

**EIB Jaspers**

**CAPACITY BUILDING FOR SUSTAINABLE URBAN MOBILITY PLANS**

# **Demand Management**

**Stockholm, 5-6 May 2026**

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## 1. Demand management definition, objectives, mechanisms and benefits

- This section explores the concept of demand management, aiming to shift behaviors toward sustainable transport. It delves into its key objectives, such as reducing traffic (growth) and addressing environmental issues like congestion and air pollution.

## 2. Demand Management and SUMP

- In this section, we'll understand the relationship between demand management and SUMP. While SUMP emphasizes planning, demand management focuses on immediate behavioral changes, aligning both for the overarching goal of increasing sustainable mode usage.

## 3. Broad Categories of measures

- This section highlights two measures which contribute to demand management: parking management and soft measures like information and communication for behavioral changes. We'll discuss how effective parking management contributes to urban space efficiency and air quality, while awareness campaigns and behavioral change initiatives enhance sustainable mobility choices.

#### **4. Case Study: Urban Vehicle Access Regulations (UVAR) and SUMPs**

- This section will cover how UVARs, designed to regulate vehicular access, can help with demand management. We'll explore their contribution to cleaner air and safer urban spaces, and discuss issues of public acceptance.

#### **5. Complementary measures**

- To be successful, 'stick' measures need to be complemented by 'carrot' measures

#### **6. Monitoring and data collection**

- Scheme implementation should be supported by robust data collection and evaluation

## A vibrant, stylized illustration of a city skyline. The city is represented by several blue and white buildings of varying heights. In the foreground, a blue curved path or road winds through the scene. Along this path, there are several icons representing different modes of transportation: a white car in a green circle, a white bus in an orange circle, a person riding a bicycle, a person walking with a bag, and a person pushing a stroller. There are also green and orange clouds, a bright orange sun, and a pink location pin icon. The overall style is modern and colorful, suggesting a focus on urban mobility and sustainable transportation.

- Demand management is an essential component of a city's toolbox, in order to manage and reduce traffic levels; though it can also be politically and publicly contentious
- To minimise such risks, measures need to be carefully chosen to maximise success, and be introduced as part of a broader policy package

Demand management should not be confused for mobility management as these are two different concepts. They share the same goal (reduce car traffic and promote sustainable modes) though with different means (marketing and better information for mobility management, parking and traffic restraint for demand management) and at different scales (political levels for demand management, and at the site level for mobility management)

## Demand management: definition and objectives

- Demand management comprises a set of measures introduced primarily by city authorities to regulate levels of motor vehicle use, in space and time, particularly the use of private cars. They aim to reduce car trips numbers and/or lengths
- Objectives supported by demand management include:
  - To encourage a **change of behavior** towards greater use of sustainable transport modes, i.e. public transport, collective transport, walking, cycling and intermodal combinations.
  - To **reduce traffic (growth)** by limiting the number, length and need for motorized vehicle trips.
  - To **increase the economic efficiency** of the entire transport system.
  - To reduce negative externalities, such as carbon emissions, congestion, air quality, accidents
- Demand management ('sticks') needs to be complemented by improved modal alternatives ('carrots')

Definitions taken from:  
[https://urban-mobility-observatory.transport.ec.europa.eu/system/files/2023-11/integrating\\_mobility\\_management\\_into\\_sumps.pdf](https://urban-mobility-observatory.transport.ec.europa.eu/system/files/2023-11/integrating_mobility_management_into_sumps.pdf)

[https://urban-mobility-](https://urban-mobility-observatory.transport.ec.europa.eu/system/files/2023-11/integrating_mobility_management_into_sumps.pdf)



## Application of demand management

Two targets:

- **Stopping traffic**  
(parking, loading)
- **Moving traffic**



The management of motorised traffic can either targeted when it is stopped at the kerbside, or moving on the road network

## Mechanisms for achieving demand management

- **Physical constraints**
  - Limiting road capacity
  - Limiting/managing parking space
- **Regulation**
  - Restricting stopping or access
  - Time limits on use
- **Pricing**
  - Parking pricing
  - Congestion pricing



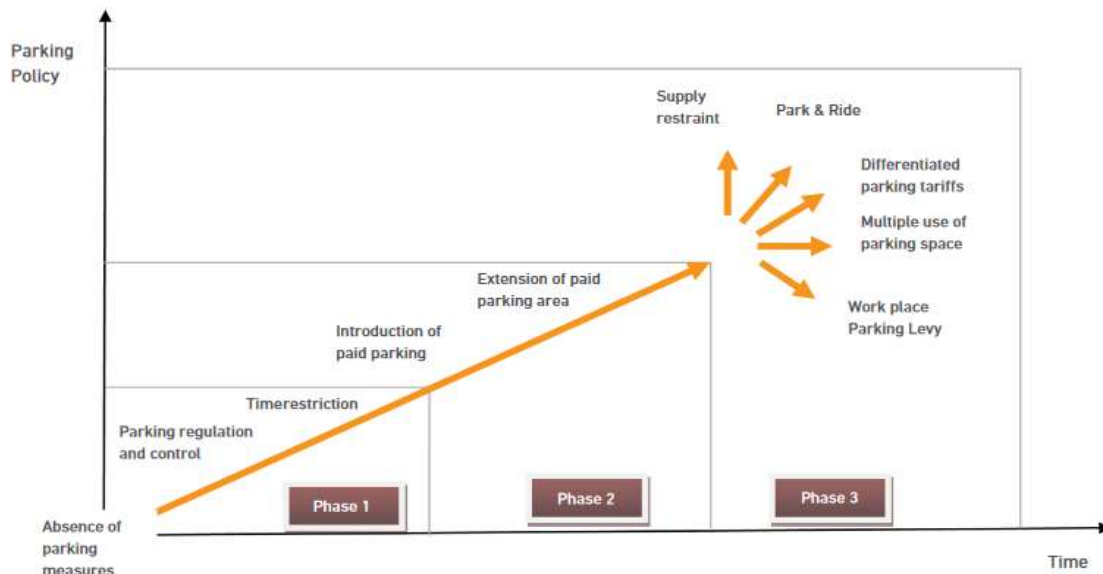
<https://ifpedestrians.org/reallocate/>

For both stopped and moving traffic, there are three mechanisms that can be applied (individually or in combination) to manage demand.

This slide gives examples, in both situations.



## Phased introduction of parking management, over time



**Figure 3.2:** Development of Parking Policy. Source: Push&Pull Training Material "Setting the framework for parking policy" by Prof. G. Mingardo, Erasmus UPT. <http://push-pull-parking.eu/index.php?id=55>. Taken from Mingardo, Rye and Wee (2015), p 272.

[https://park4sump.eu/sites/default/files/2022-09/SUMP2.0\\_Topic%20Guide\\_Parking%20and%20SUMP\\_EN.pdf](https://park4sump.eu/sites/default/files/2022-09/SUMP2.0_Topic%20Guide_Parking%20and%20SUMP_EN.pdf)

- The graph illustrates a logical development pattern for the development of cities' parking policies, a development that should also be reflected in second, third and further generations of SUMP in a city.
- This logical development is using the mechanisms explained previously.
- Implement parking management in small steps. Step-by-step you can broaden your ambitions and geographical scope

Different arguments on parking management benefits :

1. Public space has a high value and therefore should be paid for if used for parking.
2. Parking management contributes to a more sustainable modal choice and therefore quality of life.
3. Parking Management leads to less park search traffic.
4. Parking management has a good impact – acceptance - ratio compared to other demand management measures such as road pricing.
5. People usually complain before new parking management is introduced but initial opposition turns to support when they realize its positive impacts.
6. Parking management protects European historic cities from an "invasion" of parked

cars.

7. Parking Management does not kill the high street – it can support the local economy.
8. User-friendly parking areas within walking distance of key locations are acceptable.
9. Parking Management will not stop companies investing in your city.
10. Guaranteed parking spaces at workplaces influence modal choice significantly.
11. Parking Management contributes to road safety.
12. Enforcement of parking violations is necessary – and not harassment of car users.
13. Carefully chosen parking standards can have a positive impact on housing and other real estate projects.
14. Correct rates, prices and appropriate fines are key to the success of parking management.
15. Parking Management can raise municipal revenue that can be used to encourage sustainable mobility.

## Effectiveness : Parking management

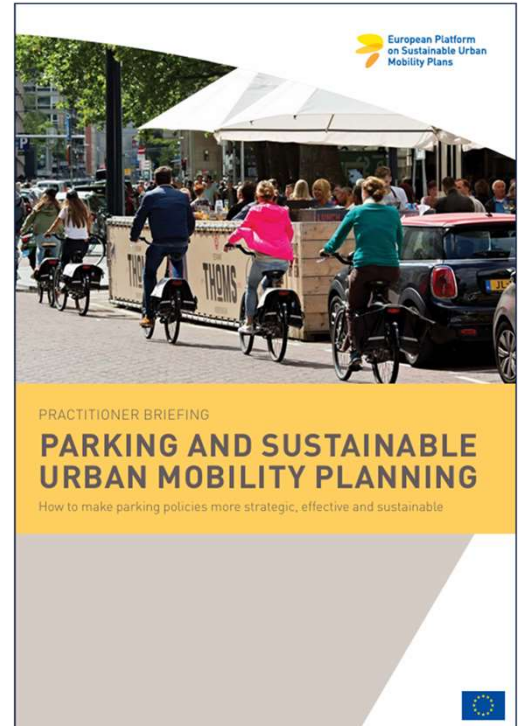
- In areas with good non-car access, car use can be greatly reduced by parking controls.
- Resident parking permits can limit ownership & use

### Adverse side-effects :

- Parking at other location
- May increase traffic (cars searching for a parking space)

### Barriers to implementation :

- Parking spaces may not be under authority control (legal issue)
- Political acceptability and public acceptability



Some precision :

Concerning the legal issue in the barriers to implementation :

-> in most city centres, majority of spaces are PNR (Private, Non-Residential) and often not under local authority control

Concerning the scale of contribution of parking management on different topics :

-> Reduce congestion : The contribution is good if alternatives to car exist. Where this is not the case, congestion will either be severe as a result of traffic searching for a parking space, or congestion will shift to an alternative destination.

-> Community impacts : Many positive impacts on reducing congestion, reducing pollution, placemaking and potentially local economies also. Enables redevelopment of buildings in locations where parking cannot be provided.

## Wider benefits of parking restrictions: Krakow

### Socio-economic success:

Transformation of car parks into city squares did not cause significant changes in the amount of income for owners in the area in several European city centers locations. Some income increase were found and coincide with the highest pedestrian activity in the city centre.



Source : <https://upload.wikimedia.org>

A study was conducted by Krakow university that assessed the results of traffic and parking restriction measures implemented over the last decade in several city centre locations.

The greater number of shops, bars and restaurants and the presence of other attractions resulted in an increase in the number of visitors to these areas, who also stayed there for longer than previously.

A very high percentage of owners (75% within the relevant area) would not want to return to the times before the vehicle access regulation. customers of the facilities located in the analysed areas also reported a very high degree of satisfaction (on average 83%).

They are primarily happy with the absence of cars in these areas, whilst also enjoying the presence of structural landscaping, historic buildings, and the general atmosphere.

[https://urban-mobility-observatory.transport.ec.europa.eu/system/files/2023-11/uvar\\_and\\_sumps.pdf](https://urban-mobility-observatory.transport.ec.europa.eu/system/files/2023-11/uvar_and_sumps.pdf)

Picture : [https://en.wikipedia.org/wiki/Main\\_Square,\\_Krak%C3%B3w](https://en.wikipedia.org/wiki/Main_Square,_Krak%C3%B3w)

## City Parking Areas of Development

- Future *development of parking management* activities:
  - **Extend general parking management** – managing parking demand by targeting supply
  - **Use parking revenue** to finance sustainable urban (mobility) measures – provide wider travel choice
  - **Modify parking standards** – reducing parking requirements in new developments
  - **Enhance enforcement** – technology option (mobile/static cameras)
  - **Integrate parking management** into sustainable urban mobility planning (SUMP) – Smart parking management
  - **Technological innovation** – automatic enforcement & parking guidance systems



<https://urban-mobility-observatory.transport.ec.europa.eu/resources>

- **Extend general parking management:** Manage parking demand by targeting the supply of parking spaces, e.g. introduce/extend parking fees, reduce parking time, etc.
- **Use parking revenue to finance sustainable urban (mobility) measures:** Through the introduction of paid parking, drivers are encouraged to use more sustainable transport. Fees collected can contribute to investments in sustainable initiatives.
- **Modify parking standards:** alter minimum requirements and introduce maximum allowances: Reducing parking requirements for new buildings and set maximum limits for the number of car parking spaces in new developments – this has a real impact on how people choose to travel.
- **Enhance enforcement:** Effective enforcement is needed in the whole parking system to maximise its impact.
- **Integrate parking management into sustainable urban mobility planning (SUMP):** Move from a reactive and operational level of parking management to a strategic style of smart and sustainable parking management. This includes setting longer term goals and influencing behaviour.
- **Technological innovation:** Continuously implement technological innovations, such that sustainability, monitoring and efficiency are improved, e.g. automated enforcement (that scans cars), sensor data, mobility apps and parking guidance systems.

## Interactive Point: Experience of Parking Controls in your City:

In pairs of people from different cities, discuss the following questions for 5 minutes and be prepared to report back to the facilitator (but a formal presentation is not required)



- Have they been widely applied – if not, why not?
- Are they successful and in what ways?
- Do you think they could be used more in your city as a means of managing demand for car travel and influencing mode choice? Why or why not?

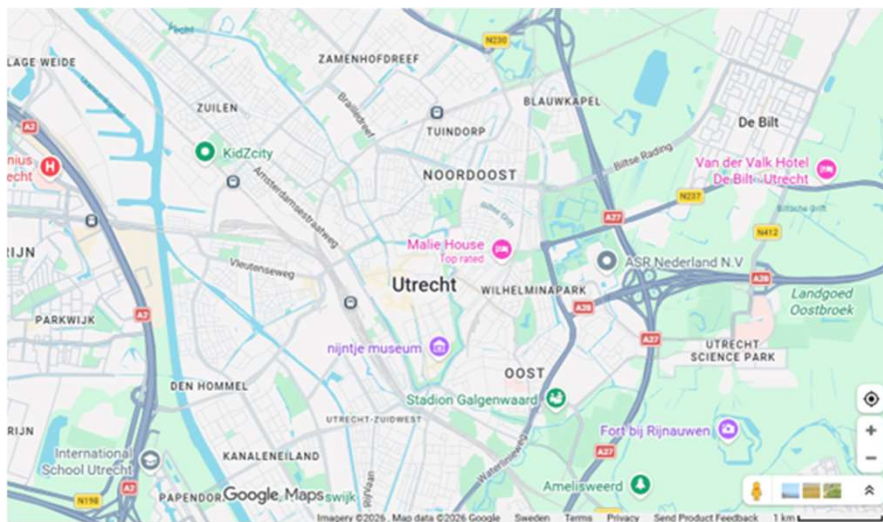
The question-and-answer session is designed to assess level of experience with parking controls, issues around implementation and an opportunity for people to exchange experiences.

It will also flag up areas of interest that the trainer can talk about later if time

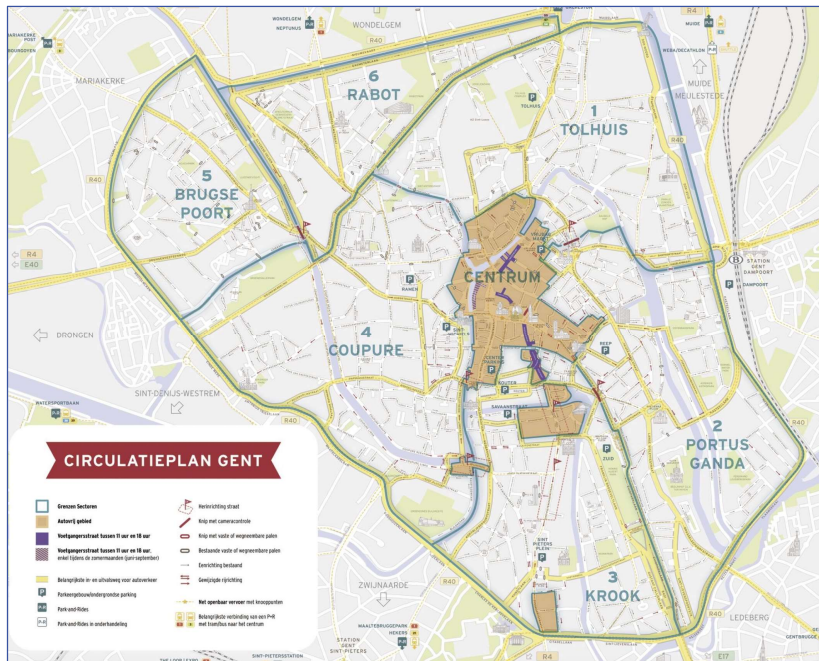


## Example of capacity reallocation – Utrecht Ringroad

Minder ruimte voor de auto betekent niet per se meer drukte – NM Magazine



## Ghent – Traffic Cells (Circulation plans)



- The city centre is pedestrianised
- Between the city centre and the ring road, the area is divided into 6 traffic 'cells'
- Pedestrians, cycles and public transport can pass between the cells, but cars/ vans and HGVs need to go to the ring road, to access another cell

Source : <https://www.transportxtra.com>

Ghent, the host city of Velo-city 2024, has a long history of cycling and a future with demonstrable commitment to sustainable mobility. A bicycle plan was implemented as early as 1993, a large pedestrian area created in 1997, and the city has the a car-free historic city centre that is the largest in Belgium (70 hectares).

The Circulation Plan took two and a half years to plan, one weekend to implement and cost just €5 million, yet has had spectacular results. Cycling is up, car ownership and road injuries are down and, despite a lot of before the scheme went in, public satisfaction is high.

The first line is circulation measures, then infrastructure, and then culture.

- "The first one is very important, because with circulation measures, you don't forbid cars, you don't take away the possibility of people reaching any particular destination. The circulation plan created space for cyclists and public transport without forbidding cars.
- "What is important is that before the circulation plan, we had a parking plan, and that was key preparation for the circulation plan. We started charging for parking, especially visitors. And we saw that pressure on the streets from cars decreased. So with the parking plan and the circulation plan, we got people to shift modes.
- "In the past six years, I scrapped 7,000 parking spots. And as I also always say, mobility is emotion. If we change something, we are changing the habits of people. If people can't do what they are used to, then there is a problem. And people get angry, loud and insulting. But the point is, in Ghent there are more people who are silent than those making noise.

See: <https://www.transportxtra.com/publications/parking-review/news/73807/ghent-a-city-plan-that-transformed-transport-and-livability/>

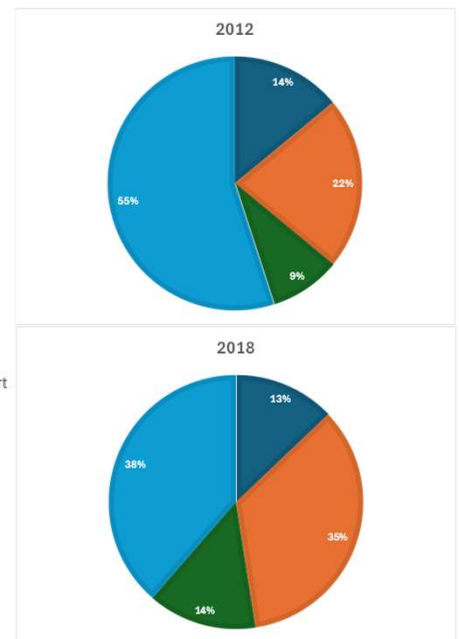


## Monitoring & Results

The circulation plan in number :

- Car journeys in Ghent have reduced from 55% to 27%
- Cyclists have increased from 22% of journeys to 37%
- 18% reduction in air pollution
- 20% per cent fewer cars in the centre
- 10% per cent more cars on the ring road but no traffic jams
- Increased use of public transport instead of the car (Flanders region saw a decrease)
- Fewer road traffic accidents

■ walking  
■ cycling  
■ collective transport  
■ individual motorized transport

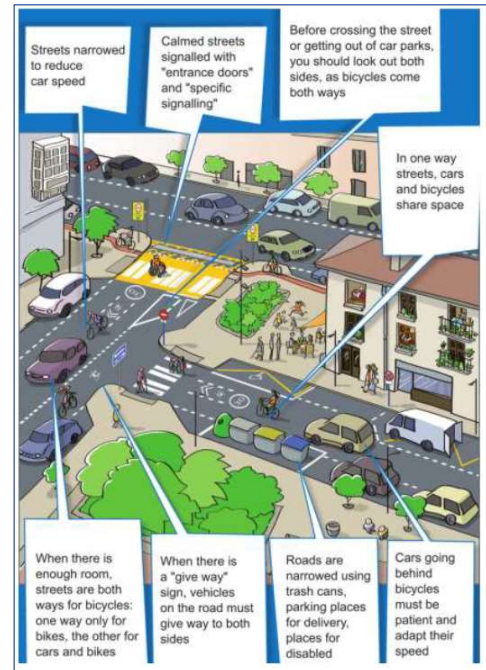


Source : [https://gef.eu/wp-content/uploads/2020/02/GEF\\_Oikos\\_Article\\_Ghent-2.pdf](https://gef.eu/wp-content/uploads/2020/02/GEF_Oikos_Article_Ghent-2.pdf)

Source : <https://www.transportextra.com/publications/parking-review/news/73807/ghent-a-city-plan-that-transformed-transport-and-livability/>

## Vitoria-Gasteiz – Traffic calming

- Traffic calming as a transition from functional superblock (30 km/h) towards the superblock scheme (10 km/h)
- Allows a quick and affordable intervention aiming the same objective of giving public space back to the citizen and discouraging the use of the private car



Source : Superblocks streets designed for sustainable mobility in Vitoria-Gasteiz

Traffic calming measures/devices can be separated into two types based on the main impact intended:

- segregation (volume control measures), in which extraneous traffic is removed;
- integration (speed control measures), in which traffic is permitted, but encouraged to respect safety and the environment.

In Vitoria-Gasteiz, the two types were implemented conjointly.

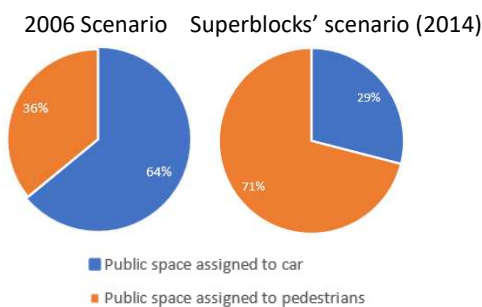
Allows a quick and affordable intervention aiming the same objective of giving public space back to the citizen and discouraging the use of the private car

[https://www.interregeurope.eu/sites/default/files/inline/14.\\_Superblocks\\_streets\\_designed\\_for\\_sustainable\\_mobility\\_in\\_Vitoria-Gasteiz.pdf](https://www.interregeurope.eu/sites/default/files/inline/14._Superblocks_streets_designed_for_sustainable_mobility_in_Vitoria-Gasteiz.pdf)

## Monitoring and Results

### ■ Key indicators includes :

- Acceptance level (400 surveys were carried out by telephone. Acceptance levels for the measure were quite high at 7.43 out of 10)
- CO2 emissions
- Nox emissions
- Small particulate emissions
- Noise perception
- Pedestrian surface (see below)



No.	Target	Rating
1	To increase the free public space for citizens activities in the area up to 10%. <i>It is increased the pedestrian surface (64%) in the pilot superblock.</i>	***
2	To improve the acoustical quality of the area up to 10%. <i>It is decreased the noise perception (-8%).</i>	*
3	To reduce emissions of polluting gasses in the area up to 10%. <i>It is decreased the emissions (-40%).</i>	***
4	To obtain a higher level of use of pedestrians and bicycles and a reduction of use of cars in the area up to 10%. <i>The modal split change from cars (-63%) to pedestrians (55%) and bicycles (8%).</i>	***
5	To reduce the average speed of vehicles in the inner streets of superblocks up to 5%. <i>The average speed of vehicles in the inner street has decreased (-8%).</i>	***

NA = Not Assessed, O = Not Achieved, \* = Substantially achieved (at least 50%), \*\* = Achieved in full, \*\*\* = Exceeded

Source : Superblocks streets designed for sustainable mobility in Vitoria-Gasteiz

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Funded by the European Union

These are the results of the superblock scheme. For reminder, traffic calming acted as a transition from functional superblock (30 km/h) towards the superblock scheme (10 km/h)

Bicycle and pedestrian modal share greatly increased

- Motto : “Giving back the Public Space to the people”
- Public space assigned to car (2006 -> Superblock scenario) : 64% -> 29 %
- Public space assigned to pedestrians (2006 -> Superblock scenario) : 36 % -> 71 %

Allows a quick and affordable intervention aiming the same objective of giving public space back to the citizen and discouraging the use of the private car.

[https://www.interregeurope.eu/sites/default/files/inline/14.\\_Superblocks\\_streets\\_designed\\_for\\_sustainable\\_mobility\\_in\\_Vitoria-Gasteiz.pdf](https://www.interregeurope.eu/sites/default/files/inline/14._Superblocks_streets_designed_for_sustainable_mobility_in_Vitoria-Gasteiz.pdf)

## Effectiveness: Traffic Calming & Pedestrianisation

### Positive impacts :

- Less ownership of cars, due to the affordable and convenient alternatives to car use
- Positive community impacts : reduced traffic speed and flows
- Town center pedestrianization strategies encourage more people to shop in town centers and improve economic viability.

### Side-effects :

- Reduced road capacity and Rerouting
- Potential environmental impacts



<https://mobility-friendly.com/does-the-street-pedestrianisation-show-an-economic-impact>

*Want to know more?*

»»» MODULE 11

The immediate purpose of traffic calming is to reduce the speed and volume of traffic. Reductions in traffic speed and volume are just means to other ends such as traffic safety and active street life, livability and the local environment, but can also induce re-routing.

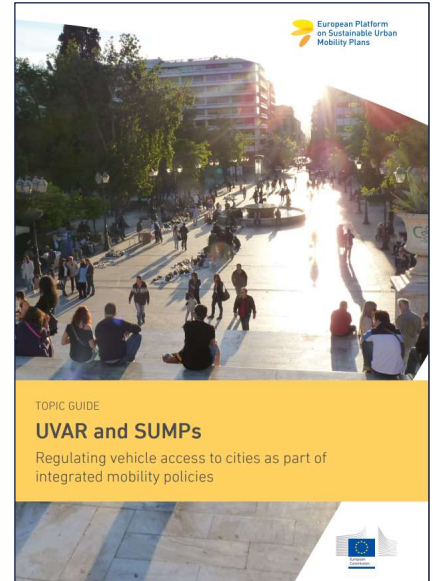
<http://www.konsult.leeds.ac.uk/pg/49/> & <http://www.konsult.leeds.ac.uk/pg/13/>

Impact of street pedestrianization has been revealed to show a positive economic impact in many Spanish cities. Examination of walking activity it was found to increase random shopping encounters compared to intentional shopping. Data collected and reviewed in a range of Spanish cities (including Barcelona, Seville, Madrid and Malaga) over a 2-year period.. Key findings include the following:

- Shops on pedestrian grids generate higher revenues than shops on non-pedestrian grids (zone),.
- Small and medium-sized cities notice a greater difference in economic impact, as pedestrian streets generate a positive percentage impact over non-pedestrian ones.
- A correlation was found in land use change and sales volume, ie streets that were previously non-pedestrianized suffered positive economic effects once pedestrianized.
- Higher density of cafes and restaurants attracts more people to the pedestrian environment than to the non-pedestrian environment.

## Urban Vehicle Access Regulations (UVARs)

- UVARs : measures to regulate motor vehicular access to urban infrastructure
- UVARs restrict or regulate some or all types of traffic from entering through policy or pricing. They can be placed into five broad categories:
  - **Pricing** : Vehicles are charged to enter or travel within a defined area
  - **Vehicle emissions**: Regulates vehicles in a defined area based on the vehicle's pollutant levels
  - **Residential/Historic centers**: Restricts vehicles in a defined area based on the drivers' relationship to the area
  - **Pedestrian Areas** : Prevents all but people (and usually bicycles) from entering a street or zone
  - **Lorry and/or delivery regulations** and restrictions



### UVARs' relationship with SUMP:

It is now widely agreed that uVARs, when implemented, should be integrated into a larger transport and mobility plan. A local or regional SUMP serves as the ideal vehicle for them. uVARs support the promotion of sustainable mobility measures under given circumstances, regulating traffic flows and helping to achieve compliance with air quality legislation. Both are key SUMP goals.

Here are some of the objectives that can be achieved by implementing uVARs:

- Space reallocation for public transport, cycling, walking and other urban functions (e.g. green and public spaces, retail, businesses, and restaurants and bars);
- Road safety improvements, e.g. by means of time windows or zonal regulations for Heavy Goods Vehicles (HGVs) or through reduced traffic volumes or speeds which result 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.

[https://urban-mobility-observatory.transport.ec.europa.eu/system/files/2023-11/uvar\\_and\\_sumps.pdf](https://urban-mobility-observatory.transport.ec.europa.eu/system/files/2023-11/uvar_and_sumps.pdf)



## Antwerp Low-Emission Zone (LEZ)

In Antwerp (Belgium) 100% of the vehicles are controlled and checked through smart cameras that have been installed along the boundary of the LEZ and in the city centre.

Two key indicators monitor the impact of the LEZ :

- Annual evaluation of the composition of the fleet entering the LEZ
- Air quality measurements



Source : [www.thebulletin.be](http://www.thebulletin.be)

Effectiveness of the measure : 2 key indicators :

- An annual evaluation of the Low-emission Zone in Antwerp (Belgium) is conducted by comparing the vehicles entering the LeZ with the composition of the Flemish regional fleet (fuel and euro-norm). This provides
- Information on the transition that the implementation of the LEZ is driving.

The city has also extended its network of air quality measurement stations in cooperation with the VMM - the Flemish Regional environmental Agency.

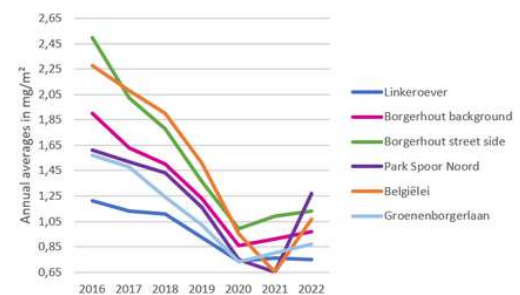
VMM conducts the air quality measurements required under EU law.

[https://urban-mobility-observatory.transport.ec.europa.eu/system/files/2023-11/uvar\\_and\\_sumps.pdf](https://urban-mobility-observatory.transport.ec.europa.eu/system/files/2023-11/uvar_and_sumps.pdf)

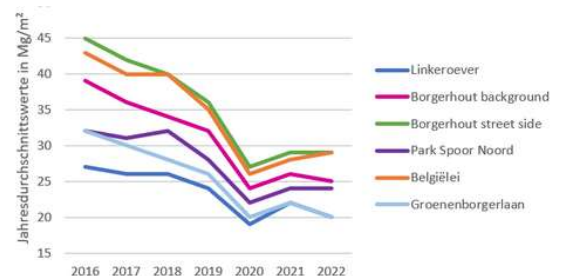
## Monitoring & Results

- Decrease between 21% and 5% of black carbon concentration in the LEZ between 2016 and 2022.
- Overall decrease of 35 % in 2022 compared to 2016 in Flanders. -> The effects of LEZ extend beyond the zone itself
- NO2 concentrations have decreased between 25 % and 38 % at monitoring sites in the LEZ between 2016 and 2022.

Air quality measurement - Black soot



Air quality measurement – NO2



Source : <https://www.slimnaarantwerpen.be/en/lez/>

An **evaluation** published by the Flanders Environment Agency (VMM) in November 2020 on low emission zones (LEZ) in Flanders shows that:

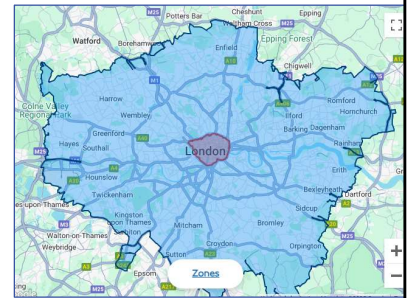
- **Low emission zones have effectively accelerated greening of the vehicle fleet.** Most residents of a low emission zone, with an old diesel vehicle, sold this vehicle before or immediately after the introduction of the low emission zone or the tightening of access conditions (from 1 January 2020). As a result, old diesel cars disappeared from the low emission zones faster than in the rest of Flanders. Those who replaced an old vehicle were more likely to opt for a (second-hand) petrol vehicle than for a more recent diesel vehicle, because a petrol vehicle is allowed in a low emission zone for far longer.
- **Air quality is improving in cities where a low emission zone was introduced.** Emissions of nitrogen oxides (NOx) and especially black carbon (soot) in the low-emission zones have fallen sharply. In Antwerp, an additional local decrease in soot concentrations can be attributed to the faster disappearance of the old diesel vehicles without soot filters.
- **Effects of low emission zones extend beyond the zone itself.** This is due to the fact that in the rest of Flanders, too, more petrol than diesel cars were purchased, due to the arrival of low emission zones, but also due to the adjustment of fuel excise duties and the greening of traffic taxation. As a result, nitrogen dioxide concentrations have also decreased significantly in Flanders at all high-traffic locations.
- **Better air quality leads to a healthier living environment. Socially vulnerable**



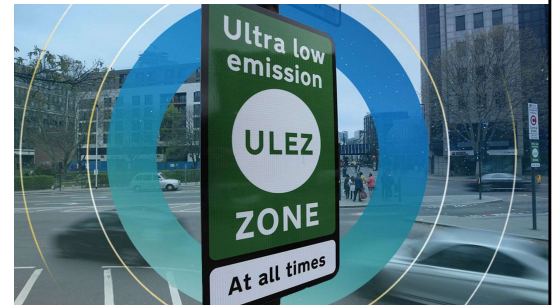
**groups, such as people on low incomes, the unemployed and tenants, benefit in particular.** Not only are they exposed to higher concentrations of air pollution, they also suffer greater or faster health effects due to this air pollution. A significant proportion of residents in Antwerp's low emission zone are socially vulnerable and exposed to high concentrations of air pollution. For these residents, the health gains from the arrival of the low emission zones are the greatest.

## London Ultra Low Emission Zone

- 17 Feb 2023 marked 20 years since Congestion Charge was first introduced – significant results:
  - Limited traffic entering the zone by 18 per cent during weekday charging hours
  - Reduced congestion by 30%
  - Boosted bus travel in central London by 33 per cent
  - 10% switch to walking, cycling and public transport journeys
- ULEZ introduced in 2019 – expansion of scheme in 2021:
  - Significant benefits in terms of NO<sup>2</sup> & PM reductions
  - Scrappage scheme introduced
  - Sustainable mobility offers for business & residents



Source: TfL.gov.uk



Source: Sky news

- Traffic congestion is damaging to the economy; in 2019, drivers in London spent an average of 149 hours in gridlock, contributing to congestion costing London £4.9 billion.
- The Congestion Charge was supported by expanding London's iconic bus network, with an extra buses and new routes introduced, while frequencies were increased and reliability improved. This resulted in bus passengers traveling through the central London increase by a third.
- The charge also reduced traffic collisions and emissions of carbon and air pollutants, making London's streets cleaner and safer.
- 17 Feb 2023 - 20 years of the Congestion Charge was first introduced – significant results:
  - Limited traffic entering the zone by 18 per cent during weekday charging hours
  - Reduced congestion by 30 per cent
  - Boosted bus travel in central London by 33 per cent

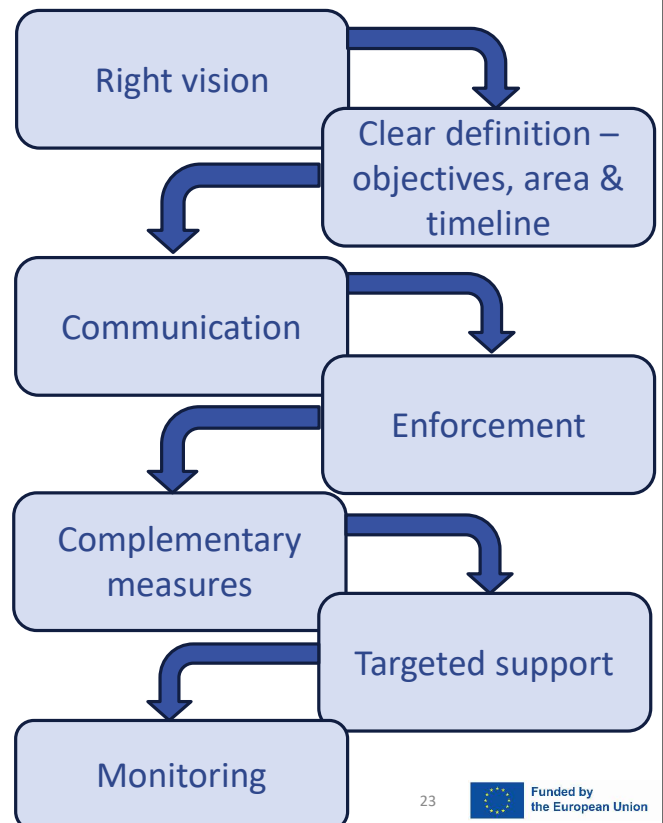
- Enabled 10 per cent of journeys to switch to walking, cycling and public transport
- 2019 - changes introduced by TfL removed three million additional journeys by car across London with the package of sustainable transport initiatives – the Congestion Charge was a critical first step.
- Around 4,000 Londoners die prematurely each year due to air pollution with dirty air
- Ultra Low Emission Zone (ULEZ) introduced in 2019:
  - Scheme expanded to inner London in 2021 NO<sup>2</sup> levels ↓ 46% (21% in central and inner London respectively than they would have been without the scheme.
  - 10% ↓ NO<sub>x</sub> emissions from cars in outer London (16% ↓ PM<sub>2.5</sub> emissions)
  - More than was achieved when the central zone came into operation
  - Aug 2023 ULEZ expanded London-wide:
    - 5 million more people breathing cleaner air - predicted to save 23,000 tonnes of CO<sub>2</sub> in outer London
- To help people make the green transition ahead of the ULEZ being expand London-wide, the Mayor has launched a £110 million scrappage scheme.
  - It will support Londoners on lower incomes, disabled Londoners, charities, sole traders and business with 10 or fewer employees to replace or retrofit their old, polluting vehicles.
  - To accompany the scrappage scheme there are a host of ULEZ support offers from businesses, including additional exclusive offers for

successful applicants of the scrappage scheme.

- Londoners to benefit from discounts on subscriptions, rentals and purchases of bicycles, e-bikes, cargo bikes, cars and vans from companies including Brompton, Enterprise and Santander Cycles
- Money raised from the Congestion Charge has been ploughed into sustainable transport
- Cycling levels have increased 137% since the start of the millennium.
- Since TfL pioneered the Congestion Charge 20 years ago, cities around the world have visited to learn more about the scheme. TfL is continuing to lead the way by innovating and using technology to deal with the transport challenges faced by large urban centres.

## Key Factors for Successful LEZs

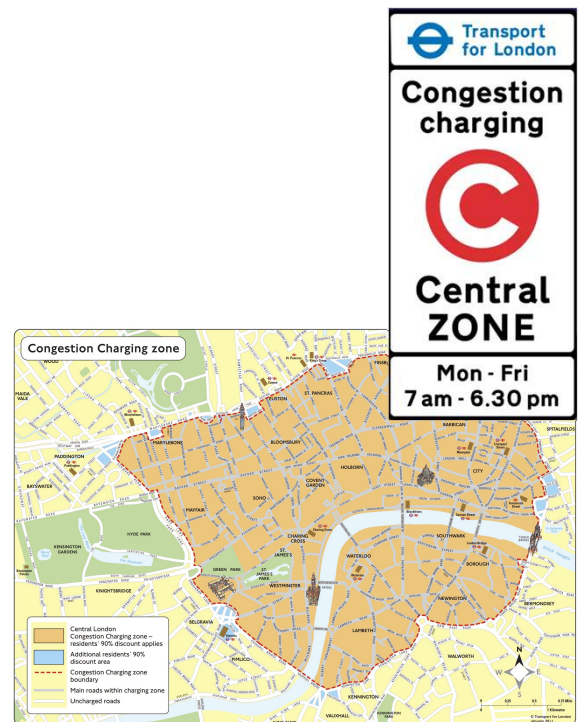
- Recognising that LEZs are a step in transition towards zero emission mobility
- Determine key design principles
- Communicate clearly & well in advance
- Use effective enforcement options
- Ramp up alternatives to the private car – enhanced PT & NMT facilities
- Overcoming public resistance & gaining acceptance – addressing socio-economic impacts
- Collection of high-quality & consistent data – inform stakeholder about impacts of scheme



- Establish the right vision – plan for gradual upgrades of the zone and transition to low/zero emission mobility
- Clear definition & focus: Define clear objectives and scope/coverage of the scheme
- Communication: communicate well in advance – including targeting all affected groups (residents and commuters)
- Complementary Measures: Set up complementary UVAR measures – ramp up alternatives to the private car
  - Complementary measures need to be designed for the full FuA that help to maintain the level of mobility and access to provide viable travel alternatives.
- Targeted support: adapt the support to different population groups (households etc.)
- Enforcement: Use effective enforcement options – include a trial period to assess performance. Use revenues from fines to fund alternatives.
- Monitoring: ensure proper and comprehensive data collection – make data readily available on impacts of the LEZ scheme

## London Congestion Charging Scheme

- The London congestion charge was implemented in February 2003.
- The key elements of the scheme as it was originally set up are set out below:
  - Scheme operates on weekdays between 7 a.m. and 6:30 p.m. in the area of Central London, as shown in the map.
  - Cars, vans and lorries charged £5 to operate within the zone.
  - Exemptions include motorcycles, licensed taxis, vehicles used by disabled people, some alternative fuel vehicles, buses and emergency vehicles.
  - Area residents receive a 90% discount for their vehicles.



Source : <https://content.tfl.gov.uk/congestion-charge-zone-map.pdf>

## Effectiveness: Road Pricing

Urban road charging is usually very suitable for city centers with the following characteristics:

- Traffic **congestion** problem;
- **No planned increase of the capacity** of the road network;
- **Good public transport** network;
- **Economic autonomy** in relation to neighboring cities.

Adverse side-effects :

- Drivers encouraged to **travel elsewhere**;
- **Equity implications**

Barriers to implementation:

- **Legal** issues;
- **Political and public acceptability**

Long history of road pricing in Sweden



<https://urbanaccessregulations.eu/countries-mainmenu-147/sweden-mainmenu-248/stockholm-charging-scheme>



<https://medcities.org/documents/Valentino+Sevino+-+Milan+-+High+Level+Trainings+-+Go+SUMP.pdf>

<http://www.konsult.leeds.ac.uk/pg/01/>

### Adverse side effects

1/Planners are often concerned at the potentially adverse impact on the economy of the charged area if charging encourages drivers to travel elsewhere, there is no empirical evidence however of this having happened in London or any of the other cities where congestion charging has been implemented. However, a number of desktop and attitudinal studies have concluded that there would be minor negative economic impacts, although these are very much dependent upon the characteristics of the urban centre (e.g. Flowerdew 1994, Richards et al, 1996, Still, 1996). Most studies have highlighted the need for complementary public transport improvements.

2/The second concern relates to the equity implications. Bus users, pedestrians and cyclists will benefit; rail users will be little affected except, perhaps, by increased patronage, although in the longer term increased patronage may encourage an improved service. If the scheme is a mileage-based system then users of commercial vehicles that drive many miles will be disadvantaged whilst commuters may be net beneficiaries with the reduced congestion more than compensating them. If on the other hand a set daily fee is paid for unlimited mileage then it is likely that commercial drivers will benefit relative to commuters.

### Barriers to implementation

- Legal : Requires special legislation in many countries.
- Governance : Coordination needed between adjacent authorities, particularly to avoid spill over effects.
- Political acceptability : Highly contentious, given expected serious opposition by car owners and other affected road users.
- Public and stakeholder acceptability : Any increase in the costs of motoring is seen as very unpopular.
- Technical feasibility :Some systems require complex technology.



## Summary: Comparative Effectiveness

Source : <http://www.konsult.leeds.ac.uk/pg>

Objectives	Scale of contribution				
	Parking Management	Circulation Plan	Traffic Calming	LEZ	Road Pricing
Reduce Congestion	XXXXX✓////	XXXXX✓////	XXXXX✓////	XXXXX✓////	XXXXX✓////
Enhance positive community impacts	XXXXX✓////	XXXXX✓////	XXXXX✓////	XXXXX✓////	XXXXX✓////
Reduce environmental damage	XXXXX✓////	XXXXX✓////	XXXXX✓////	XXXXX✓////	XXXXX✓////
Improve accessibility	XXXXX✓////	XXXXX✓////	XXXXX✓////	XXXXX✓//// XXXXX✗////	XXXXX✓////
Reduce social and geographical disadvantages	XXXXX✓////	XXXXX✓////	XXXXX✓////	XXXXX✓//// XXXXX✗////	XXXXX✓////
Improve road safety	XXXXX✓////	XXXXX✓////	XXXXX✓////	XXXXX✓////	XXXXX✓////
Boost economic growth	XXXXX✓////	XXXXX✓////	XXXXX✓////	XXXXX✓//// XXXXX✗////	XXXXX✓//// ?

XXXXX✓//// = Weakest possible positive contribution

XXXXX✓//// = Strongest possible positive contribution

XXXXX✗//// = Weakest possible negative contribution

XXXXX✗//// = Strongest possible negative contribution

XXXXX//// = No contribution

More details for these scores are directly to be found on the effectiveness slides and commentaries

Most of the scores have been taken, or adapted from <http://www.konsult.leeds.ac.uk/pg>

## Interactive Point

In groups of two people – for 5 minutes:

- Which types of objectives could demand management help your town/city to achieve?
- What type of demand management measures would be most appropriate for your town/city, and why?
- What actions would you take to try and improve acceptance of demand management measures?
- Does your Trafikstrategi contain any traffic restraint measures? Why or why not?



iStock  
Credit: whilerests

An opportunity for groups to decide on and justify a new form of traffic restraint scheme –the answer will depend on the local context: what issues need to be addressed? What has already been done? The local geography and mobility patterns.

Advantages will relate back to the objectives that the measure is intended to address (e.g. congestion and air pollution); in addition, there will be a need to stress personal and family benefits (e.g. improved public health)

See also Additional Materials

[https://urban-mobility-observatory.transport.ec.europa.eu/system/files/2023-11/uvar\\_and\\_sumps.pdf](https://urban-mobility-observatory.transport.ec.europa.eu/system/files/2023-11/uvar_and_sumps.pdf)

Picture : <https://www.linkedin.com/pulse/challenges-around-public-acceptance-ruc-dave-diangelo>

## Public resistance to demand management measures

- Measures that restrict car use are likely to meet strong opposition, among some population groups – which may make politicians cautious
- To gain extensive public support, it is necessary to demonstrate that:
  - There are serious negative consequences of current levels/patterns of car use
  - The space can be put to better use
  - It will make alternative modes faster, safer and more attractive
- There are several methods of gauging public support and opposition:
  - Surveys
  - Focus groups
  - (Social) Media screening
- But best outcomes come from full stakeholder engagement, co-creation of solutions and strong political support

Public resistance is a major inhibitor to the introduction of demand management measures, whether this involves parking restrictions, congestion charging or local access restrictions (e.g. Low Traffic Neighbourhoods in the UK).

The slide provides tips on how to anticipate and address public concerns.

- To gain extensive public support, it is necessary to demonstrate that:
  - There are serious negative consequences of current levels/patterns of car use (e.g. traffic accidents, high levels of local air pollution and carbon emissions)
  - The space can be put to better use (e.g. created major public spaces in areas previously covered by car parking spaces)
  - It will make alternative modes faster, safer and more attractive (e.g. faster and more reliable bus services, due to fewer traffic delays)
- There are several methods of gauging public support and opposition:
  - Surveys (e.g. Market research, public attitude surveys)
  - Focus groups (e.g. groups of younger motorists)
  - (Social) Media screening (targeted dialogue with specific groups)

## Complementary measures

- To be successful, both behaviourally and in terms of public/political acceptance, the '**stick**' measures of demand management need to be part of a comprehensive package of policy measures that includes 'carrots'
- This typically involves improving modal alternatives
- To meet challenging carbon reduction targets, a wide range of complementary measures are needed. For example, combining a traffic reduction scheme with:
  - Reducing the need to travel, by providing on-line services – ranging from home working to doctor appointments, and home delivery of goods and services
  - Localisation of service provision (e.g. through '15-minute city' initiatives), so that car trip lengths reduce – and there are more opportunities to walk and cycle instead
  - Improving the range, quality and quantity of public transport services, and providing attractive walking and cycling networks

Experience indicates that to maximise both public support and the effectiveness of a demand management measure, it is necessary to introduce complementary measures. For example:

- Neighbourhood traffic restrictions: ensure enough capacity on main roads for diverted traffic
- Congestion charging: provide improved public transport and cycling alternatives

The last bullet considers demand management in the challenging context of transport decarbonisation targets

## Beware of (Negative) Secondary Effects!

- Reduced congestion may increase traffic volumes
- Switching to a closer destination may increase trip frequency
- Switching mode may leave a car free to be used by another person instead
- OTHERS???

There are many examples of potential secondary effects – the ones shown here are negative ones that can dilute the effectiveness of the primary objectives that demand management is aiming to achieve. Trainees should be asked to come up with others.

But, there can also be positive ones. For example, as more people cycle, this can encourage others to do so – resulting in a positive feedback loop

## Conclusions

- Demand management will form a key component of most SUMPs – and needs to be part of a wider package that includes modal alternatives
- The reasons for implementing such measures needs to align with city goals, such as reduced congestion and air pollution, meeting carbon reduction targets...
- There is a wide variety of potential measures, some targeting stopping vehicles, others moving vehicles; and through adopting three main mechanisms: physical, regulatory and pricing
- Context is very important, both in terms of effectiveness and acceptability

In conclusion, Demand Management represents a strategic approach aimed at transforming urban mobility.

By encouraging a shift towards sustainable modes of transport, such as public transport, walking, and cycling, it addresses critical issues like congestion, air pollution, and accidents.

This comprehensive strategy involves various measures, from improving access to sustainable modes to reducing unnecessary car trips, making cities more livable, efficient, and environmentally friendly.

Through the integration of Demand Management into Sustainable Urban Mobility Plans, cities can create a holistic framework for sustainable transportation, fostering positive behavioral changes and improving overall urban well-being.

## Additional Material

## Improve public acceptance (1/2)

- The UVAR should address a clear and recognized objective, either solving a problem or creating opportunities.
- Before deciding on UVAR implementation, an assessment should look at alternative measures and the necessity of the implementation of a UVAR
- Include early stakeholder involvement and anticipate user needs and views. Make the best use of participatory governance tools to ensure that users are heard.
- The scheme should be well-designed : The availability of good alternatives to the 'old' travel option is the most crucial step towards publicly accepted UVAR
- The design should also be adaptable enough to enable the UVAR to be adjusted in light of new or unexpected issues that might reduce acceptance

[https://urban-mobility-observatory.transport.ec.europa.eu/system/files/2023-11/uvar\\_and\\_sumps.pdf](https://urban-mobility-observatory.transport.ec.europa.eu/system/files/2023-11/uvar_and_sumps.pdf)



## Improve public acceptance (2/2)

- The scheme should be well-communicated. All communication activities should make the positive impacts clear to improve compliance.
- Key politicians or other people that enthusiastically support the UVAR can help rally support for the scheme and facilitate its implementation
- Demonstrations, trials and experiments can help create an understanding of why the UVAR is necessary and what its impact will be
- Citizens and stakeholders should perceive and experience that the system is fair and transparent
- A phased introduction of the UVAR, with gradually tightening standards or expanding zones, can help acceptance (citizens and road users can gradually adapt their behavior)

[https://urban-mobility-observatory.transport.ec.europa.eu/system/files/2023-11/uvar\\_and\\_sumps.pdf](https://urban-mobility-observatory.transport.ec.europa.eu/system/files/2023-11/uvar_and_sumps.pdf)