

ReVeAL



UVAR Guidance: Mobility Concepts

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1. Introduction

1.1 About the ReVeAL project

Urban vehicle access regulations (UVARs) are one of the tools that can help make cities more liveable, healthier and more attractive for all. The goal of the EU Horizon 2020 project ReVeAL is to support cities producing good practice in UVAR and to add UVARs to the standard range of urban mobility approaches across Europe and beyond.

The ReVeAL project supports UVAR implementation in six pilot cities and is developing a tool to help other cities decide what UVAR measures may be appropriate for them and what to be aware of when implementing. The project is also producing several guidance documents on specific UVAR-related topics.

To find out more about ReVeAL, please see the [ReVeAL website](#).

1.2 Purpose and context of this document¹

There is no one-size-fits-all solution in implementing an UVAR, however ReVeAL has identified four aspects – called *Transition Areas* in ReVeAL – that are relevant to the change process associated with the implementation of any UVAR. These are governance and financing, user needs and public acceptance, mobility concepts and ensuring compliance (see Figure 1).

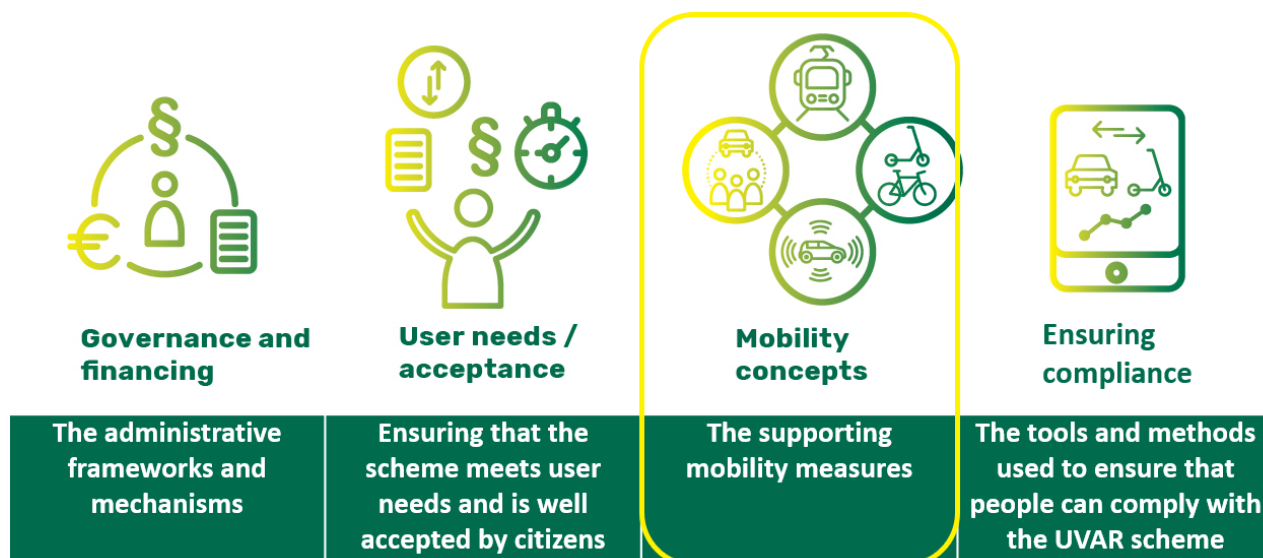


Figure 1: ReVeAL Transition Areas

As these key aspects are relevant to all schemes, we have developed a guidance document for each one. This document addresses **mobility concepts**. The guidance is not intended to tell cities which options to use, but rather to help identify the questions to be asked and the factors to be

¹ This document is for information and guidance. ReVeAL and its partners take no responsibility for any action taken based upon its content.

considered in making decisions. As there are many linkages among the four Transition Areas, it may be worth reading the guidance documents together.

1.3 Definition and scope of mobility concepts

Mobility concepts refer to the mobility schemes (composed by different mobility measures) that may be needed to help enable an UVAR to reach its full potential of positive impact on a city. Such measures aim to accelerate, maximise or introduce significant changes in mobility patterns or mitigate possible negative impacts of an UVAR implementation. Those schemes include **a coherent package of accompanying or interlinked measures** (transport infrastructures, services, policies and technologies) **that support the implementation of a specific UVAR**.

Concretely, they can be classified into the following categories:

1. Improvements in public transport
2. Enhancement of cycling and walking
3. Changes in parking system
4. Enhancement of shared mobility
5. Improvements in urban logistics
6. Zero and low emission vehicles
7. Ticketing and digital support

2. Key aspects

Regardless of its size and type, an UVAR scheme may have an impact on modal split and other relevant transport variables within and beyond the areas in which it is located. This depends on the alternatives provided by the mobility infrastructures, services and policies accompanying the UVAR as well as the options for sustainable logistics.²

Most UVARs should include packages of accompanying mobility measures to continue to enable (appropriate) transport of people, goods and services to and within the zone using permitted transport options when the UVAR restrictions are in place.

Five key aspects are described below that should be considered in the development of an UVAR.

2.1 Understanding your local context

Some cities serve as a regional centre for workplaces, business and public services. Others are cultural centres or tourist destinations which attract travellers from far beyond their borders. A city on a plain is more inviting to an investment in cycling than a hilly one.

Context is essential when selecting the package of mobility measures that will accompany the UVAR process. Several things should be considered while identifying which measures are more suitable to your local context:

- Topography of the city
-

² Goods and commercial traffic are a crucial issue in most cities and alternatives are needed to each operator working independently with its own vehicles.

- Main characteristics (historic, touristic, industrial, financial, mainly residential, etc.)
- Role of the city (core city of the functional urban area, town in the functional urban area, main city without agglomeration, independent town, etc.)
- Urban and demographic structure as well as environmental, economic and social variables (air quality, fleet composition, road safety impacts, etc.)
- Current modal split and allocation of road space between modes
- What are the existing sustainable mobility measures in the city/ functional urban area?
- What is the mobility 'culture' of the city (cycling-friendly, car-dominated)?

2.2 Selecting complementary mobility measures

The right package of measures, together with the right timing, can increase the impact of an UVAR. It can also improve its feasibility. Every UVAR should put forward an integrated set of technical, infrastructural, policy, and soft measures related to different mobility concepts in order to improve performance and cost effectiveness with regard to the declared goal and specific objectives. The plan should be a balance between services, opportunities, rules and restrictions.

When selecting a specific mobility measure (or a package of measures), it is important to consider:

- How will the planned supporting measures respond to the issue(s) arising from the implementation of the UVAR measure? Is the timing appropriate (preferably before the UVAR is implemented)?
- Has the planned supporting measure been used in the past? Was it successful?
- Does the city have the competence and resources to implement the measure?
- Does the implementation of the planned supporting measures (or package of measures) address the actual user needs? (see [ReVeAL guidance on user needs](#))

In 2012, Milan introduced the congestion charge scheme, **Area C**, replacing the previous pollution charge "Ecopass" based on the same designated traffic restricted zone. The congestion charge is a €5 fee charged to vehicles entering Milan's city centre between 7:30 and 19:30 (Monday to Friday) and is applied to an 8.2 km² area.

From design to implementation, the scheme introduced a number of necessary complementary measures such as: **pricing integration** of the access fee and the on-street parking fee for service vehicles (e.g., maintenance or construction), **urban consolidation centres** for the reorganisation of last-mile delivery, supply of **reserved bays for the loading and unloading** of goods, introduction of **20-minute free parking** on paid parking spaces for loading and unloading.

Immediately at the start of the scheme, **improved public transport** was introduced with an increase in capacity of 75,000 passengers daily thanks to better services in metros, buses, and trams. Two more trains were added to the M1 line and one more train to the M3 (5% more capacity), frequencies on bus lines travelling to the city centre were increased and there was an extension of peak-hour frequency until 10:00. More staff was also temporarily employed to assist passengers.

Thanks to Area C and partly using its revenues, in 2013 over €13 million were allocated to the further development of metro lines, trams and buses and for the implementation of the second phase of the Milanese **bike share system**. At the same time, the municipality also financed other works to promote sustainable mobility: a **P&R facility**, new **30 km/h zones** and an **upgraded cycle network**.

2.3 Integration within a larger mobility plan

It is important to consider the best way to combine the planned supporting measures to maximise the impact of an UVAR. For example, should additional resources be allocated to new and upgraded infrastructure (e.g., park and ride facilities, bicycle paths, improved public spaces or interchanges) or to improve services (e.g., public transport, new mobility services, logistics hubs or shared bikes)?³

When deciding which mobility measures will accompany the UVAR scheme, it is also useful to consider whether planning measures are foreseen for the coming years to improve the sustainable modes and which options could best provide the needed transportation to shift away from car use.

The circulation plan of Ghent is part of a larger mobility plan devised in 2012 in response to the rising amount of car traffic within the inner-city ring. To prevent cars from needlessly crossing the city centre, **the circulation plan divides the central area into six separate zones** (separated from one another by traffic filters) plus a car-free zone in the city core that is regulated as a limited traffic zone (but with no on-street parking).

The mobility concept supporting the circulation plan includes the **Wandelbus** (walking bus), an electric microbus driving at walking speed to facilitate mobility into the car-free area, especially for people with reduced mobility. These small electric buses follow a fixed route with eight fixed stops, but people can get on and off the bus anywhere along the route. The service is free of charge and runs Monday to Saturday from 11:00 to 23:00 and on the first Sunday of the month.⁴

The City of Ghent also provides a **free shuttle service** between the city centre and two **Park and Ride facilities** in the outskirts. The nine-seat minibuses connect to the city centre in less than 15 minutes. Frequency is between 10 and 30 minutes and minibuses are active Monday to Saturday between 7:00 and 22:00 (midnight on Friday and Saturday) plus the shopping Sunday.

Other complementary measures include **on-street parking** immediately outside the car-free area **exclusively reserved for residents** (residents parking zones), **cycle streets** where cars can't overtake bicycles and about 7,000 **bicycles available for rent** at several bicycle points (some of them also served by the shuttle bus).

2.4 Using incentives to mitigate the effects of a new LTZ/LEZ

A balanced package of compensating measures also shows citizens that policy makers look after and provide concrete solutions to those who are asked to change their behaviour.

Questions to consider are: What kind of change is expected to be triggered by the UVAR? What types of vehicle/ user will be affected by the UVAR (long/short distance commuters, residential, commercial, delivery, etc.)? Which mobility/ accessibility issue(s) may arise from the implementation of the UVAR?

³ Modelling or other assessment methods (e.g., cost-benefit analysis, multi-criteria analysis or qualitative analysis) help determine which measures in the long-list of options are the most (cost-) efficient over time, and for which users the support is most needed.

⁴ This type of flexible micro-PT service is used in several cities and towns where large pedestrian areas or LTZs are in place: the **Kavalir** service launched in Ljubljana is another example. In the future, autonomous shuttles may be used.

The City of Bologna has embedded low-emission restrictions into its long-established limited traffic zone (LTZ) in the city centre; it is now called ZTL *Ambientale* (environmental LTZ; in a practical sense a LEZ+LTZ).

As of January 2020, most polluting vehicles are being progressively phased out of the LTZ. Users eligible for a permit (residents, garage owners, occasional users, essential public services and doctors) can no longer access the city centre with EURO 0 and EURO 1 vehicles. In 2022, EURO 2 will also be banned and in 2025 restrictions will reach diesel EURO 5. Only Blue Badge holders (people with disabilities) and certified low-income residents are exempted.

To accompany and support the introduction of the LEZ+LTZ, the municipality has introduced a tailored **mobility bonus**. Residents who opt for other modes and services such as public transport, taxi, ride hailing, car sharing and bike sharing, and who give back a permit, will receive a yearly financial bonus of:

- €1,000 per family if they give back 2 permits associated to EURO 0 vehicles
- €700 per family if they give back a sole permit associated to a EURO 0 (not if a Blue Badge)
- €500 per family if they give back 1 permit associated to a EURO 0

Recipients must use the bonus for other mobility options. Via a dedicated website, they can choose which amount of the bonus they want to use on which mobility option(s). The maximum duration is two years. Residents over age 70 can choose between the bonus and a 10-year free pass for the urban public transport network.

Bologna has also launched a **funding scheme** addressed to all residents and local companies who decide to buy a new e-bike (€300) or cargo bike (€600) up to 50% of the total purchase cost.

2.5 Rethinking logistics when implementing a logistics UVAR

Cities should secure and provide proper space and facilities for consolidation, loading/unloading and switch to low/zero emission vehicles while defining their urban freight UVAR scheme. An asset review can help identify appropriate under-utilised space for cycle / last mile depots that can be offered perhaps at below market rates. Spaces with lorry/van loading access – it can give perhaps a financially viable option for facilities such as empty shops or carparks that will be closed, no longer permitted or less used due to the UVAR etc.

Past experiences of (mostly) public-driven and subsidised urban consolidation centres (UCC) often failed to reach long term benefits, but there are exceptions and success stories such as the **Cityporto** in Padova or the **Stadsleverhansen** in Gothenburg. The first is strongly linked to the functioning (and competitive position) of the city's freight village, while the latter uses mostly microvans and cargo bikes to reach local shops.

In **Parma**, the municipality opted for a certification of urban distribution platforms within a radius of 12 km from the city centre and the provision of onboard units to track all authorised light duty vehicles (**Ecologistics**).

Since 2010, the city of **Donostia-San Sebastian** (Spain) has combined the reuse of part of a public garage as an urban distribution centre with electric cargo trikes for last mile distribution in the inner city UVAR. The initiative is operated by the local and leading cycle logistics company **Txita**.

Many mobility concepts are focused on awareness raising, guidance and creation of a zero-emission logistics complete framework to favour the phasing out of most polluting vehicles. London has several initiatives and actions in place such as the **TfL Code of Practice on how to minimise noise from**

deliveries or the recent [Guidance for managing deliveries and servicing during the Covid-19 pandemic](#) and the [City of London's guidance for managing deliveries and servicing](#).

3. Mobility measures

This section presents some common options that can be used in cities to increase the effectiveness of the UVAR scheme by helping users change their behaviour and therefore limiting the possible negative impacts induced by the UVAR implementation.

It is important to highlight that, while planning high-impact and sometimes controversial measure such as UVARs, it is beneficial to rely on an integrated framework as defined by a [Sustainable Urban Mobility Plan \(SUMP\)](#) rather than approaching each mobility measure independently.

ReVeAL presents seven main categories with a number of supporting mobility measures that can be combined to build up a tailored concept for the UVAR (see Table 1).

Table 1: Supporting mobility measures to accompany UVARs

Categories	Explanation	Mobility measures
<i>Improvements in public transport</i>	<p>Increased public transport capacity and new/smart mobility services help cater for motorised users and shift the modal choice towards sustainability.</p> <p>An affordable, green and efficient public transport service is essential to help achieve UVARs objectives. For UVAR acceptance it is fundamental that users perceive that the public authority is offering them suitable and efficient alternatives in parallel to the imposed restrictions. Any UVAR revenue can be allocated to cover the increase of public transport spending⁵.</p>	<ul style="list-style-type: none"> • Fleet renewal to reduce emissions • Increase of the service (new PT lines, extension of existing ones, increased frequencies, higher capacity) • Improvement of the prioritisation measures (dedicated lanes, priority for buses/trams) • Implementation or improvement of additional complementary services (e-ticketing, mobility info, mobility app) • Economic incentives to citizens/companies to enhance PT use • Provision of small and/or automated shuttle services (citizen buses)

⁵ However, except for tolling schemes, most UVARs are not net income generators, as cities generally prefer compliance to penalty fees.

Categories	Explanation	Mobility measures
<i>Enhancement of cycling and walking</i>	<p>Often, one of UVARs main objectives is to improve public space and to increase healthy habits such as walking and cycling. The improvement of cycle and pedestrian networks and the provision of new facilities, even outside the regulated area, is fundamental to reach this objective.</p> <p>Communication campaigns about good habits is also important to encourage people to change behaviour, as is an attractive walking and cycling environment.</p>	<ul style="list-style-type: none"> • Extension of the cycle network • Extension of the pedestrian network (pedestrian paths or pavements) • Improvement of prioritisation measures (bicycle streets, bicycle zones, 30 km/h zones, traffic calming interventions) • Provision of bike/pedestrian facilities (bike racks, benches, shaded paths) • Wayfinding • Incentives/communication campaigns to increase the share of walking and cycling
<i>Changes in parking system</i>	<p>Parking regulation and parking infrastructures are key elements to guarantee the success of UVARs and help reducing congestion.</p> <p>Appropriate on-street parking management strategies/measures such as Park and Ride or Park and Walk/Bike schemes can often help increasing the accessibility of the UVAR area by shifting demand from central on-street to peripheral off-street areas.</p>	<ul style="list-style-type: none"> • Park and ride schemes • Park and walk/bike schemes (close to the destination but outside regulated areas) • Modification of on-street/off-street parking supply, regulation and costs, including introducing e.g., controlled parking zones (e.g., residents only) • Improvement of the enforcement capacity • Changes in the park pricing system • Introduction/improvement of dynamic parking guidance • Working with employers to reduce parking / workplace parking levy
<i>Enhancement of shared mobility</i>	<p>Shared mobility allows users to access mobility services on an as-needed basis and it complements other services like public transport. Sharing has a range of positive effects that help achieving UVAR goals while ensuring accessibility.</p> <p>Sharing services can be used for passenger transport purposes or adapted to urban logistic schemes.</p> <p>Incentives to increase their use can be related to the UVAR restrictions and permits. For example, it may be allowed for car sharing vehicles to enter a restricted area, or they might be exempted from fees.</p>	<ul style="list-style-type: none"> • (e-)Bike sharing system • Car sharing system • Van sharing system • Other sharing systems (mopeds, e-scooters) • Incentives/infrastructure development/campaigns/ agreements/partnerships to increase the use of (electric) shared mobility

Categories	Explanation	Mobility measures
<i>Improvements in urban logistics</i>	<p>Specific attention should be paid to mobility measures linked to freight. The overall traffic and economic performance of cities (and city centres in particular) depends on how first-/last-mile, local freight and logistics flows are organised, and UVARs can help improve this if carefully planned.</p> <p>Cargo bikes, off-peak-hour deliveries and urban consolidation centres can be used not only as alternative solutions, but also to improve the efficiency of the UVAR and transport systems themselves. UVARs with noise regulation can help facilitate night-time deliveries.</p>	<ul style="list-style-type: none"> • Development and support for new urban logistics platforms /infrastructure /services • Changes/improvement/new regulations of loading and unloading bays • Projects to promote cycle/ foot/ autonomous deliveries • Covenants/ incentives/ campaigns/ agreements to develop cleaner/more sustainable logistic systems/fleets • Facilitating quiet night-time deliveries • Working with city and large companies to combine logistic needs and requirements • Identify appropriate under-utilised space⁶ for cycle / last mile depots to offer for below market rates
<i>Zero & low emission vehicles</i>	<p>Incentives to increase zero and low emission vehicle use can be related to UVAR restrictions, especially to those limiting emissions. For example, electric cars can be exempted from a congestion charge or a parking fee⁷, or able to gain permits.</p> <p>In UVARs schemes seeking to reduce climate emissions and enhance electric mobility, a consolidated and widespread charging point network is essential.</p>	<ul style="list-style-type: none"> • Extension of charging point network for e-vehicles • Covenants/incentives/campaigns/ agreements to enhance the shift to cleaner/electric private vehicles • Promotion of cleaner/electric taxis/private hire vehicles • Leading by example, with zero and low emission public fleets (including PT)
<i>Ticketing & digital support</i>	<p>Single ticketing and simple payment solutions for public transport and shared mobility services (or Mobility as a Service programmes) can encourage multimodality and offer viable mobility alternatives in areas with access restrictions. If presented well, an UVAR can provide an additional push to make new mobility services attractive.</p>	<ul style="list-style-type: none"> • Single/ digital multimodal ticketing • Introduction of Mobility as a Service (MaaS) or other platforms to combine multiple mobility modalities • Introduction of ride hailing platforms/ services • Coordinated city mobility apps

⁶ Appropriate: e.g., with lorry/van loading access near the UVAR, space shared with other last-mile providers; space: e.g., carparks that will be closed/less used due to UVAR, empty shops, through an asset review

⁷ This needs to be carefully considered so it does not damage the UVAR purpose. They may well be 'sunset advantages' that phase out as the numbers of electric vehicles increase

4. Recommendations

- When identifying potential measures and solution trajectories, make sure that push measures that regulate and limit private motorised transport are accompanied by pull measures such as an increased provision of mobility services and infrastructures. Citizens, particularly residents, need to be assured that there will be alternatives available; and these should be available before or when the UVAR is implemented.
- Planners should be aware that UVARs can cause direct or indirect financial disadvantages along with societal and individual benefits, and these often affect those with low incomes, but if accompanied by increasing non-car mobility options the UVAR-package can have a positive effect on those with low incomes. Support mechanisms, such as incentives, exemptions, special permits, etc. should be considered to help all vulnerable groups.
- Planners need to ensure that push and pull elements integrated in the SUMP process are well balanced and that an UVAR is incorporated and integrated within the SUMP, as opposed to standing alone.
- Cooperation across institutional boundaries is fundamental. A broad scoping of problem areas relating to urban mobility is needed through a cross-sectoral assessment. This coordination should be carefully crafted and can be part of a bigger interdepartmental and inter-agency/authority coordination within the framework of the mobility concept implementation. If a city is part of a broader public transport authority, the additional public transport offer will need to be negotiated. The same applies to services such as park and ride, which, although situated outside the municipal boundaries, could determine the success of the access policy.
- The city will also have to cooperate beyond the public sphere and create partnerships with the private sector in its role as a generator of trips, handler of goods or provider of mobility solutions. These partnerships may use the UVAR to help kick-start discussions towards a solution-oriented environment for improved mobility options.
- Specific attention should be paid to mobility measures linked to freight. Measures such as consolidation or last-mile solutions require locations that must be linked to zone design.
- Those UVARs that generate revenues, the accompanying measure package can be funded by the scheme's anticipated revenues. Road users then see how their contributions are reinvested in new and improved mobility options (however, most UVARs do not generate revenue but will cost money to implement and run). Indeed, a good practice scheme would prefer compliance to revenue from fines, as it means their objectives are being met. Additional funding may be able to be negotiated from national or regional government⁸.
- The ability to change the scheme on the basis of monitoring and evaluation results is important. This means there should be sufficient political, regulatory, operational and technological room to adapt and evolve the scheme as needed. This might also be applied to the way mobility options are shaped and scaled to accompany the UVAR scheme.

⁸ See also the [ReVeAL Governance and Finance Guidance](#)

- Having evaluation and monitoring include the overall mobility concept can also help a city understand the effects of different measures and the relation between those measures and the UVAR. Identifying the impact of a single measure such as an UVAR can be difficult, with or without its accompanying mobility options. Different methods are available, and guidance for assessment may be available at national level. ReVeAL's [guidance on UVAR monitoring](#) will be published in summer 2021.

5. Link and references

ReVeAL UVAR guidance (all available at: <https://civitas-reveal.eu/resources-overview/publications/guidances/>)

- General – What to think about when planning an UVAR?*
- UVAR Development Process*
- Mobility concepts
- Ensuring Compliance
- User needs and public acceptance of UVARs
- Equity*
- Data and monitoring*
- Stakeholder involvement*
- Communication, awareness raising (incl. digitising UVARs)*
- Geofencing
- Permits and exemptions
- Privacy and camera enforcement*
- Foreign vehicle enforcement*

*available autumn 2021

Topic Guide UVAR and SUMP, Regulating vehicle access to cities as part of integrated mobility policies. Ivo Cré (Polis). 2019: www.eltis.org/sites/default/files/uvar_brochure_2019-09-26_digital_version_v2.pdf

CIVITAS Insight N°6, Access regulations to facilitate cleaner and better transport. Fred Dotter (Mobiel 21). 2016: <https://civitas.eu/content/civitas-insight-06-access-regulations-facilitate-cleaner-and-better-transport>

London's walking maps, networks, walking times: <https://tfl.gov.uk/modes/walking/>

Nottingham's Workplace Levy: www.nottinghamcity.gov.uk/wpl

Stockholm's night-time delivery facilitation: <https://civitas.eu/content/night-delivery-clean-and-silent-vehicles>

Energy Savings Trust last mile guides for local authorities

<https://energysavingtrust.org.uk/sites/default/files/EST0011%20-%20Last%20mile%20best%20practice%20guide-WEB.pdf> and for businesses <https://energysavingtrust.org.uk/sites/default/files/EST007-01-EST%2BDFT-Electrifying%20last%20mile%20deliveries%20guide-WEB.pdf>

Polis on Urban Freight: www.polisnetwork.eu/topic/urban-freight-2/

London Ultra LEZ and info on scrappage scheme: <https://tfl.gov.uk/modes/driving/ultra-low-emission-zone>

London ULEZ traffic impact: <https://tfl.gov.uk/info-for/media/press-releases/2019/may/gla---first-month-of-mayor-s-ulez-sees-74-per-cent-of-vehicles-comp>

London ULEZ's "green" standards for PT buses: <https://tfl.gov.uk/modes/buses/improving-buses>
Walk to school initiative in Jerusalem (SUNRISE project): <https://civitas-sunrise.eu/neighbourhoods/jerusalem-baka>

Communication, stimulation and facilitation measures in Amsterdam LEZ/ZEZ:
<https://amsterdameconomicboard.com/greendeal>

Bologna: <http://comune.bologna.it/trasporti/servizi/2:1688>

Padova Cityporto: <http://www.interportopd.it/en/cityporto/>

Göteborg Stadslevehansen: <https://innerstadengbg.se/stadsleveransen>

Bicycle use for goods delivery as a "quick-win" for cities working towards zero emissions logistics:
http://two.cyclelogistics.eu/docs/119/D2_1_Guide_to_effective_strategies_for_cyclelogistics.pdf

City of London Guidance for managing deliveries and servicing:
<https://www.cityoflondon.gov.uk/assets/Services-Environment/guidance-for-managing-deliveries-and-servicing.pdf>

Transport for London toolkit for efficient deliveries: <https://tfl.gov.uk/info-for/deliveries-in-london/delivering-efficiently>