbank/literatuur-en-onderzoek/4099355b3e-1726572369/nul-emissiezone_stadslogistiek_2025_-_kosten_en_baten_vier_archetypen_-_samenvatting_resultaten.pdf

3.2. Strategy and development

In this phase, the planner should consider whether the UVAR is needed, or whether other measures could be implemented at a similar cost and are more or as effective. It builds directly on the problem definition and scenario analysis of the previous phase, ensuring that UVARs are positioned as part of a coherent response to the identified mobility challenges rather than an isolated stand-alone measure. Stakeholder involvement with local citizens, non-residents, businesses, and public authorities is key for this phase, as the basis for future buy-in and acceptance will be created here. This is the phase in which the planner needs to ensure that push and pull elements of the SUMP are well balanced and that a UVAR is incorporated and integrated within the SUMP.

It may be challenging to make the link between the vision and the access regulation explicit. The planner will have to explain that the positive, aspirational image of a city's future mobility system can only be achieved when certain vehicle types and numbers are rerouted or excluded from certain areas in the city. To support this, UVAR dimensions should be embedded in the scenario-building work carried out during this phase, ensuring that the alternative futures clearly reflect the role and impact of the access regulation. Where available, modelling tools could be used to simulate different policies to assess how UVARs interact with broader sustainable mobility strategies.

Stronger emphasis should be placed on the importance of clear governance frameworks and the establishment of long-term UVAR roadmaps. Experience across Europe shows that well-defined national frameworks provide cities with the stability and clarity needed to implement access regulations effectively. Italy and the Netherlands offer good examples, as their national frameworks help cities such as Milan, Rome, Amsterdam, and Utrecht coordinate actions, align objectives and maintain public confidence. In contrast, countries without such structures might be exposed to fragmentation and lower acceptance.

To provide greater certainty for people and businesses, phased UVAR roadmaps should be embedded in city strategies. Amsterdam's plan to move progressively from LEZ to a citywide ZEZ by 2030 demonstrates how long-term planning can create predictability and support forward-looking investment decisions. Such trajectories should be communicated early, showing when standards will tighten and how exemptions or transitional regimes will evolve.

Digital communication should also be integrated from the outset. Harmonised roadside messages, variable message signs and digital navigation updates can help ensure that access rules are clear and consistent, especially for cross-border travellers who may be unfamiliar with local regulations.

Finally, participatory approaches should be explicitly included. Citizen engagement mechanisms — such as local 'mobility dialogues' that link UVAR restrictions to improvements in public transport or street safety — have proved effective in increasing understanding and acceptance. In Rome, for example, presenting new bus service

upgrades alongside the expansion of Limited Traffic Zones (LTZs) helped residents recognise the benefits and foster greater public support. Participation should also reflect the functional scale of the mobility system: consultations must therefore involve stakeholders outside the planned UVAR area, including non-residents, foreign travellers, freight operators and coach operators, as UVAR impacts frequently extend beyond its boundaries. Their involvement is important to ensure the city remains accessible to occasional visitors, freight, and tourism, and to ensure the role of UVARs in local, regional and international mobility and economic networks (this aspect is further developed in section 4.3).

When UVARs are designed to evolve over time, this evolution should be discussed with stakeholders early and communicated transparently to the public. Changes may involve adjusting exemptions, expanding or modifying the zone, or tightening access rules. Clear communication ensures that residents and companies who are not initially affected can still anticipate future standards and adapt their vehicle choices or travel behaviour accordingly.

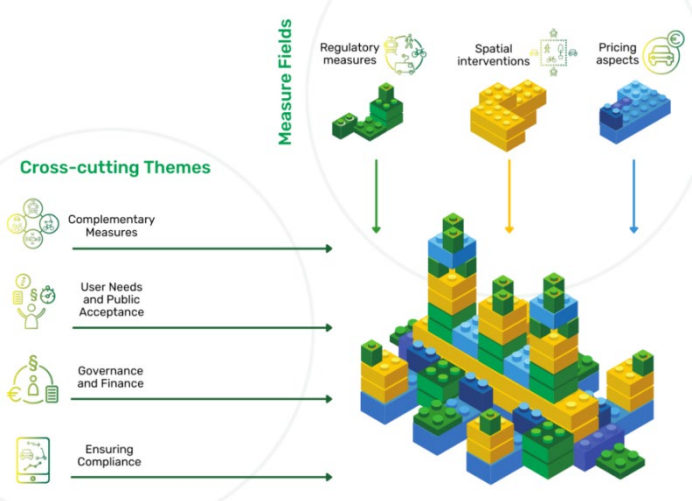
3.3. Measure planning

The measure planning phase of the UVAR involves defining the specific characteristics of the measure to be implemented, along with any complementary actions. Various scenarios may be developed and assessed in terms of their transport, environmental, social, and economic impacts. At this stage, public consultation should also be carried out, and a clear communication strategy should be designed to foster public acceptance and compliance (see section 4.1). For larger scale UVARs which have an impact beyond city boundaries, a coordination structure should also be set up, bringing together all relevant public authorities, including neighbouring local governments beyond that implementing the UVAR.

The specifics of the UVAR measure must be defined according to the city's characteristics, the current state of the mobility system and the city's strategy and objectives, as identified in sections 3.1 and 3.2. The UVAR specifics to be defined include: the boundaries of the zone in which the UVAR will apply, and its access characteristics, including the targeted vehicles, the type of regulation, the scheme design, the regulated time period, and the technological options for implementation and enforcement, as described in Table 1 in section 1.2.

ReVeAL Building Blocks

Mix and match components to fit your goals



UVAR schemes can be found in multiple forms and combinations that adapt to the characteristics and needs of each local context. In the ReVeAL project, UVARs were broken down into their essential components identifying 33 'building blocks' grouped into three categories: spatial interventions, pricing measures and regulatory measures. The building blocks can be combined—within or across the three measure fields—to create a UVAR package that responds to the specific mobility needs and policy objectives of a given area.

For each building block, the project developed a detailed factsheet containing practical information such as examples, guidance on design and implementation, ensuring compliance, and other useful insights. These factsheets can also be accessed through the AccessRegulationsForYourCity tool referenced in section 3.1 of this Guidance document.

For more information see: http://accessregulationsforyourcity.eu/tool/

During measure planning, relevant **complementary measures** to a UVAR should be developed. Complementary measures support a planned UVAR by ensuring access of people, goods or services into the UVAR area while maintaining the goal of the UVAR of limiting access to certain classes of vehicles. Within a SUMP, a UVAR is a regulatory and restrictive 'push' measure, whereas complementary measures act as the 'pull' measures that facilitate access to restricted areas through alternative modes or other forms of support. They ease compliance and help users adapt to the new regulation, thus creating the ideal **package of measures** to achieve policy goals.

Complementary measures can be of several types[30]:

- Complementary sustainable mobility measures, such as improved public transport, walking/cycling facilities, freight hubs, shared mobility, or additional parking outside the UVAR zone.

[30] Expert Group on Urban Mobility, 2024 & ReVeAL project, 2022

- Financial or in-kind incentives, such as grants for retrofits or exchanging parking/access permits for sustainable mobility vouchers.
- Exemptions for people with disabilities, emergency vehicles, inter-city coaches, or residents.
- Organisational support or other solutions based on the local situation; examples include pilot projects to support adaptation to the UVAR, linking service providers to one another, adapting the UVAR operating times or organising joint procurements.

When selecting complementary measures for a UVAR scheme, planners should consider cost-efficiency and fairness, as these measures help address the financial and social disadvantages caused by restricted private vehicle access—particularly for low-income, car-dependent residents outside the urban centre.

UPPER Toolbox

Linking UVARs to investments in PT-oriented infrastructure

UPPER promotes UVARs as part of a coherent SUMP strategy, rather than as standalone restrictions. The Toolbox helps cities **link vehicle-access restrictions** (e.g. LEZ, limited-traffic areas, congestion charges) to **positive measures** — especially in **public transport (PT), active mobility and intermodal hubs**. This integrated approach ensures UVARs are not seen merely as punitive (restricting access), but as **enablers of sustainable modal shift** into improved mobility alternatives. One of the Toolbox's good practices is to earmark UVAR benefits for enhancements in public and shared transport, cycling, and pedestrian infrastructure. This creates a **virtuous cycle**: access regulation reduces car traffic → improved air quality and space → increased opportunity for PT and active mobility → enhanced accessibility → reduced need for car use.

For more information see: www.upperprojecteu.eu/wp-content/uploads/2024/09/D3.5-UPPER-UVAR-toolbox_For-submission-3.pdf

Best Practice Example

London's ULEZ: grants for retrofitting and scrapping non-compliant vehicles

In London (United Kingdom), the ULEZ expansion was paired with a targeted scrappage scheme plus reinvestment into buses, walking and cycling to compensate lower-income and car-dependent people in outer suburbs. The scrappage fund launched in 2023 helped low-income Londoners, disabled people, charities, sole traders and small businesses scrap/retrofit non-compliant vehicles; the scheme paid out ~£194m and removed/updated >53,000 older vehicles. Applicants could also convert part of the scrappage payment into an annual public transport pass.

For more information: https://content.tfl.gov.uk/scrappage-scheme-factsheet-sep2024.pdf

Best Practice Example

Brussels' 'Prime Electric Utility Vehicle' scheme

The Brussels-Capital Region (Belgium) operates a subsidy program to promote the adoption of electric utility vehicles by small and medium-sized enterprises active in eligible sectors. Launched in 2022, the scheme provides financial support for the purchase of electric utility vehicles—either to expand or replace existing fleets—and the installation of charging infrastructure. The intervention consists of a base contribution amounting to 5% of the cost of the purchased vehicle, which can be increased through additional contributions linked to specific policy priorities. A 40% contribution is available for replacing vehicles affected by Brussels' LEZ restrictions. Subsidies are capped at €16,000 per vehicle, with annual limits of three vehicles and three charging stations per beneficiary.

For more information: https://economie-emploi.brussels/prime-utilitaire-electrique

Combining a UVAR with other measures can facilitate political negotiations and enhance public acceptance. A well-balanced package of accompanying measures also demonstrates to citizens that policymakers care about those being asked to change their behaviour. With the right mix of measures and well-timed implementation, the overall impact of the UVAR can be significantly increased.

For those UVARs generating revenue, the accompanying measure package can be funded by the scheme's anticipated revenue. Road users then see how their contributions are reinvested in the transport system's continued improvement. It should be noted that most UVARs do not generate revenue but will cost money to implement and run. Indeed, cities should prefer compliance to the

revenue from fines paid, as this means their objectives are being met.

As part of the SUMP process, assessing alternatives and selecting complementary measures should ensure that the area subject to the UVAR remains accessible to people and goods coming from outside the UVAR target area, including from beyond the city borders. Complementary measures may fall under the responsibilities of regional or national authorities, as well as neighbouring municipalities. For instance, improving public transport may require the involvement of the local transport authority or adjacent municipalities. Effective deployment of the UVAR and its complementary measures therefore requires a coordinated approach across the entire urban area, making the establishment of a governance structure among local authorities essential. Establishing inter-municipal working groups enables authorities to align objectives, conduct stakeholder consultations across municipalities, and agree on timelines for communication campaigns and complementary actions.

Best Practice Example

Milan's Area C: revenue reinvestment into sustainable modes

In 2012, Milan (Italy) introduced Area C, a congestion charge in the city's central area, amounting to 7.50 EUR/day for cars. Revenue from the measure is earmarked by law for sustainable mobility. Funds have gone into expanding bus and tram lines, purchasing electric buses, improving metro frequency, financing cycling lanes and bike parking facilities. Some categories are exempt from the charge, including those serving persons with disabilities. Residents within the restricted zone are allowed a limited number of free entries per year. Car-sharing vehicles are also exempt, promoting a reduction in private car ownership in the city.

For more information: https://www.comune.milano.it/aree-tematiche/mobilita/area-c

Ensuring compliance is a key aspect of the measure-planning phase. Compliance depends not only on enforcement but also on the clarity and accessibility of UVARs and their rules. Users—particularly occasional visitors and foreign drivers—are more likely to comply when information is accurate, machine-readable and interoperable across systems[31].

Cities should therefore ensure that access rules are published in harmonised, machine-readable formats (e.g. DATEX II), made available through National Access Points (NAPs), and communicated clearly via signage, digital platforms and navigation tools. Digital permits and vehicle-eligibility registries support drivers in determining whether they are compliant before entering

[31] UVARTech mapping study

the zone. Complementary measures (e.g. alternatives to car use), combined with targeted communication, further strengthen compliance and reduce unintentional violations.

Enforcement, by contrast, concerns the legal and institutional mechanisms used to act on non-compliance. The choice of enforcement approach must reflect the local legal framework, available resources and cultural context. Options include automated systems such as ANPR cameras, physical barriers, radio-frequency identification tags (RFID) and visual on-street inspections. Automated enforcement requires greater upfront investment but enables systematic and consistent checks; visual enforcement is less capital-intensive but labour-intensive and limited in coverage. All enforcement measures must comply with relevant EU and national legislation, including the General Data Protection Regulation (GDPR) and the Data Protection Law Enforcement Directive[32], as well as national data-protection rules. When a specific option is widely used in a country or region, acceptance, interoperability and harmonisation all increase. Familiarity usually also helps to achieve higher acceptance for a system. Lastly, cultural contexts determine how much enforcement is required. In some countries, UVARs are less likely to be complied with unless strong and visible enforcement is present; elsewhere, high compliance rates may be achieved with the sole use of road signs.

A key challenge is cross-border enforcement[33]. As data exchange between Member States is not yet fully harmonised, many cities still rely on pre-registration systems for non-resident vehicles, which can burden visitors and reduce user-friendliness. Improved interoperability, harmonised data standards and clearer legal pathways for exchanging vehicle and compliance data across borders are essential to support fair, effective and future-proof enforcement.

Evaluation of UVAR Scenarios and Trial Periods

Multiple **scenarios** featuring different UVAR characteristics and complementary measures may be developed, and their **impacts** assessed to support the selection of the most suitable option. As indicated in section 3.1, the depth and complexity of this assessment should be proportionate to the type of UVAR under consideration. When considering complex UVARs, this can be done by modelling the situation both before and after implementation, under the same conditions. The 'before' should have been assessed during the preliminary evaluation conducted as described in section 3.1. Assumptions will be needed for the 'after' situation, which should be based on data as much as possible.

It is crucial that the assessment encompasses environmental, social, and economic aspects, and that performance is evaluated against local policy objectives as well as relevant EU targets. This helps to

[32] Directive (EU) 2016/680 - https://eur-lex.europa.eu/eli/dir/2016/680/oj/eng

[33] UVARTech mapping study

ensure that the proposed regulation does not lead to unintended consequences, such as reduced accessibility or adverse effects on the local economy.

Best Practice Example

Dutch ZEZ-Fs: decarbonizing urban logistics

In the Netherlands, zero-emission zones for freight (ZEZ-Fs) are being deployed to decarbonise urban logistics. Introduced in 18 municipalities as of early 2025 and set to expand to 29 by 2030, these zones restrict access to central urban areas to only zero-emission logistics vehicles, primarily electric vans and trucks. Before deployment, the government conducted a comprehensive cost-benefit analysis (2025–2050) across four city archetypes, classified by size and logistics intensity. The pre-assessment tracked environmental gains, public costs for enforcement and communication, and business impacts, modelling how firms might adapt or resist: purchasing e-vans or trucks, outsourcing deliveries, shifting to cargo bikes, or circumventing restrictions. This behavioural modelling guided the design of targeted subsidies and transitional regimes, ensuring the policy's economic and operational feasibility.

For more information:
https://www.opwegnaarzes.nl/media/pages/gemeente/kennisbank/literatuur-en-onderzoek/4099355b3e-1726572369/nul-emissiezone_stadslogistiek_2025_-_kosten_en_baten_vier_archetypen_-_samenvatting_resultaten.pdf

Future performance can also be explored by means of **trial periods or experiments**. Possibilities include temporary zonal access management, alternative use of street space, events impacting on motorised traffic circulation, and car free days. These can all give an impression of how a city changes when there is less motorised traffic on its streets.

Experimental schemes should be carefully planned, documented and monitored according to the expected impacts, targets chosen and indicators selected.

The results of the pre-assessment can be used to illustrate different options during the public consultation process. Trial periods can also help reduce opposition by presenting the measure as reversible, which lowers initial resistance and allows people to better understand its purpose and impacts (see chapter 4.1).

Evidence shows that public support often increases after implementation and an initial adjustment phase. For example, in London, the expansion of the ULEZ[34] initially faced significant resistance; however, monitoring data published by Transport for London showed that acceptance rose markedly after

[34] TfL ULEZ Monitoring Reports, 2022–2023

the scheme became operational and early air-quality results were communicated, with the share of residents considering the measure worthwhile increasing from around 35–40% before implementation to almost 60% within the first few months.

3.4. Implementation and monitoring

When commencing the rollout of the UVAR, a trial period can be considered. As noted in section 3.3, this can be useful for testing systems and procedures in addition to measuring initial impacts. The trial needs to be very carefully planned and sufficiently funded, as a poorly implemented trial could undermine public trust and acceptance. The implementation should be preceded by appropriate awareness raising to inform users of the upcoming changes to access conditions of the urban road network.

The feasibility of implementation needs to be assessed in the planning phase. Timescales are also important to consider. Planners must ensure that the proposed measures can either be implemented within the electoral term of the current decision-makers or that sufficient cross-party support exists to sustain implementation across multiple electoral cycles.

Monitoring should be linked to the ex-ante assessment of the UVAR, including cost-benefit, feasibility, and cost-effectiveness analyses. The policy objectives, targets, and indicators defined at the start should be maintained and tracked throughout the process. Core and context indicators, such as economic performance, tourism, and retail, should be monitored, alongside perception indicators gathered from surveys or focus groups.

Systematic data collection and transparency are essential. Experience across Europe shows that monitoring practices vary widely: while cities such as London publish comprehensive evaluation reports, many others still focus mainly on basic environmental indicators, and social or economic impacts are seldom made public. Strengthening data-sharing mechanisms and applying common standards can help improve comparability, transparency and harmonisation, ensuring that UVAR performance is assessed consistently across Europe.

Best Practice Example

Salzburg VMS dynamic signage

Recent pilot initiatives have demonstrated the value of real-time monitoring and communication. For example, in Salzburg (Austria), dynamic VMS signage displayed access messages based on vehicle categories, improving driver awareness and compliance. Similarly, digital tools can support adaptive management by providing up-to-date information to both users and authorities.

For more information: https://uvarbox.eu/wp-content/uploads/2022/10/1.-Maria-UVARExchange_overview_oct2022.pdf

Monitoring media coverage and social media feedback on the scheme could also be pursued, as well as direct dialogue with a selected user panel to collect feedback about implementation. Most importantly, in the case of LEZs, pollutant concentration (mainly NO_2 and PM) within and outside the LEZ should be monitored against the limit values set out in the Ambient Air Quality Directive. Primarily, this should be done using data collected by official monitoring stations. However, measurements conducted by citizens using private air quality sensors (although less precise) can indicate wider trends related to pollution changes.

Additionally, remote-sensing technologies, already deployed in several European cities, can support the monitoring of real-world emissions of vehicles entering LEZs. This makes it possible to identify the highest emitters and take targeted action based on real-world data. A re-evaluation of the UVAR should be conducted once its initial objectives have been achieved. At that point, tightening or adapting the access regulation—or even phasing it out, as seen in temporary tolling schemes in the Nordic countries—may be considered to ensure continued alignment with SUMP objectives and evolving mobility goals.

4. Key considerations for UVARs

4.1. Stakeholders' ownership, acceptance and buy-in

As with the SUMP process, stakeholder involvement is an essential part of implementing a UVAR, as it results in a better and more accepted scheme. Consultations can be a source of innovative solutions and can uncover issues not previously considered by planners. The stakeholder involvement strategy should include:

- Identifying relevant stakeholders
- Forms and methods of engagement to be used
- Level of engagement (inform, consult, collaborate or empower) and decisions about which stakeholders to involve at which levels
- Timing of engagement activities (also what information to provide when)
- Required resources (skills, budget, time)
- Ensuring that the voices of all socio-demographic user groups are heard through appropriate channels (e.g. younger and older people, residents and commuters, etc).

As noted in Chapter 3, UVAR impacts often extend beyond the city boundaries. Stakeholder consultation should therefore include groups affected by trips entering from surrounding areas. This means engaging not only residents and businesses, but also commuters, neighbouring municipalities, regional authorities, logistics operators, and other users who regularly travel into the city from surrounding areas. Their needs, trip purposes and potential displacement effects must be considered early, as UVARs can influence travel patterns, freight flows and parking behaviour well outside the regulated zone. Coordination with adjacent authorities helps avoid unintended impacts, ensures consistency of measures, and supports public acceptance across the wider travel-to-work and travel-for-services area.

The following table summarises potential stakeholder groups to be engaged. Stakeholders should represent all transport modes and trip purposes, including both professional and private road users, as well as groups that will benefit from the scheme—even those not required to change their behaviour. Outreach should cover the UVAR area, the entire municipality, and the whole wider area beyond the city boundaries.

Table 3. Possible stakeholder groups to engage

Public authorities	– Authority colleagues in relevant departments – Neighbouring authorities – Other levels of government – Transport authority(s) – Transport operators
Business	– Chamber of commerce – Business and trade – Freight associations – Shopkeepers – Individual businesses, if significantly affected – Transport operators
Other	– Representative associations (e.g. people with disabilities, older people's forums, tourism, car drivers, cyclists…) – Mobility service providers (taxis, ride-hailing, car-sharing and other professional passenger services) should be systematically engaged, given their operational dependency on predictable and fair access conditions – Special groups (e.g., women, elderly, youth, migrants) – Those who contract or hire drivers/vehicles – Interest groups (e.g., NGOs, community groups) – Universities, research institutes – Building occupants – Local, regional, national media – Schools and children – Emergency and security services – Local, and (if relevant) national politicians – General public

Source: ReVeAL project 2022.

Stakeholder engagement should begin early, by convening representatives from key groups to identify initial concerns and priorities. This should be followed by a formal consultation at a later stage, ensuring transparent access to all relevant data. At this stage, the focus should be on the detailed design of the scheme, rather than reopening debate on the overall need for access regulation. It is essential to clearly define the scope of stakeholder influence to avoid raising false expectations, specifying when and where their input is expected and providing sufficient information for informed responses.

Engagement must be structured to ensure that it does not amplify only the voices of those opposing measures that may inconvenience them. A critical assessment is needed to distinguish between legitimate concerns and those based on resistance to change. Care should be taken to ensure that underrepresented voices, such as younger and older people, women, minorities, and people with disabilities, are heard as clearly as those of more powerful actors. Reaching cultural and socio-economic minority groups and ensuring gender balance are key to achieving effective and fair UVAR.

Acceptance and buy-in

There are several good reasons to carefully reflect upon the acceptance of the planned UVAR. Firstly, local policymakers are more likely to support measures endorsed by the electorate. Secondly, poor acceptance or resistance to the UVAR can halt its implementation, even when major public investment is at stake. UVARs are designed to bring substantial positive impacts; therefore, it would be problematic if a scheme was stopped before reaching its goals, or if alternative solutions to the same problems were introduced prematurely. By gaining cross-party support and broader societal acceptance, a UVAR can continue across multiple political cycles.

This section complements the process-oriented guidance of chapter 3 by highlighting specific issues and good practices related to stakeholder ownership and acceptance. It underlines the importance of independent evaluations, transparent communication of results, and the integration of social and economic impacts alongside environmental outcomes. Together, these elements strengthen the legitimacy of UVAR schemes and help cities avoid common pitfalls.

There are several ways to improve acceptance:

- Defining clear and recognised objectives
- Transparent assessment testing different scenarios that reflect the necessity of the implementation of a UVAR
- Early dialogue with stakeholders
- Fair design that guarantees complementary measures and sustainable alternatives as mentioned in chapter 3. The availability of good alternatives to the 'old' travel option is the most crucial step towards publicly accepted UVARs
- The design should also be sufficiently adaptable to enable the UVAR and its package of accompanying measures to be adjusted in light of new or unexpected issues that might reduce acceptance
- Good communication is key. Not only before implementation but also continuing after rollout
- Key politicians or other people who enthusiastically support the UVAR (so-called 'champions', such as trusted stakeholders or community groups) can help rally support for the scheme and facilitate its implementation
- Demonstrations, trials and experiments can help citizens gain an understanding of why the UVAR is necessary and what its impact will be
- Enforcement needs to be balanced and reasonable, with exemptions granted in a justifiable manner
- Clarity about the use of revenues (if any); this prevents the UVAR being seen as a hidden tax
- A phased introduction of the UVAR with gradually tightening standards or expanding zones, can help acceptance. The idea that citizens and road users can gradually adapt their behaviour, and that

fleet owners can plan for improved vehicle characteristics, makes the scheme more acceptable

Cities should also monitor how social and economic impacts evolve alongside environmental improvements. The inclusion of social indicators (such as accessibility, affordability, or effects on local businesses) and behavioural metrics (such as mode shift and perceived fairness) can help create a more balanced narrative about the scheme's success. These findings should be shared regularly with the public through reports, online dashboards or open data portals.

Best Practice Example

Published evaluation reports

Cities such as London (United Kingdom) and Milan (Italy) demonstrate how transparent, multi-dimensional evaluations can strengthen public trust and policy learning. In London, Transport for London and the Greater London Authority publish independent monitoring reports on the ULEZ, presenting evidence of impacts on air quality, vehicle compliance, and social outcomes. For example, The *London-wide ULEZ One Year Report (2024)* shows that the number of older, more polluting vehicles fell by 60%, with NO_x emissions reduced by up to 15% in outer London compared to the non-ULEZ scenario.

Access the report: https://www.london.gov.uk/programmes-strategies/environment-and-climate-change/environment-and-climate-change-publications/london-wide-ultra-low-emission-zone-one-year-report

Similarly, Milan's Area B and Area C schemes are regularly assessed by the Agenzia Mobilità Ambiente e Territorio (AMAT), with findings publicly released by the municipality. Reports highlight a steady 10% decrease in diesel vehicles and an increase in hybrids over two years, while an IEEP (2024) case study also analyses social equity effects and fleet renewal patterns.

Access the report: https://www.amat-mi.it/it/progetti/report-mobilita/

IEEP study: https://ieep.eu/wp-content/uploads/2024/06/Social-aspects-of-low-emission-zones-Milan-case-study-IEEP-2024.pdf

How can acceptance be assessed?

There are several methods, such as surveys, focus groups, and (social) media screening. Cities may also consider partnering with universities or research institutions to conduct independent, recurring assessments of public sentiment. These evaluations should cover how different population groups perceive fairness, accessibility, and benefits of the UVAR.

However, UVAR implementers must accept that 'there will always be opposition'. It is an

art to keep communication lines open – even with those who oppose the measure - to remain factual and transparent, and to run a UVAR scheme that delivers on its policy goals. Once the scheme has been decided on, communication and discussion need to focus on compliance, rather than whether the scheme should be there.

Communication is key!

As mentioned above, good communication is key when implementing UVAR schemes. Once the scheme is confirmed, communication campaigns must be developed to inform drivers about the scheme. Appropriate messaging is key to achieving a high level of compliance with the new UVAR. It can make the difference between a scheme being well accepted or not, as in the example of Stockholm and Gothenburg's congestion charges–the latter obtained weaker public support than the former, due to less effective communication. Communication should occur as soon as possible prior to implementation to give citizens and businesses time to adapt. Practical measures should include:

- The communication strategy should ensure a good mix of communication channels. The messaging underpinning the issue(s) addressed by the UVAR needs to be appropriate to the local context. This works best if the problem is already recognised as something that affects everyone. This may be pollution, congestion, safety, or another issue that is not new to the community where the scheme will be introduced
- Where schemes are reactive (e.g. emergency-pollution schemes), a special focus is needed on disseminating daily information and keeping drivers informed of the changing situation
- A challenge for local authorities is to provide proper information to non-residents, especially if penalties and fines are linked to UVARs' enforcement. Any communication directed at both residents and non-residents must consider the particularities and needs of different groups of road users (see section 4.3)
- Communication and dissemination of information should also include the visibility of UVARs in the digital sphere. Integration of information into route planners and navigation devices should be explored. The National Access Points for digital transport data will enable machine-readable, standardised information on UVARs to be made available to other service providers, such as satellite-navigation devices, route planners, apps or websites. The UVAR requirements of the Single Digital Gateway (SDG)[35], to provide UVAR information on national and city websites linked to and searchable through MyEurope, will help to coordinate the information available EU-wide.

[35] https://ec.europa.eu/growth/single-market/single-digital-gateway_en

4.2. Urban freight: mitigating impacts and supporting efficient logistics

UVARs can significantly affect freight operations and cities should pay specific attention to accompanying measures that maintain efficient logistics while achieving environmental and congestion objectives. Measures such as consolidation centres or first- and last-mile solutions require locations linked to the UVAR zone design. These freight schemes entail more complex value chains than passenger transport. While UVARs may be one factor driving their deployment they must be embedded within urban freight strategies. Regular dialogue between city authorities and the freight sector is essential.

Urban freight stakeholders[36] have identified two types of UVARs as particularly effective in addressing local logistics challenges: LEZ and Congestion Charging schemes. To reduce potential negative impacts on freight operations, several complementary solutions can be implemented, including:

- Urban Consolidation Centre (UCC)
- Cargo bike (CB)
- Off-hour deliveries (OHD)

UCCs are logistics facilities located close to the area they serve (e.g. a city centre, an entire town or a specific site such as a shopping centre complex). Many logistics companies deliver goods there, and it is a central point from which consolidated deliveries are carried out to businesses within that area. Within the UCC, a range of other value-added logistics and retail services can be provided.

The effectiveness of UCCs seems to depend heavily on the presence of appropriate local regulations, including vehicle access rules for the zone covered by the UCC and benefits granted to UCC operators. Public authorities can put legislation or other regulations into place to promote the use of the system being offered. These regulations can be restrictive (requiring or strongly inducing vehicles to use UCC) or founded instead on advantages to users. It should be stressed that this should be linked to dialogue with stakeholders.

Cargo bikes are used for final freight delivery to reduce congestion in cities and are a second mitigating solution for logistics activities in UVAR schemes. Given the advantages (no greenhouse gases emissions, low kerbside space requirements, easy to manoeuvre) and disadvantages (limited payload weight, low travel speed) of cargo bikes, it would appear that they are best suited for the distribution of products with a relatively low bulk density and size, and which only require simple storage or handling requirements.

Suppliers schedule deliveries to meet the demands of their clients. If the retailers require deliveries during normal working hours, most lorry traffic will occur during the most congested daytime traffic periods. If a

[36] 2018, Study on urban logistics – 'the integrated perspective' as consulted on https://ec.europa.eu/transport/themes/urban/studies_en

critical mass of businesses is able to adjust their schedules to accept deliveries when there is less traffic congestion, it could enable transport companies to deliver goods more quickly and at lower cost. This could result in less traffic congestion, reduced cost of goods and economic benefits, whilst also being better for the environment.

Off-hour delivery (OHD) is therefore a third solution. It is a simple concept, but it can be challenging to implement because the benefits and costs are not always evenly distributed. Carriers generally like the idea because it can save them time and money, but customers often resist it because it can add costs. Communities will benefit from lower congestion but may have concerns about night-time noise. Sometimes, special incentives or requirements to mitigate noise disturbance are needed to encourage businesses to participate. An OHD programme needs to be designed in a manner that balances the benefits and costs to make it practical for shippers, carriers, customers and the community alike.

The NOVELOG SULP (Sustainable Urban Logistics Plans) guidelines[37] specify the creation of a multi-stakeholder platform for freight issues in a city: it is a mechanism for industry and local governments to work together in partnership to produce a tangible outcome to localised freight transport problems.

This platform should be established to discuss all freight transport-related issues and not only the UVAR topics. Ideally, the UVAR should not be the first issue the group has to tackle. Instead, it will have been in existence long enough for there to be mutual trust and a productive working environment; conditions required to deal suitably with a major project like the implementation of a UVAR scheme.

Recent examples and tools provide valuable insights into how cities are integrating freight considerations within UVAR design.

Best Practice Example

Delivery of goods

Oslo (Norway) is currently piloting a Zero Emission Zone dedicated specifically to goods delivery, showing how freight-oriented access regulations can accelerate decarbonisation. Similarly, the UPPER Toolbox highlights the use of consolidation centres and micro-hubs to facilitate sustainable last-mile logistics. These approaches have been successfully applied in cities such as Turin and Barcelona, where local authorities combine UVARs with supportive infrastructure for cargo bikes and electric vans.

For more information: https://civitas.eu/news/towards-sustainable-last-mile-delivery-insights-from-green-log-workshops

[37] NOVELOG Sustainable Urban Logistics Plan Guidelines: http://novelog.eu/wp-content/uploads/2018/07/NOVELOG_SULP-Guidelines.pdf

Best Practice Example

Improving coordination

UVARExchange plays a role in improving coordination for freight operators. By promoting harmonised communication through digital tools, such as C-ITS messages and standardised data exchange, UVARExchange ensures that cross-border freight operators receive consistent and real-time information on access rules. This supports both compliance and efficiency in logistics operations.

For more information: https://uvarbox.eu/uvar-exchange https://civitas.eu/news/towards-sustainable-last-mile-delivery-insights-from-green-log-workshops

These emerging practices show that addressing freight explicitly within UVAR planning helps reduce emissions without disrupting supply chains. Integrating freight needs early in the SUMP cycle, through dialogue, digital communication, and supporting infrastructure, is essential to create fair and workable solutions for all urban actors.

4.3. Occasional visitors: tourists, cross-border drivers and non-resident users

UVARs also affect occasional visitors and non-resident road users: those entering a regulated area without being part of the local population or business community. This group includes tourists, business travellers, cross-border commuters, rental car users and international coach passengers. As these users typically come from beyond the city boundaries and may be unfamiliar with local access rules, they often face practical challenges when navigating UVAR systems.

Tourists represent a large and distinct subgroup of occasional visitors. Many do not speak the local language, stay only for a short period and are generally unfamiliar with local access regulation policies. At the same time, tourists tend to value the protection of historic areas and often appreciate car-free centres that enhance the visitor experience. They are also more open to multimodal alternatives when these are convenient, clearly communicated and integrated into tourist itineraries.

Cities should therefore work closely with tourism boards, hotels, cultural institutions, heritage organisations and coach or tour operators to ensure that visitors receive clear and consistent information before arrival, whether through booking platforms, travel agencies, visitor apps or tourist information services.

To maintain good accessibility for visitors while ensuring effective UVAR outcomes, cities can complement access restrictions with dedicated facilities such as perimeter coach parking areas, designated drop-off and pick-up zones, efficient park-and-ride or shuttle services, and strong connections to public transport and shared mobility. These are not UVARs themselves, but they are

essential measures that help occasional visitors navigate access restrictions smoothly and predictably.

Challenges for occasional visitors: information, data gaps and interoperability

Occasional visitors face several recurrent challenges when interacting with UVARs. The main difficulties stem from:

- Inconsistent or unclear information
- Fragmented or incompatible data systems
- Limited cross-border interoperability

Approaches to UVAR rules vary widely across Europe, and in some cases even within the same country, which creates confusion for occasional visitors. Foreign drivers face particular difficulties with incompatible sticker schemes such as Germany's *Umweltplakette* and France's *Crit'Air*, or when penalties are issued long after an offence has occurred. In some cities, incomplete foreign vehicle data limits enforcement. For example, Amsterdam cannot always identify foreign vehicles through existing databases. In others, delayed notification of fines contributes to perceptions of unfairness.

A key source of these challenges lies in the different methods used by cities to identify foreign vehicles. Across Europe, three main models are in use:

- Pre-registration, where drivers provide vehicle information in advance
- On-the-spot physical checks, typically for temporary or low-tech schemes
- Automatic Number Plate Recognition (ANPR) where licence plates are read automatically, and technical vehicle data are retrieved through national or bilateral databases

Each model has limitations, particularly when foreign vehicle data are incomplete, inconsistent or unavailable across borders. Pre-registration, while not ideal from a user-experience perspective, remains the most practical solution in situations where reliable EU-wide vehicle data exchange is lacking. To reduce uncertainty for occasional visitors, cities should strengthen the publication and visibility of UVAR information, especially in harmonised, machine-readable formats, and ensure that rules are accessible through National Access Points and navigation systems.

Practical examples also show how cities are tackling the issue of non-resident compliance and fairness. Milan's Area C allows all vehicles, including foreign ones, to purchase and activate a day ticket online, with clear multilingual information that helps reduce unintended non-compliance. Antwerp requires foreign vehicles entering its LEZ to complete a simple online registration, supported by multilingual guidance, and offers temporary exemptions and post-registration options to ensure fairness. These examples demonstrate how transparent procedures, and accessible digital tools can make UVARs more understandable and predictable for occasional visitors.

Best Practice Example

Clear digital procedures for occasional visitors: Milan (Italy): Area C

Milan's Area C provides a straightforward and transparent way for non-resident and foreign drivers to comply with access rules. All vehicles entering the zone, including those with foreign number plates, can purchase and activate a day ticket online. Multilingual information and simple digital procedures help visitors understand the rules and avoid unintended violations. Milan's approach demonstrates how clear communication, and easy-to-use tools can reduce confusion for occasional users.

For more information:

https://www.comune.milano.it/en/argomenti/mobilita/area-c

Best Practice Example

Fair treatment of foreign vehicles: Antwerp – Simple LEZ registration for foreign vehicles

In Antwerp (Belgium), foreign vehicles entering the city's LEZ must register before entering. Drivers who forget to do so can register up to 24 hours after entry, either online or at one of the LEZ registration machines. Antwerp has invested significantly in multilingual communication to ensure that non-resident drivers are aware of registration requirements, including targeted outreach to neighbouring countries. Clear signage on major access routes, including regional roads, supports consistent information for all drivers approaching the LEZ.

For more information:

LEZ registration overview: https://www.slimnaarantwerpen.be/en/LEZ/registration/overview

Vehicle registration portal: https://www.slimnaarantwerpen.be/en/LEZ/register-your-vehicle

Digital harmonisation and international coach travel

To reduce uncertainty further, greater emphasis should be placed on harmonised digital information on access regulations, consistent signage, and the publication of UVAR rules in machine-readable formats that can be integrated into navigation systems and NAPs. This approach helps ensure that foreign drivers receive accurate and up-to-date access information across borders, reduces confusion, supports transparent

enforcement and contributes to making UVARs understandable and fair for all road users.

International and long-distance coach travel should also be considered. This growing sector faces challenges in meeting emissions requirements and adapting to UVAR access rules. Providing clear routing, parking and access plans can help operators comply efficiently, while retrofitting or upgrading fleets can improve environmental performance.

Addressing the needs of occasional visitors, including tourists, cross-border road users and international coach passengers, is essential to the legitimacy and acceptance of UVARs. Clear information, fair enforcement, digital interoperability and coordinated collaboration with tourism and mobility stakeholders can make access regulations more understandable, predictable and equitable for all users.

4.4. SUMP funding

Implementing and maintaining UVARs requires careful financial planning. This section distinguishes between two main aspects: (1) how to fund the implementation of UVARs, and (2) how to manage and use the revenues once the scheme is operational. Both aspects should be transparent, proportionate, and aligned with wider SUMP objectives.

Funding the implementation

A common misconception regarding UVARs is that they automatically generate revenue for city accounts. However, unless the scheme is specifically designed to raise revenue, such as through congestion charging or infrastructure packages, UVARs should generally not be considered sources of income. In practice, they usually require significant upfront investment, particularly in the early stages of implementation.

Funding the set-up of UVARs can be challenging, particularly for smaller municipalities. Initial costs often include investments in enforcement technologies, such as ANPR cameras and remote sensors, as well as signage, communication and awareness campaigns, and supporting digital infrastructure. These elements are critical to ensure both compliance and fairness, but they can represent a substantial portion of the overall budget.

Examples from cities such as London (United Kingdom) and Milan (Italy) show that external support, whether from national governments, EU programmes, such as CEF or Horizon Europe, or public-private partnerships, can play a decisive role in overcoming these upfront barriers. In some cases, phased implementation has been used to spread costs over time and align spending with other mobility or environmental initiatives.

Authorities should also explore opportunities for integrating systems and infrastructure. For example, enforcement and data platforms used for UVARs can often be shared with other city functions, such as parking management, traffic monitoring or emission reporting, improving both cost efficiency and interoperability.

Funding management and revenue use (self-financing)

Once in place, UVARs can generate revenues through access fees, penalties or differentiated charging mechanisms. However, not all UVARs are designed to raise income. In schemes such as LEZs, the ultimate goal is full compliance, meaning that revenues from fines should decrease over time as cleaner vehicles replace older ones.

Cities such as Stockholm and Gothenburg (Sweden) have used congestion charging not only to cover operating and maintenance costs but also to reinvest in sustainable transport projects, including public transport expansion and cycling infrastructure. In contrast, many LEZs and LTZs remain cost-neutral, as revenues typically do not exceed management expenses.

All financial flows related to UVARs, including investment, operation, and revenues, should be fully transparent. Clear communication about finances helps counter the misconception that UVARs function as hidden taxes and reinforces their legitimacy among citizens and businesses.

The EGUM recommendations emphasise that where revenues are collected, they should be transparently earmarked for sustainable mobility purposes. Communicating how the funds are reinvested, for example, into public transport, air quality improvements or street redesign, is essential to maintain public trust and political support.

The societal benefits of UVARs, including reduced congestion, improved air quality and enhanced road safety, can also be monetised through cost-benefit analyses. Although these benefits may not directly flow into municipal budgets, they deliver clear value to society and to other government bodies, such as health services or regional administrations.

UVARs should therefore be managed in an economic, efficient, and transparent way. The need for upfront financing and long-term operational funding must be reflected in local budget planning, ensuring that the system remains sustainable while supporting broader policy objectives.

4.5. UVAR 3.0: how UVARs might evolve

Europe's transition toward climate neutrality and the rapid uptake of zero-emission vehicles will fundamentally reshape the role of UVARs over the next decade. As air quality improves and the environmental performance of vehicle fleets increases, adherence to pollutant-based norms will probably no longer be the primary reason for introducing UVARs. However, the underlying challenges that UVARs address, including the efficient use of limited urban space, congestion management, road safety, and ensuring predictable city access for businesses, freight operators and coaches, will remain. In this evolving context, UVARs will continue to play an important role, particularly as tools that support modal shift toward public transport and active mobility and contribute to a more efficient and competitive Single Market. Future UVAR strategies will therefore need to balance these objectives while maintaining

fairness, clarity and economic predictability for users.

The time at which current technological developments, such as automation and the transition of vehicle fleets to alternative fuel sources, are likely to have a real impact is beginning to align with the typical SUMP planning period of five to ten years. Local authorities should take this into account when planning UVARs, even when they are implemented to address current challenges.

These are technological trends to take into account:

- There is a clear evolution is underway LEZs towards ZEZs, as demonstrated by cities such as Amsterdam, Oslo and Stockholm. These cities are progressively tightening access rules to align with broader climate neutrality goals. This shift is reinforced by national commitments to phase out conventionally fuelled vehicles, meaning that today's LEZs must be designed with future flexibility in mind.
- The overall environmental performance of vehicle fleets will continue to improve, leading to better compliance with air-quality legislation. However, meeting climate and net-zero objectives will require UVARs to evolve beyond air-quality concerns and increasingly address decarbonisation, energy efficiency, congestion, the use of urban space and road safety. Digitalisation will play a central role in this transition. Automatic Number Plate Recognition (ANPR) is already the most widespread enforcement technology, but cities still face limitations in identifying foreign vehicles due to incomplete or inaccessible data. As long as interoperable cross-border data exchange is not fully available, some form of pre-registration will remain necessary for non-resident road users. Emerging digital identity tools, such as the EU Digital Wallet[38] or verifiable vehicle credentials, have the potential in the future to support secure, reliable and privacy-protecting data exchange. Once mature, these solutions could reduce administrative burdens for drivers and authorities alike and enable more seamless cross-border compliance and enforcement.
- Vehicles are becoming increasingly connected, both to each other and to urban infrastructure. Solutions such as geofencing are emerging and are being trialled in several European cities. In the future, these technologies could support dynamically managed UVARs, for instance by automatically rerouting vehicles, reducing speeds, or switching hybrid vehicles to zero-emission mode when entering specific zones.
- Improved routing and connectivity can make access regulations more seamless and less visible to drivers. Future systems may embed compliance into vehicle

[38] European Commission: Directorate-General for Mobility and Transport, AustriaTech, MAPtm, Panteia and TRT, *Mapping study on digital and technical solutions to enable more effective and user-friendly UVARs – Final report*, Publications Office of the European Union, 2025, https://data.europa.eu/doi/10.2832/7516051

software, meaning that restrictions become 'forgettable' as vehicles will operate automatically within the permitted parameters without the driver's direct intervention.

- Technological and regulatory transitions should be communicated early and clearly. Phased trajectories, such as stepwise tightening of emission standards or progressive expansion of zones, must be announced in advance to prevent residents and businesses from making investments, e.g., in vehicles or logistics systems, that may soon become non-compliant. Transparency about timelines helps ensure fairness and predictability.
- At the European level, several initiatives are supporting this evolution. The Using Urban Vehicle Access Regulations for Reshaping Urban Space (UVAR4US) project, funded under the Driving Urban Transitions Partnership and co-financed by the European Commission, explores how UVARs can contribute to net-zero, liveable '15-minute cities.' UVAR4US develops a shared knowledge base, participation framework, and practical toolkit to support local policy-making, co-created and tested in four Living Lab cities. This approach links UVAR design directly to urban transformation and co-benefits such as accessibility, liveability and equity.
- Digital tools and harmonised communication practices are becoming increasingly important in the European UVAR ecosystem. UVARBox provides a machine-readable, up-to-date repository of UVAR data across Europe, supporting consistent and interoperable information sharing. In parallel, recent European recommendations on UVAR communication emphasise the need for clearer and more harmonised approaches, including the use of standardised information formats, consistent digital signage and, where relevant, C-ITS messages. These improvements strengthen the visibility, accuracy and predictability of UVAR information for both residents and cross-border drivers.

Best Practice Example

Oslo: using a climate budget to manage CO_2 emissions

Oslo (Norway) uses its Climate Budget as a key governance tool to achieve the targets set out in the city's Climate and Energy Strategy. The Climate Budget allocates the city's CO_2 emissions in a similar way to the city's finances. This means that the overall emissions for transport are capped, and measures implemented accordingly. Tolling is implemented to achieve this goal.

More information: https://www.klimaoslo.no/wp-content/uploads/sites/2/2024/01/Climate-budget-2023.pdf

5. Glossary

Congestion Charge (CC): The charge for driving a vehicle within a charging zone. It aims to reduce congestion within a specific area.

Cordon based UVARs: Vehicles are charged as they passed the boundary of an area. This is opposed to 'area-based' where all movements within the zone are charged, which may vary by time of day, direction of travel, vehicle type and location. There can be a number of cordons with different rules/fees (EC, 2017).

Limited Traffic Zone (LTZ): Urban areas where access is regulated by other methods than payment or emissions (retrieved from https://urbanaccessregulations.eu).

Low-Emission Zones (LEZs): LEZs are areas where access is regulated by vehicle emission. The most polluting vehicles are regulated, and usually this means that vehicles with higher emissions cannot enter the area (retrieved from https://urbanaccessregulations.eu).

National Access Points (NAP): A NAP is a mechanism for accessing, exchanging and reusing transport related data, established under the ITS (Intelligent Transport Systems) Action Plan and Directive (EC, 2010).

Permeability: For the purpose of this Topic Guide, permeability describes the extent to which urban forms permit (or restrict) movement of vehicles in different directions.

Push and pull measures: Measures that persuade and incentivise sustainable behaviour are combined with measures that actively prevent undesired behaviour.

Quiet zone (Q-zones): An area where a low level of traffic noise is guaranteed by the reserving access only for low-noise vehicles. (Retrieved from http://www.cityhush.eu/results.html).

Single Digital Gateway (SDG): The Single Digital Gateway will provide easy online access to the information, administrative procedures and assistance services that citizens and businesses need to get active in another EU country (EC, 2016).

Superblocks: A superblock is a geographical space that covers several city blocks. Vitoria-Gasteiz has used the superblock model: Private cars and public transport are kept outside of the superblocks, and the inner streets are redesigned mainly for pedestrian use.

Ultra-Low-Emission Zones (ULEZ): Ultra-Low-Emission Zone is the terminology used in London for a Euro 6/VI diesel, Euro 4 petrol LEZ. In Germany, these have been termed 'diesel bans', and in Belgium as a later phase of the LEZ.

Urban Vehicle Access Regulations (UVARs): These are measures that regulate vehicular access to urban infrastructure (EC, 2013).

Toll Ring: Toll rings are the application of highway tolling schemes that are similar to a cordon but generally applied to regulate access to the entire city. This solution has been implemented in Singapore and in many Norwegian cities. As in the cordon-based schemes, flexibility is a key feature. (EC, 2017).

Zero-Emission Zone (ZEZ): A LEZ where only zero-emission vehicles (ZEVs) are allowed.

6. References

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