TREN/A4/103-2/2009

Study on Urban Access Restrictions

Study Abstract

Rome, December 2010

Abstract

This document reports on the results of a study funded by the EC – DG MOVE to investigate the state-of-the-art of Access Restriction Schemes (ARS) in Europe and identify actions in which the European Union could engage to promote better awareness of the ARS concept, of the implementation options and of their effects, and to foster the dissemination and exchange of best practice in this field. It explicitly addresses Action 7 of the Urban Mobility Action Plan, adopted by the EU on September 29th, 2009:

"Action 7 — Access to green zones

The Commission will launch a study on the different access rules for the different types of green zones across the EU in order to improve knowledge on how the different systems work in practice. On the basis of the study results, the Commission will facilitate the exchange of good practices."

The study has relied on the combination of extensive desk work with direct interaction with stakeholders, including two questionnaire-based surveys and a dedicated stakeholders workshop.

While the nature and functioning of the existing schemes are in general well documented, the study confirmed that the availability of data on the impacts of scheme implementation is extremely limited, and in general of episodic nature.

Many of the drivers, enablers and barriers experienced by cities that decide to implement an ARS are common to all types of schemes, irrespective of the specific features of the scheme itself.

The stakeholders consultation showed that ARS are seen as a powerful policy instrument by most stakeholders groups, and that their potential in addressing the major challenges of urban sustainability (notably air quality, congestion, but also the need to forcefully strengthen the role of non motorized modes) is recognized as considerable.

Recommendations primarily concentrate on actions that the EU could undertake in order to make the most of the good practices developed in those EU cities that have already accrued a meaningful experience in the design, implementation and evaluation of schemes, notably including (i) the development of a harmonised guidance on ARS good practice that would support cities without prescribing standardized solutions (ii) the establishment and maintenance of a single-window information resource on all ARS aspects, (iii) the funding of large ARS demonstrators.

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Study on Urban Access Restrictions

Executive Summary

Rome, December 2010

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An increasing number of European cities is engaged in the design and implementation of demand management strategies based upon the concept of 'controlled access', which entails the more or less gradual interdiction of selected urban areas to traffic. The current situation is characterized by a high degree of heterogeneity, for what concerns:

- the objectives of the Access Restriction Schemes (ARS): so far schemes were mainly driven by air quality targets, but other strategic objectives are forcefully emerging (reducing congestion, increasing the overall livability of cities)
- the type of access restriction: i.e. which traffic is specifically targeted? (passengers Vs freight, vehicle technology, time slots, etc.)
- the instruments adopted: they can be regulatory/prescriptive (bans, vehicle standards, etc.) or/and market based (road and/or parking pricing, bonuses, paying permits, incentives, etc), while information based instruments can supplement/facilitate the implementation of both regulatory and economic instruments
- the technical/technological solutions adopted to implement and enforce the schemes

The Action Plan on urban mobility was adopted by the EU on September 30th, 2009. While it implicitly recognizes that the decision on whether or not to adopt an ARS should be left to cities themselves, it repeatedly and forcefully stresses the importance of promoting the exchange of best practices in all areas of urban sustainable mobility. Action 7 of the Action Plan explicitly reads:

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In line with such strategic objective, this document reports on the results of a study funded by the EC – DG MOVE to investigate the state-of-the-art of Access Restriction Schemes (ARS) in Europe and identify actions in which the European Union could engage to promote better awareness of the ARS concept, of the implementation options and of their effects, and to foster the dissemination and exchange of best practice in this field.

The study has relied on the combination of extensive desk work with direct interaction with stakeholders.

A systematic review of all available sources of information was carried out, including general literature, websites, targeted reports issued by cities, reports of EU funded and other projects dealing with ARS as well as grey literature available through direct contacts with the authors. To supplement the information produced by the review, a detailed questionnaire was designed and submitted to a sample of ca. 300 cities.

Following this first consultation step (exclusively directed to cities), a second questionnaire was designed to serve as the basis for the consultation of stakeholders, including representatives of industry, operators, governmental agencies, researchers, consultants and citizens. Usable responses were received from ca. 60 stakeholders.

Finally, a dedicated workshop was staged in September 2010 to present and discuss the preliminary results of the study, and elicit additional insights from stakeholders through direct interaction.

The fact finding work allowed to acquire a rather extensive and homogenous set of data on existing access restriction schemes, including (i) the scheme objective, i.e. to reduce traffic congestion or to improve city environmental conditions or other aims like raising funds to be invested in enhancing the quality of local transport, (ii) the type of vehicles targeted by the scheme, (iii) the presence of a charge for entering the restricted zone, (iv) the time slot of enforcement, i.e. if the restriction works 24 hours or just during specific time slots, (v) the solution chosen for the identification of vehicles entering the restricted zone (manual/stickers/ITS) and finally, the extent to which information about the scheme existence and rules is made available on the city websites (or on other national websites).

While the nature and functioning of the existing schemes are in general well documented, the study confirmed that the availability of data on the impacts of scheme implementation is extremely limited, and in general of episodic nature. Major efforts are needed to ensure that more and better evidence on ARS evaluation is produced, in order to document their potential benefits and the risks to be addressed. The scarce information available however points at consistently beneficial effects of ARS implementation in terms of traffic reduction, improving of air quality and overall performance of the urban transport systems.

A systematic assessment of the legal basis behind ARS at national level in each EU27 MS was also conducted. The emerging picture is extremely varied, ranging from countries where no specific legal provision exists to deal with access restrictions (although in some cases local rules are issued) to others where road codes and other specific pieces of legislation offer more explicit legal grounds.

An overall summary appraisal of the European ARS experience so far was carried out in the form of a SWOT analysis that presents the Strengths, Weaknesses, Opportunities and Threats of the analyzed schemes .

The SWOT has notably led to conclude that many of the drivers, enablers and barriers experienced by cities that decide to implement an ARS, are common to all types of schemes, irrespective of the specific features of the scheme itself, including the city typology or the extension of the restricted areas. On the other hand, other aspects are geared to the specific options adopted by each ARS type, and accordingly require targeted actions that are hardly transferable to other contexts.

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In line and within the spirit of the Urban Action Plan, recommendations primarily concentrate on actions that the EU could undertake in order to make the most of the good practices developed in those EU cities that have already accrued a meaningful experience in the design, implementation and evaluation of schemes. These notably include (i) the development of a harmonised guidance on ARS good practice that would support cities without prescribing standardized solutions (ii) the establishment and maintenance of a single-window information resource on all ARS aspects, (iii) the funding of large ARS demonstrators.

Further practical recommendations are directed to cities, in an attempt to build upon the experience accrued so far and issue practical guidance on primary DOs and DONTs.

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Study on Urban Access Restrictions

The European Traveler

Rome, December 2010

The European Traveler

Many access restriction schemes are already in operation throughout Europe and a traveler moving around the Union is bound to encounter very diverse regimes, with access being restricted or altogether denied in specific cities while granted with no restraints in others. This high heterogeneity makes trip planning a very hazardous affair, as illustrated below, where a selection of exemplary virtual routes crossing Europe is used to highlight the differentiated situations facing the motorist.

Itinerary n.1

Vehicle used	Euro 3 Diesel car	
City A	Bari (IT)	Limited Traffic Zone
City B	Rome (IT)	Zonal Based restriction
City C	Florence (IT)	Limited Traffic Zone
City D	Milan (IT)	Area Licensed Based
City E	Munich (DE)	Low Emission Zone
City F	Prague (CZ)	Limited Traffic Zone
City G	Berlin (DE)	Low Emission Zone
City H	Copenhagen (DK)	No access restriction scheme for cars
City I	Malmö (SE)	No access restriction scheme for cars

As illustrated in the map below (Figure 1), the legs to be followed by the European traveler aiming at crossing different countries with a Euro 3 Diesel car by entering all the city centers of the selected cities start from the city of Bari where there is a Limited Traffic Zone where the perimeter streets can be accessed during weekdays from 7 a.m. to 8. p.m. by every driver while the circulation in the internal roads is allowed only for residents and no exception is foreseen for visitors. The trip then continues through the city of Rome where it is possible to circulate inside the LTZ against the request of a temporary permit to be issued by the hotel where the foreign tourist will stay. Of course this procedure is allowed only if the hotel is located inside the restricted area; otherwise no exemption will be granted and the access to the LTZ will be permitted only during the time slots when the scheme is not in operation. The same procedure should be made when arriving in Florence in order to avoid fines. The main problem that the European traveler may encounter is the difficulty to find out the needed information in English. It often happens, in fact, that the information translated in English is not available in the official websites of the Municipality or of the Mobility Agency, while it is available on the blogs created by people that have already had some bad experiences in accessing Italian Limited Traffic Zones. The third Italian city to be crossed by the tourist will be Milan. In that case the information on how to deal with the request of permission for entering the restricted zone can be found in other languages than Italian and, differently from the previous cities, in Milan the Euro class of the vehicle is a key information that should be communicated when applying for the so-called Ecopass daily permit since the tariff depends on the vehicle pollution class. In this specific case, since the vehicle is a Diesel Euro 3 without particulate filter, the entrance is subject to a payment of 5 Euros.

After having left Italy, the European traveler will arrive to Munich where the access restriction scheme rules also consider the vehicle Euro class. To access the restricted zone, in fact, a sticker must be bought and displayed in the windscreen. This sticker is then valid for all LEZs in Germany. Proof of emissions standard (given on German vehicle papers) is needed to purchase the sticker. Stickers can be purchased from the vehicle registration authorities, authorized local garages, vehicle test organizations like TÜV, DEKRA, or some websites. The LEZ city authorities and some cities also sell stickers over the internet. Additionally,

many hotels offer to order the stickers on behalf of their guests, provided they receive the required documents in advance. The German LEZ stickers can be purchased online for all vehicles in all countries for 12.50€, also in different languages, since foreign vehicles too are enforced. In the specific case of the European traveler, since the vehicle used is a Euro 3 Diesel a yellow sticker will be issued.

The travel then continues to Prague where no information on hypothetical access restriction scheme could be found. For that reason the Czech access restriction rules cannot be easily appraised.

Then, the European traveler returns to Germany and precisely to Berlin where he/she can drive around the city centre without any restrictions thank to the yellow emission sticker already bought for entering Munich city center.

Left the German city, the trip carries on toward Copenhagen where no access restriction is foreseen for cars and will end in the Swedish city of Malmö in which the restriction in place concerns heavy duty vehicles.

From this itinerary we can conclude that rules for accessing a limited traffic zone can vary notably from country to country and depend upon very different criteria (e.g. a purely temporary request against a personalized emission sticker on the basis of Euro class of the vehicle).

Figure 1 – City legs of Itinerary n.1

Itinerary n.2

Vehicle used	Euro 3 Diesel car	
City A	Lisbon (PT)	Limited Traffic Zone
City B	Valencia (ES)	No access restriction
City C	Barcelona (ES)	Limited Traffic Zone
City D	Toulouse (FR)	Point Based Access Restriction Scheme
City E	Nantes (FR)	Limited Traffic Zone
City F	Paris (FR)	No access restriction
City G	Gent (BE)	Limited Traffic Zone
City H	Bruges (BE)	No access restriction
City I	Rotterdam (NL)	No access restriction
City J	The Hague (NL)	Cordon Based Access Restriction Scheme
City K	Hannover (DE)	Low Emission Zone
City L	Dresden (DE)	No access restriction
City M	Krakow (PL)	Limited Traffic Zone

The second itinerary to be followed by the European tourist goes from West to East starting from the city of Lisbon (Portugal) where there is a Limited Traffic Zone in place enforced manually but unfortunately no online information is available to let the traveler plan her/his trip in advance. Then the trip continues toward the Spanish city of Valencia where no access restriction scheme is operating. Then the journey lays over the city of Barcelona where a Limited Traffic Zone is present. Unfortunately, no information on that is available online; for that reason the traveler should just try to gather information from other possible sources in order to avoid getting any fines during his stay there. From Barcelona the trip continues towards the French city of Toulouse. Again, also in this case no online information could be found and the traveler could find himself in some unexpected troubles with local traffic rules. Proceeding towards the city of Nantes, the traveler can find online some useful information about the Limited Traffic Zone, on condition that he is able to understand the national language, the only one being present on the website of main interest. The last city before leaving France is Paris, where no access restriction is in place. The journey goes on in Belgian city of Gent where an access restriction scheme is operating everyday from 11 a.m. to 6 p.m. as reported online. In the second Belgian city crossed by the traveler, Bruges, instead there is no access restriction scheme in place. Left Belgium, the trip goes on in The Netherlands, starting from the city of Rotterdam where no access restriction is operating for cars and then passing through the city of The Hague, where a pilot road charging scheme is in place but not involving foreign vehicles. Then the trip goes through the German city of Hannover where a Low Emission Zone is in place and a considerable amount of information is available online. Thanks to that, the traveler can early organize him/herself by buying online the yellow or green emission sticker and so being ready to circulate inside the restricted central area of the city. The city of Dresden is the following destination and here no access restriction is operating. Finally, the travel ends in the Polish city of Krakow where a Limited Traffic Zone is in place. Also in this case useful and exhaustive information can be found on the official city website where all single rules of the three traffic zones differing for the level of restrictions applied are explained in English.

In this second case the level of accessibility of information on ARS greatly varies from Western to Eastern countries as summarized in the following table.

Level of information on access restriction scheme rules on the web		
Lisbon (PT)	Limited Traffic Zone	☹
Valencia (ES)	No access restriction	–

Level of information on access restriction scheme rules on the web		
Barcelona (ES)	Limited Traffic Zone	☹
Toulouse (FR)	Point Based Access Restriction Scheme	☹
Nantes (FR)	Limited Traffic Zone	😐
Paris (FR)	No access restriction	–
Gent (BE)	Limited Traffic Zone	☺
Bruges (BE)	No access restriction	–
Rotterdam (NL)	No access restriction	–
The Hague (NL)	Cordon Based Access Restriction Scheme	☺
Hannover (DE)	Low Emission Zone	☺
Dresden (DE)	No access restriction	–
Krakow (PL)	Limited Traffic Zone	☺

Figure 2 – City legs of Itinerary n.2

Following a similar approach, two additional itineraries have been described by making a comparison of the same road map gone through by car and by heavy duty vehicle; while the last one considers a trip made by a tourist bus.

Itinerary n.3

		Euro 3 Diesel car	HD V Euro 3 > 3.5 tons	Comments
City A	Bremen (DE)	No access restriction scheme	Low Emission Zone	From 1st January 2010 until 1st July 2011: o Diesel Euro 3(PM), Petrol Euro 1 / Yellow Sticker From 1st July 2011 onwards: o Diesel Euro 4(PM), Petrol Euro 1 / Green Sticker.
City B	Eindhoven (NL)	No access restriction scheme	Low Emission Zone	In place since the 1st July 2007. Until 1st July 2013: o Euro 3 with retrofit particulate trap and if not older than 8 years o Euro 4 and above allowed in After 1st July 2013: o Euro 4 and above allowed in
City C	Stuttgart (DE)	Low Emission Zone	Low Emission Zone	The standards for the LEZ in Stuttgart are different to the LEZs in the rest of Baden-Württemburg: From 1st July 2010 until 1st January 2012 o Diesel Euro 3(PM), Petrol Euro 1 / Yellow Sticker. From 1st January 2012 onwards o Diesel Euro 4(PM), Petrol Euro 1 / Green Sticker
City E	Ljubljana (SLO)	No access restriction scheme	Low Emission Zone	
City F	Pécs (HU)	No access restriction scheme	Low Emission Zone	Freight traffic is not allowed to enter the city centre without any exception.
City G	Sofia (BG)	No access restriction scheme	Low Emission Zone	In temperatures of over 35°C, there is a prohibition on lorries throughout the road and motorway network between 12h00 and 21h00. The exact dates

		Euro 3 Diesel car	HD V Euro 3 > 3.5 tons	Comments
				of the beginning and end of the restrictions will be announced in the media at least two days in advance.
City H	Athens (GR)	Limited Traffic Zone	Limited Traffic Zone	Number plate restrictions are in operation in Athens, where an "odds and evens" system operates[1].

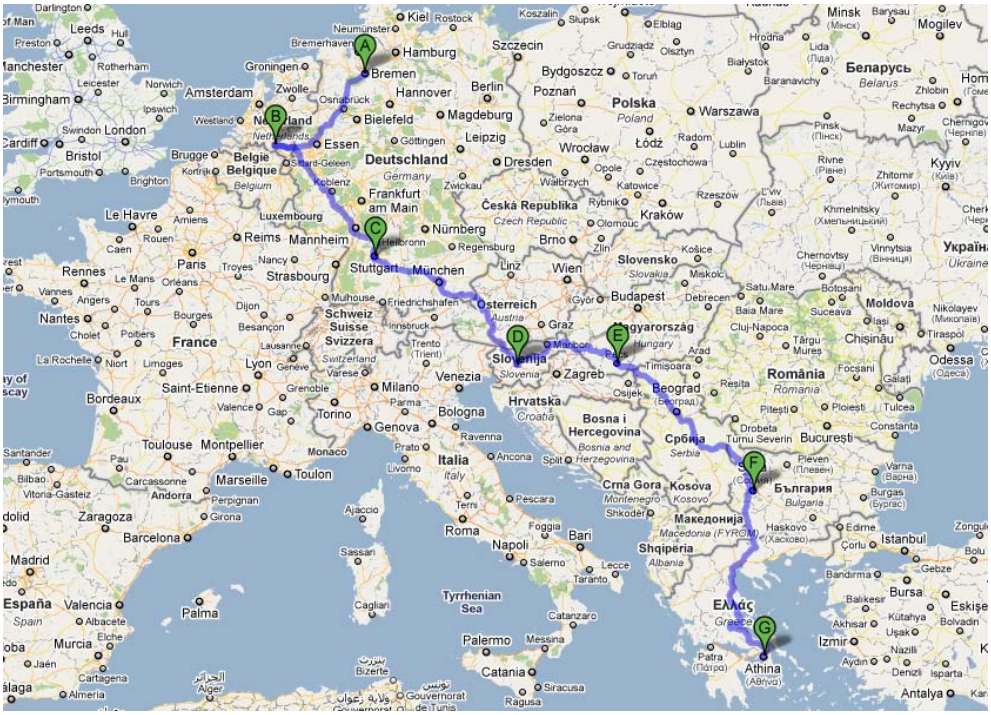

Figure 3 – City legs of Itinerary n.3

[1] Cars with odd number plates can enter on alternate days, and those with even numbers on the other days. Such scheme aims at reducing congestion and journey lengths.

Itinerary n.4

		Euro 3 Diesel car	HDV Euro 3	Comments
City A	Szczecinek (PL)	Area Licensed Based	No access restriction scheme	Access for cars is not permitted in the central area of the city. Only goods vehicles with special permit can enter the zone during time windows.
City B	Poznan (PL)	Low Emission Zone	Low Emission Zone	A LEZ is foreseen but not yet implemented.
City C	Debrecen (HU)	Low Emission Zone	No access restriction scheme	A LEZ is working 24/7 in the city centre but no information has been found about the Euro classes of vehicles allowed to enter the zone.
City D	Timisoara (RO)	No access restriction scheme	Low Emission Zone	Information are available only in local language.
City E	Craiova (RO)	Limited Traffic Zone	Limited Traffic Zone	The access restriction is characterized by time windows for freight while cars are not allowed to enter the zone.

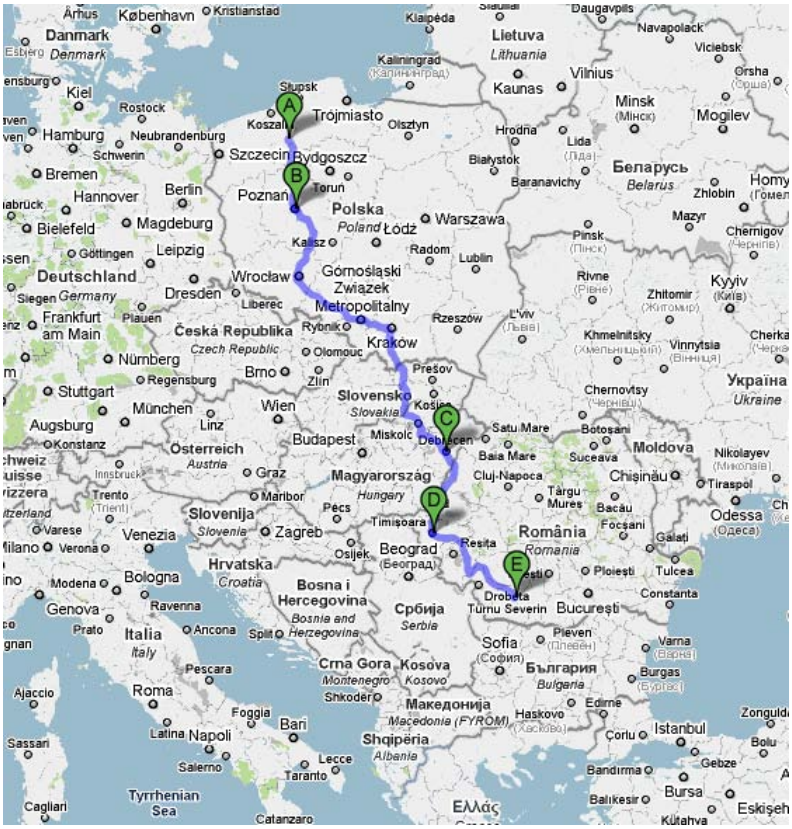

Figure 4 – City legs of Itinerary n.4

Itinerary n.5

This last itinerary aims at describing a typical tourist bus route that starts in the Italian capital of Rome, continues toward another Italian tourist destination, Florence, and then goes to Wien. From the Austrian country the itinerary of the touristic bus then goes on in the Eastern countries of Hungary and Poland by visiting Budapest and Prague respectively.

		Tourist Bus	Comments
City A	Rome (IT)	Limited Traffic Zone	To be accessed by buying a permit the price of which depends on Euro class of vehicle[2].
City B	Florence (IT)	Limited Traffic Zone	To be accessed by buying a permit the price of which depends on Euro class of vehicle[3].
City C	Wien (AT)	Limited Traffic Zone	There are some specific zones for dropping-off and picking up passengers, for parking both free of charge around the inner centre or with payment if closer to the city centre[4].
City D	Budapest (HU)		No information available.
City E	Prague (PL)		No information available.

[2] There is a discount in respect of the Euro class of vehicles, namely:
- 10% for Euro 4 vehicles until 31.12.2012
- 30% for Euro 5 vehicles until 31.12.2013
- 50% for electric, LPG or methane vehicles.

[3]
- Euro 5-4: 180 €/day
- Euro 3-2: 210 €/day
- Euro 1-0: 270 €/day
- Methane vehicles: 120 €/day
- Electric/Hybrid vehicles: 90 €/day

[4] www.bus.wien.info

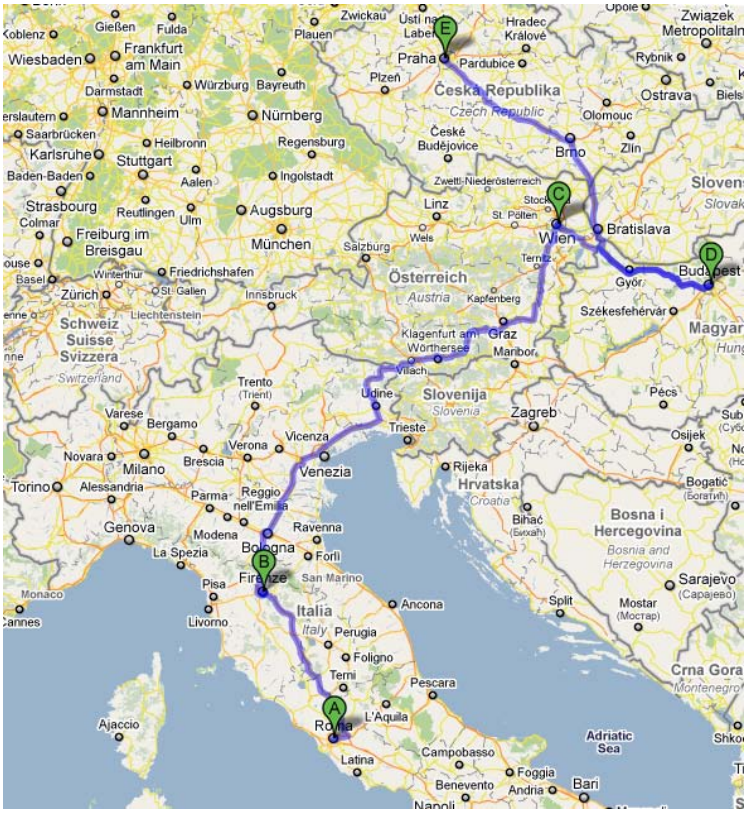

Figure 5 – City legs of Itinerary n.5

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Study on Urban Access Restrictions

Recommendations to the EU

Rome, December 2010

Summary of recommendations to the EU

1. To develop a **harmonizing guidance** to assist cities in their decision making process concerning the possible adoption of ARS (which criteria to consider, which impacts to assess, etc.).

2. To actively promote – notably in the framework of the UN-ECE-led enforcement process of the Vienna convention of 1968 - a **standardized nomenclature** for signals, symbols, and in general concepts and instruments associated to urban access restriction schemes.

3. To require Member States to explicitly include all legal provisions behind access restriction measures in the **national Road Codes.**

4. To require from Member States that the **EURO class is explicitly mentioned** in the vehicle papers.

5. To establish standardized rules for the **verification and certification** of vehicle performances, notably in the context of retrofits.

6. To issue guidance on recommended **best practice for the assessment** of ARS, including on issues like evaluation frameworks, key indicators, monetary valuation parameters, minimum data requirements, and methodological guidance in general on e.g. how to conduct surveys and consultation exercises.

7. To establish a **comprehensive information resource**, publicly available, providing updated information on ARS, in the form of a single window also allowing for interactive vehicle registration and the payment of access charges.

8. To establish a **permanent advisory group** to regularly review ARS developments and accordingly recommend actions to enhance best practice exchange.

9. Fund the development of **large scale ARS demonstrators**, with explicit emphasis on the generation of high quality impact data.

10. Consider the **gradual introduction of stricter EURO standards** for vehicles in operation as an alternative to access restriction for older vehicles.

TREN/A4/103-2/2009

Study on Urban Access Restrictions

Final Report

Rome, December 2010

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Acronyms

ANPR	Automatic Number Plate Recognition
APR	Áreas de Prioridad Residencial
ARS	Access Restriction Scheme
EPA	Danish Environmental Protection Agency
G-Kat	Catalytic converter – *Geregelter Katalysator*
HCGMB	Decision of the General Council of Bucharest – *Hotararea Consiliului General al Municipiului Bucuresti*
LEZ	Low Emission Zone
NO 2	Nitrogen Dioxide
PCN	Penalty Charge Notice
PM	Particulate Matter
RTRA	Road Traffic Regulations Act
TfL	Transport for London
TMA	Traffic Management Act
TRO	Traffic Regulation Order
ZTL	Italian access restriction area – *Zona a Traffico Limitato*
ΔΜΕΟ	Greek Directorate of Road Construction Works Studies – *Διεύθυνση Μελετών Έργων Οδοποιίας*

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In line and within the spirit of the Urban Action Plan, recommendations primarily concentrate on actions that the EU could undertake in order to make the most of the good practices developed in those EU cities that have already accrued a meaningful experience in the design, implementation and evaluation of schemes. These notably include (i) the development of a harmonised guidance on ARS good practice that would support cities without prescribing standardized solutions (ii) the establishment and maintenance of a single-window information resource on all ARS aspects, (iii) the funding of large ARS demonstrators.

Further practical recommendations are directed to cities, in an attempt to build upon the experience accrued so far and issue practical guidance on primary DOs and DONTs.

1. Objectives and methodology of the study

The primary objective of the Study was to provide a comprehensive overview of all existing and planned urban traffic access restriction zones, addressing the main environmental, economic, social and legal aspects and targeting the facilitation of the exchange of best practices[1]. The Study was organized along seven Tasks represented in the diagram below.

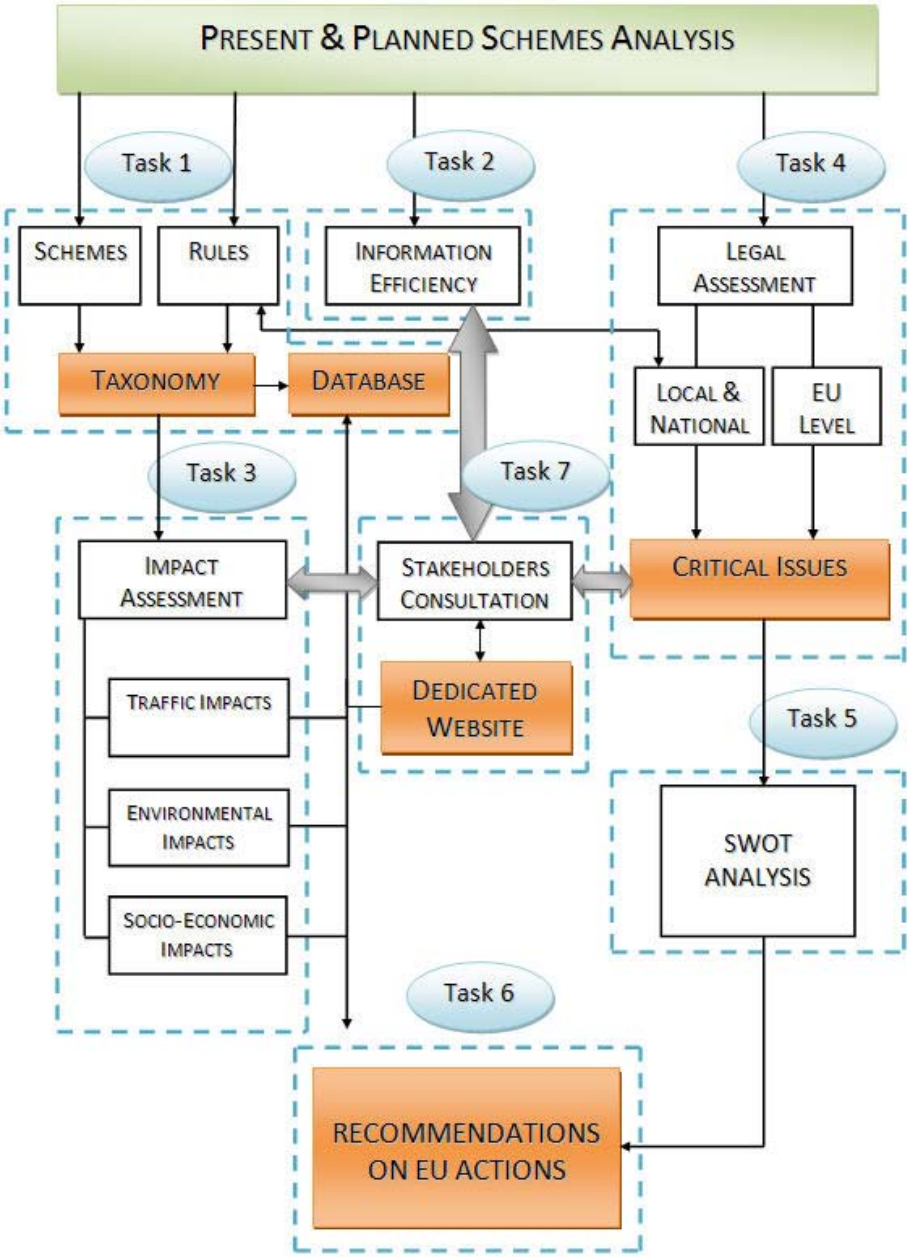


Figure 1 – Tasks

[1] Action 7 — Access to green zones The Commission will launch a study on the different access rules for the different types of green zones across the EU in order to improve knowledge on how the different systems work in practice. On the basis of the study results, the Commission will facilitate the exchange of good practices.
Source: Commission of the European Communities, Brussels, 30.9.2009, COM(2009) 490 final COM(2009), Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, Action Plan on Urban Mobility.

Specifically:

Task 1 gathered and organized information on the nature and characteristics of the Access Restriction Schemes (ARS), along a standardized template that was expressly designed to facilitate homogeneous reporting and synthesis, covering scheme objectives, targeted traffic, type of restriction, design features, technological options, monitoring and enforcement.

Task 2 gathered and organized evidence on which information is provided to users in currently known ARS, on how such information is concretely disseminated to users, and on how effective the adopted options have proved to be.

Task 3 gathered, organized and interpreted information on the effects of ARS implementation (on traffic, environment and possibly other socio-economic dimensions such as accessibility, welfare, etc.), based on the evaluations carried out at each known ARS (when available).

Task 4 analyzed the legal aspects associated to the design and implementation of the known ARS, with particular regard to existing EU legislation.

Task 5 developed a SWOT analysis of the different type of urban ARS zones in Europe In practical operations, strengths, weaknesses, opportunities and threats of each type of ARS have been assessed, notably leading to an assessment of existing good practices in ARS implementation.

Task 6 aimed at recommending the possible EU actions to facilitate the exchange of good practices on urban traffic access restrictions zones (e.g. internet portal, printed information material, information campaign, training; conferences, etc.).

Task 7 (consultation) had the twofold objective of:

- supplementing the information already available from documentary sources with additional inputs to be elicited from cities that have been involved in ARS planning and or implementation (whether realized or not);
- involving a broad range of stakeholders in the identification of the most promising ways forward, with particular emphasis on the promotion, dissemination and exchange of good/best practices.

Moreover, a dedicated Website was established to facilitate the consultation with stakeholders (Figure 2).

Figure 2 – Urban Access Restriction Study website

1.1 Desk Work

The first four Tasks aimed at documenting existing ARS (including schemes that have been planned but have not, or not yet, been implemented), organizing and interpreting the available information and establishing a robust taxonomy of the various access restriction concepts and instruments. The fact finding consisted in a research carried out at national level by investigating each EU 27 country plus Norway and Switzerland by means of institutional websites inspection, experts' interviews and consultation of the Low Emission Zones study website[2], leading to the identification of ca. 400 schemes, explicitly reporting on access restriction policies (planned, implemented, or rejected).

The facts finding phase has relied on two main information channels: the *desk work* and a dedicated *survey* (City survey). The aim of the desk work was to gather and organize, for all already running restriction schemes, a rather large set of information, notably including: the primary objective (congestion or environment), the targeted vehicles, the adoption of charging, the daily time slot of operation (24h or less), the methods for vehicles identification and the accessibility via web to the scheme's information. The co-presence of ARS and LEZ has been also identified. The desk work was based on the identification and exploitation of existing documents, reports and presentations publicly available in paper or/and electronic format[3]. The reference documents and sources of information have been classified into:

- Studies providing data on existing ARS in specific cities

[2] www.lowemissionzones.eu

[3] The list of all information sources identified and exploited is presented in Annex 12: Reference documents and sources of information.

– Other relevant studies

Several sources were thus exploited, such us the EU projects BESTUFS and CURACAO, the internet portal on Low Emission Zones in Europe, the ELTIS documentation on environmental zones in Europe, the Joint Expert Group on Transport and Environment report etc. For each relevant document, the following information was reported:

- Title
- Author/s
- Year of publication
- Type (e.g. best practices, feasibility study, guidelines, fact sheets, recommendations etc.)
- Topics of interest (e.g. low emission zone, environmental zone, charging scheme etc.)
- Area
- Website
- Notes (if applicable)

The desk work has led to the identification of 417 European cities. The geographical coverage of cities in respect to EU27 countries is illustrated in Figure 3.

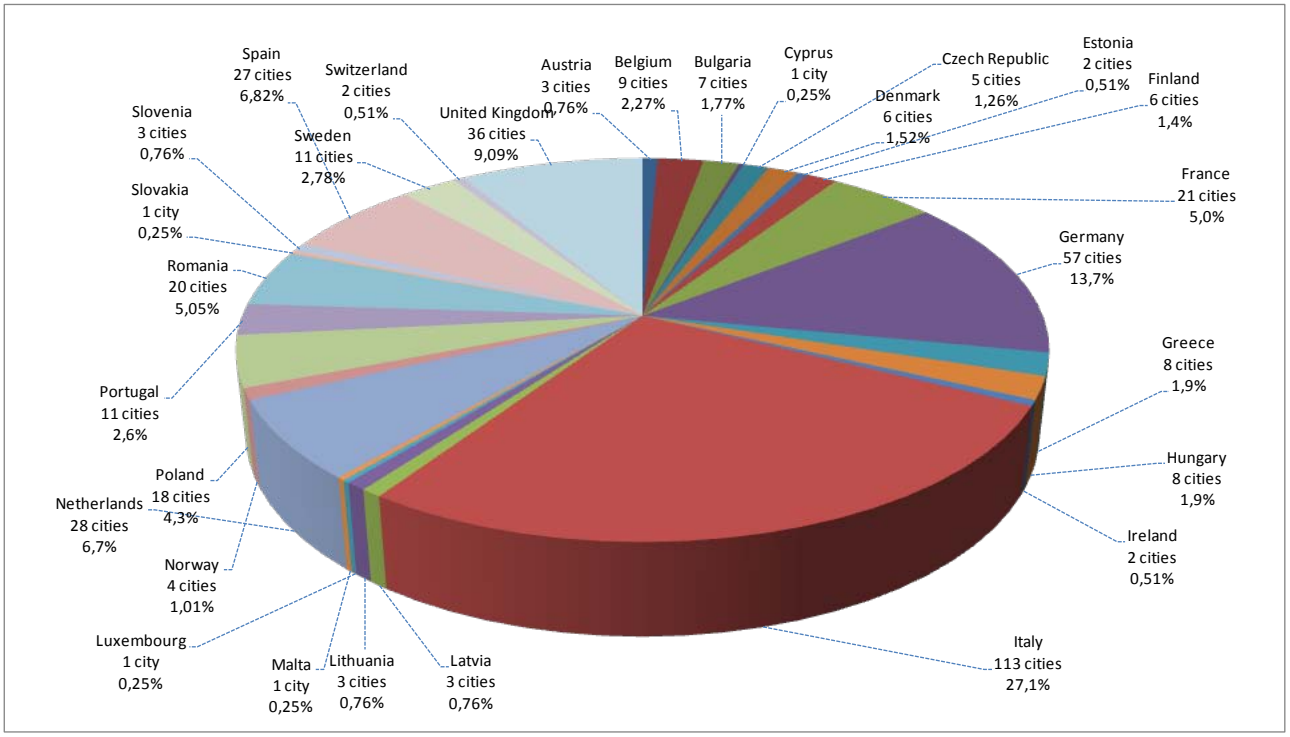


Figure 3 – Geographical coverage of cities having information on ARS

1.2 Consultation

1.2.1 City Survey

In order to further populate the information on access restriction schemes being present around Europe, recourse was made to two main databases – the CIVITAS Forum and POLIS database – listing reference persons in European cities, the CURACAO European project's list of referenced partners, and indirectly to two additional networks[4] (EUROCITIES and CCRE).

The City survey was designed and implemented for the specific purpose of this Study to elicit, directly from EU cities, additional and/or more recent information supplementing the deskwork findings (par. 2.1).

The City survey was devised as an on-line questionnaire addressed only to local authorities having already an urban access restriction scheme in place or undergoing the planning phase. The on line questionnaire[5] was made accessible via the website dedicated to the Study and filled online (Figure 2)[6]. It included both a data collection section and a review of drivers and barriers encountered during the preparation, implementation and/or operation of the scheme. Specifically, the questionnaire was organized into the following sections:

1. contacts
2. city statistics, in terms of:
    - general facts
    - transport facts
    - other transport information
3. implementation stage, divided into three sections:

SECTION A : for cities with ARS in operation:

4. access restriction scheme
5. scheme implementation
6. scheme results
7. information dissemination
8. scheme legal aspects
9. additional information and data
10. future plans

SECTION B: for cities with ARS being envisaged:

4. access restriction scheme
5. scheme implementation
6. scheme results
7. information dissemination
8. scheme legal aspects

[4] The network managers agreed to circulate the questionnaire among their members, without however disclosing their mailing lists (which made it impossible for the consultant to establish direct contact with them, for e.g. reminders, telephone support in filling the questionnaire, etc.).

[5] The on line questionnaire is presented in Annex 8: Questionnaire Template.

[6] http://www.accessrestriction.eu /

9. additional information and data
10. future plans

SECTION C: for cities with ARS neither implemented nor foreseen

Thanks to the contributions coming from the CIVITAS Forum, POLIS database, CURACAO European project's partners, and indirectly from EUROCITIES and CCRE, a total of 274 cities out of the 417 have been contacted by means of an invitation to fill the questionnaire. Following the e-mail information to the local authorities, against a very limited initial number of responses, it has been necessary to proceed to individual telephone contacts, and to set up a help desk to encourage and support the respondents in filling the questionnaire.

Ultimately, usable feedbacks were received by 58 cities, covering 18 countries and 16 Member States, mostly dealing with AR schemes, and only very marginally with LEZ (Figure 4).

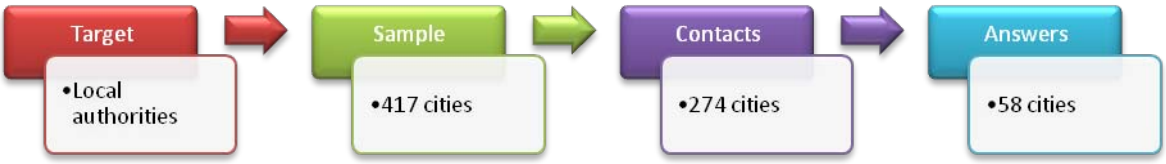


Figure 4 – City survey

1.2.2 Stakeholders Consultation

In view of the Stakeholders consultation, a short questionnaire[7] was prepared and submitted to a diversified range of respondents. This Questionnaire was intended to elicit the views and opinions of a wide variety of stakeholders on the role that ARS can/should play in European cities, and on what could/should be done to promote their adoption and implementation. Following the e-mail presentation to the selected stakeholders, the on-line questionnaire was made accessible via the Study website to be filled online (Figure 2)[8].

Contrary to City survey questionnaire, the Stakeholders consultation questionnaire was submitted to a selected and representative sample of respondents, in order to ensure the most appropriate balance between the various types of stakeholders and avoid the biases that would inevitably result from an open and uncontrolled participation to the consultation process. The following stakeholders groups were contacted: Member State institutions, governmental agencies, economic players, private consultancy companies, academic and research organizations and citizens. In order to contact the above categories, two channels were used:

- individual contacts, as for the academic and research organizations
- industry and other associations, like:
  - European Freight & Logistics Leaders Forum
  - European Association for forwarding transport logistics & customs services (CLECAT)
  - European Association for forwarding transport logistics & customs services (CLECAT)
  - International Association of Public Transport (UITP)
  - ERTICO - ITS Europe

[7] The questionnaire is presented in Annex 10: Consultation Phase Questionnaire Template.
[8] http://www.accessrestriction.eu /

- International Association of Public Transport (UITP)
- Verband Für Spedition Und Logistik Der Tschechischen Republik (SSL)
- Danish Transport & Logistics Association (DTL)
- European Logistics Association (ELA)
- Association of European Vehicle Logistics
- Freight & Logistics Forum
- IRU
- Logistics Initiative Hamburg
- ACEA
- Deutsche Post / DHL
- Deutsche Post / DHL
- EVO

A total of 126 stakeholders were contacted, of which 53 ultimately filled the questionnaire (Figure 5).

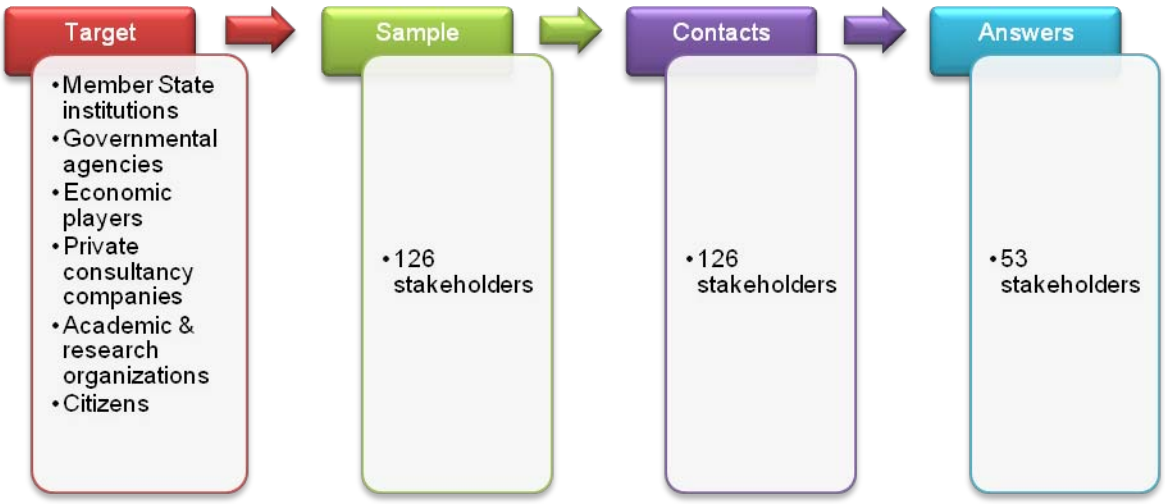


Figure 5 – Stakeholders consultation

Following the stakeholders consultations, a workshop was organized in Brussels, where the results of the consultation was presented and discussed. A total of 169 stakeholders were invited , of which 12 ultimately participated to the workshop.. The results of Stakeholders consultation questionnaire and of the workshop have fed into Tasks 5 (SWOT Analysis) and 6 (Recommendations).

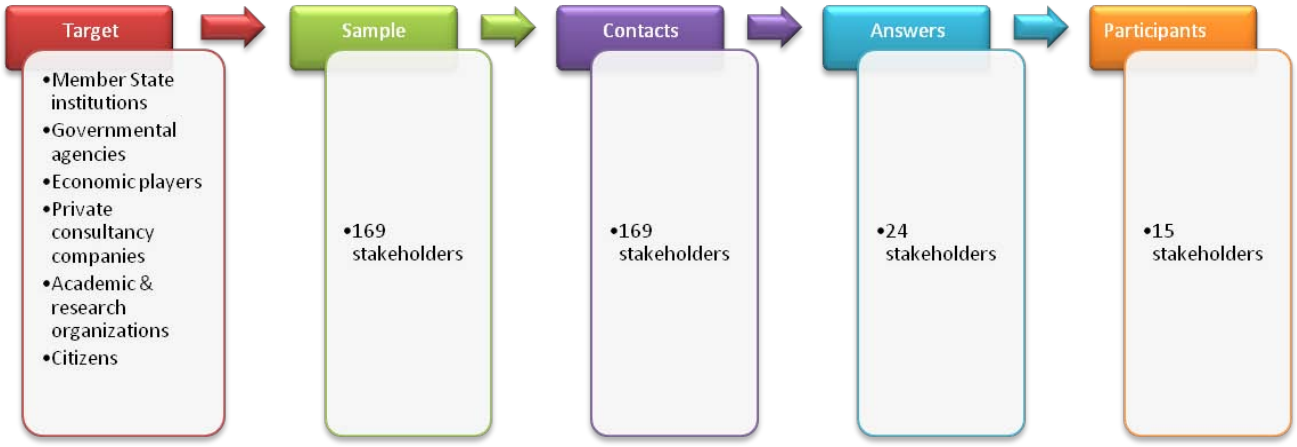


Figure 6 – Stakeholders workshop

2. Review of Access Restriction Schemes in Europe

2.1 Introduction

As outlined above, the systematic search carried out in the early phases of the study led to the identification of 417 European cities, listed in Table A (where cities on a grey background are those for which no ARS-relevant information was ultimately found).

Table A – List of 417 European cities

City	Country	City	Country
Graz	Austria	**Oulu**	Finland
Krems	Austria	**Tampere**	Finland
Vienna	Austria	**Turku**	Finland
Antwerp	Belgium	**Vantaa**	Finland
Bruges	Belgium	**Amiens**	France
Charleroi	Belgium	**Bordeaux**	France
City of Brussels	Belgium	**Brest**	France
Gent	Belgium	**Chalon-sur-Saône**	France
Hasselt	Belgium	**Clermont-Ferrand**	France
Kortrijk	Belgium	**Grasse**	France
Turnhout	Belgium	**La Rochelle**	France
Verviers	Belgium	**Lille**	France
Bourgas	Bulgaria	**Lyon**	France
Burgas	Bulgaria	**Marseille**	France
Gorna-Oryahovitsa	Bulgaria	**Montpellier**	France
Plovdiv	Bulgaria	**Nantes**	France
Sliven	Bulgaria	**Nice**	France
Sofia	Bulgaria	**Niort**	France
Varna	Bulgaria	**Paris**	France
Nicosia	Cyprus	**Poitiers**	France
Brno	Czech Republic	**Rennes**	France
Ostrava	Czech Republic	**Saint Etienne**	France
Pilsen	Czech Republic	**Strasbourg**	France
Prague	Czech Republic	**Toulouse**	France
Usti-nad-Laben	Czech Republic	**Tours**	France
Aalborg	Denmark	**Augsburg**	Germany
Aarhus	Denmark	**Berlin**	Germany
Copenhagen	Denmark	**Bochum**	Germany
Frederiksberg	Denmark	**Bonn**	Germany
Naestved	Denmark	**Bottrop**	Germany
Odense	Denmark	**Bremen**	Germany
Pärnu	Estonia	**Chemnitz**	Germany
Tallinn	Estonia	**Cologne**	Germany
Espoo	Finland	**Dortmund**	Germany
Helsinki	Finland	**Dresden**	Germany

City	Country	City	Country
Duisburg	Germany	**Ruhr**	Germany
Dusseldorf	Germany	**Scghwabish-Gmund**	Germany
Essen	Germany	**Scghwabish-Gmund**	Germany
Frankfurt am Main	Germany	**Stuttgart**	Germany
Freiburg	Germany	**Tubigen**	Germany
Gelsenkirchen	Germany	**Ulm**	Germany
Gera	Germany	**Wolfsburg**	Germany
Gottingen	Germany	**Wuppertal**	Germany
Hagen	Germany	**Amaroussion**	Greece
Halle	Germany	**Athens**	Greece
Hamburg	Germany	**Crete**	Greece
Hannover	Germany	**Heraklion**	Greece
Heidelberg	Germany	**Hersonissos**	Greece
Heilbronn	Germany	**Philippi**	Greece
Herrenberg	Germany	**Thessaloniki**	Greece
Ilsfeld	Germany	**Voula**	Greece
Ingolstadt	Germany	**Budapest**	Hungary
Karlsruhe	Germany	**Debrecen**	Hungary
Leipzig	Germany	**Györ**	Hungary
Leonberg	Germany	**Gyula**	Hungary
Ludwigsburg	Germany	**Miscolc**	Hungary
Mannheim	Germany	**Pécs**	Hungary
Markgröningen	Germany	**Sopron**	Hungary
Marktredwitz	Germany	**Szeged**	Hungary
Marktredwitz	Germany	**Cork**	Ireland
Muhlacker	Germany	**Dublin**	Ireland
Muhlheim	Germany	**Reykjavik**	Island
Munich	Germany	**Acqui Terme**	Italy
Munster	Germany	**Ala**	Italy
Neuss	Germany	**Alba**	Italy
Neu-Ulm	Germany	**Alessandria**	Italy
Nuremberg	Germany	**Ancona**	Italy
Oberhausen	Germany	**Appiano (Eppan)**	Italy
Osnabruek	Germany	**Asti**	Italy
Pfinztal	Germany	**Bari**	Italy
Pforzheim	Germany	**Beinasco**	Italy
Pleidelsheim	Germany	**Bergamo**	Italy
Recklinghausen	Germany	**Biella**	Italy
Regensburg	Germany	**Bologna**	Italy
Reutlingen	Germany	**Bolzano**	Italy

City	Country	City	Country
Borgaro Torinese	Italy	**Lecco**	Italy
Borgomanero	Italy	**Levico Terme**	Italy
Bra	Italy	**Livorno**	Italy
Brescia	Italy	**Lodi**	Italy
Bressanone (Brixen)	Italy	**Lucca**	Italy
Bronzolo (Branzoll)	Italy	**Mantova**	Italy
Brunico (Bruneck)	Italy	**Marlengo (Marling)**	Italy
Cagliari	Italy	**Merano (Meran)**	Italy
Calenzano	Italy	**Mezzocorona**	Italy
Campi Bisenzio	Italy	**Mezzolombardo**	Italy
Carmagnola	Italy	**Milan**	Italy
Carpignano	Italy	**Modena**	Italy
Carrara	Italy	**Moncalieri**	Italy
Casale Monferrato	Italy	**Mondovì**	Italy
Cassino	Italy	**Monza**	Italy
Cermes (Tscherms)	Italy	**Naples**	Italy
Chieri	Italy	**Nichelino**	Italy
Chivasso	Italy	**Novara**	Italy
Collegno	Italy	**Novi Ligure**	Italy
Como	Italy	**Orbassano**	Italy
Cremona	Italy	**Palermo**	Italy
Cuneo	Italy	**Parma**	Italy
Dovera	Italy	**Pavia**	Italy
Empoli	Italy	**Perugia**	Italy
Ferrara	Italy	**Piacenza**	Italy
Florence	Italy	**Pinerolo**	Italy
Forlì	Italy	**Pisa**	Italy
Fossano	Italy	**Ponte a Signe**	Italy
Genoa	Italy	**Ponte San Giovanni**	Italy
Gorizia	Italy	**Porto di Mezzo**	Italy
Grosseto	Italy	**Postal (Burgstall)**	Italy
Grugliasco	Italy	**Potenza**	Italy
Imola	Italy	**Prato**	Italy
Ivrea	Italy	**Ravenna**	Italy
L'Aquila	Italy	**Reggio Emilia**	Italy
Lagundo (Algund)	Italy	**Riva del Garda**	Italy
Laives (Leifers)	Italy	**Rivoli**	Italy
Lana	Italy	**Rome**	Italy
Lastra a Signa	Italy	**Salerno**	Italy
Lavis	Italy	**San Lorenzo (St. Lorenzen)**	Italy

City	Country	City	Country
San Mauro Torinese	Italy	**Kalisz**	Poland
Savigliano	Italy	**Katowice**	Poland
Sesto Fiorentino	Italy	**Krakow**	Poland
Sesto Fiorentino	Italy	**Lodz**	Poland
Settimo Torinese	Italy	**Lublin**	Poland
Settimo Torinese	Italy	**Mielec**	Poland
Siena	Italy	**Nowy Sacz**	Poland
Siena	Italy	**Poznan**	Poland
Terni	Italy	**Rzeszow**	Poland
Tirolo (Tirol)	Italy	**Szczecin**	Poland
Tortona	Italy	**Szczecinek**	Poland
Trento	Italy	**Warsaw**	Poland
Turin	Italy	**Wroclaw**	Poland
Vadena (Pfatten)	Italy	**Braga**	Portugal
Valenza	Italy	**Cascais**	Portugal
Valle Salimbene	Italy	**Coimbra**	Portugal
Varese	Italy	**Evora**	Portugal
Varna (Vahrn)	Italy	**Faro**	Portugal
Venaria Reale	Italy	**Funchal**	Portugal
Venice	Italy	**Lisbon**	Portugal
Vercelli	Italy	**Matosinhos**	Portugal
Verona	Italy	**Porto**	Portugal
Viareggio	Italy	**Sintra**	Portugal
Bauska	Latvia	**Sintra**	Portugal
Cçsis	Latvia	**Vila Nova de Gaia**	Portugal
Riga	Latvia	**Arad**	Romania
Kaunas	Lithuania	**Bacau**	Romania
Klaipeda	Lithuania	**Baia Mare**	Romania
Vilnius	Lithuania	**Braila**	Romania
Luxemburg	Luxemburg	**Bucharest**	Romania
Valletta	Malta	**Cluj Napoca**	Romania
Bergen	Norway	**Constanta**	Romania
Nord-Jæren	Norway	**Craiova**	Romania
Oslo	Norway	**Giurgiu**	Romania
Trondheim	Norway	**Hunedoara**	Romania
Bialystok	Poland	**Iasi**	Romania
Bydgoszcz	Poland	**Miercurea Ciuc**	Romania
Elbląg	Poland	**Mures**	Romania
Gdansk	Poland	**Oradea**	Romania
Gdynia	Poland	**Pitesti**	Romania

City	Country	City	Country
Ploiesti	Romania	**Karlstad**	Sweden
Resita	Romania	**Linkoping**	Sweden
Sfantu	Romania	**Lund**	Sweden
Sfantu	Romania	**Malmö**	Sweden
Suceava	Romania	**Mölndal**	Sweden
Timisoara	Romania	**Örebro**	Sweden
Kosice	Slovakia	**Ronneby**	Sweden
Ljubljana	Slovenia	**Stockholm**	Sweden
Maribor	Slovenia	**Umea**	Sweden
Nova Gorica	Slovenia	**Genève**	Switzerland
Alcalà de Henares	Spain	**Zurich**	Switzerland
Aranjuez	Spain	**Alkmaar**	The Netherlands
Barcelona	Spain	**Amersfoort**	The Netherlands
Bilbao	Spain	**Amsterdam**	The Netherlands
Burgos	Spain	**Arnhem**	The Netherlands
Donostia-SanSebastian	Spain	**Breda**	The Netherlands
Figueres	Spain	**Delft**	The Netherlands
Gandia	Spain	**Den Bosch**	The Netherlands
Gijón	Spain	**Deventer**	The Netherlands
Girona	Spain	**Eindhoven**	The Netherlands
Granada	Spain	**Gouda**	The Netherlands
Hospitalet Llobregat	Spain	**Haarlem**	The Netherlands
Irun	Spain	**Heerlen**	The Netherlands
Las Palmas de Gran Canaria	Spain	**Helmond**	The Netherlands
Madrid	Spain	**Leeuwarden**	The Netherlands
Malaga	Spain	**Leiden**	The Netherlands
Murcia	Spain	**Leidschendam**	The Netherlands
Palma	Spain	**Maastricht**	The Netherlands
Ponferrada (Léon)	Spain	**Nieuwegein**	The Netherlands
Santiago de Campostela	Spain	**Nijmegen**	The Netherlands
Seville	Spain	**Parkstad Limburg**	The Netherlands
Seville	Spain	**Rijswijk**	The Netherlands
Terrassa	Spain	**Rotterdam**	The Netherlands
Tudela	Spain	**Schiedam**	The Netherlands
Valencia	Spain	**Schiedam**	The Netherlands
Vigo	Spain	**Sittard-Geleen**	The Netherlands
Vitoria Gasteiz	Spain	**The Hague**	The Netherlands
Zaragoza	Spain	**Tilburg**	The Netherlands
Göteborg	Sweden	**Utrecht**	The Netherlands
Helsingborg	Sweden	**Zaanstad**	The Netherlands

City	Country	City	Country
Bath	United Kingdom	**London**	United Kingdom
Belfast	United Kingdom	**Manchester**	United Kingdom
Birmingham	United Kingdom	**Newcastle upon Tyne**	United Kingdom
Bradford	United Kingdom	**Northampton**	United Kingdom
Brighton & Hove	United Kingdom	**Norwich**	United Kingdom
Bristol	United Kingdom	**Nottingham**	United Kingdom
Bromley	United Kingdom	**Oxford**	United Kingdom
Cambridge	United Kingdom	**Plymouth**	United Kingdom
Derby	United Kingdom	**Preston**	United Kingdom
Durham	United Kingdom	**Reading**	United Kingdom
Edinburgh	United Kingdom	**Sheffield**	United Kingdom
Exeter	United Kingdom	**Sheffield**	United Kingdom
Gateshead	United Kingdom	**Southampton**	United Kingdom
Glasgow	United Kingdom	**Suffolk**	United Kingdom
Hammersmith and Fulham	United Kingdom	**Sunderland**	United Kingdom
Kingston-Upon-Hull	United Kingdom	**Sutton**	United Kingdom
Leeds	United Kingdom	**Winchester**	United Kingdom
Leicester	United Kingdom	**York**	United Kingdom
Liverpool	United Kingdom		

The methodology adopted to gather information on the possible presence of an access restriction scheme in each of the cities listed above allowed to acquire a **rather extensive and homogenous set** of data on the possible presence of an access restriction scheme, notably including the nature of the **primary objective pursued through the scheme**, i.e. to reduce **traffic congestion** or to improve city **environmental conditions** or other aims like raising funds to be invested in enhancing the quality of local transport. General information has also been acquired concerning the type of **vehicles targeted** by the scheme, the **presence of a charge** for entering the restricted zone, the **time slot of enforcement,** i.e. if the restriction works 24 hours or just during specific time slots. Additional information collected concerns the solution chosen for the **identification of vehicles** entering the restricted zone; specifically, three options were considered: 'manual' – when each vehicle should be stopped at the entrance by controllers checking for permit to enter, 'stickers' – usually referring to the Low Emission Zones for which an emission sticker is required, to be exhibited in the windscreen and checked at the entrance, 'technological' – when the access control is automatically performed by a Automatic Number Plate Recognition technology and the related automatic check in a 'white list' database.

Another important piece of information gathered regards t**he availability of information about the scheme existence and rules on the city websites (or on other national websites),** to assist non-resident (including foreign) motorists in dealing with an access restriction when travelling abroad.

Finally, it has been highlighted the possible **coexistence of a traffic restriction scheme with a Low Emission zone.**

For each city selected main features have been investigated, specifically:

- Adoption of charging (Y/N)

- Primary Objective (Congestion reduction/Environment/Other)
- Targeted Vehicles (Private cars/Freight/Private cars & freight)
- Presence of charging (Charged/Non charged)
- Time of operation (24h/Day time)
- Type of enforcement (Manual/Stickers/Technological)
- Presence of online information about the scheme (Y/N)
- Possible coexistence of a Congestion Charged Scheme with a Low Emission Zone (Y/N)

Figures from 7 through 14 illustrate the main results[9].

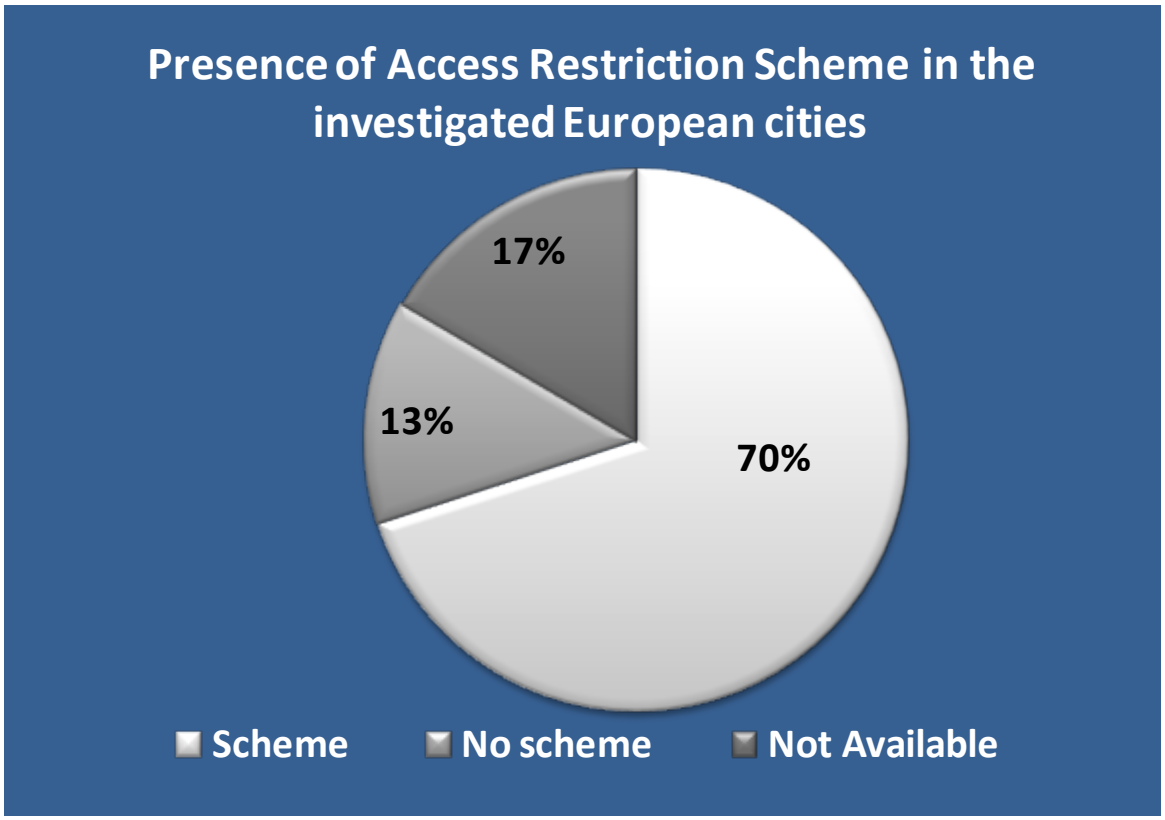


Figure 7 – Access Restriction Schemes being present in the 417 investigated cities

[9] The complete list of 380 schemes with information available can be found in Annex 1 – Cities general information on ARS.

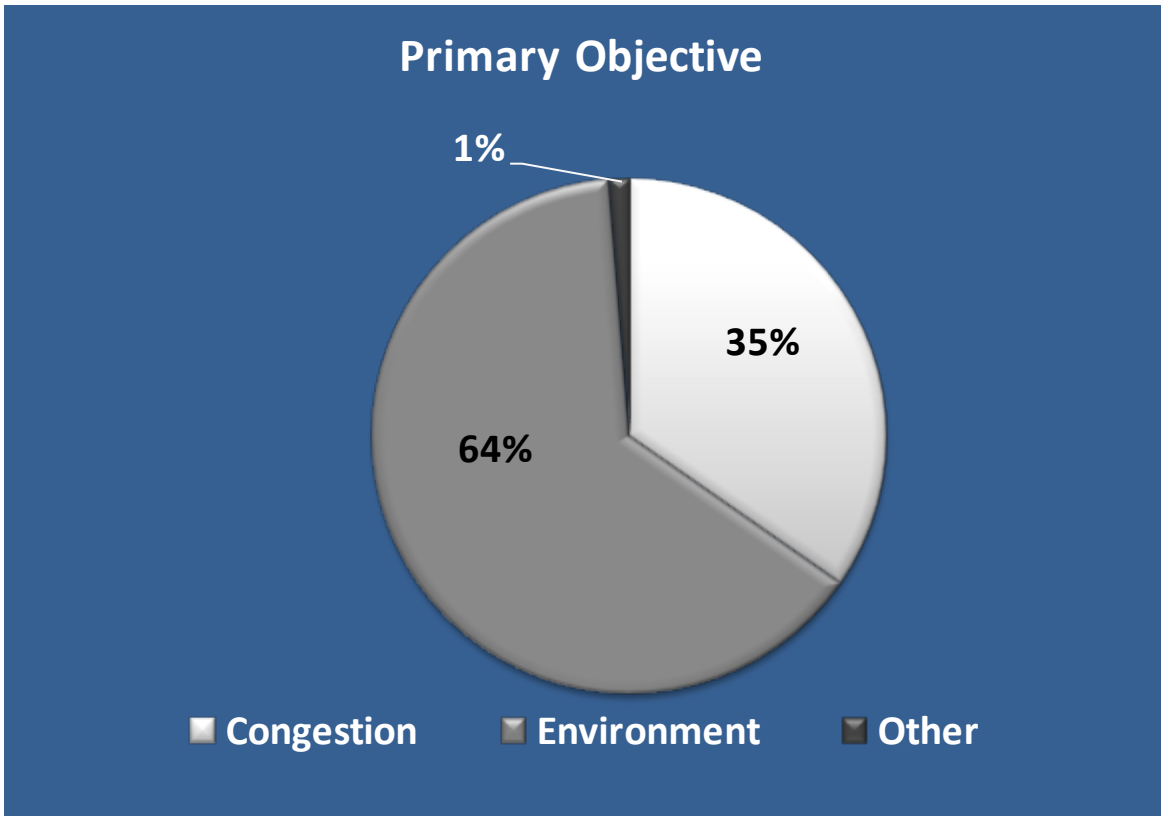


Figure 8 – Primary objective of the investigated access restriction schemes

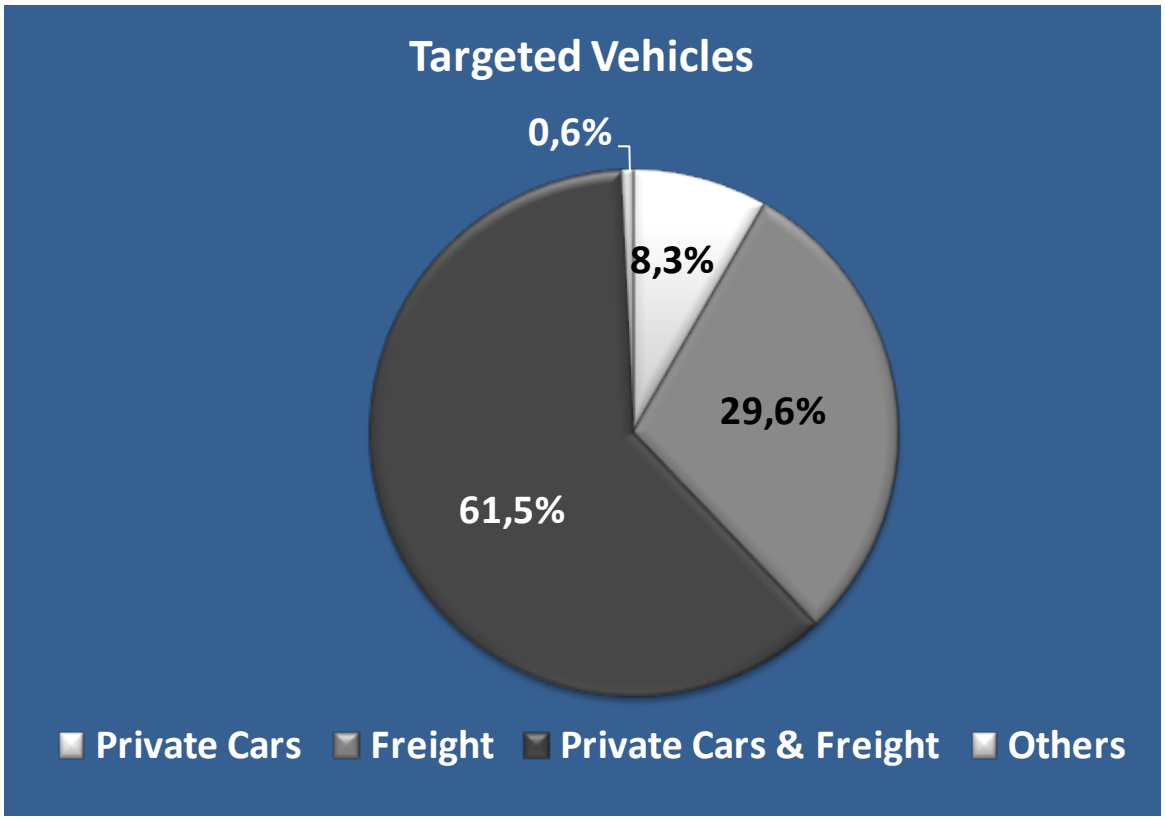


Figure 9 – Target vehicles of the investigated access restriction schemes

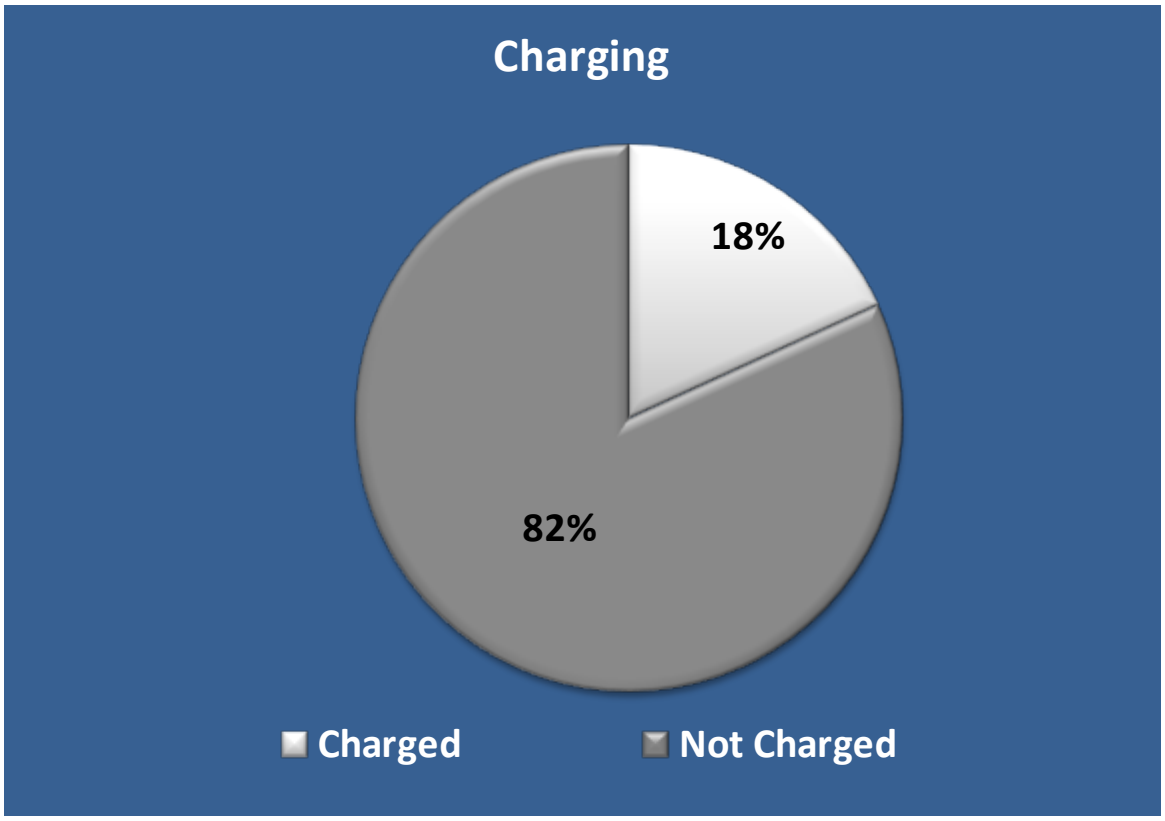


Figure 10 – Presence of charging in the investigated access restriction schemes

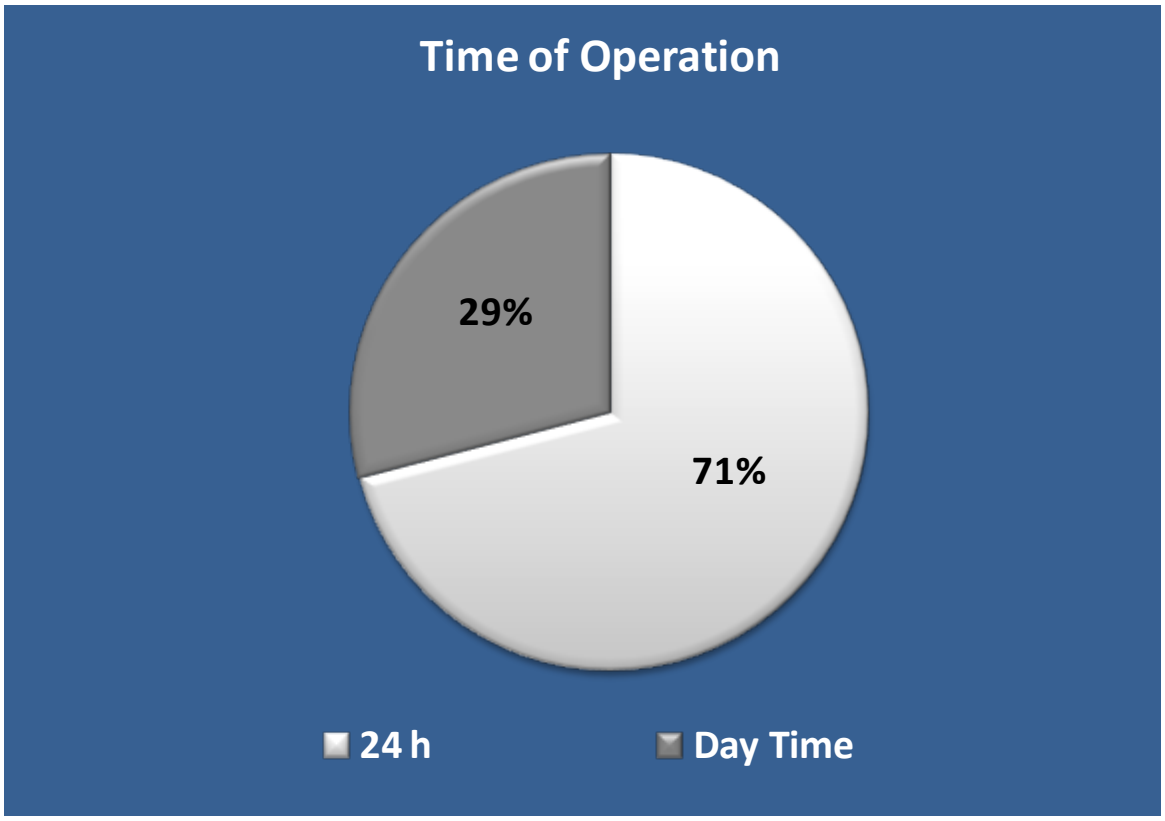


Figure 11 – Time of operation of the investigated access restriction schemes

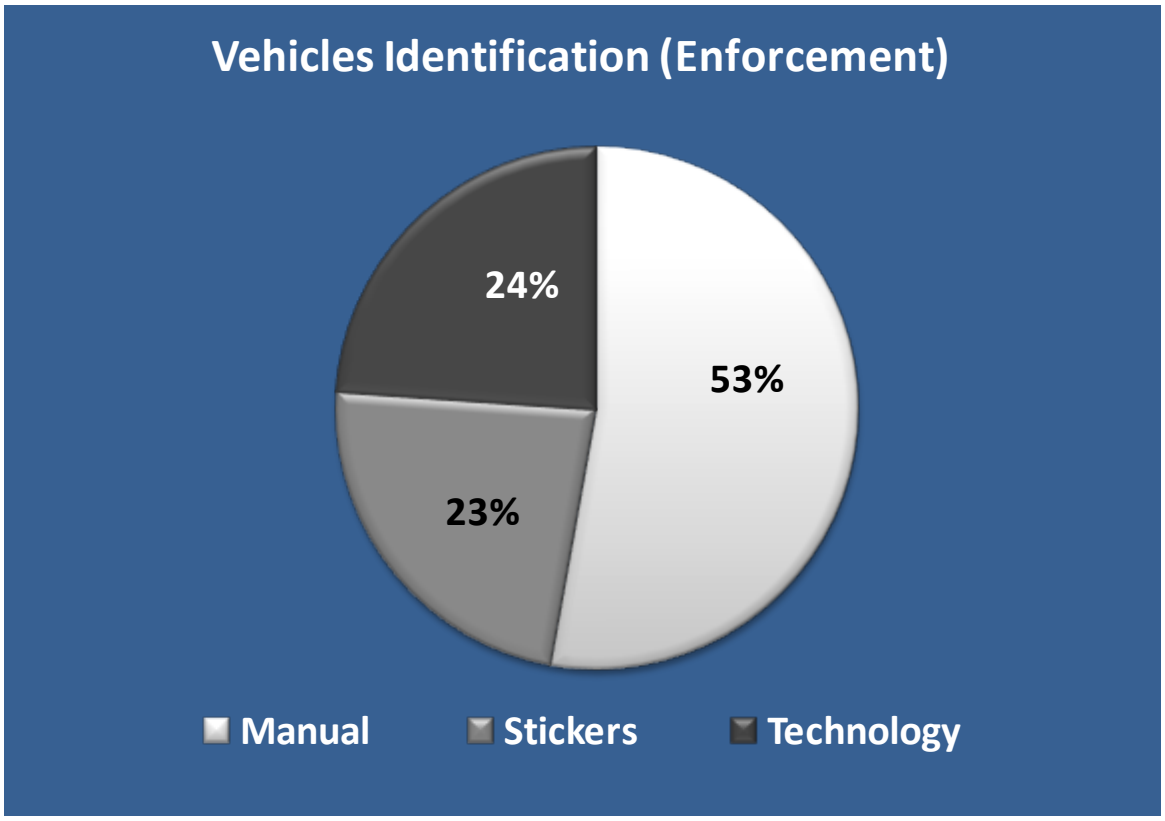


Figure 12 – Type of enforcement adopted in the investigated access restriction schemes

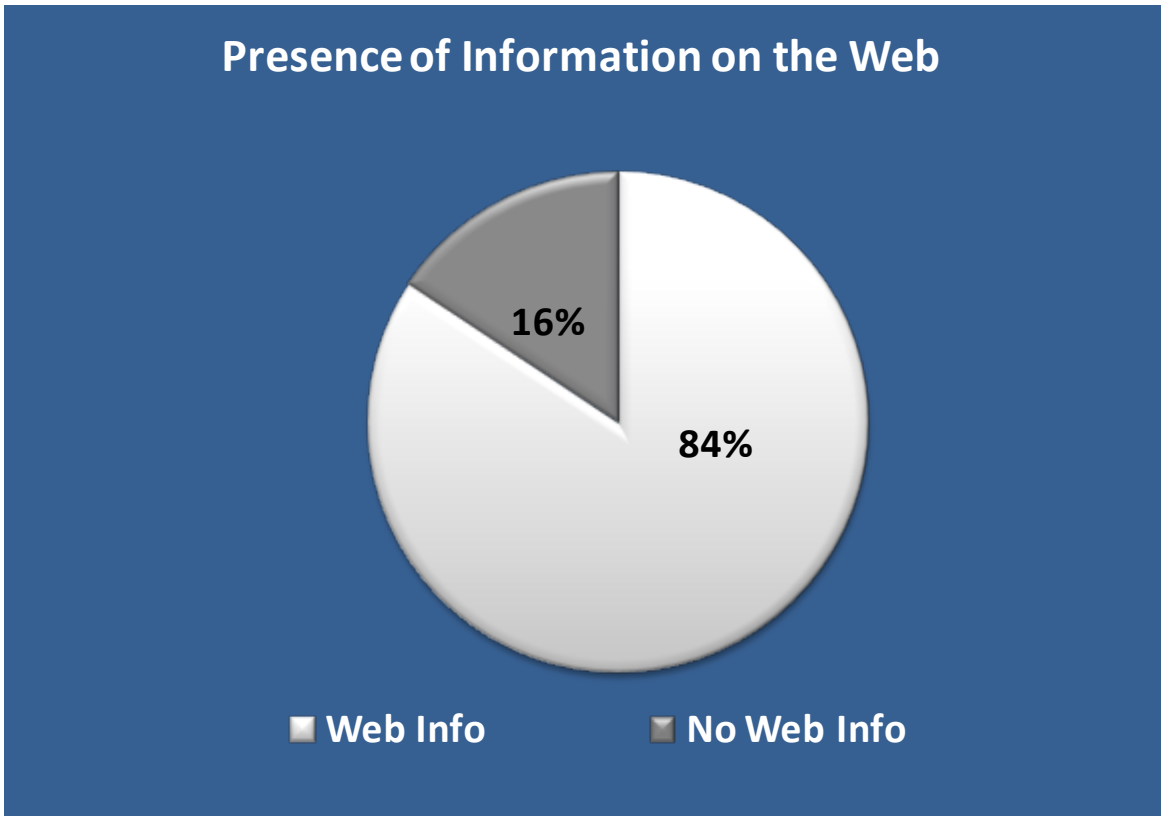


Figure 13 – Presence of online information concerning the investigated access restriction schemes

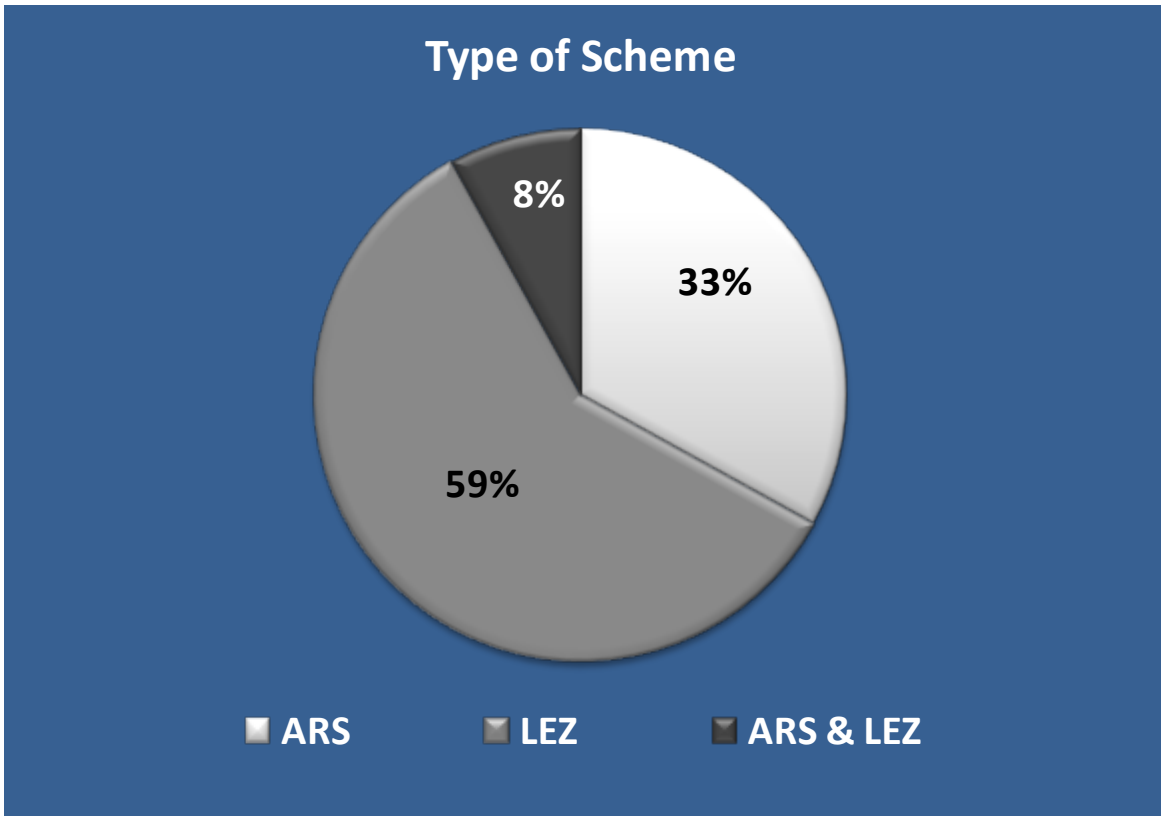


Figure 14 – Type of scheme and coexistence of both traffic restriction and low emission zone in the investigated schemes

2.1.1 The City Survey

As outlined above, 58 cities have ultimately provided usable responses through the questionnaire, as reported in Table B.

Table B – List of the 58 cities exhaustively responding to the questionnaire

City	Country	City	Country
Ghent	Belgium	**Bauska**	Latvia
Turnhout	Belgium	**Riga**	Latvia
Verviers	Belgium	**Bergen**	Norway
Aalborg	Denmark	**Nord-Jaeren**	Norway
Helsinki	Finland	**Oslo**	Norway
La Rochelle	France	**Trondheim**	Norway
Poitiers	France	**Gdansk**	Poland
Toulouse	France	**Poznan**	Poland
Berlin	Germany	**Szczecinek**	Poland
Hannover	Germany	**Funchal**	Portugal
Munich	Germany	**Craiova**	Romania
Nuremberg	Germany	**Burgos**	Spain
Stuttgart	Germany	**Göteborg**	Sweden
Debrecen	Hungary	**Lund**	Sweden
Debrecen	Hungary	**Örebro**	Sweden
Cork	Ireland	**Stockholm**	Sweden
Bologna	Italy	**Amsterdam**	The Netherlands
Ferrara	Italy	**Eindoven**	The Netherlands
Genoa	Italy	**Rotterdam**	The Netherlands
Imola	Italy	**The Hague**	The Netherlands
Milan	Italy	**Utrecht**	The Netherlands
Modena	Italy	**Bristol**	United Kingdom
Monza	Italy	**Cambridge**	United Kingdom
Parma	Italy	**Durham**	United Kingdom
Perugia	Italy	**Edinburgh**	United Kingdom
Potenza	Italy	**Gateshead**	United Kingdom
Ravenna	Italy	**London**	United Kingdom
Rome	Italy	**Manchester**	United Kingdom
Verona	Italy	**Reading**	United Kingdom

The cities' spatial distribution is reported in Table C. Eastern Europe, with 12% of the sample, is underrepresented. The low rate of usable replies from the Eastern cities could be possibly explained in relation to the data holders not coinciding with the officer in charge or belonging to different administrative services. The low rate of replies from France could be associated to the limited number of cities having concretely implemented an ARS. The same applies for Spain which rates the higher number of potential respondents who have given up with the questionnaire despite having agreed on a possible schedule for delivery. The high rate of replies from Italian cities appear to reflect both a diffuse presence of

traffic restriction schemes and the rather widespread practice of monitoring policy effectiveness, also for governance purposes.

Table C – Numerical Distribution of Cities by Country (18 countries)

City	Num.	% Out of 18
Belgium	4	7%
Denmark	1	2%
Finland	1	2%
France	2	4%
Germany	5	9%
Hungary	1	2%
Ireland	1	2%
Italy	13	23%
Latvia	2	4%
Norway	4	7%
Poland	3	5%
Portugal	1	2%
Romania	1	2%
Spain	1	2%
Sweden	4	7%
The Netherlands	4	7%
Ukraine	1	2%
United Kingdom	8	14%

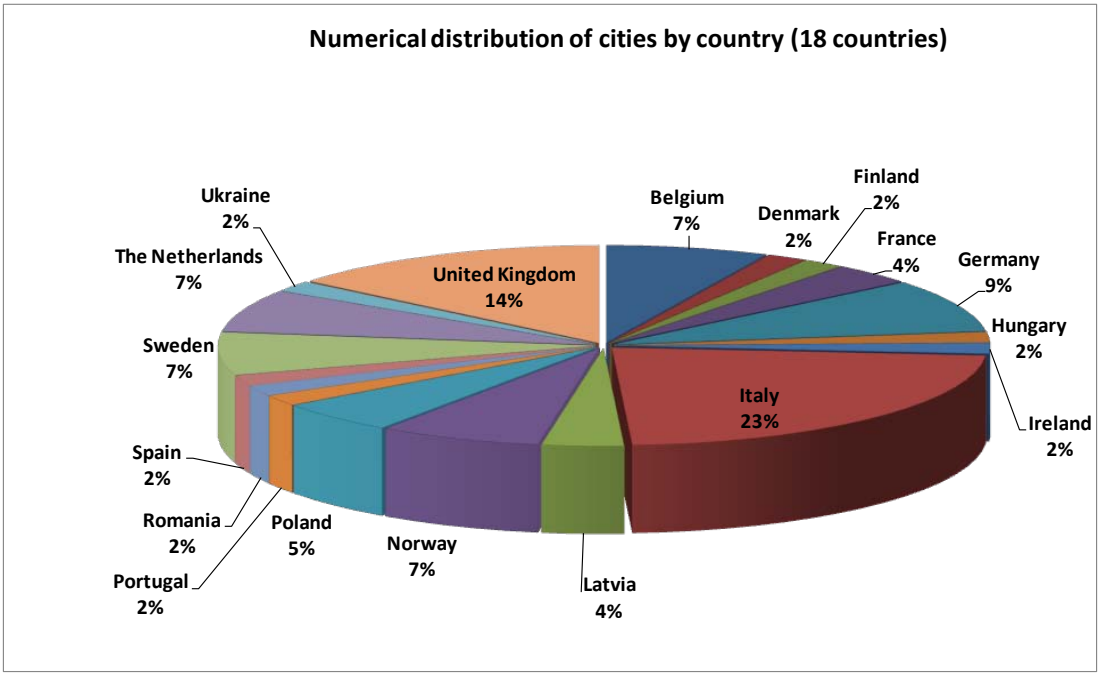


Figure 15 – Numerical Distribution of Cities by Country

Figure 16 below plots the sample of investigated cities[10] against time (year when the scheme was actually implemented). Early implementations in the 70s and 80s (the well known Norwegian schemes playing the main pioneering role), are followed by selected and geographically distributed medium-sized cities in the 90s, and the subsequent mushrooming of ARS implementation over the last decade (ca. 80% of the total sample of investigated cities).

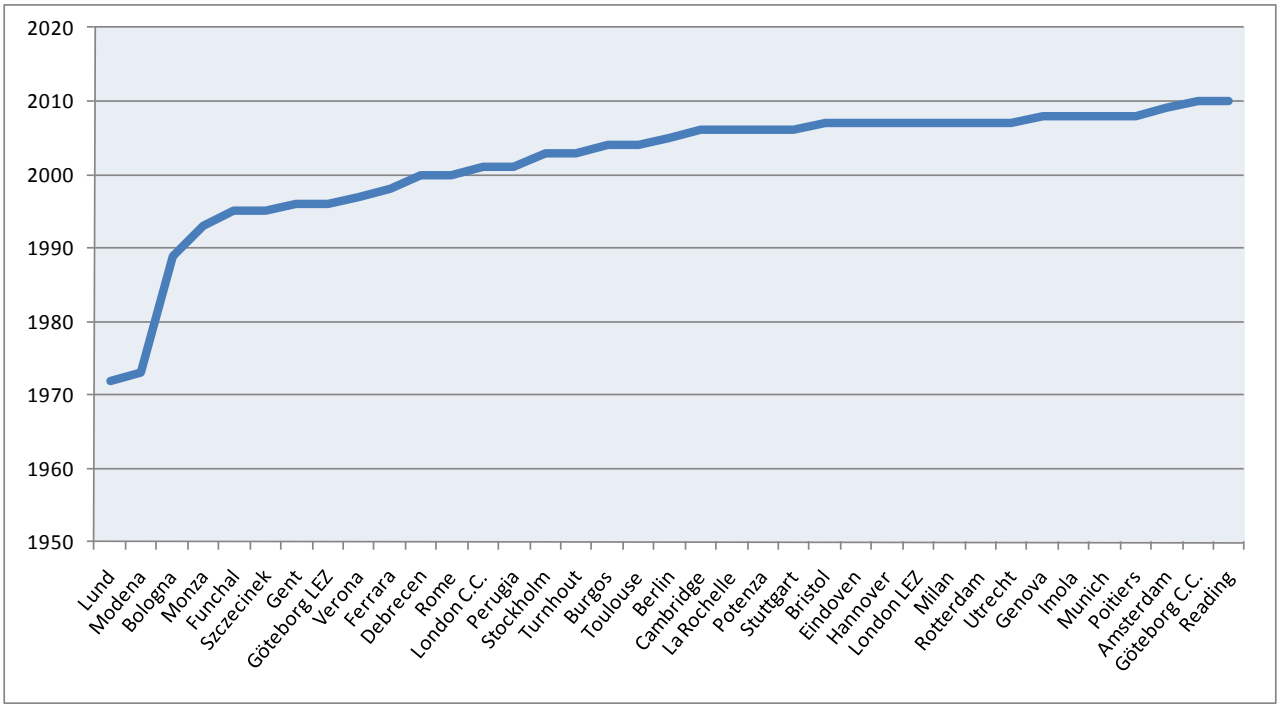


Figure 16 – Trend of Outset Dates

[10] In the following, we systematically refer to the overall batch of 58 cities for which a meaningful ARS profile was assembled, by combining desk analysis and the questionnaire results.

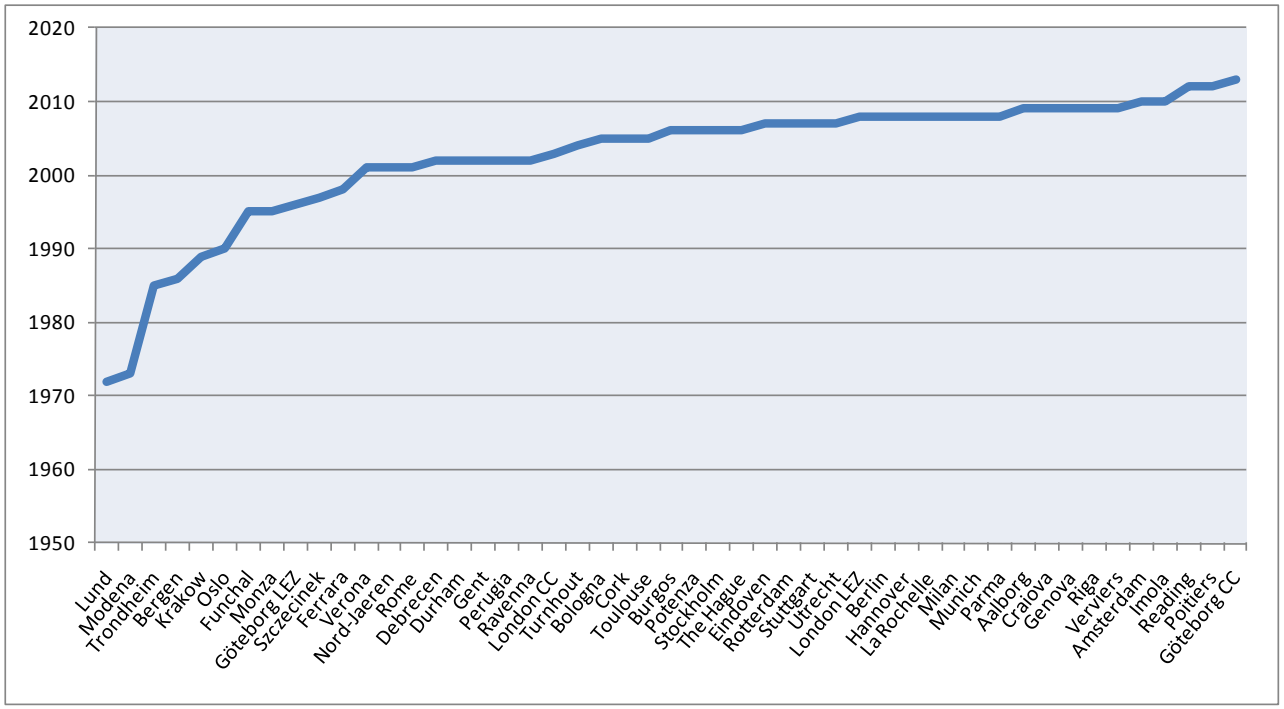


Figure 17 – Trend of Implementation Dates

2.2 Analysis of the Access Restriction Schemes (existing and planned)

2.2.1 Scheme definitions

AR schemes can broadly be classified into four types:

1) ***Point based*** (e.g. restriction to cross a bridge or to enter a small section of city)
2) ***Cordon based***: a restriction is applied for crossing a cordon, and may vary with time of day, direction of travel, vehicle type and location on the cordon. There could be a number of cordons with different rules/prices.
3) ***Area licence based* pricing**: a restriction is applied for driving within an area during a period of time. The rules may vary with time and vehicle type.
4) ***Distance or time based***: it is essentially a pricing restriction based upon the distance or time a vehicle travels along a congested route or in a specified area, and may vary with time, vehicle type and location.

Point based charges are reasonably commonplace, but they are generally limited to specific small locations and not spread across the network.

Cordons are simply combinations of point-based schemes located to form a continuous or semi-continuous boundary around an area. Cordon schemes are present in Stockholm, in several Norwegian cities, and are the most common in UK. They are the typical form of electronic road pricing. Their main advantages are their flexibility in having variation by time of day and vehicle type, and that each individual trip made into the area can be subject to a charge.

Toll rings are the straightforward application of the highway tolling scheme, somehow similar to the cordon but generally applied to regulate the access to the entire city. This solution is implemented in Singapore and in many Norwegian cities. Flexibility is featured as in the cordon schemes.

Area licensing or entry permit schemes are applied to restrict the access to areas mainly in the inner core of cities. Their main attraction is that they are simple to understand and straightforward to implement; rules may vary with time and vehicle type.

The London Congestion Charge is the most well known example of this type of regime. Users pay a daily charge to enter or be within the charging zone, and they can enter and exit as many times they like during the day. The charge is operational between the hours of 07.00 and 18.00 Monday through Friday.

Low emission zone (LEZ) is a scheme targeting mainly the restriction of accessing freight vehicles to large areas of the city. It is largely implemented in cities with more than 200.000 inhabitants with peak in Germany and it has been integrated to the congestion charge scheme in London.

2.2.2 Scheme Adoption and Objectives

The questionnaire asked cities to identify the scheme adopted, its objectives and the targeted traffic.

As expected, almost every scheme implemented has multiple objectives, from large traffic volume/congestion to environmental quality. In case the of LEZs the main objective is environmental quality, whereas in the toll ring schemes the main objective – after traffic reduction – is the revenue to finance transport infrastructures.

Most of the respondent cities have adopted a traffic restriction scheme (only two of them, Goteborg and London feature the coexistence of a traffic restriction with a Low Emission Zone). This is obviously reflected in the results shown in figure 18 below. Nevertheless, a significant percentage of schemes have the environmental issues as one of the main objectives.

Figure 18 reports the main aims expressed by cities classified according to the scheme adopted.

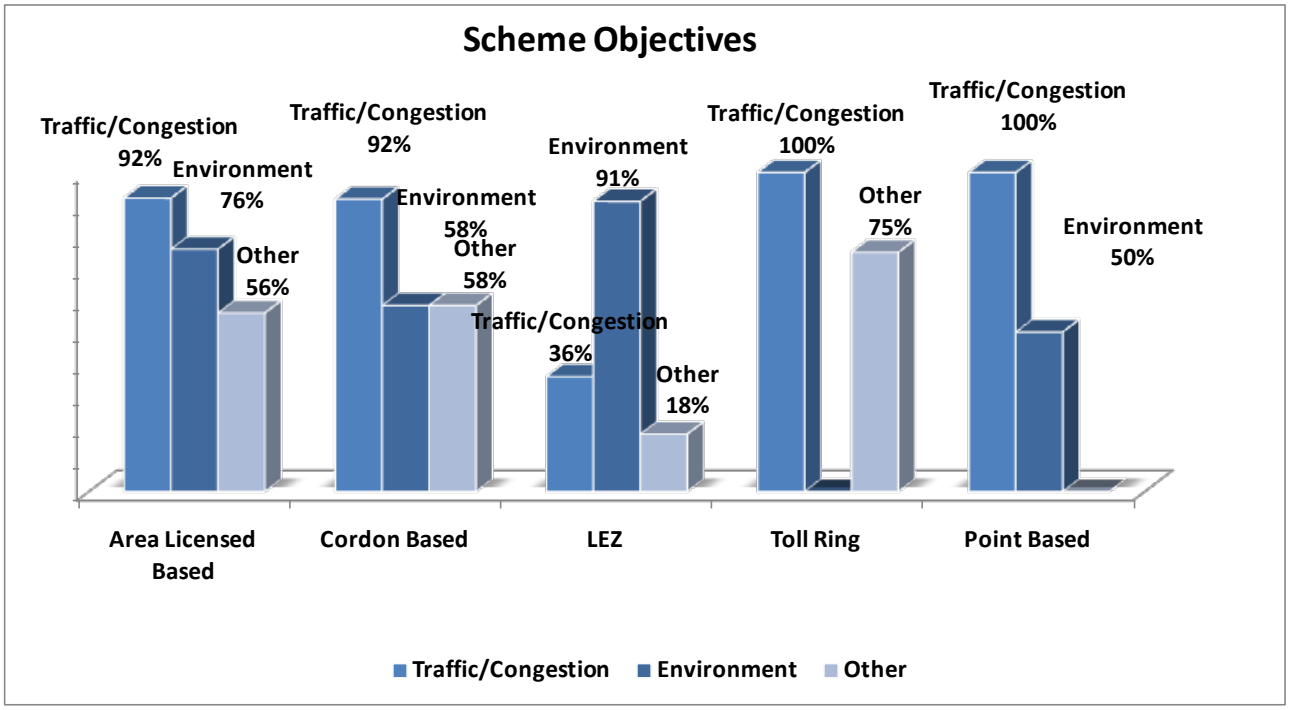


Figure 18 – Scheme Objectives by Type of Scheme

Figure 19 reports the targeted traffic identified by cities classified according to the scheme adopted. Besides the obvious target of private vehicles (cars) for all schemes, in the case of LEZs , as anticipated, the prevailing target are freight vehicles and in more than one case the only exemption to access is given to clean vehicles.

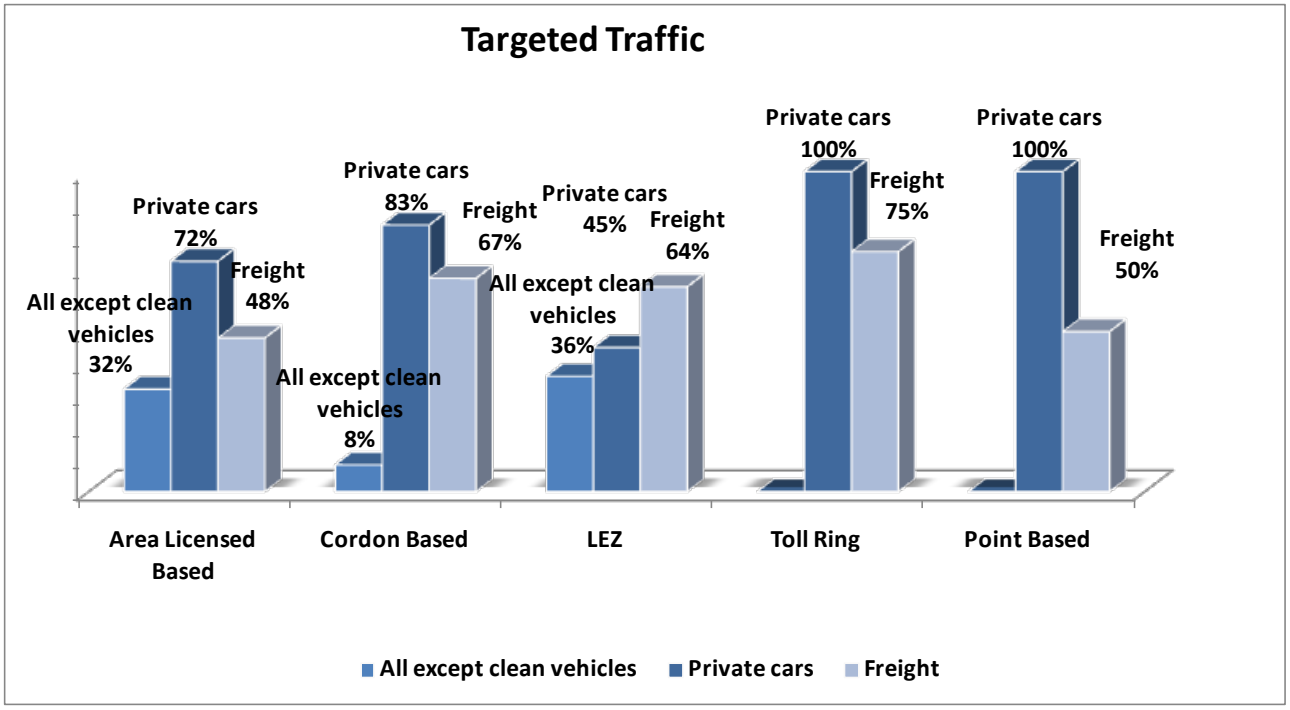


Figure 19 – Targeted Traffic by Type of Scheme

2.2.3 Scheme Features

For each scheme several features have been investigated.

Specifically:

- Adoption of charging (Y/N)
- Level of technology deployed (High/Low; high meaning automatic system, low meaning manual management)
- Level of exceptions (Rigid/loosing)
- Time of operation (24h/daytime)
- Pricing (per day/per trip)

Figures from 20 through 24 report the results classified according to the schemes adopted.

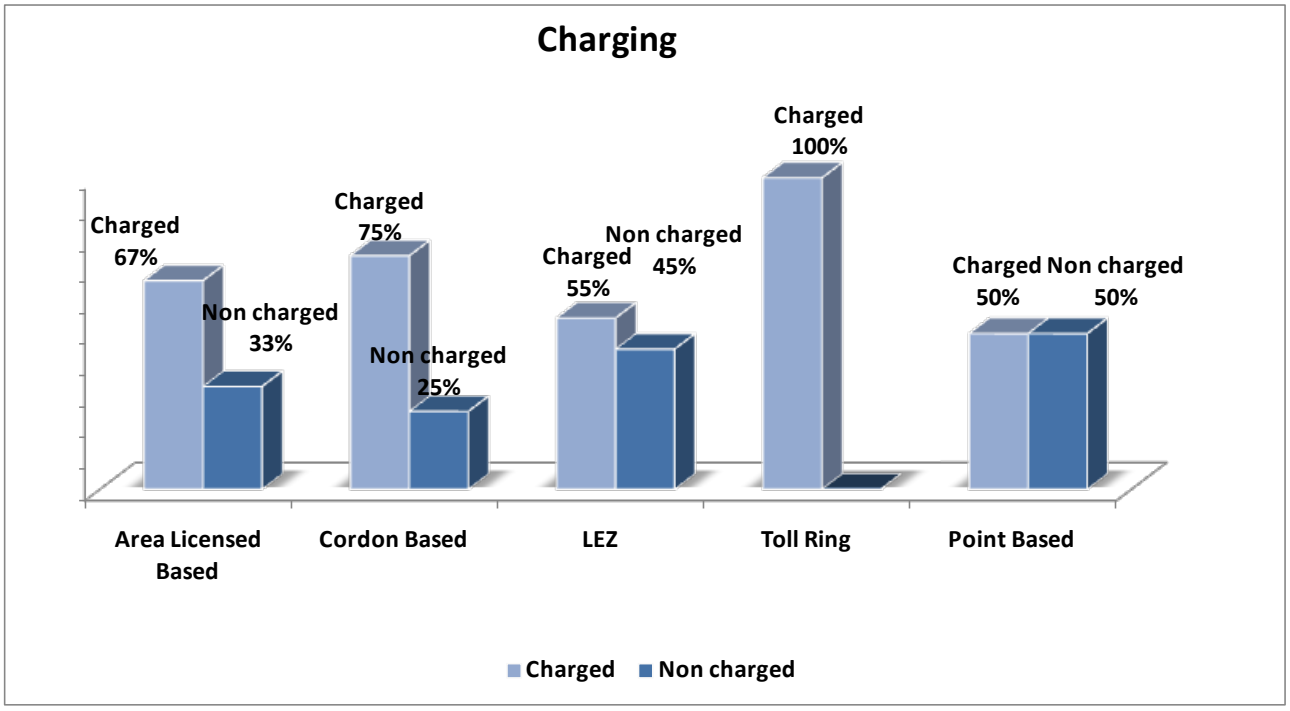


Figure 20 – Charging by Type of Scheme

Whereas the high percentage of charging for the toll ring and cordon based schemes is an intrinsic feature of these kind of schemes, charging also appears to be widely diffused in area licensed based schemes.

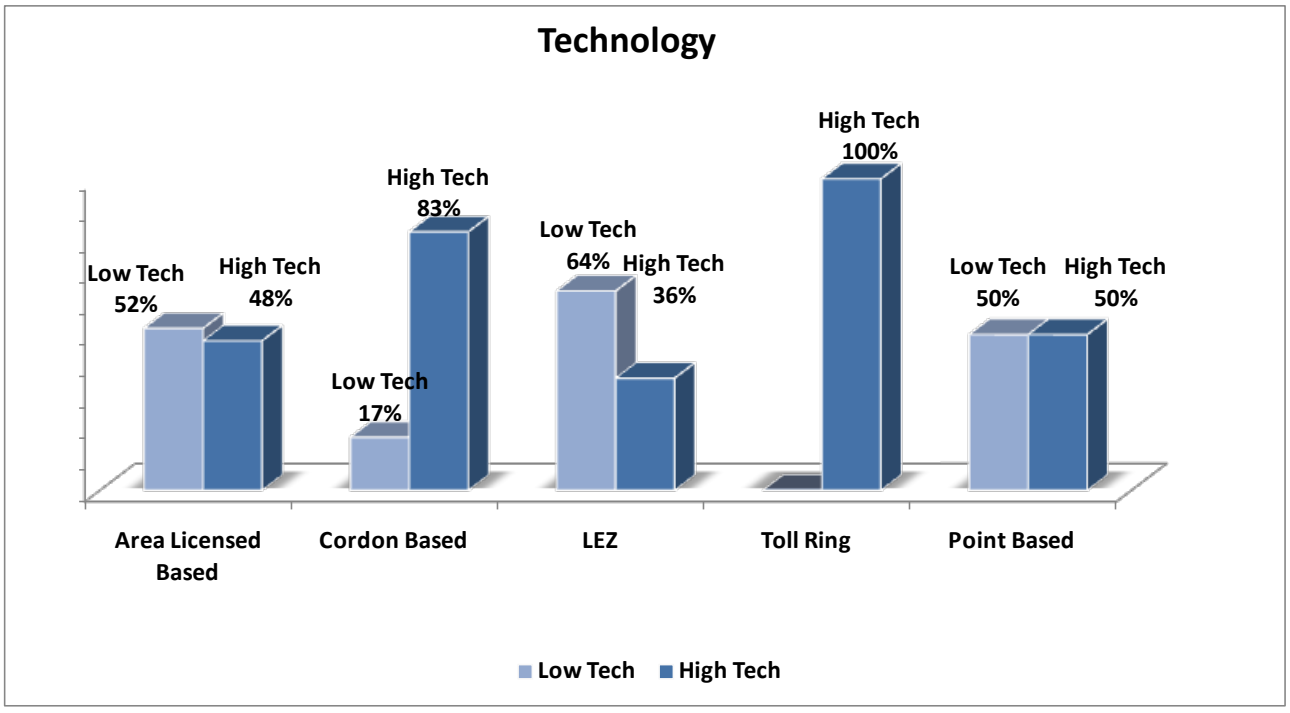


Figure 21 – Technology by Type of Scheme

Again the high percentage of high technology deployment for the toll ring and cordon based schemes comes quite naturally with their intrinsic characteristics.

Enforcement proceeds in parallel with technological choice: high tech implies stricter enforcement whereas the low tech choice yields higher permeability to the scheme. More specifically low-tech identification of vehicles corresponds to the cases when each vehicle is stopped at the entrance of the restricted zone by controllers checking for permit to enter, or – usually referring to the Low Emission Zones - for the vehicle emission sticker on the windscreen.

The level of exceptions decided by cities does not correlate with the specific scheme adopted (toll ring apart), and appears to be primarily driven by consensus related matters (See Figure 22).

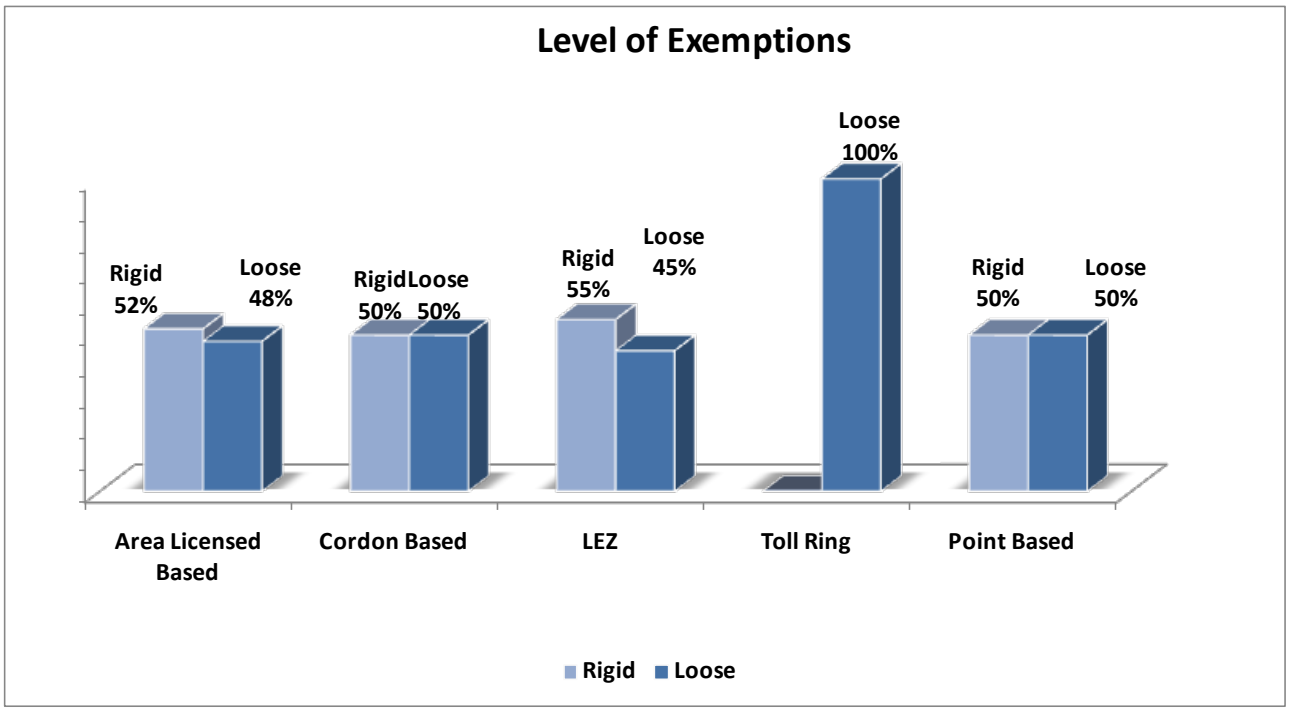


Figure 22 – Level of Exemptions by Type of Scheme

Concerning the time of operation (or of enforcement) of the schemes, the day time slots are the most often adopted coherently with the private trips demand pattern; schemes aiming to minimize the environmental impacts (i.e. LEZ) are enforced mainly h24 (Ref. Figure 23).

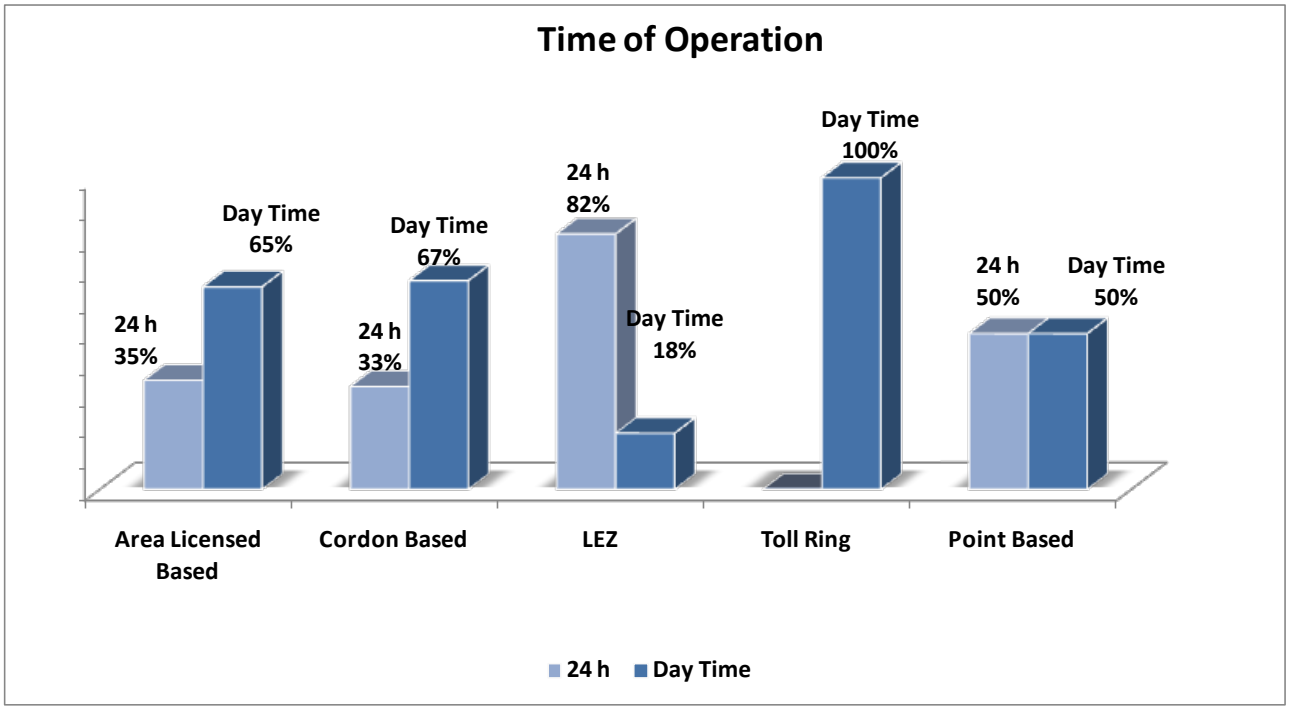


Figure 23 – Time of Operation by Type of Scheme

The pricing structure of the schemes adopting the charging to strengthen the effectiveness of the restriction policy is based prevalently on per day fees; toll ring schemes are by definition priced per trip as the point based ones, affecting a very limited and selected portion of the city networks (See Figure 24). In the analysed schemes, the price per trip ranges from 1.5€ to 4€, while the per day tariffs vary significantly from a minimum below 1€ up to 200€ (HDV in London).

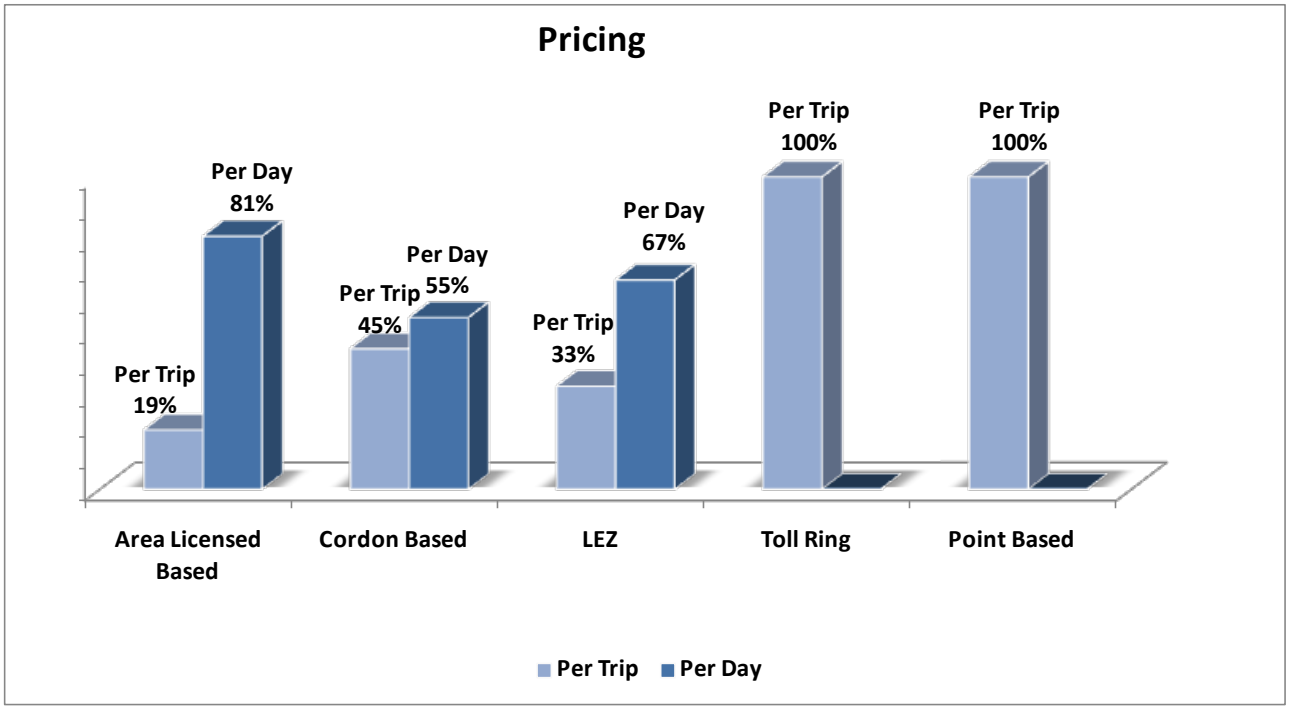


Figure 24 – Pricing by Type of Scheme

2.2.4 Stakeholders involvement, barriers and enablers

Regardless of the scheme solution adopted it was found that citizen representatives, service providers and supply chain operators are largely involved in all cities dealing with ARS. The latter category prevails only in the LEZ type schemes (Figure 25).

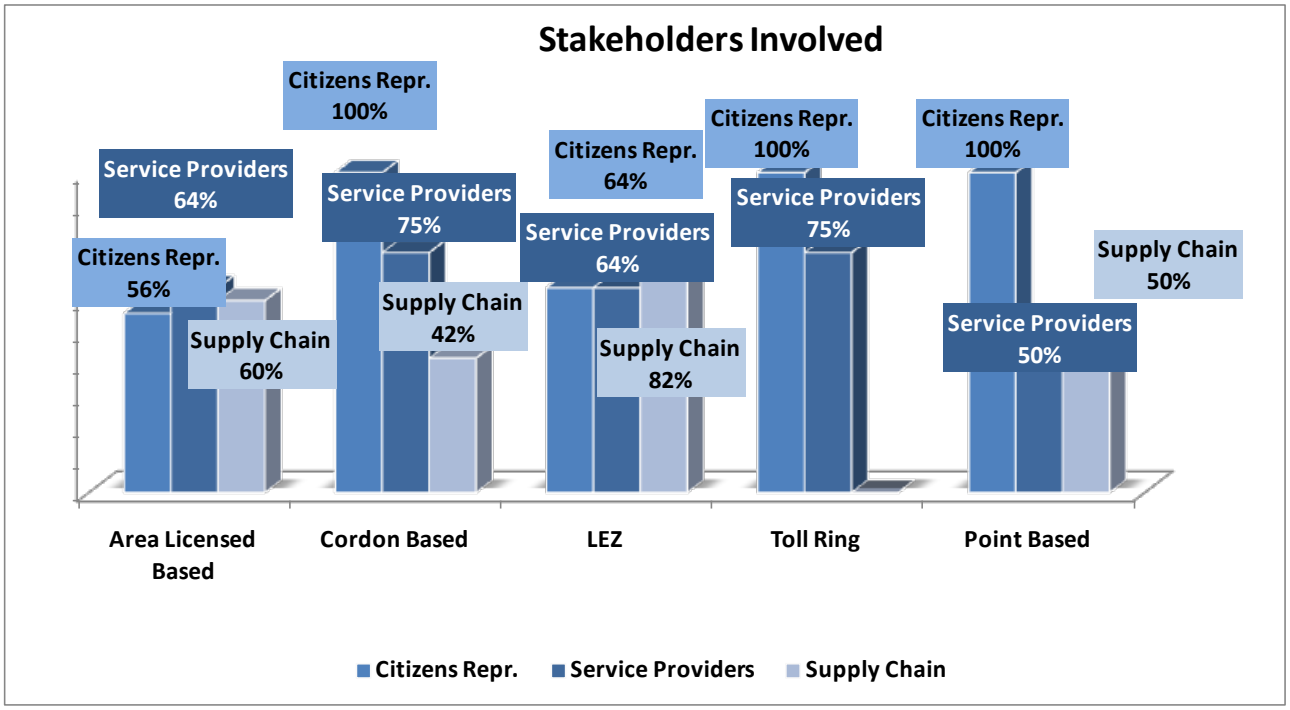


Figure 25 – Stakeholders Involvement by Type of Scheme

The answers to the questionnaire for what concerns the identification of what is /was playing a major role in enabling the adoption, deployment and operation of an ARS indicate that the very same issues identified as barriers are also revealed as the most important potential enablers. This can be interpreted as the recognition that critical factors deserve the utmost attention all along the decision making and implementation process: if adequately dealt with, they can determine the success of the scheme. Conversely, an underestimation of (the same) critical factors can easily lead to failure

However a full understanding of the entire process leading to the implementation of an ARS could only be achieved through the detailed analysis of case studies, well beyond the scope of the survey carried out in this study.

2.3 Information Dissemination on ARS

From the survey outcomes there is no clear evidence of whether the dissemination of information among potential users should be considered more as barrier or as an enabler during the scheme planning and implementation (Figure 87 and Figure 88).

Nevertheless, generally before the implementation of an access restriction scheme but also when the ARS is operative, managing the relationship with users (both citizens and operators) is a key aspect that needs to be considered with particular attention in order to ensure a long-term effectiveness of the scheme. Assuredly, customer service is one of the most relevant expenses of any access restriction scheme, on account that only a sound customer relationship management strategy makes it acceptable and easy for road users to understand which are the rules, the charge – if foreseen – and sanctions. Moreover, it should be flexible enough to handle all target groups, from daily commuters to occasional road users.

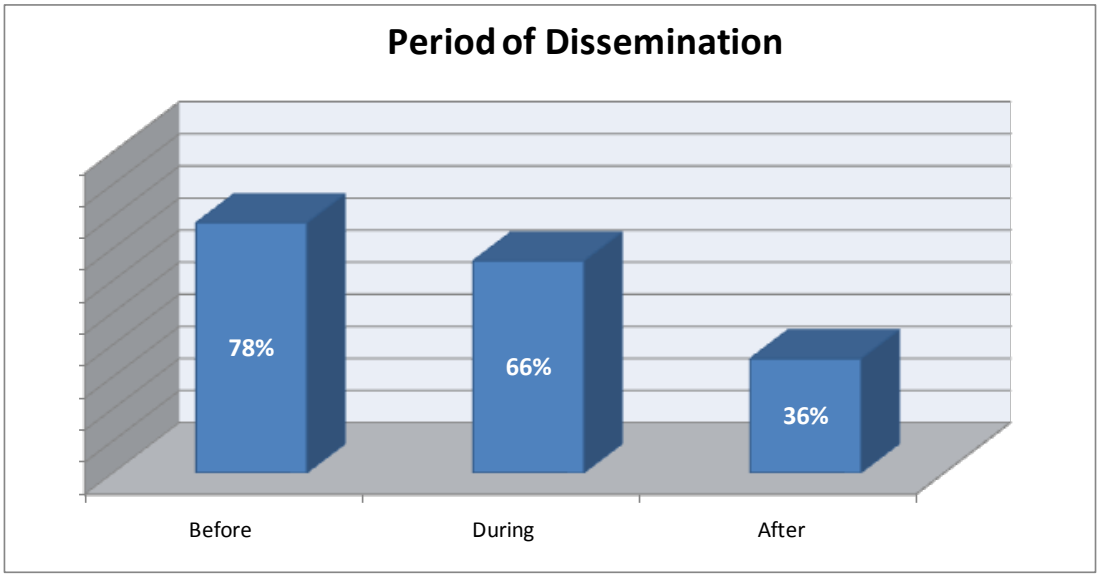


Figure 26 – Period of Dissemination

From questionnaire findings, as illustrated in Figure 26, most of the respondent cities (78%) have spread information about the scheme and its rules (Figure 28) before implementing it and also in the operational phase of the scheme (66%). These results can be explained by considering that, even if a public information campaign before the scheme implementation could be of help in smoothing the launch – as e.g. for the London Congestion Charging - it is also crucial to disseminate information once the scheme is in operation in order to enhance/maximize people awareness and, consequently, decrease the number of violations. This phenomenon is well exemplified by the city of Rome where, during the first year of scheme implementation, there has been a decreasing trend of violations, that went from a mean daily value of 20% to a stabilized rate of 8% of illegal entrances per day (Figure 27).

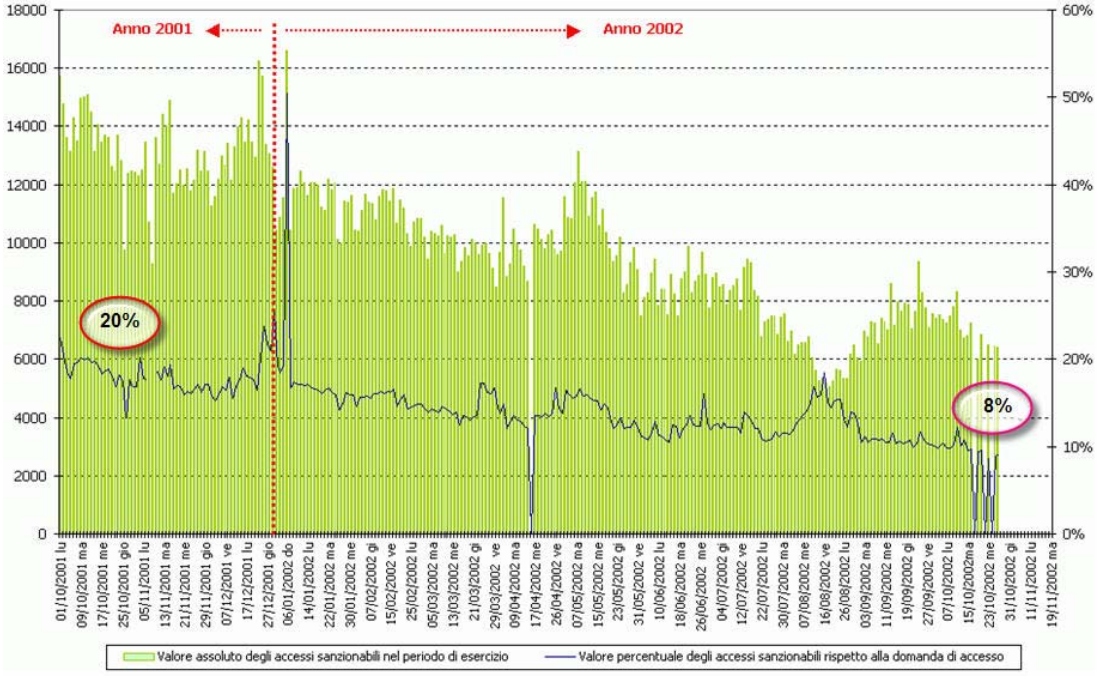


Figure 27 – Daily violations Trend in Rome (October 2001 – October 2002)

It is worth noting that only 24% of cities provides information about possible alternative options (Figure 28). This means that many cities do not seem to recognize the importance of setting up appropriate complementary and alternative transport modes and options, which should be available as soon as the scheme begins. For instance, if commuters do not find efficient alternatives to cars, they are likely to return to their individual vehicle, which would undermine the success of and support for the scheme.

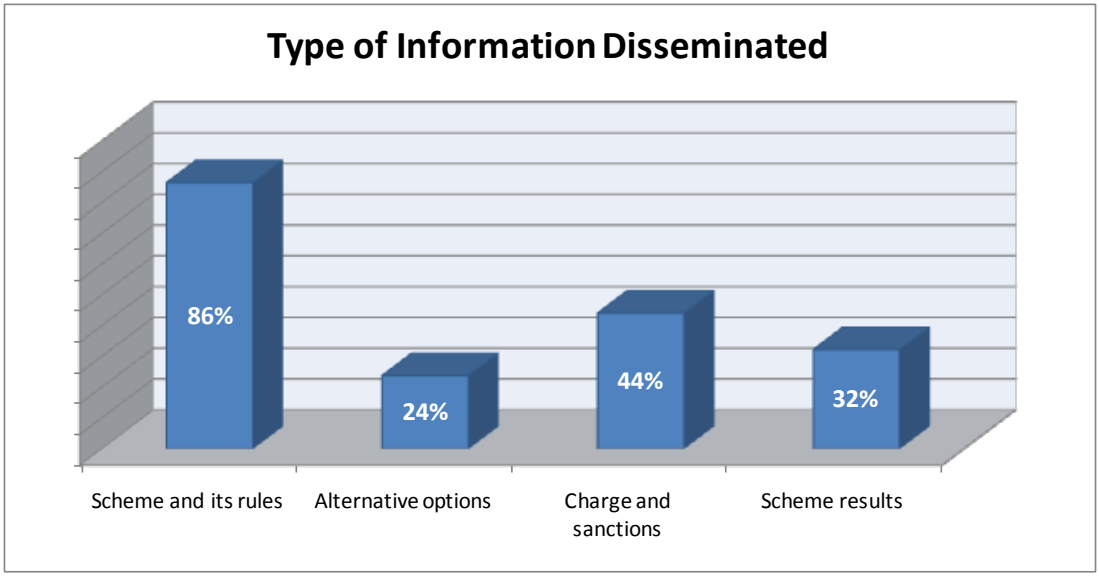


Figure 28 – Type of Information Disseminated

As expected, the main target groups (Figure 29) are the private motorized users together with the residents in the restricted zone and the freight distributors. This latter category turns out to be the key interlocutor when considering schemes such as the Low Emission Zone usually affecting heavy duty goods vehicles.

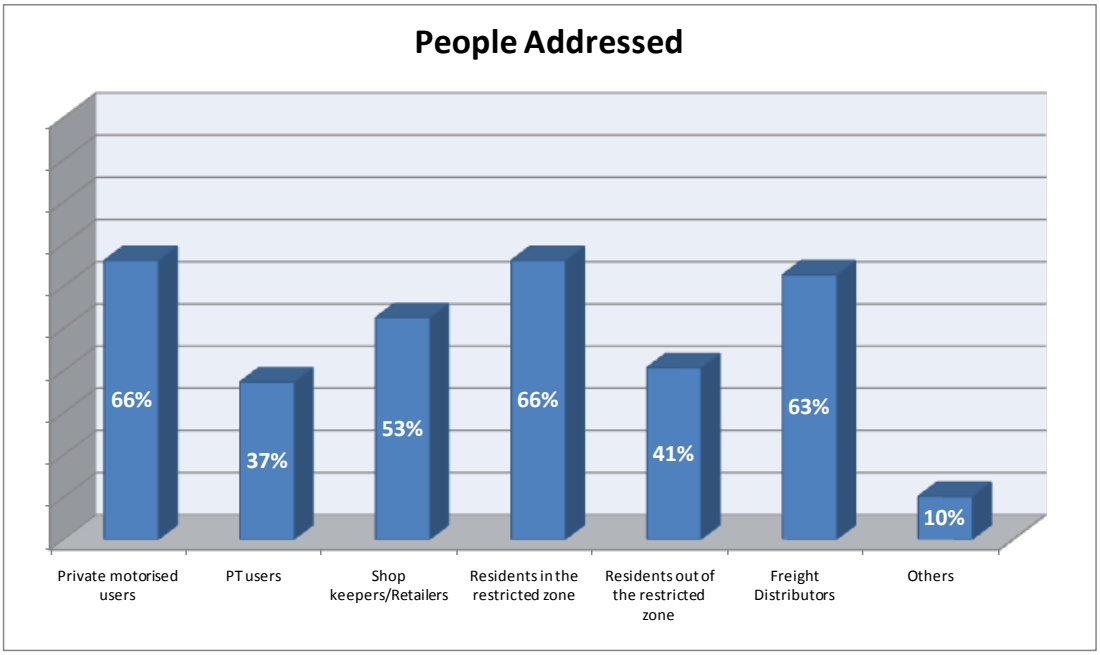


Figure 29 – People Addressed

As illustrated in Figure 30, the questionnaire outcomes show an extensive use of the Internet (73%) to spread information on access restriction schemes among potential users. Since, in the majority of cases, drivers are seldom aware of the features of schemes that are in force in cities others than their own, the use of the Web is a key driver to enable broadening information to a potentially large audience at greatly reduced expense and time delay.

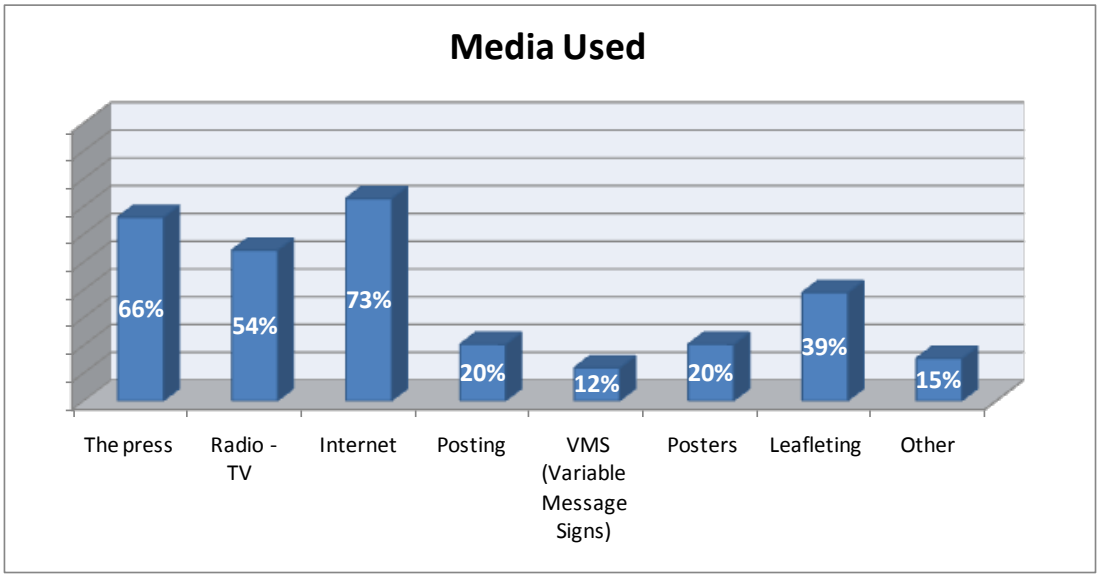


Figure 30 – Media Used

In addition, traditional media such as the press, radio and television channels and leafleting, have been used by a significant group of cities. The public information campaign of London city, for instance, has facilitated a smooth launch of the Congestion Charging scheme. In particular, leaflets have been distributed to 3 million households and over 35,000 packs were made available to businesses operating fleets of 25 or more vehicles; a dedicated call centre has been created; advertising has been spread on TV, radio, newspapers and in the dedicated London Congestion Charging website; face to face activity has been carried out in boroughs; emails have been sent to businesses in and around London.

Finally, a special mention should be made of the website running on behalf of the Low Emission Zone in Europe Network (LEEZEN[11]), LEZ cities, ministries and regions, working together to spread information about the LEZs that they run. This website gives information about the number of LEZs in operation or planning in each European country considered[12], how the drivers have to comply with them, which are the exemptions.

[11] www.lowemisisonzones.eu – Sadler Consultants in co-funding with the European Commission.
[12] Austria, Czech Republic, Denmark, Germany, Hungary, Italy, The Netherlands, Norway, Sweden, United Kingdom.

2.3.1 Accessibility of Information

During the investigation of the 417 cities identified the presence - on the web - of information on access restriction scheme rules was researched. These rules, in fact, vary from country to country across Europe. For drivers the biggest challenge is knowing the local road laws and thus being sure to follow all the regulations to avoid any penalties. As a matter of fact, it is easy to be caught out by small variations, particularly on a journey that takes in a lot of countries.

The facts finding phase[13] highlighted that access restrictions have been quite widely implemented in various countries, but drivers are seldom aware of the features of the schemes that are in force in cities others than their own.

Table D – Facts finding overview of web information on ARS rules being present in different cities

Country	N. of cities with ARS	% of Cities with ARS having web info
Austria	1	0%
Belgium	4	75%
Bulgaria	1	0%
Cyprus	1	0%
Czech Republic	3	0%
Denmark	5	40%
Estonia	2	50%
Finland	1	100%
France	7	43%
Germany	45	100%
Greece	1	100%

[13] Information based on a larger cities sample compared to the 58 cities having filled the questionnaire, covering all EU 27 countries.

Country	N. of cities with ARS	% of Cities with ARS having web info
Hungary	5	0%
Ireland	2	50%
Island	1	0%
Italy	141	99%
Latvia	1	100%
Lithuania	No schemes found	-
Luxembourg	1	100%
Malta	1	100%
Netherlands	19	74%
Norway	7	100%
Poland	4	25%
Portugal	4	0%
Romania	17	59%
Slovakia	No schemes found	-
Slovenia	1	0%
Spain	12	25%
Sweden	8	88%
Switzerland	2	0%
United Kingdom	21	71%

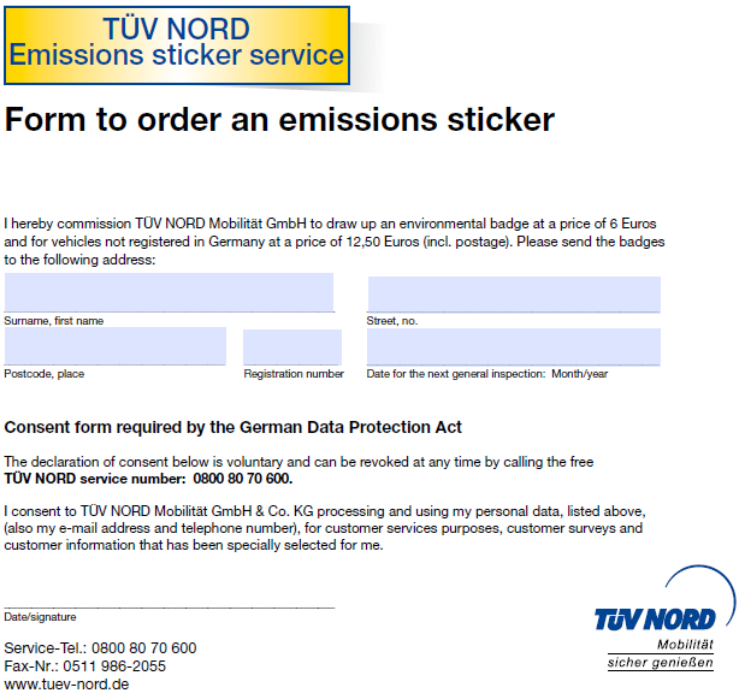
As illustrated in the table above, the most effective information on how to deal with access restriction rules is provided by German and Norwegian cities followed by Sweden, United Kingdom and Belgium. Also The Netherlands and Romania have a high percentage of cities offering online information on their access restriction schemes, even though in these cases the information provided is available only in the national language. Finally Latvia, Malta and Luxembourg have a hundred percent of access restriction scheme information to be found online, but this result is somehow misleading since in all these cases a single case was found of ARS in operation.

The case of Italian cities is anomalous since the majority of information can be found in a website dedicated to Low Emission Zones that is however insufficiently known and publicized.

2.3.1.1 Germany: how easy it is to buy an "emission sticker"

Besides the information reported on German city websites, specific instructions on how to obtain the so-called "emission sticker" can be found in the TÜV NORD Group[14] website where foreign visitors travelling to Germany can easily order the environmental badge for their cars. The steps to be followed consist in:

1. Filling the online form by indicating the car owner's details, the license number and category, and the vehicle registration certificate;
2. Sending the form signed in original to TÜV NORD Group by post, fax or e-mail;
3. Paying for the emission sticker 6 Euros including VAT and postage for vehicles registered in Germany and 12.50 Euros in case of foreign vehicles by transfer;
4. Waiting to receive, upon receipt of payment, the environmental badge.



TÜV NORD
Emissions sticker service

Form to order an emissions sticker

I hereby commission TÜV NORD Mobilität GmbH to draw up an environmental badge at a price of 6 Euros and for vehicles not registered in Germany at a price of 12,50 Euros (incl. postage). Please send the badges to the following address:

Surname, first name

Street, no.

Postcode, place

Registration number

Date for the next general inspection: Month/year

Consent form required by the German Data Protection Act

The declaration of consent below is voluntary and can be revoked at any time by calling the free **TÜV NORD service number: 0800 80 70 600.**

I consent to TÜV NORD Mobilität GmbH & Co. KG processing and using my personal data, listed above, (also my e-mail address and telephone number), for customer services purposes, customer surveys and customer information that has been specially selected for me.

Date/signature

Service-Tel.: 0800 80 70 600
Fax-Nr.: 0511 986-2055
www.tuev-nord.de

TÜV NORD Mobilität
sicher genießen

Figure 31 – Emission Sticker Order Form

[14] TÜV NORD Group is one of the largest technical service providers in Germany. It also operates in over 70 countries in Europe, Asia, Africa, and the Americas. The Group owes its leading market position to its technical competence and a broad range of advisory, service, and testing services in the Mobility, Industrial Services, International, Natural Resources and Training and Human Resources fields.
http://www.tuev-nord.de/SID-86218D30-DF3F9F58/en/traffic/Order_form_ENGLISH_8761.htm

2.3.1.2 How little the Italian Limited Traffic Zones are known

In Italy foreign visitors, mostly tourists, if renting a car, should beware that Limited Traffic Zones are in force in almost every major Italian city. Since these zones are areas where only cars with special permits may enter motorists need to know that e.g. in the case of a rented car the rental agencies do not provide these permits, or that, if they stay in a hotel inside the LTZ they can ask for an exemption (day after day) to drive to/from the hotel. Such information is rarely published in the city websites and often the only help tourists can receive is provided by some blogs offering tips about travelling around Europe.

In Italy these limited zones have been often put in place in order to reduce congestion and pollution, thus making city centers more pleasant for residents and visitors alike. Each zone has its own regulations: some are restricted to certain hours, some to residents only, some to cars with certain permits. These conditions are exhibited underneath the road sign which marks the entrance to the zone. Although the sign is an international driving sign, it is one that some countries do not use, and a significant proportion of motorists is not familiar with it. Moreover, boundaries are not always adequately signposted resulting in many foreigners crossing boundaries unaware, being caught on camera and facing a fine.

The figure below illustrates how confusing can be the signposting, which is often part of a larger set of information provided to the user when entering the LTZ, which inevitably makes it difficult for motorists to take in all the posted information.

Figure 32 – LTZ entrance in Florence

In the above example the LTZ sign is the one in the middle of the shot, and in some cases these signs can be even smaller, with the terms and conditions of the ZTL in such a small print that drivers cannot realistically be expected to read them.

Another issue to be faced by foreign visitors is that not all LTZs are camera enforced. Cameras, on the other hand, are not always as obvious as the one in Figure 32, and even if there is no camera, foreigners entering a zone when they should not run the risk of being ticketed by the police there and then.

In Florence, a new sign has also been introduced, which does not bear the red circle on it, but a traffic lights sign instead, showing red when access is limited and green when it is not. Both Italian and English text is provided making the system altogether more easily understandable, also by non Italian users (Figure 33).

Figure 33 – A new LTZ sign with traffic lights system in Florence

In summary, one must somehow concur with the a specialized blog when it claims that, if you want to drive your car around Europe, better to opt for countries like Greece where the restrictions don't apply to cars owned by foreigners who are visiting the country, or to rental cars.

2.3.2 The European Traveler

Many access restriction schemes are already in operation throughout Europe and in some cases the differences among them can represent an obstacle to travelers for moving around. As an exemplary illustration, and with no claim to exhaustivity, this section describes some different virtual routes crossing Europe and the differentiated situations facing the motorist that would follow them, in order to:

1. Identify the degree of homogeneity of access restrictions rules in different European countries for a given type of vehicle entering city centers;
2. Identify the level of accessibility of information regarding the different access restriction schemes a traveler could encounter along a European itinerary.

2.3.2.1 Itinerary n.1

Vehicle used	Euro 3 Diesel car	
City A	Bari (IT)	Limited Traffic Zone
City B	Rome (IT)	Zonal Based restriction
City C	Florence (IT)	Limited Traffic Zone
City D	Milan (IT)	Area Licensed Based
City E	Munich (DE)	Low Emission Zone
City F	Prague (CZ)	Limited Traffic Zone
City G	Berlin (DE)	Low Emission Zone
City H	Copenhagen (DK)	No access restriction scheme for cars
City I	Malmö (SE)	No access restriction scheme for cars

As illustrated in the map below (Figure 34), the legs to be followed by the European traveler aiming at crossing different countries with a Euro 3 Diesel car by entering all the city centers of the selected cities start from the city of Bari where there is a Limited Traffic Zone where the perimeter streets can be accessed during weekdays from 7 a.m. to 8. p.m. by every driver while the circulation in the internal roads is allowed only for residents and no exception is foreseen for visitors. The trip then continues through the city of Rome where it is possible to circulate inside the LTZ against the request of a temporary permit to be issued by the hotel where the foreign tourist will stay. Of course this procedure is allowed only if the hotel is located inside the restricted area; otherwise no exemption will be granted and the access to the LTZ will be permitted only during the time slots when the scheme is not in operation. The same procedure should be made when arriving in Florence in order to avoid fines. The main problem that the European traveler may encounter is the difficulty to find out the needed information in English. It often happens, in fact, that the information translated in English is not available in the official websites of the Municipality or of the Mobility Agency, while it is available on the blogs created by people that have already had some bad experiences in accessing Italian Limited Traffic Zones. The third Italian city to be crossed by the tourist will be Milan. In that case the information on how to deal with the request of permission for entering the restricted zone can be found in other languages than Italian and, differently from the previous cities, in Milan the Euro class of the vehicle is a key information that should be communicated when applying for the so-called Ecopass daily permit since the tariff depends on the vehicle pollution class. In this specific case,

since the vehicle is a Diesel Euro 3 without particulate filter, the entrance is subject to a payment of 5 Euros.

After having left Italy, the European traveler will arrive to Munich where the access restriction scheme rules also consider the vehicle Euro class. To access the restricted zone, in fact, a sticker must be bought and displayed in the windscreen. This sticker is then valid for all LEZs in Germany. Proof of emissions standard (given on German vehicle papers) is needed to purchase the sticker. Stickers can be purchased from the vehicle registration authorities, authorized local garages, vehicle test organizations like TÜV, DEKRA, or some websites. The LEZ city authorities and some cities also sell stickers over the internet. Additionally, many hotels offer to order the stickers on behalf of their guests, provided they receive the required documents in advance. The German LEZ stickers can be purchased online for all vehicles in all countries for 12.50€, also in different languages, since foreign vehicles too are enforced. In the specific case of the European traveler, since the vehicle used is a Euro 3 Diesel a yellow sticker will be issued.

The travel then continues to Prague where no information on hypothetical access restriction scheme could be found. For that reason the Czech access restriction rules cannot be easily appraised.

Then, the European traveler returns to Germany and precisely to Berlin where he/she can drive around the city centre without any restrictions thank to the yellow emission sticker already bought for entering Munich city center.

Left the German city, the trip carries on toward Copenhagen where no access restriction is foreseen for cars and will end in the Swedish city of Malmö in which the restriction in place concerns heavy duty vehicles.

From this itinerary we can conclude that rules for accessing a limited traffic zone can vary notably from country to country and depend upon very different criteria (e.g. a purely temporary request against a personalized emission sticker on the basis of Euro class of the vehicle).

Figure 34 – City legs of Itinerary n.1

2.3.2.2 Itinerary n.2

Vehicle used	Euro 3 Diesel car	
City A	Lisbon (PT)	Limited Traffic Zone
City B	Valencia (ES)	No access restriction
City C	Barcelona (ES)	Limited Traffic Zone
City D	Toulouse (FR)	Point Based Access Restriction Scheme
City E	Nantes (FR)	Limited Traffic Zone
City F	Paris (FR)	No access restriction
City G	Gent (BE)	Limited Traffic Zone
City H	Bruges (BE)	No access restriction
City I	Rotterdam (NL)	No access restriction
City J	The Hague (NL)	Cordon Based Access Restriction Scheme
City K	Hannover (DE)	Low Emission Zone
City L	Dresden (DE)	No access restriction
City M	Krakow (PL)	Limited Traffic Zone

The second itinerary to be followed by the European tourist goes from West to East starting from the city of Lisbon (Portugal) where there is a Limited Traffic Zone in place enforced manually but unfortunately no online information is available to let the traveler plan her/his trip in advance. Then the trip continues toward the Spanish city of Valencia where no access restriction scheme is operating. Then the journey lays over the city of Barcelona where a Limited Traffic Zone is present. Unfortunately, no information on that is available online; for that reason the traveler should just try to gather information from other possible sources in order to avoid getting any fines during his stay there. From Barcelona the trip continues towards the French city of Toulouse. Again, also in this case no online information could be found and the traveler could find himself in some unexpected troubles with local traffic rules. Proceeding towards the city of Nantes, the traveler can find online some useful information about the Limited Traffic Zone, on condition that he is able to understand the national language, the only one being present on the website of main interest. The last city before leaving France is Paris, where no access restriction is in place. The journey goes on in Belgian city of Gent where an access restriction scheme is operating everyday from 11 a.m. to 6 p.m. as reported online. In the second Belgian city crossed by the traveler, Bruges, instead there is no access restriction scheme in place. Left Belgium, the trip goes on in The Netherlands, starting from the city of Rotterdam where no access restriction is operating for cars and then passing through the city of The Hague, where a pilot road charging scheme is in place but not involving foreign vehicles. Then the trip goes through the German city of Hannover where a Low Emission Zone is in place and a considerable amount of information is available online. Thanks to that, the traveler can early organize him/herself by buying online the yellow or green emission sticker and so being ready to circulate inside the restricted central area of the city. The city of Dresden is the following destination and here no access restriction is operating. Finally, the travel ends in the Polish city of Krakow where a Limited Traffic Zone is in place. Also in this case useful and exhaustive information can be found on the official city website where all single rules of the three traffic zones differing for the level of restrictions applied are explained in English.

In this second case the level of accessibility of information on ARS greatly varies from Western to Eastern countries as summarized in the following table.

Level of information on access restriction scheme rules on the web		
Lisbon (PT)	Limited Traffic Zone	☹
Valencia (ES)	No access restriction	–
Barcelona (ES)	Limited Traffic Zone	☹
Toulouse (FR)	Point Based Access Restriction Scheme	☹
Nantes (FR)	Limited Traffic Zone	😐
Paris (FR)	No access restriction	–
Gent (BE)	Limited Traffic Zone	☺
Bruges (BE)	No access restriction	–
Rotterdam (NL)	No access restriction	–
The Hague (NL)	Cordon Based Access Restriction Scheme	☺
Hannover (DE)	Low Emission Zone	☺
Dresden (DE)	No access restriction	–
Krakow (PL)	Limited Traffic Zone	☺

Figure 35 – City legs of Itinerary n.2

Following a similar approach, two additional itineraries have been described by making a comparison of the same road map gone through by car and by heavy duty vehicle; while the last one considers a trip made by a tourist bus.

2.3.2.3 Itinerary n.3

		Euro 3 Diesel car	HD V Euro 3 > 3.5 tons	Comments
City A	Bremen (DE)	No access restriction scheme	Low Emission Zone	From 1st January 2010 until 1st July 2011: o Diesel Euro 3(PM), Petrol Euro 1 / Yellow Sticker From 1st July 2011 onwards: o Diesel Euro 4(PM), Petrol Euro 1 / Green Sticker.
City B	Eindhoven (NL)	No access restriction scheme	Low Emission Zone	In place since the 1st July 2007. Until 1st July 2013: o Euro 3 with retrofit particulate trap and if not older than 8 years o Euro 4 and above allowed in After 1st July 2013: o Euro 4 and above allowed in
City C	Stuttgart (DE)	Low Emission Zone	Low Emission Zone	The standards for the LEZ in Stuttgart are different to the LEZs in the rest of Baden-Württemburg: From 1st July 2010 until 1st January 2012 o Diesel Euro 3(PM), Petrol Euro 1 / Yellow Sticker. From 1st January 2012 onwards o Diesel Euro 4(PM), Petrol Euro 1 / Green Sticker
City E	Ljubljana (SLO)	No access restriction scheme	Low Emission Zone	
City F	Pécs (HU)	No access restriction scheme	Low Emission Zone	Freight traffic is not allowed to enter the city centre without any exception.
City G	Sofia (BG)	No access restriction scheme	Low Emission Zone	In temperatures of over 35°C, there is a prohibition on lorries throughout the road and motorway network between 12h00 and 21h00. The exact dates

		Euro 3 Diesel car	HD V Euro 3 > 3.5 tons	Comments
				of the beginning and end of the restrictions will be announced in the media at least two days in advance.
City H	Athens (GR)	Limited Traffic Zone	Limited Traffic Zone	Number plate restrictions are in operation in Athens, where an "odds and evens" system operates[15].

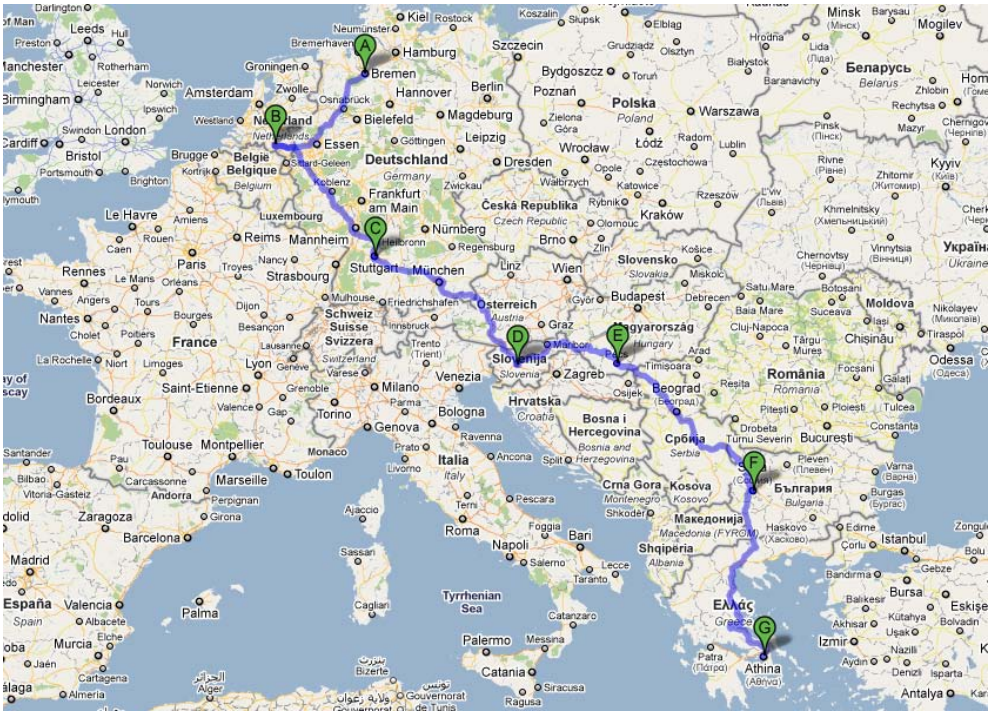


Figure 36 – City legs of Itinerary n.3

[15] Cars with odd number plates can enter on alternate days, and those with even numbers on the other days. Such scheme aims at reducing congestion and journey lengths.

2.3.2.4 Itinerary n.4

		Euro 3 Diesel car	HDV Euro 3	Comments
City A	Szczecinek (PL)	Area Licensed Based	No access restriction scheme	Access for cars is not permitted in the central area of the city. Only goods vehicles with special permit can enter the zone during time windows.
City B	Poznan (PL)	Low Emission Zone	Low Emission Zone	A LEZ is foreseen but not yet implemented.
City C	Debrecen (HU)	Low Emission Zone	No access restriction scheme	A LEZ is working 24/7 in the city centre but no information has been found about the Euro classes of vehicles allowed to enter the zone.
City D	Timisoara (RO)	No access restriction scheme	Low Emission Zone	Information are available only in local language.
City E	Craiova (RO)	Limited Traffic Zone	Limited Traffic Zone	The access restriction is characterized by time windows for freight while cars are not allowed to enter the zone.

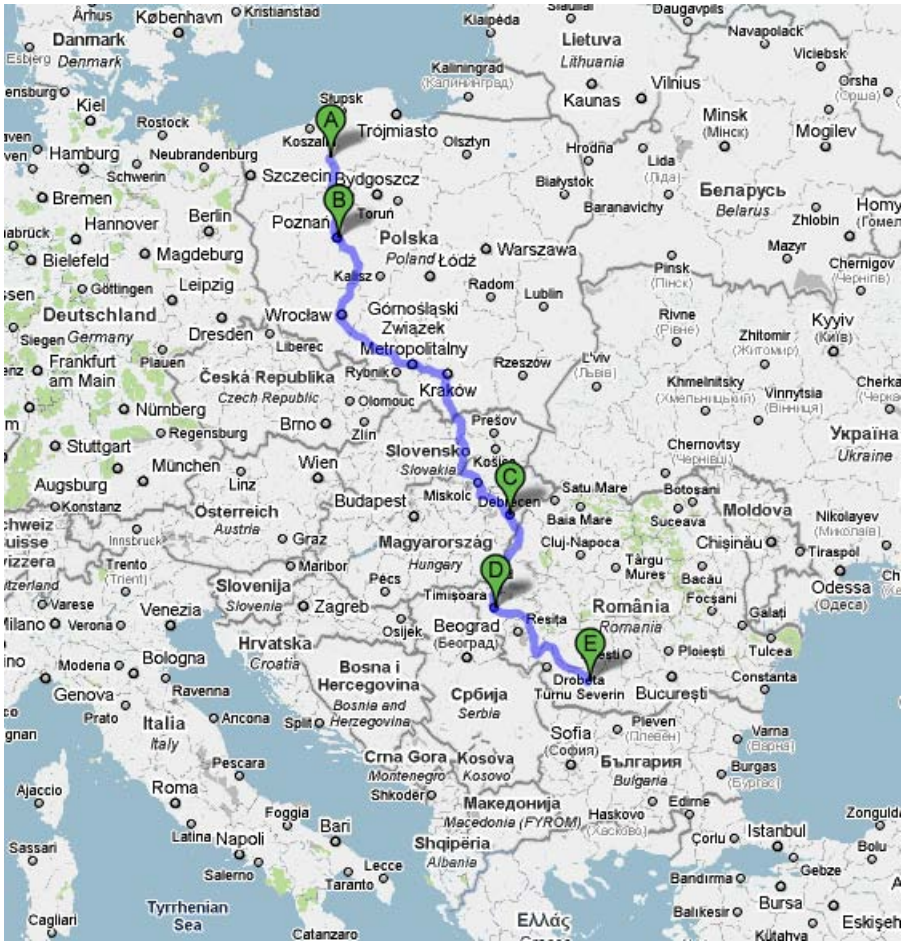


Figure 37 – City legs of Itinerary n.4

2.3.2.5 Itinerary n.5

This last itinerary aims at describing a typical tourist bus route that starts in the Italian capital of Rome, continues toward another Italian tourist destination, Florence, and then goes to Wien. From the Austrian country the itinerary of the touristic bus then goes on in the Eastern countries of Hungary and Poland by visiting Budapest and Prague respectively.

		Tourist Bus	Comments
City A	Rome (IT)	Limited Traffic Zone	To be accessed by buying a permit the price of which depends on Euro class of vehicle[16].

[16] There is a discount in respect of the Euro class of vehicles, namely:

- 10% for Euro 4 vehicles until 31.12.2012
- 30% for Euro 5 vehicles until 31.12.2013
- 50% for electric, LPG or methane vehicles.

		Tourist Bus	Comments
City B	Florence (IT)	Limited Traffic Zone	To be accessed by buying a permit the price of which depends on Euro class of vehicle[17].
City C	Wien (AT)	Limited Traffic Zone	There are some specific zones for dropping-off and picking up passengers, for parking both free of charge around the inner centre or with payment if closer to the city centre[18].
City D	Budapest (HU)		No information available.
City E	Prague (PL)		No information available.

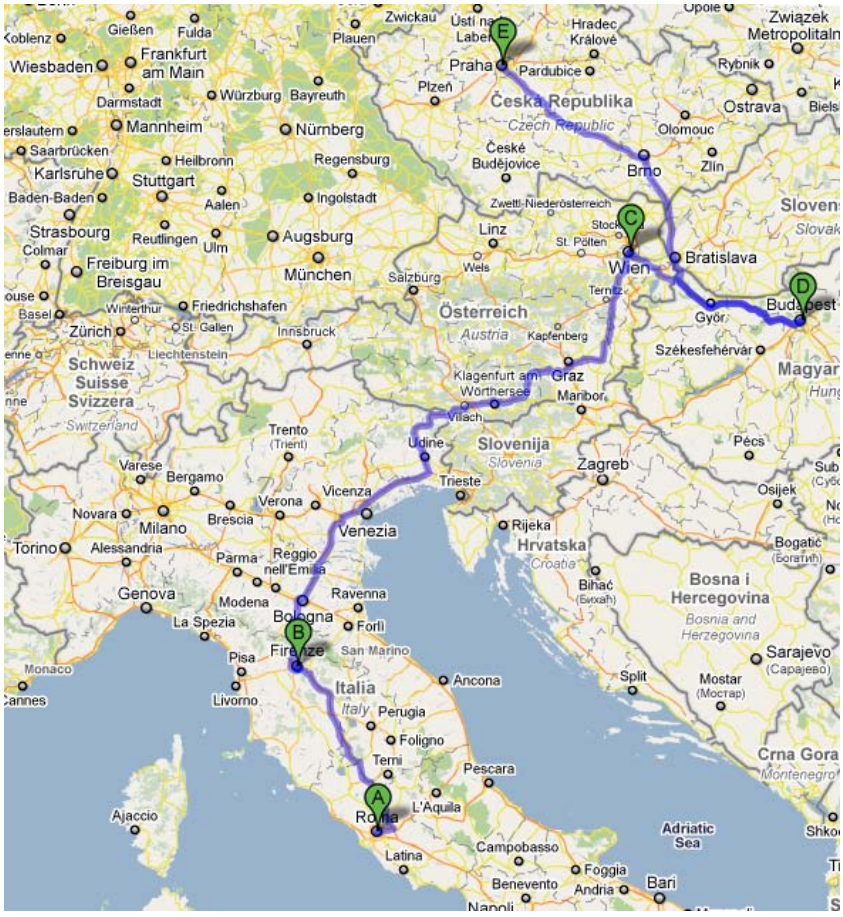


Figure 38 – City legs of Itinerary n.5

[17]
- Euro 5-4: 180 €/day
- Euro 3-2: 210 €/day
- Euro 1-0: 270 €/day
- Methane vehicles: 120 €/day
- Electric/Hybrid vehicles: 90 €/day

[18] www.bus.wien.info

2.3.3 A pan-European service for collecting fines from access restriction zones violations

Since many Italian cities attract people from all over the world, it often happens that visitors organize their holidays in Italy by car. Then, as Italian Limited Traffic Zones are often not well known by foreigners due to the lack of information disseminated, a rather high number of foreign vehicles ends up by being fined. Because of the difficulties encountered by the Municipalities when trying to find personal details of foreign people to whom the violation has been notified, during these years many Italian cities have recurred to a society specialized in debts collection towards foreign people related to failure to pay highways tolls and road charges.

This company is called European Municipality Outsourcing (E.M.O.) and, as already said, mostly works in the international management and notification of administrative sanctions issued by the local Police in connection with the violation of the Highway Code rules. Management includes all operations, imposed by the Commands of Municipal Police, provided by the Convention of Strasbourg and by other various international conventions now in force. E.M.O. is known by the main embassies and governmental bodies in a large number of States to whom E.M.O. has released its own credentials to guarantee the correctness and clearness of the tasks carried out.

Whoever has been fined in a European country that has an agreement with E.M.O., can access their website (www.emo.nivi.it) created on purpose to give all information regarding the charged sanction together with the possibility for an easy way of payment on-line.

The website can be accessed in 11 languages[19] in order to give the possibility to as many people as possible to access the information. There is also a Frequently Asked Questions section where people questions and doubts concerning violations and fines are answered. It is worth noting that more than one third of the questions are focused on LTZ issue. In many cases, in fact, people do not know what is a Limited Traffic zone and, consequently, they do not understand why they have been fined. Another issue that often is not well understood by foreigners is that, since normally the accesses in larger cities are controlled by cameras taking photos of the unauthorized vehicles as they enter, all entrances to the ZTL recorded by the camera are considered as distinct and separate violations due to being dynamic violations. Therefore every single fine is regular and cannot be attributed to one and the same violation.

[19] Italian, Portuguese, English, Croatian, French, German, Dutch, Polish, Spanish, Swedish, Danish.

2.4 Environmental and Socio-economic Assessment of ARS

To gather, organize and interpret information on the effects of ARS implementation , each scheme has been analyzed in terms of impacts on:

- Network
- Economy
- Environment
- Acceptability
- Equity
- Livability

Relevant sources of information about studies providing data on existing ARS in specific cities were[20]:

- The CURACAO – Coordination of Urban Road User Charging Organisational Issues –Urban Road User Charging Online Knowledge Base[21].
- KonSULT – the Knowledgebase on Sustainable Urban Land use and Transport – Road User Charging Evidence on performance[22].
- BESTUFS II – Best Urban Freight Solution.[23]
- START PROJECT – Short Term Actions to Reorganize Transports of goods.[24]

The majority of information has ensued from the online survey to local authorities having already urban access restriction scheme in place or experiencing the planning phase (58 cities), despite the rather limited feedbacks received on these specific issues.

As Figure 39 shows, there are considerable information gaps for the most part regarding environmental aspects, economic issues and liveability.

[20] See Annex 3 for a complete list of sources.
[21] http://www.isis-it.net/curacao/index.asp
[22] http://www.konsult.leeds.ac.uk/
[23] www.bestufs.net/
[24] www.start-project.org/

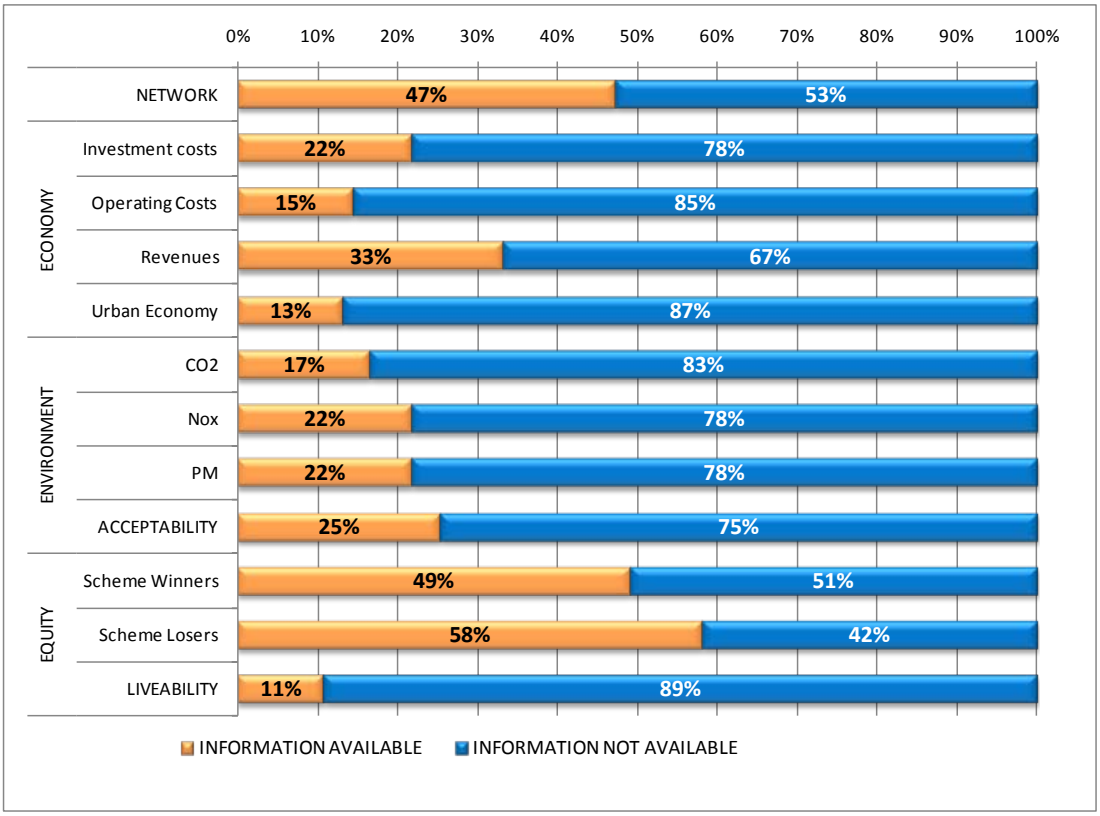


Figure 39 – Environmental and socio-economic impact assessments – Information availability

(sample of 58 respondent cities)

2.4.1 Network Dimension

By network dimension are meant the changes that may occur on traffic flows and/or vehicles speed following the implementation of the scheme.

In the on-line survey, the network dimension has been addressed in quantitative terms, namely by considering:

- the decrease in n° of vehicles entering the zone (% vehicles/day) or
- the change in average vehicle speed in the zone (km/h)

The outcomes are reported in the table of Annex 3 – Information on ARS impacts on network dimension from questionnaires, showing that the data available are limited (only 10 cities have reported) and, moreover, hardly comparable across schemes.

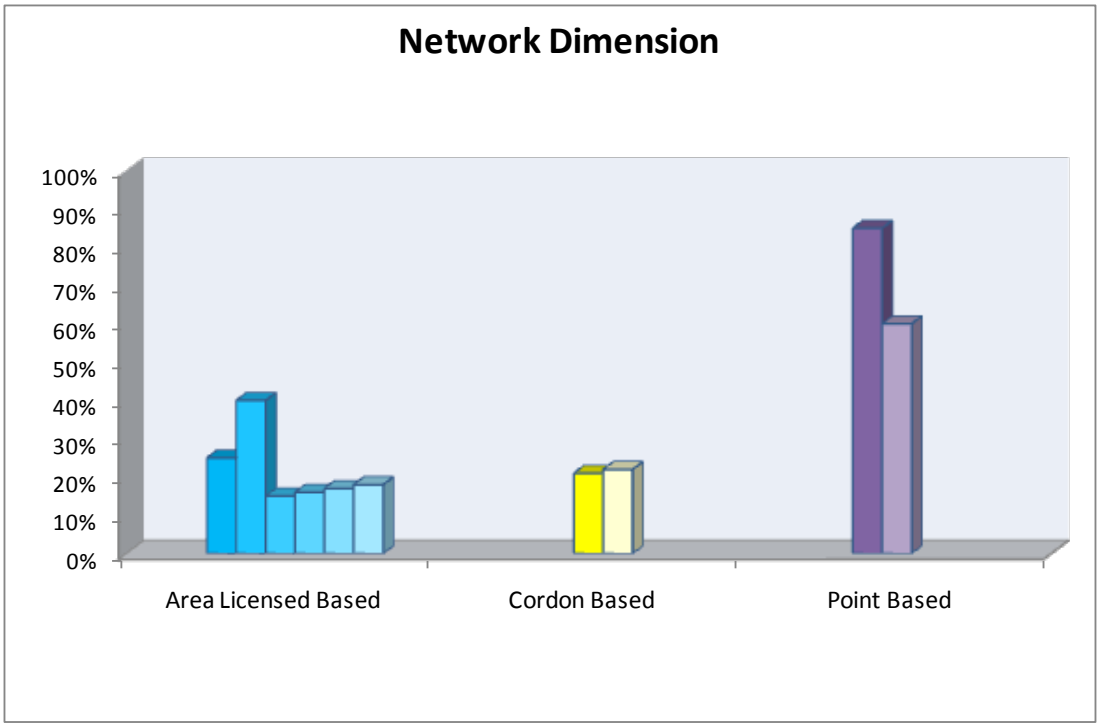


Figure 40 – Network Dimension by Type of Scheme (from 10 cities)

Figure 40 shows the distribution of decrease in vehicles entering the restricted zone in percentage terms. The area licensed based schemes together with the cordon based ones exhibit a mean value decrease of 23%, while the point based schemes, that are generally limited to specific small locations and not spread across the network, can achieve percentages of decrease in vehicles crossing the control points definitely more significant – in the cases considered close to 73% on average.

Literature sources[25] provide good insights on the **Berlin** LEZ. After one year from the initial implementation of the scheme (2008) traffic flows within and around the zone were analysed using traffic data, Berlin's vehicle registration data base, and conducting extra video recordings at representative spots of the main road network. In busy roads in and outside the LEZ a decrease of motor traffic by 4% inside the zone and 6% in the surrounding areas was recorded. Given the larger drop of vehicle numbers outside the zone it can be concluded that the LEZ has had no measurable impact on traffic flows. Initial concerns that traffic could be pushed into residential areas around the zone did not materialize. The observed decrease in traffic load, which also leads to lower emissions and air pollution from traffic, is not sparked by the LEZ, but rather a result of the peak in fuel prices in 2008 and of Berlin's transport policy to promote cleaner modes of transport that activated, among others, a quite rapids renewal of private cars fleet.

Among the few cases well documented it is worth mentioning the scheme implemented in the city of **Stockholm**, where on June 2003 the City Council decided to launch an experiment of environmental charges/congestion tax called the Stockholm Trial[26].

[25] "The Low Emission Zone in Berlin – Results of a First Impact Assessment", Martin Lutz – Senate Department for Health, Environment and Consumer Protection, Berlin (Germany).
[26] Facts and results from the Stockholm Trials Final version – December 2006.

Since prior to the trial it was a well known fact that motorists are sensitive to financial incentives, it was a well found expectation that car tolls in Stockholm would reduce traffic volumes. The reduction was expected to occur near the congestion-charge zone cordon and to decrease relatively rapidly the greater the distance from the cordon. As regards traffic across the charge cordon, the Stockholm Trial was expected to lead to more people opting to travel by public transport and (based on experiences from London) to some extent by bicycle instead of travelling by car. The expected greater use of public transport was not just due to the congestion tax but also the fact that public transport – which is part of the Stockholm Trial – was improved and expanded.

It was expected that the congestion taxes would reduce the traffic crossing the inner-city segment during the morning and afternoon rush hours by 10-15 per cent, and that access would improve on Stockholm's busiest roads.

The trial cut traffic flows – even more than expected – and the reduction was surprisingly stable across the seasonal variations. In addition, the effects were noticeable further away than first anticipated. Traffic volumes also decreased a long way from the charge zone. This means that several of the feared "side effects" – such as negative impact on suburban link roads – did not materialize. The reduction in traffic volumes was measured using traffic counts, but was also illustrated in other special studies.

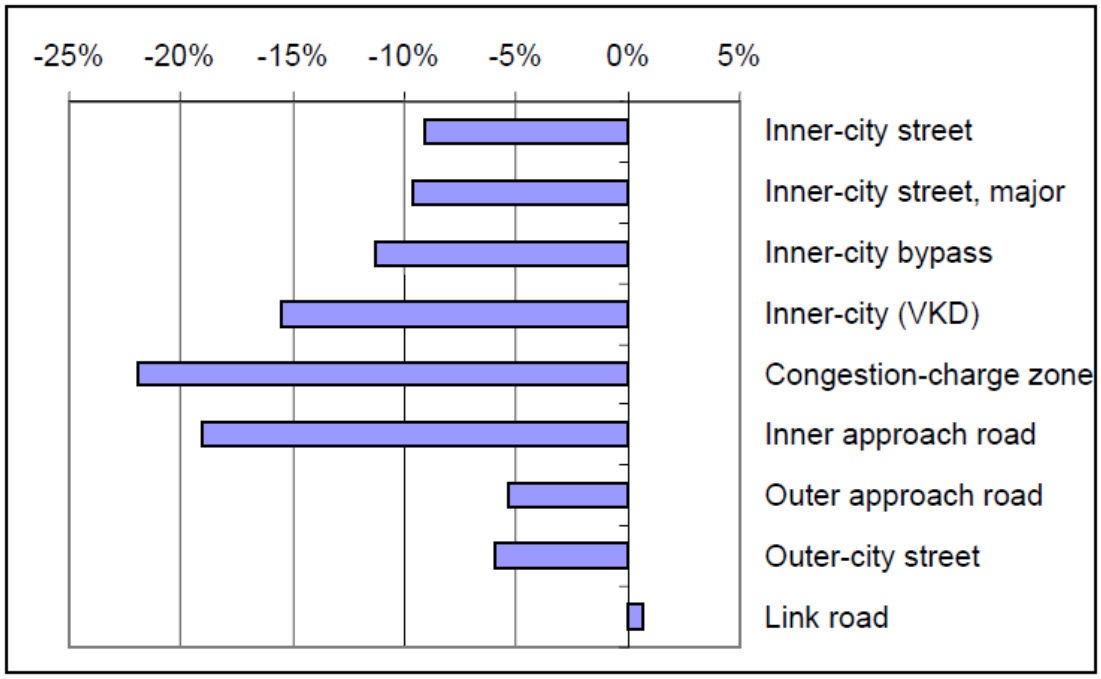


Figure 41 – Average traffic reductions for different types of roads and streets

Figure 41 shows average traffic reductions for different types of roads and streets. The flow of traffic on major inner-city roads fell during the congestion tax period, but not as much as across the congestion-charge zone cordon. In terms of the number of vehicle kilometers driven, traffic in the inner city fell by more than 15 per cent. Other studies besides the traffic counts indicate that the motorists who do not need to cross the charge cordon benefited from the drop in congestion and actually used their vehicles more. This might also partly explain why traffic fell less in the inner city than across the charge zone.

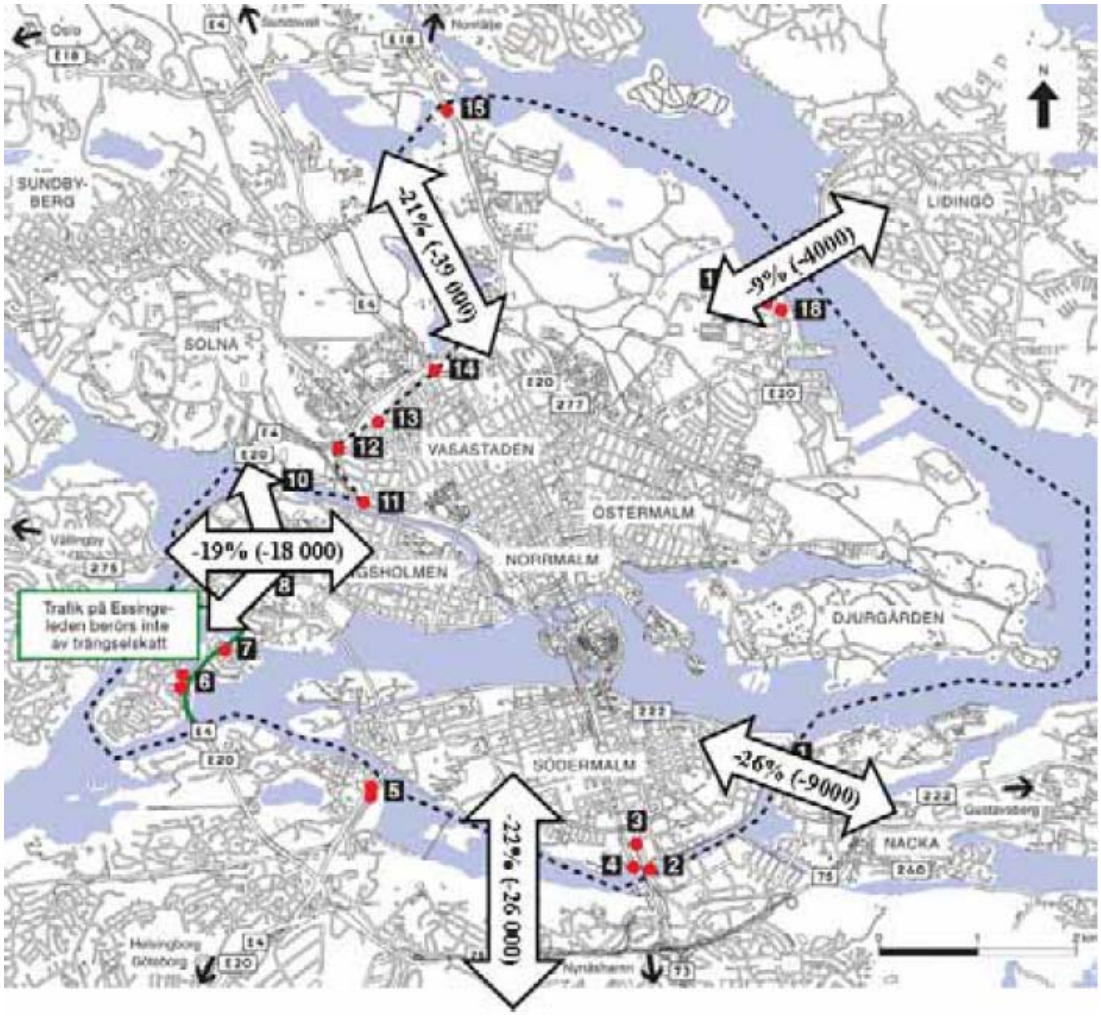


Figure 42 – Percentage change in traffic flows in and out of the congestion-charge zone during the charge period (06.30–18.30) for different points of the compass. (The figures in parentheses indicate the change in the number of vehicle passages.)

As a last meaningful example the **London** Congestion Charging should be mentioned. The scheme was introduced into central London in February 2003[27]. In July 2005 the basic charge was raised from £5 to £8 per day. In February 2007 the original central London congestion charging zone was extended westwards, creating a single enlarged congestion charging zone.

Congestion charging contributes directly to the achievement of four transport priorities, as set out in the current Mayor's Transport Strategy:

- to reduce congestion;
- to make radical improvements to bus services;
- to improve journey time reliability for car users;
- to make the distribution of goods and services more efficient.

[27] "Central London Congestion Charging Scheme: ex-post evaluation of the quantified impacts of the original scheme" Prepared by Reg Evans, for Congestion Charging Modelling and Evaluation Team, 29 June 2007.

Furthermore, by reducing traffic levels it has also facilitated wider transport, safety and environmental improvements to central London. More generally, it also produces net revenues to support the Mayor's Transport Strategy.

The main expected impacts of the scheme were on congestion. Transport for London had projected that congestion within the charging zone will reduce by 20 to 30 percent. The Inner Ring Road was expected to carry additional orbital traffic, though congestion here was expected to be constrained at or below pre-charging levels by the Real Time Traffic Management system, which will allow traffic signals to be adjusted to manage the flow of vehicles on and approaching the Inner Ring Road. It has also projected that congestion charging would reduce the volume of traffic (excluding pedal and motorcycles) within the charging zone during its hours of operation by some 10 to 15 percent. This is expected to lead to an increase in traffic on the Inner Ring Road, and some increase in orbital traffic in inner London, as some drivers choose routes to divert around the charging zone boundary. Traffic is expected to reduce on radial approaches to the charging zone, reflecting the anticipated reduction in traffic travelling to the zone. Other changes are expected, such as drivers changing the time of their trips to avoid the charging hours; as well as changes to the composition of traffic as different kinds of vehicle are deterred or attracted into the charging zone in response to both the charge itself and the changing traffic conditions that result.

Vehicle kilometers across London reduce by some 211 million per year with a £5 charge and 237 million with an £8 charge. Fuel consumption falls by 44 million liters and 48 million liters per year with £5 and £8 charges.

The initial observations made by Transport for London indicate that the volumes of traffic entering the charging zone have declined by up to 6%, comparing movements by vehicles with four or more wheels and charge payments in equivalent weeks in 2005 and 2006. Taking background trends into account, this suggests that the change in the charge has been responsible for a reduction of around 4% in traffic entering the charged area. This is towards the lower end of Transport for London's prior expectations.

There are similar indications that the volume of traffic circulating within the charged area is 3 to 4% down in early 2006 on a year previously. The available data suggests there are larger reductions in the volume of potentially chargeable vehicles (cars, vans and lorries), being partly offset by increases in non-chargeable vehicles (buses, taxis and two-wheeled vehicles).

The time savings from the imposition of the £5 charge are estimated at around £197 million, with charged area reliability savings estimated at £27 million. Increasing the charge from £5 to £8 for individual charge-payers and from £5.50 to £7 for fleet vehicles generates additional time savings of around £31 million and reliability savings of about £5 million. Thus, the increase in the charge of up to 60% adds only 16% to time and reliability savings. The increased charge also increases the cost to the extra deterred trips by around £11 million, from £20 million to £31 million, through a combination of more deterred trips and a higher cost to each deterred trip.

Annex 6 – Relevant statistical data showing the key impacts in the charging area and in Inner and Outer London of charges at £5 and £8 per dayreports an extensive set of statistical data on London congestion charging effects.

Even fewer data were available for scheme impacts on vehicles speed. For instance, the city of La Rochelle has registered an increase in average vehicle speed in the restricted zone of 30 km/h, while the city of Milan has recorded an increase in Public Transport commercial speed of 8.1% during the day time enforcement.

2.4.2 Economic Dimension

In the on-line questionnaire the Economic dimension has been addressed quantitatively in terms of:

- Investment costs (M€)
- Operational costs (M€ per year)
- Revenues from charges (€ per year)
- Revenues from fines (€ per year)
- Urban economy increase/decrease

The available information (Figure 43) collected by means of both survey and literature review covers roughly 13% of the responding cities for the impacts on urban economy, 33% for revenues and 28% and 30% for operating and investment costs respectively.

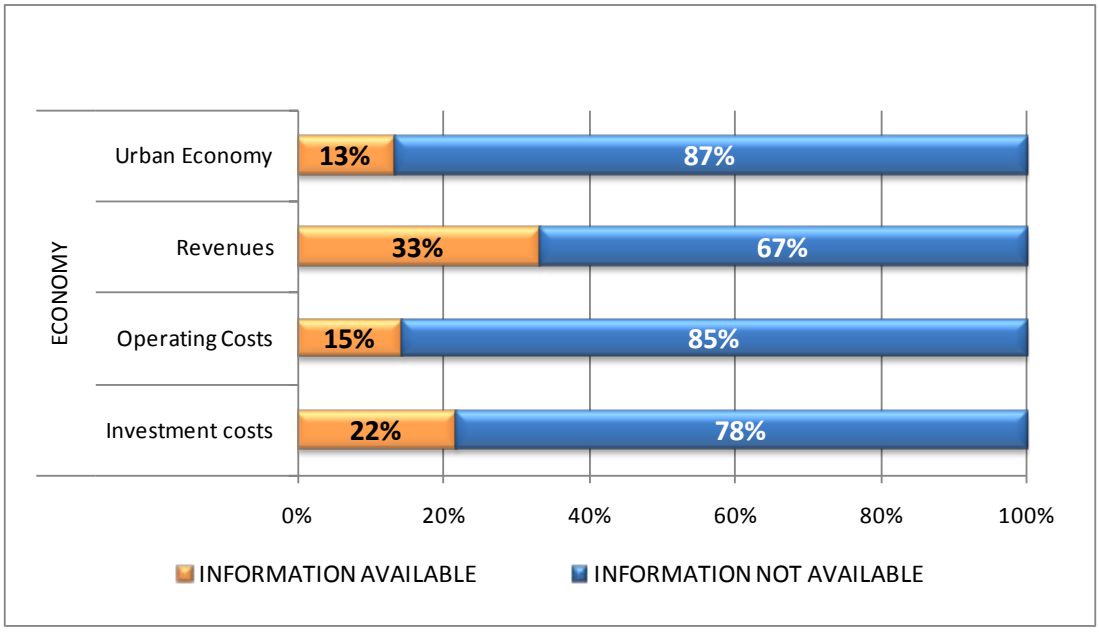


Figure 43 – The Economic Dimension: Information Coverage

The table in Annex 4 – Information on ARS impacts on economic dimension from questionnaires gives an overview of investment costs, operational costs and revenues of schemes as reported in the questionnaires.

Comparisons among the different implementation investment and operating costs is not very meaningful, in the light of the large differences in extensions, technology adopted, back office procedures and enforcement processes. As an example, the London Congestion Charging recorded around 250 M€[28] of investment costs, while the cities of Stuttgart, La Rochelle and Perugia reported an investment of 0.2 M€, 0.25 M€ and 0.45 M€ respectively. The London case covers an area charged of ca. 42 km^2, a number of

[28] At 2002 prices and exchange rate.

entries and exit points to be kept under surveillance of about 200, whereas the other mentioned cases cover areas less than 1 Km^2 with few control gantries.

Same considerations hold for revenues of charging schemes ranging from the 215 M€/yr of London to values as 100 K€ for other smaller schemes.

It is worth to underline the economic significance of the revenues generated by fines; in the case of London a value of 83 M€/yr is reported, comparable to the one of Rome (75 M€/yr). However even in smaller schemes like Perugia (not charged) the revenues are in the order of millions of €.

From the information obtained it can be observed that revenues from charges and fees have been reinvested for:

- financing road infrastructure and public transport enhancement (e.g. Bergen, London))
- increasing the bus services to and from the charging area (e.g. Durham, London)
- improving the local environment and liveability of the area (e.g. Nord-Jaeren).

Within the general theme of economic impact the local economy should also be considered, and its primary function i.e. the commercial operation of businesses in towns and cities. Much of this, in fact, relies – in transport-related terms – on good access to services for employers, employees and customers alike. For most businesses, concerns over a scheme's ability to maintain and improve their business operation would appear to be the major barrier to endorsing any access restriction scheme.

The table below shows the comments cities have inserted in their responses to the online questionnaire.

Table E – Information on ARS impacts on urban economy from questionnaires

City	ARS impacts on urban economy
Burgos	Indicator: Value of buildings Data: 600 €/m2 of increase
Durham	The majority of businesses (83%) have not altered their servicing arrangements following the introduction of the charge.
Edinburgh	A very marginal impact on the Lothian economy – in terms of value added and jobs this is marginally negative. A redistribution effect within the area of both jobs and population: population would be slightly higher in the city centre and outside the city; there would have been some movement of jobs out of the city into the surrounding areas.
London C.C.	Indicator: Sales growth in the Central Congestion Charging Zone Data: 2.1% per annum pre-charge (2000-2002), 4.4% per annum post-charge (2003-2007) Indicator: Surveyed sales performance of retail businesses located within WEZ Data: 24% reported increase, 7% reported decrease
London LEZ	The business and economy impacts assessment, conducted during the design stage for the scheme, suggests the overall loss to the economy from the direct and wider impacts of the scheme could lie in the range of £100m to £270m, with a potential net loss of 140 to 420 full time equivalent jobs.
Rome	The better livability inside the zones has increased the value of all the buildings and commercial activities.
Stockholm	Indicator: turnover before and after the implementation of the congestion tax for three statistical sectors: retail, wholesale and sales of motor vehicles and fuel.

City	ARS impacts on urban economy
	Data: The results show that the congestion tax has not had any negative impact on the overall turnover in the inner city when compared to the rest of Stockholm county. Both the retail and wholesale sectors show a more positive development of turnover in the inner city than in the rest of the county
Trondheim	In spite of the toll ring, the city centre has had a modest growth in trade. The annulment of road user charging did not lead to an upswing in city centre trade during 2006.

For Trondheim, Tretvik (1999) reports an analysis of the impacts on turnover within and outside the Trondheim toll ring. Before implementation, a shopping survey concluded that 25% of shoppers were likely to change the location or timing of their shopping activity in response to the toll ring. A second survey in 1992, a year after implementation, recorded that 10% had in fact changed the destination or timing of their shopping trips. However, the impact on retail turnover did not reflect this downturn in activity. In 1992 the Chamber of Commerce concluded that there had been hardly any effect on trade as a result of the toll ring. Longer-term time series data from 1987 to 1997 on Trondheim's share of county retail sales and on annual turnover in different parts of Trondheim showed that Trondheim as a whole, and the Central Business District in particular, had been losing market share between 1987 and 1990, but that the city's market share within the county grew in most years from 1991 to 1997, and that the toll ring's share was maintained throughout that period. While turnover will be affected by a wide range of factors, there is thus no evidence to suggest that the toll ring adversely affected trade within the ring.

In London, work looking at monitoring the impacts of congestion charging has been completed by Transport for London, which made the following conclusions:

- The introduction of charging in February 2003 coincided with a temporary economic slowdown, as well as a wider set of local, national and international conditions that were not favourable to general economic performance.
- Analysis of several indicators of economic performance, including measures of business population and turnover, did not reveal evidence of a significant congestion charging impact.
- Shops within the inner core of the charging zone found that their rental values increased.
- TfL's business surveys conducted in 2004 showed a continued recognition of the transport benefits associated with congestion charging.

Other work conducted during 2005 found that trends in business registrations for VAT remained strong and that within the charging zone, the retail sector has increased its share of enterprises and employment since 2003.

A more recent evaluation by TfL in 2008, using key indicators such as sales, profitability and business start-up figures, has shown that there has been no discernable impact – positive or negative – on overall business performance as a result of congestion charging in central London. This does not rule out the possibility that some businesses in certain sectors may have been affected. However, any cumulative impacts from the introduction of charging have not been evident in terms of business and economic output. (TfL, 2008).

Quddus, Carmel and Bell (2007) also undertook research to assess the impact of the London congestion charge on retail sales. The modelling work showed the association of sales from John Lewis on Oxford Street with the congestion charge, the (then) closure of the London Underground Central Line, the state of the economy, the consumer price index, the number of overseas visitors to London, trend and seasonality.

Using this model, the congestion charge was considered to have a negative impact on the weekly sales of John Lewis Oxford Street.

Whilst there is a degree of support amongst the business community for congestion charging (London First, 2006), it is also believed that many smaller businesses may have experienced a drop in custom which could have a likely impact on reducing future investment decisions.

Stockholmsförsöket (2006a) reported that the effects and impact on the local economy are dependent in both the short and long term on how the surplus revenue is returned to the region. What is apparent from the trial is that the business community is dependent on a well functioning road transport system. The 'major winners' from the trial were professional and service road users, who made substantial time savings that were worth more than congestion tax paid. The short term impact of introducing a scheme on commerce and other business sectors studied showed only minor impacts.

The turnover surveys that were done indicated that the Stockholm trial had little effect on retail trade in the region. Furthermore the report concluded that the trial did not have a negative influence on small businesses as a whole in the charging zone. This conclusion was also reached in Daunfeldt *et al* (2009). This is not to say that individual companies were not adversely affected. Congestion taxes do have both positive and negative effects on costs for businesses. It is the balance of these costs against the net gains that will influence whether or not urban road user charging is acceptable to the business community.

Concerning the urban economy impacts, the value of building has increased both in Burgos and Rome, while the Trondheim city centre has noticed a modest growth in trade.

2.4.3 Environmental Impacts

In the on-line survey, the Environmental dimension has been addressed by considering the:

- Percentage of CO_2 emissions abatement
- Percentage of CO emissions abatement and levels decrease (concentration)
- Percentage of NOx emissions abatement and levels decrease (concentration)
- Percentage of Particulate emissions abatement (PM10, PM 2,5 and total PM)

Unfortunately, limited information was found to be available, whether from the on-line survey or from existing documentation; as illustrated in Figure 44, only 17% of information on CO_2 emissions abatement, 22% on particulate emissions and concentrations abatement, and 23% on NOx emissions and concentrations abatement turn out to be accessible.

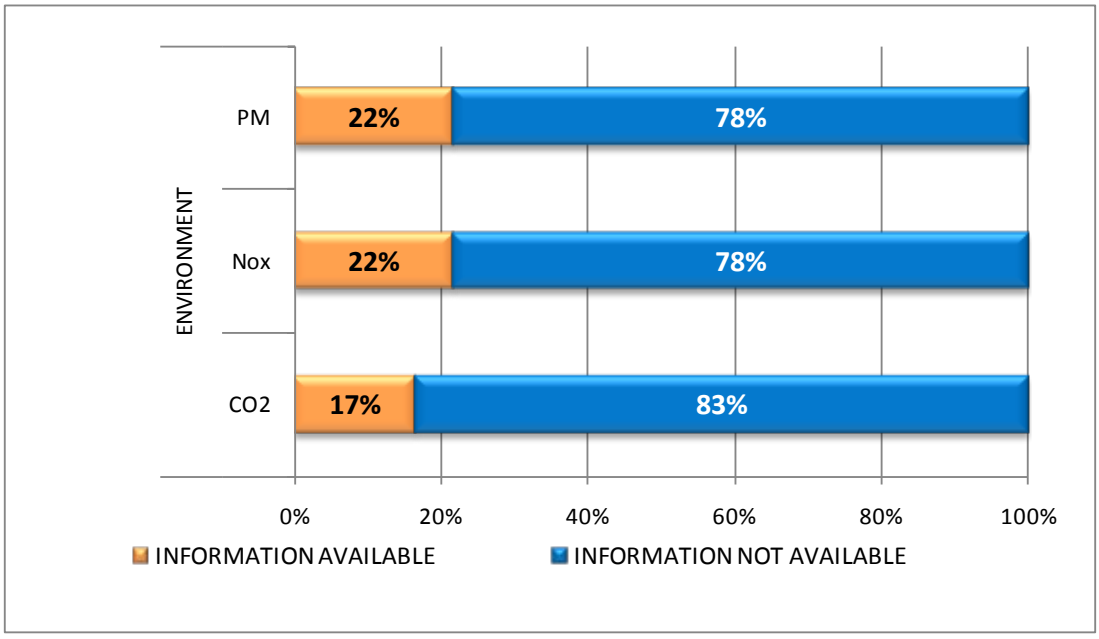


Figure 44 – The Environment Dimension: Information Coverage

The table below summarizes the information on concentrations and emissions abatement that the few cities responding to the questionnaire have experienced after the access restriction scheme implementation.

Table F – Information on ARS impacts on environment from questionnaires

City	ARS environmental impacts		
	CO2	Nox	PM10
Cork	-37.6% (emissions abatement)	-19.1% (concentration levels) -28.7% (emissions abatement)	-34.3% (PM10)
Eindoven	-	-7 ÷17% (emissions abatement)	- 5 ÷10% (PM10)
Göteborg C.C.	-4% (emission abatement)	-10% (emissions abatement)	
Göteborg LEZ	-	-7.8% (emissions abatement)	-33.2% (PM10)
La Rochelle	-22% (emissions abatement)	-	-21% (PM10)
Hannover	-	-10÷15%	-
London C.C.	-16% (emissions abatement)	-8% (emissions abatement)	-6% (PM10)

City	ARS environmental impacts		
	CO2	Nox	PM10
London LEZ	negligible (emissions abatement)	-1.48% (emissions abatement)	-1.1% (PM10) - 1.5% (PM2.5)
Milan	-11% (emissions abatement)	-18% (emissions abatement)	-16% (PM10)
Munich	-	-23% (emissions abatement)	-6% (PM10)
Reading	Net air quality benefit of £8.3m across the Reading area	Reduction between 2011 and 2030 (estimate)	Reduction between 2011 and 2030 (estimates)
Rome	-0.6% (emissions abatement)	-35% (emission abatement)	-10% (PM10)
Rotterdam		-5% (concentration levels)	-
Stockholm	-13% inner city (emissions abatement)	-8.5% inner city (emissions abatement)	-13% inner city (PM10)
Stuttgart	0% (emissions abatement)	-7% (emissions abatement)	-5% (PM10)
Trondheim	-8.5% inner city (emissions abatement)		-

Based on the available data, the CO_2 emissions abatement has an average value of 17% while the NOx concentrations show a decrease of 12 % on average whereas NOx emissions of 9.5%. Finally, PM emissions abatement exhibits mean values in the order of 12%.

With regard to environmental impact the city of **Berlin** achieved important results as reported in a recent impact assessment study[29]. After the LEZ came into force, in fact, the number of registered vehicles with high emissions, thus not eligible for any sticker, dropped significantly. 70% of high polluting passenger cars and more than 50% of old commercial vehicles have disappeared only because stage 1 of the LEZ took effect in 2008.

Taking the recorded vehicle composition before and after the launch of the LEZ as a basis it could be calculated how vehicle exhaust emissions changed due to the LEZ. In Figure 45 below, the red bar represents the real situation with the LEZ in place, calculated from the recorded vehicle fleet data inside the LEZ, while the yellow bars show the emissions in the event that all non-labelled vehicles would have been fully replaced by cleaner ones. As a result of the LEZ exhaust particle emissions dropped by 24% or by more than 60 t/a in absolute terms. NOx emissions also fell by 14% or almost 1000 t/a.

[29] "The Low Emission Zone in Berlin – Results of a First Impact Assessment", Martin Lutz – Senate Department for Health, Environment and Consumer Protection, Berlin (Germany).

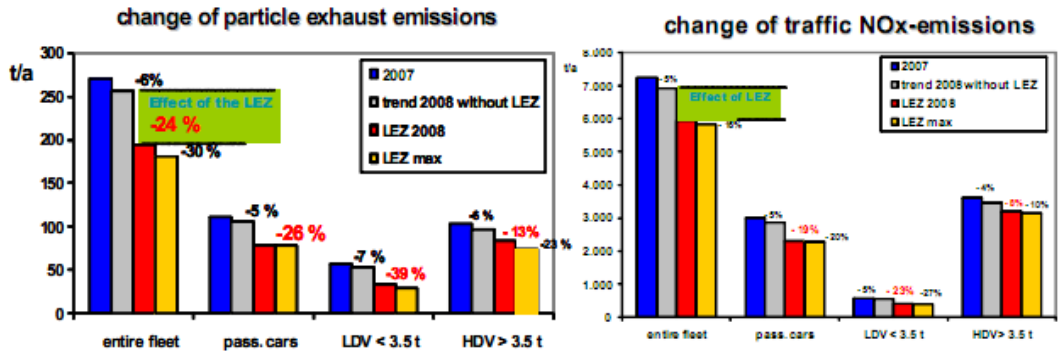


Figure 45 – Change in registered vehicles in the worst pollution category (not eligible for a sticker) after introduction of the LEZ

After one year since the start of the Low Emission Zone in Berlin its success can be clearly seen in terms of an accelerated shift towards cleaner vehicles, reduced pollutant emissions and better air quality.

Its impact on annual PM10 pollution is about 3%, which corresponds to 4-5 avoided excess days of the 24h PM10 limit value. Similar figures were obtained from a first preliminary evaluation of air quality data in the Rhine-Ruhr Area, where LEZ have been set up in several cities in October 2008.

Despite an increasing share of direct NO2-emissions, NO2 concentrations in Berlin have also decreased by 7-10%, after several years without a visible downward trend.

The **Stockholm** Trial reduced emissions of both carbon dioxide and particles. The drop in carbon dioxide is approximately in proportion with the reduction in vehicle-km driven, which means that the contribution from traffic in the county has been reduced by 2-3 per cent, and in the inner city by about 14 per cent. These are major reductions to have been achieved through one single measure, although when regarded as a reduction for the county it can only be seen as one of several measures required to achieve national climate objectives. Carbon dioxide emissions are the most difficult traffic emissions to reduce.

Total particle emissions have fallen by about the same amount as traffic volumes, but in the case of these substances, the place *where* these emissions decrease is of primary importance, because they contribute to concentrations at local level. According to the County Administrative Board of Stockholm, reduced use of studded winter tyres is an important step towards achieving the environmental quality values for particles. There are also environmental quality values for nitrogen dioxide, NO2. The concentrations of NO2 at street level are not only determined by traffic emissions, but also by other factors, such as the occurrence of other substances. Emissions of nitrogen oxides (NOX – not only NO2) from traffic have fallen steadily during recent years because of more stringent emissions requirements on vehicles. The effect of this decrease on the concentration of NO2 at street level in Stockholm's inner city is however much less. This is due to the complexity of factors such as chemical reactions. It was therefore not expected that congestion charging would make a major contribution to achievement of environmental quality values for NO2.

From literature sources the average CO2 emission rate assumed by the city of **London** impacts assessment[30] is equal to 2.5 kg per liter of fuel, based on standard emission rates of 2.4 kg per liter of petrol

[30] "Central London Congestion Charging Scheme: ex-post evaluation of the quantified impacts of the original scheme" Prepared by Reg Evans, for Congestion Charging Modelling and Evaluation Team, 29 June 2007.

and 2.7 kg per litre of diesel. A tonne of carbon is valued at around £75 (based on the values derived for the Department of Food, Environment and Rural Affairs in the Government Economic Service working paper *Estimating the Social Cost of Carbon Emissions,* 2002 - and re-confirmed by the Department in 2006 in the light of research feeding the *Stern Review on the Economics of Climate Change*) and a tonne of CO2 therefore at around £20.45, with carbon representing 6/22 of CO2 by weight. These assumptions imply total CO2 emissions of around 110,000 to 120,000 tonnes with £5 and £8 charges and a value of the CO2 emissions saved of around £2.3 million to £2.5 million with £5 and £8 charges.

Table G – Estimated CO2 savings per year

	£5 charge	**£8 charge**
Vehicle km saved	211 million	237 million
Fuel savings, litres	44 million	48 million
CO2 savings, tonnes	110,000	120,000
CO2 savings, £	£2.3 million	£2.5 million

The major pollutants affected by congestion charging are believed to be nitrogen oxides, NOx; and particulate matter, PM10. Total primary emissions of NOx on major and minor roads (including cold starts) in the charging area fell by 13.4% (from 1405 to 1216 tonnes) between 2002 and 2003. On the Inner Ring Road they fell by 7%, from 427 to 398 tonnes. These reductions are attributable in part to the flow and speed changes brought about by the congestion charge, but also to changes in the vehicle stock between these two years. Using observed traffic volumes and speeds and emissions relationships for different vehicle types, it is estimated that the congestion charge was responsible for an 8% reduction in the charging area and a 0.2% reduction on the Inner Ring Road.

The charge has been responsible for an overall reduction in PM10 emissions of around eight tonnes per year, again without including changes in Inner and Outer London. At a value of PM10 emissions of £154,000 per tonne in London (the value falls to £24,000 per tonne outside London, where concentrations are lower) the eight tonnes saved have a value of around £1.2 million. The pollution savings in NOx and PM10 emissions in the charged area and on the Inner Ring Road generated by the congestion charge are estimated at between £1 and £1.5 million per year.

2.4.4 Acceptability

In the questionnaire, the acceptance issue refers to people attitudes towards access restriction schemes. Basically, this dimension has been described by means of questions, namely:

- how have citizens been consulted (e.g. survey, consultation, etc.);
- which was the percentage of favourable people before the scheme implementation;
- which was the percentage of favourable people after the scheme implementation.

As shown in Figure 46, the survey represents the most frequently adopted way of eliciting people opinions (39%). In the majority of analysed ARS surveys were used when dealing with charging schemes. It is worth noting that the “other” mode of consultation encompasses several instruments such as meetings, opinion polls, and round tables.

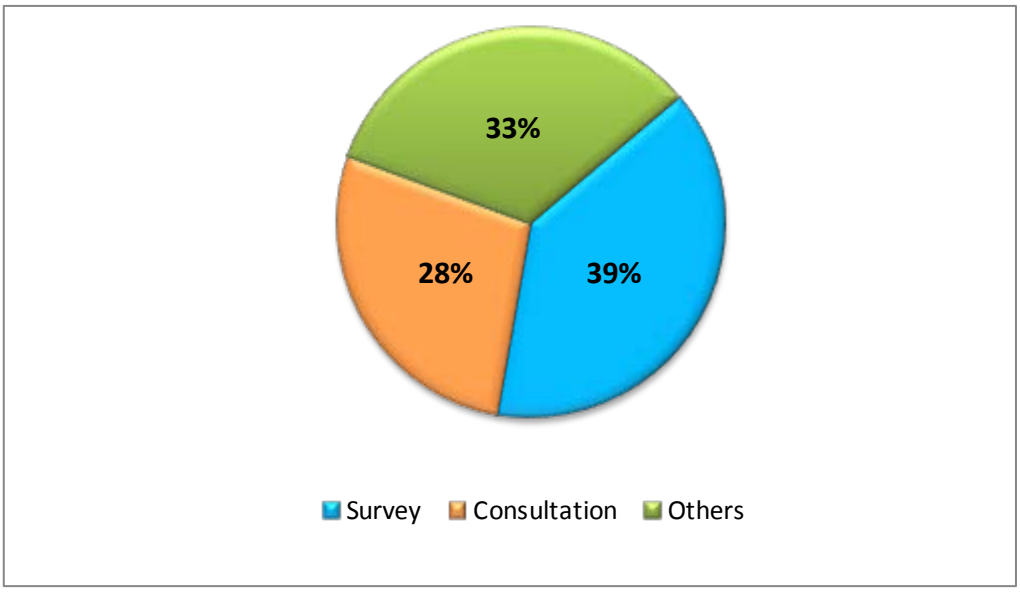


Figure 46 – The Acceptability Dimension: Modes of Consultation

As illustrated in the table shown at Appendix 5, the data collected show different attitudes towards the scheme implementation. The city of Stockholm, for instance, has registered an increase in the percentage of people favourable to the scheme after its implementation – 36% before against 51% after, while the city of Trondheim has experienced an increase in the negative share during the first decade of scheme implementation, mostly caused by a negative publicity and discussions at that time about the immediate introduction of five new charge stations close to the city centre.

In another Norwegian city, Bergen, opinion polls showed that around two thirds of the population was against the toll ring. However nowadays the majority has accepted the scheme. In this context the rethinking was due to the local transport network enhancements[31].

In general can be said that to a prevalent negative attitude of the population before the scheme implementation it correspond a shift towards a positive reaction by many of the interested users (see following paragraph).

2.4.5 Equity Impacts

In the questionnaire the Equity dimension has been handled by identifying groups of potential winners and losers. To this end the following closed format questions have been asked:

- who can be considered a scheme winner;
- who can be considered a scheme loser.

The equity topic has been exploited by considering different groups of road users (e.g. private motorised users, public transport users, shop keepers/retailers, residents in the restricted zone, residents outside the restricted zone, freight distributors).

[31] Konsult Knowledgebase.

In the analysed access restriction schemes, the top-three groups of "winners" (Figure 47) are the residents in the restricted zone (30%), the public transport users (21%) and the shop keepers/retailers (16%). It is worth noting that the "other" group (12%) encompasses several categories such as shoppers, pedestrians, cyclists and tourists.

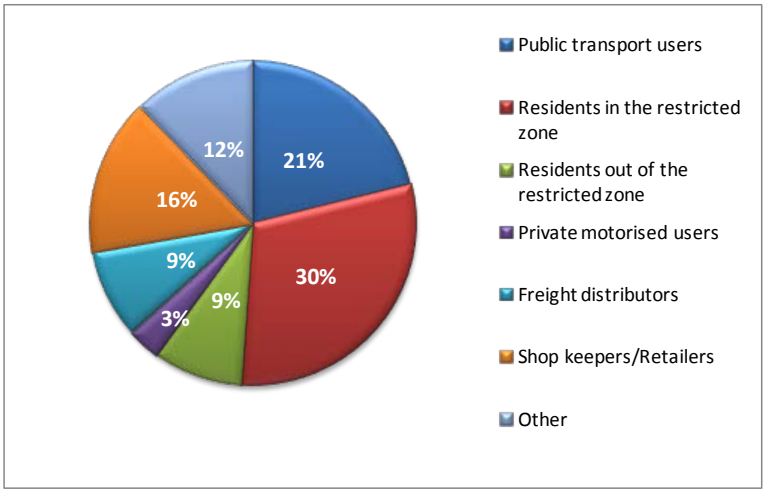


Figure 47 – The Equity Dimension: Scheme Winners

On the opposite side (Figure 48), private motorised users represent the primary scheme "losers" (44%), followed by freight distributors (21%) and residents out of the restricted zone (11%). Concerning the latter category, the 'loser' condition cannot be attributed to a specific type of scheme and the related features.

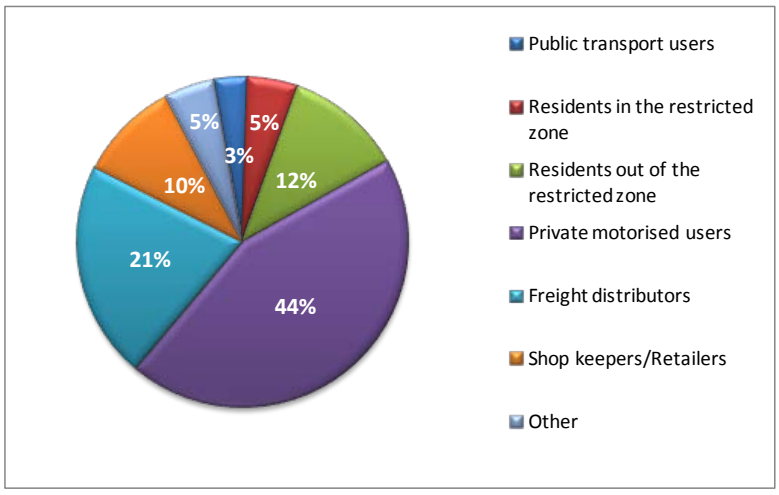


Figure 48 – the Equity Dimension: Scheme Losers

The city of **Manchester** has taken the equity issue into account by presenting at the public consultation a list of proposals to support low income workers with a discount, including public transport. Following the

consultation, AGMA[32] proposed that low-paid workers (based on statutory minimum wage) would receive a 20% discount on the congestion charge for a minimum period of 2 years. Low-paid workers would also receive a 20% discount on public transport fares at peak times.

For the proposed congestion charging scheme for **Edinburgh**, there was specific consideration of potential impacts on social exclusion. The Public Inquiry for the scheme (Scottish Executive Development Department, 2004) published conclusions from the point of view of three specific groups of people: people without access to a car, people on a low income on the margins of being able to afford to have a car, and disabled people.

The inquiry concluded that people who do not have a car cannot be adversely affected by the charging scheme, except from the point of view of a slightly reduced likelihood of being given a lift by car drivers. This conclusion failed to consider negative impacts identified elsewhere, such as the possibility for consequent over-crowding on public transport services (at least in the short term), and the potential for the spatial redistribution of traffic, causing increased flows through less affluent areas.

The Inquiry Report identified people who are on the margins of being able to afford to run a car, who are most likely to be in low-paid employment, as the group of people likely to be most adversely affected by the proposed congestion charge. As the report pointed out, people in this category who are less mobile in terms of their choice of alternative employment, would be less able to make life changes in order to cope with the increase cost of travelling by car, and some, such as shift workers, would have few, if any, alternative options for travelling to work. The report's conclusion, however, was that such problems would be alleviated in the longer term, due to planned improvements in the transport system.

These equity issues were a major factor in the subsequent referendum in Edinburgh. Whilst it was demonstrated, during the planning phase, that no group of residents would actually lose out as a result of the introduction of the scheme, a city-wide referendum resulted in the plans being rejected by almost 75% of the residents who voted, and neighbouring authorities, who were not included in the referendum, were also against the proposed scheme, on the grounds that they perceived the charging regime to be unfair. The latter perception was based upon a belief that the double-cordon system of charging would impact more upon residents commuting into the centre of Edinburgh than upon the city's residents. Furthermore, since the national legal framework dictated that a single statutory authority (i.e. the City of Edinburgh Council) should be responsible for the collection and distribution of revenues, adjacent authorities were uncertain as to whether they could guarantee receiving the funds necessary to make the investment in public transport improvements that their residents would expect.

In **London**, the impact of the city's Central Area Congestion Charge is monitored on an annual basis. TfL (2008) considers the more significant social impacts, (i.e. the effects of urban road user charging on "how people and communities live, work, travel and relate to one another"), and aims to "assess the balance between those who may have 'benefited' or 'lost out'" as a result of the scheme. The survey focuses particularly on impacts on people's access to services, which is related to the risk of some people becoming socially excluded, and on any cost of living or financial hardship implications. The survey seeks to understand how people have changed their travel behaviour in response to the introduction of Urban Road User Charging, and the resulting impacts on quality of life, and on people's perception of the "amenity" of the Congestion Charge Zone and its surrounding areas. The survey also seeks to monitor the wider impacts of the scheme on the quality of life of all Londoners.

One of the main findings from London has, unsurprisingly, been a reduction in car trips into the Congestion Zone, particularly for leisure and social purposes. Whilst some respondents have reacted by making fewer

[32] Association of Greater Manchester Authorities.

trips of this nature, others have switched to making these trips using another mode of transport. The most substantial impact of congestion charging on travel behaviour is reported to have been on shopping and entertainment car trips among infrequent travellers. From the point of view of monitoring evidence for social exclusion as a result of the charging policy, there appears to be little overall evidence of a lack of access to goods and services, mainly due to the level of availability and use of alternative modes of transport. Another area in which a substantial decrease in trips has been observed has been in parents driving children to school and day care; it might be argued that, in this context, it has been more affluent Londoners that have been forced to change their travel behaviour.

In the overall context of "winners & losers", there were 16% of Londoners who said they thought they had benefited, and roughly 16% who said they had lost out overall. Generally, there has been a consensus that improvements have been made to air quality, the environment in general, the provision of bus services, bus journey times, traffic congestion and car journey times – and this might be viewed as evidence that there have been benefits across the board.

There has also been little evidence of the scheme having an adverse impact on disabled people, although some disabled people have reported that visits from carers, friends and family have reduced in frequency during the day, since the advent of the congestion charge, with some stating that this has led to an increased sense of loneliness.

The experience in **Stockholm** (see Transek (2006b)) has been that, overall, a large proportion of congestion tax payments are paid by a relatively small number of drivers. This is a scheme that was adopted after a successful referendum vote, during which it was presented as a "congestion tax" or "environmental charge".

In terms of the relative impact of the scheme on different groups of people, substantial variations have been found within groups, but generally,

- residents of the inner city and the Lidingö district pay nearly twice as much per person as residents of other areas, suggesting some geographical inequities
- households with a high income per household member pay nearly three times as much as low income households
- employed people pay about three times as much as others
- men pay 50% more than women.

There were, however, some anomalies in the research results from Stockholm; for example, although inner city residents paid most congestion tax and derived less benefit through savings in travel time, so deriving less net benefit than others, opinion surveys showed that they had the most positive attitude towards the charge. This highlights the possible gap that might exist between perceived and measured costs and benefits, and suggests that residents of the central area of Stockholm may have derived benefits that were not considered by the research (CURACAO,2008).

Transek (2006b) also went a stage further, and examined the impact on equity according to whether different strategies were used for the redistribution of the income from the congestion charge. Three hypothetical scenarios were used – the income being distributed equally among all members of society, being used to fund a reduction in income tax, or being used to fund a reduction in public transport fares. This exercise found that these different strategies for redistributing revenues actually had a greater impact on the extent to which people from different groups were affected by the charging scheme than variations in how much congestion tax people actually paid. For example, if revenue were used to fund reductions in public transport fares, individuals who are young, single, female, on a low income and resident in the city's

suburbs would benefit the most overall, since they use public transport more and drive less, and so pay the least in terms of congestion tax. On the other hand, individuals who are employed, with children, on a high income, and residing in the inner city, would derive less net benefit. Similar calculations were made of the "winners" and "losers" in a situation where revenues were used to fund a reduction in income tax; in this scenario, high-income individuals, older people, single parents and residents of Northern suburbs were identified as being the main beneficiaries.

2.4.6 Liveability

The Liveability[33] dimension has been considered only by very few cities among the questionnaire respondents, namely the city of Cork, Durham, London (congestion charging), Rome and Stockholm. The majority of these schemes has revealed similar features, like the targeting of both private and freight vehicles, the charging components and time of operation. On the contrary, these ARS present different aspects if considering the cities in terms of population and cars density.

Generally, the establishment of access restrictions schemes allows to create more liveable and safe environment. Key elements are the reduction in the levels of traffic, pollution and accidents, and the enlargement of cyclists and pedestrians' areas.

[33] Liveability encompasses the many characteristics that influence people to live in a place. Among these characteristics there is mobility of population and distribution of goods facilitated by transport choices that are environmentally sustainable.

2.5 Legal Assessment of ARS

2.5.1 Introduction: Framework of the Legal Assessment

This section analyses the legal aspects associated to the design and implementation of the known access restriction schemes, with particular regard to existing EU legislation.

In the initial phase of the analysis, information on the legal features of the ARS have been collected through the city survey. Namely, relevant information related to:

- The legal basis level (e.g. urban, regional, national, European)
- The legal basis type (e.g. air quality legislation, road codes prescription, others)
- The enforcement approach (e.g. charging per trip, charging per day, no charging)
- The differentiation criteria by vehicles type (e.g. all except clean vehicles, private cars, freight vehicles)

As mentioned in section 2.1.1, the city survey elicited feedbacks from 58 cities covering 18 countries, of which 16 Member States. In order to derive an accurate and comprehensive picture on the legal issues at European level, the legal basis analysis has been performed on the ARS implemented or foreseen to be implemented in EU Member States plus Norway. The summary of results is shown in section 2.5.2, while the detailed analyses are reported in the Annex 7 – Legal basis analysis at country level. Moreover, section 2.5.2 reports the assessment outcomes in terms of compliance with the EU legislation, type and contents of the legal basis and conclusions.

In the city survey, with reference to ARS in operation or foreseen to be implemented in the near future (respectively, sections A. and B. of the questionnaire[34]):

- Only 36,4% of information was available for the level of the legal basis (Figure 49)
- Only 47,3% of information was available for the type of the legal basis (Figure 50)
- Few cities have explicitly stated a relationship of ARS with existing EU legislation/ regulation (5,5%)

[34] In the submitted questionnaire, see sections A.8 and B.8 on scheme legal aspects (Annex 8 – Questionnaire Template).

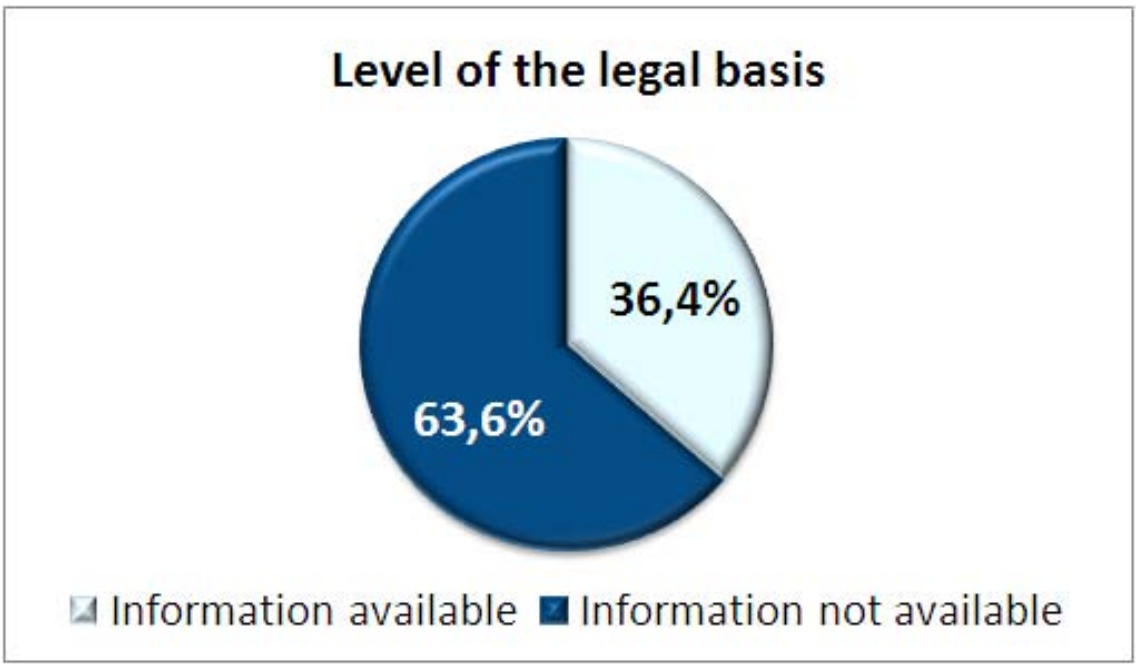


Figure 49 – Level of the legal basis: City survey information coverage

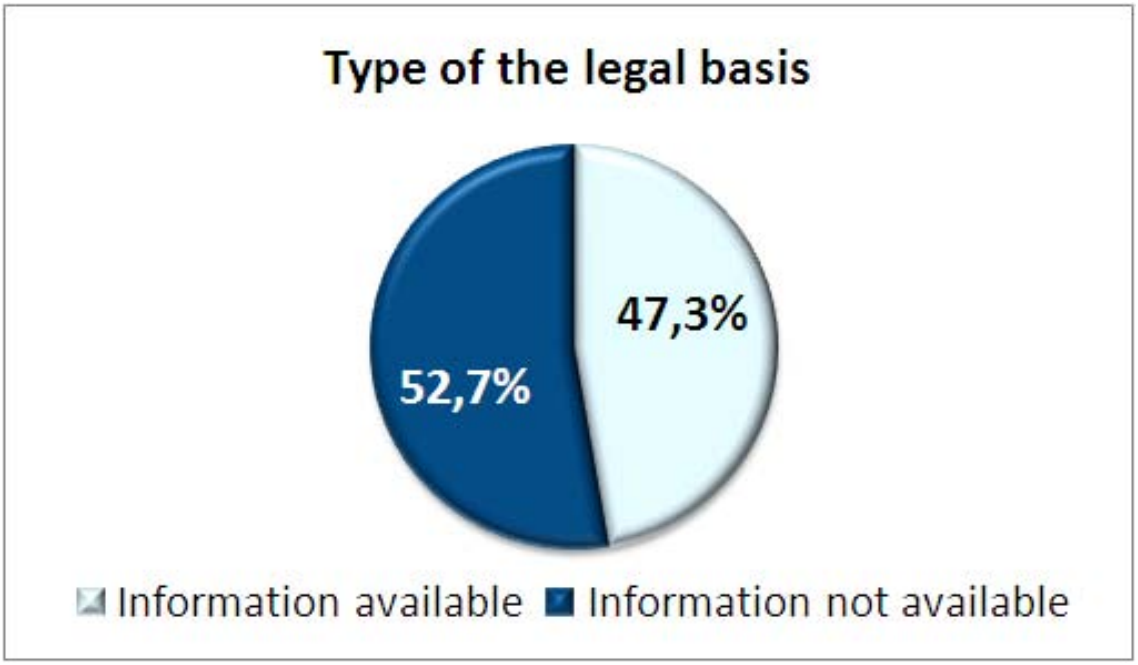


Figure 50 – Type of the legal basis: City survey information coverage

With reference to ARS in operation and foreseen to be implemented in the near future[35]:

- Most of the legal bases underlying the access restriction scheme refer to the urban level (71,4%) and national level (51,4%) (Figure 51)
- As for the type of legal basis, road codes prescriptions represent the majority (58,6%) (Figure 52)

[35] For these questions submitted questionnaire, it was possible to give more than one answer. The percentage had been calculated on the cities that had replied.

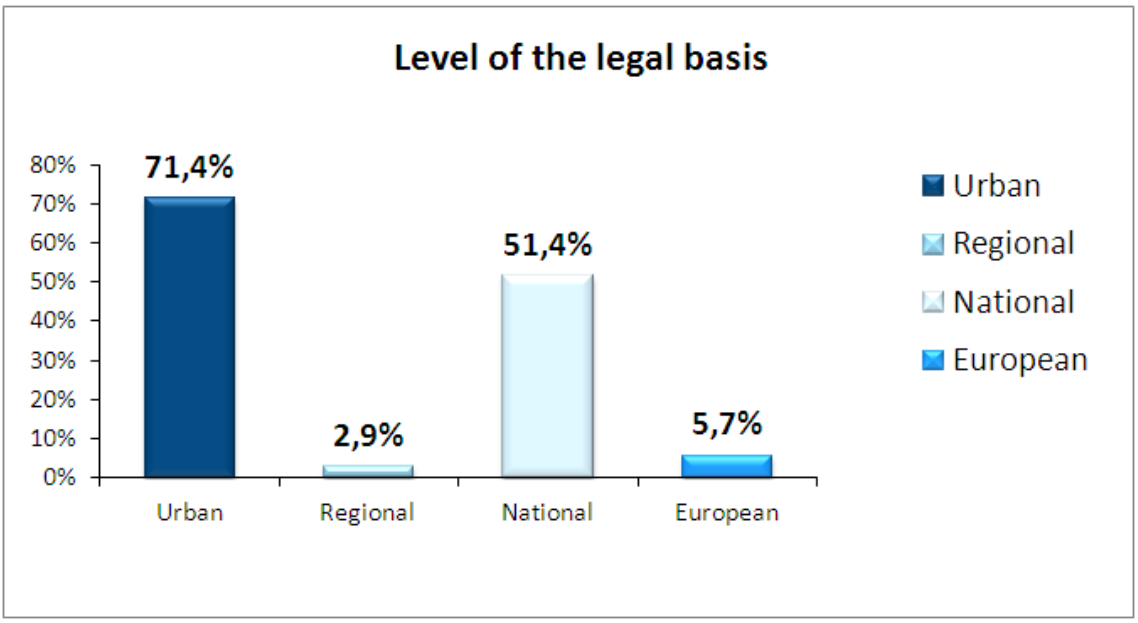


Figure 51 – Level of the legal basis: City survey results

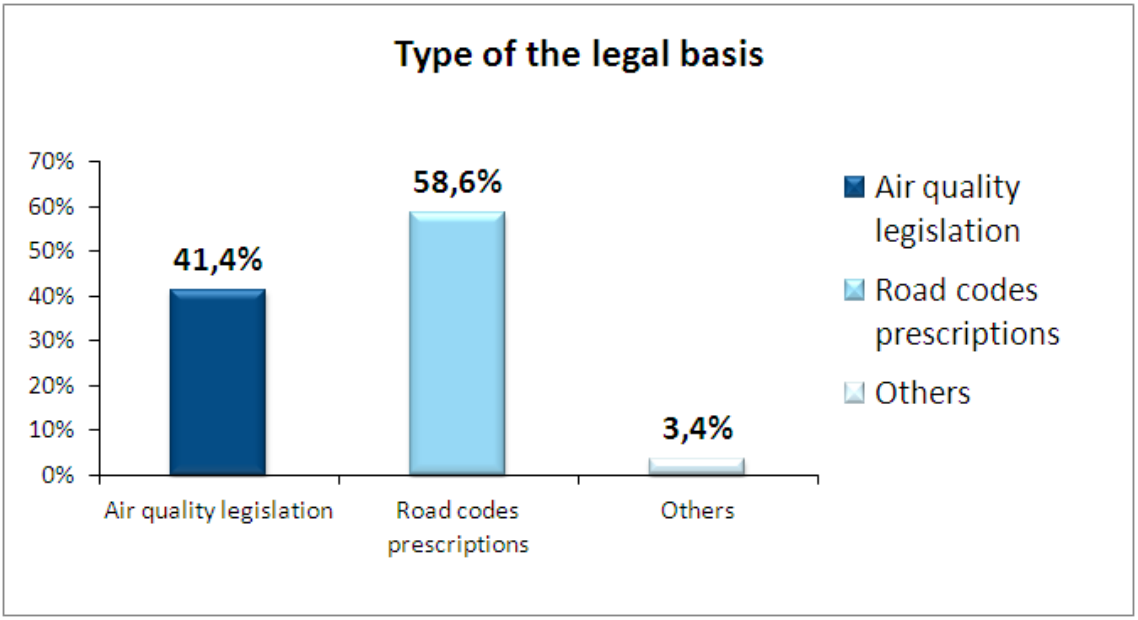


Figure 52 – Type of the legal basis: City survey results

With reference to ARS being in operation and foreseen to be implemented in the near future:

- The majority (68,5%) of the analysed schemes encompasses the charging component: 42,6% charging per day and 25,9% charging per trip[36] (Figure 53)
- Most schemes include a differentiation by type of vehicles[37] (Figure 54)

[36] The percentage had been calculated on the cities that had replied.

[37] For these questions submitted questionnaire, it was possible to give more than one answer. The percentage had been calculated on the cities that had replied.

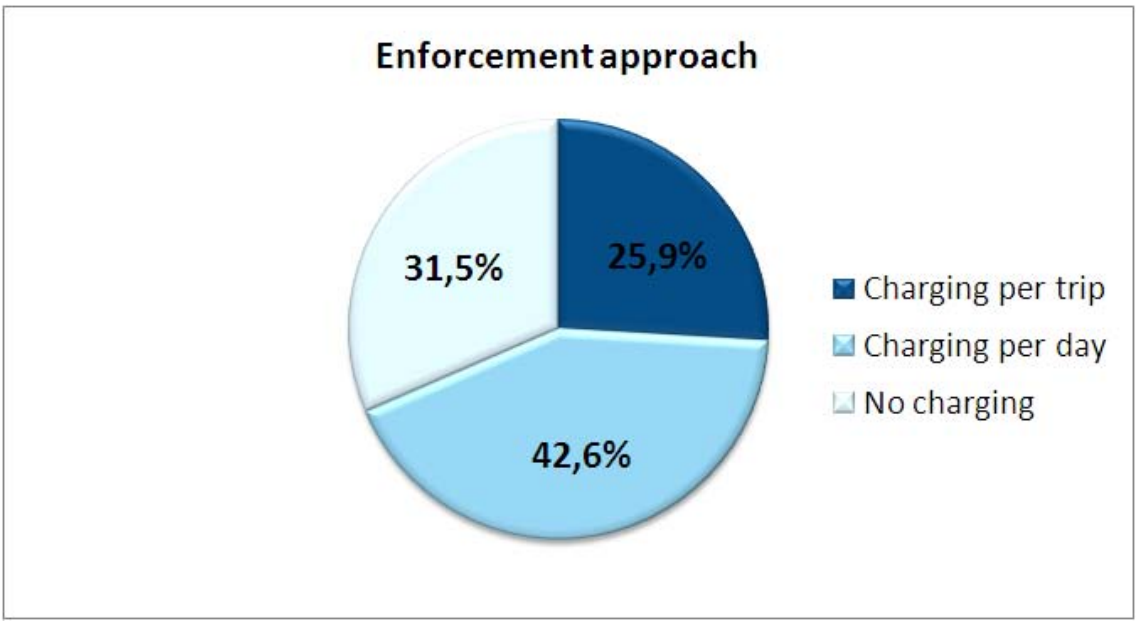


Figure 53 – Enforcement approach: City survey results

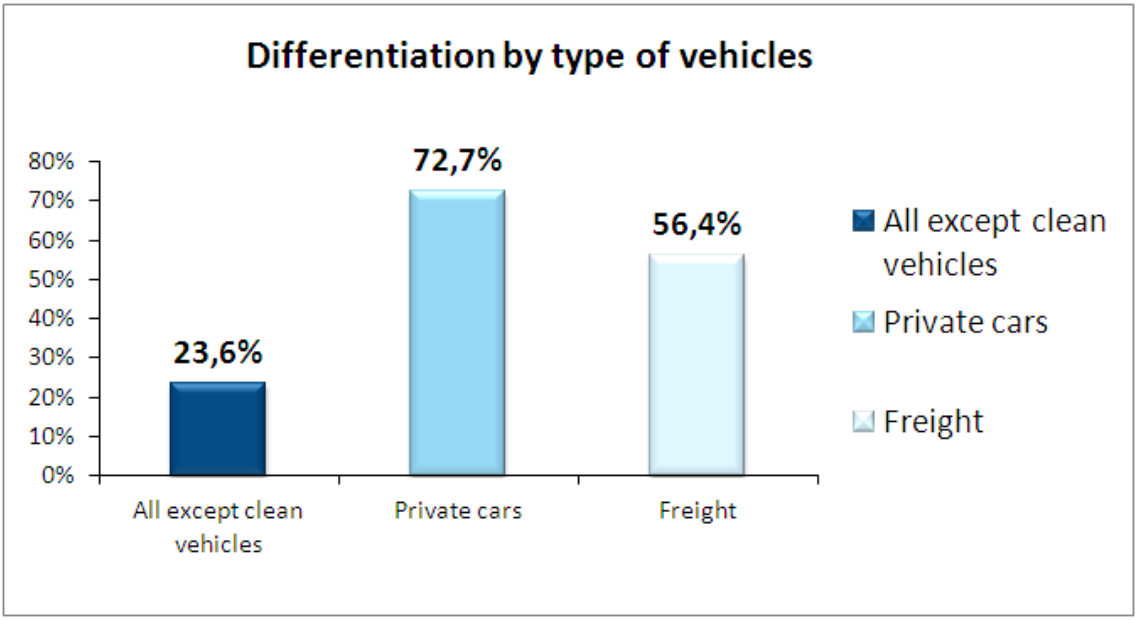


Figure 54 – Differentiation by type of vehicles: City survey results

2.5.2 Legal Basis of ARS at Country Level (EU27)

This section presents a summary of the legal basis analysis performed at country level for EU Member States plus Norway[38]. It refers to the analyzed countries having at least one access restriction scheme in place according to our findings (July 2010) or foreseeing to implement a scheme in the near future, and for which legal information is available. For each country, the legal documents regulating the access restrictions scheme and the main contents are reported.

Table H provides an overview on:

- The type, level (national and/or local) and contents of the legal basis;
- Whether the regulations set the vehicles standards (e.g. Euro standards, vehicle age, etc.) for access restrictions, specifying the level of the national basis;
- Whether any access restriction scheme has been implemented so far.

[38] Annex 7 – Legal basis analysis at country level reports the thorough results of the legal analysis performed at country level.

Table H – ARS legal basis at country level

EU Member States	LEGAL BASIS			Vehicles restriction standards	ARS implemented
	Type	Level[†]	Contents		
Austria	Air Pollution Act	N	Heavy vehicles traffic restriction measures	No	No
	Landeshauptmann regulations	L	Night driving restrictions, Trucks traffic restrictions		
Belgium	Roads Code	N	Pedestrian areas, Play streets, Roads for pedestrians, cyclists, agricultural vehicles and motorcyclists	No	Yes
Bulgaria	Roads Code	N	Traffic ban on public and individual roads	No	Yes
Denmark	Act on Environmental Zone	N	Environmental zones, vehicles standards	Yes	Yes
Estonia	Roads Code	N	Traffic restrictions measures for power-driven vehicles	No	Yes
France	Roads Code	N	Pedestrian areas	No	Yes
Germany	Marking Regulations	N	Particulate emissions marking of passenger cars and commercial vehicles	Yes	Yes
Greece	Decision of the Greek Directorate of Road Construction Works Studies	N	Traffic restriction areas, vehicles restrictions and time slots	Yes	Yes
Hungary	Municipality Council decree	L	Access restriction scheme adoption, area, vehicles restrictions, time slots	Yes	Yes
Ireland	Roads Code	N	Protected roads	No	Yes
Italy	Roads Code	N	Traffic in built-up areas	No	Yes
	Order of the Mayor	L	Vehicles restrictions	Yes	
	Municipality Council decree	L	Definition of pedestrian areas and ARS		
Latvia	Municipality Council decree	L	Traffic restriction areas, type of vehicles, time slots	Yes	Yes

EU Member States	LEGAL BASIS			Vehicles restriction standards	ARS implemented
	Type	Level†	Contents		
Luxembourg	Municipality Council decree	L	Traffic regulations		Yes
Malta	Subsidiary regulations	N	Areas, control, vehicles restrictions, vehicles exemptions and conditions	No	Yes
Netherlands	Environmental Zones Covenant	N	Environmental zones, vehicles restrictions	Yes	Yes
Poland	Municipality Council decree	L	Access restriction areas, fees	Yes	Yes
Portugal	Roads Code	N	Temporary and permanent traffic restrictions measures	No	Yes
Romania	Roads Code Municipality Council decree	N L	Pedestrian areas Areas, vehicles restrictions, charging and time slots	No Yes	Yes
Spain	National regulations* Municipality Council decree	N L	Powers of municipalities Area boundaries, access conditions and functioning	Yes	Yes
Sweden	Road Traffic Ordinance Local traffic regulation	N L	Environmental zones Adoption of environmental zones, area extension	Yes No	Yes
United Kingdom	Traffic Regulation Order Section 106 agreements Scheme Order	L L	Legal basis under which local authorities are empowered to introduce LEZ Congestion charging	 Yes	Yes Yes

† *L = local, N = national*

n.a. = not applicable

**For further details see Spain section of Annex 7 – Legal basis analysis at country level*

The figures below summarize the results of the legal analysis, in terms of level, type and contents of the legal bases. To provide a fair picture of the relative occurrence of specific legal bases, the percentages below have not been calculated as the simple ratio between the number of countries that have, for example, a national legal basis and the total of the countries concerned. Instead, they have been weighted by the number of cities that implemented an access restriction scheme in each country, based on the information collected in Annex 2 – Overall coverage and profiles of the 58 cities responding to the questionnaire.

As shown in Figure 55, the **level of the legal basis** of analyzed ARS is mainly national (54%) or both national and local (35%); while it is only local in 11% of the analyzed situations; in more detail, the legal basis level is:

- National in Belgium, Bulgaria, Denmark, Estonia, France, Germany, Greece, Ireland, Malta, the Netherlands and Portugal
- Local for Hungary, Latvia, Luxembourg, Poland and UK
- Both national and local in Austria, Italy, Romania, Spain and Sweden

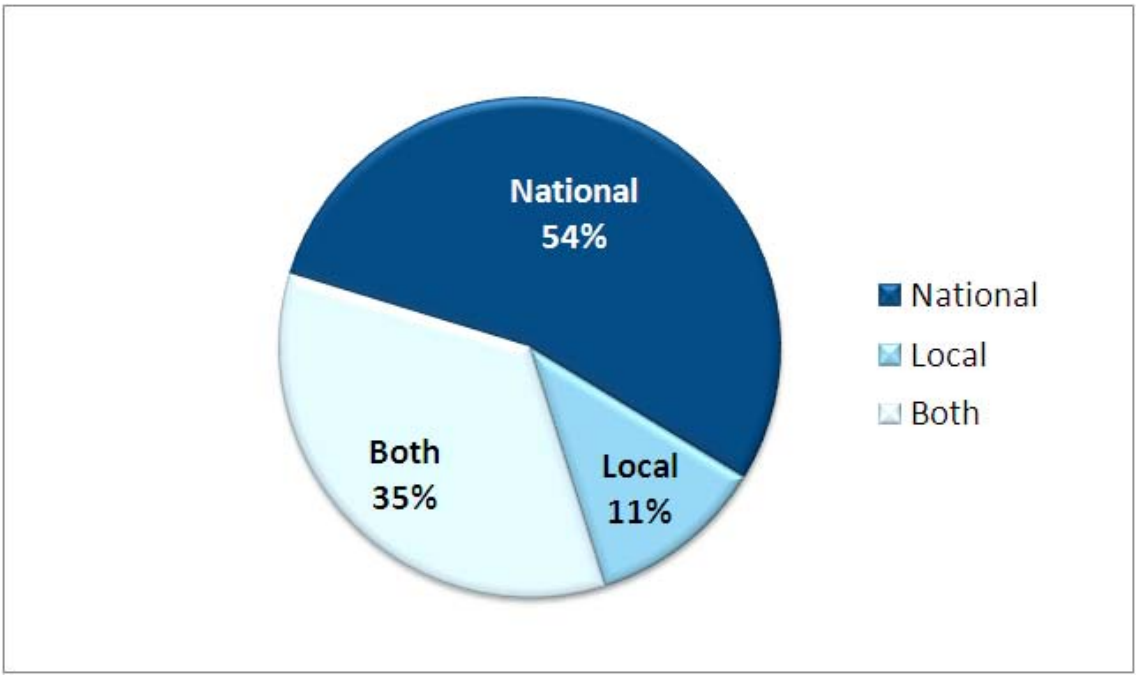


Figure 55 – Level of the legal basis of ARS

Figure 56 shows that the **type of legal basis** corresponds to road codes prescriptions in 40% of the analyzed situations. The "Other" group encompasses, among the others, the German marking regulation, the Dutch environmental zones covenant, the UK scheme order etc.

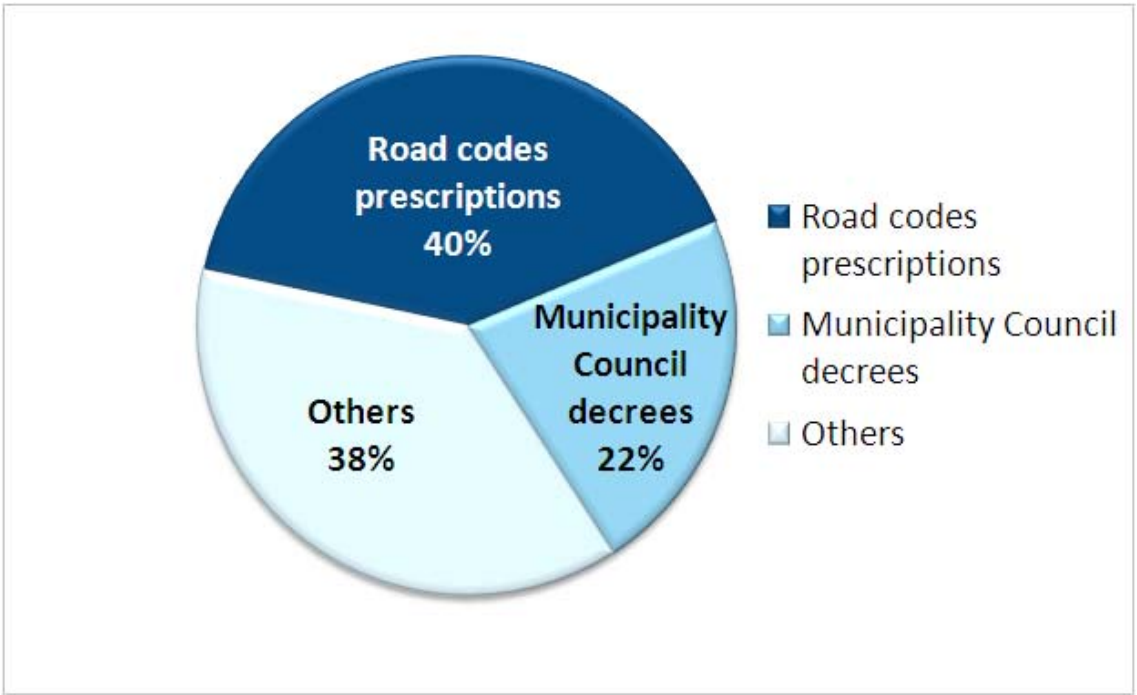


Figure 56 – Type of the legal basis of ARS

The majority of the legal basis considers **vehicles characteristics standards** (48%), like in Denmark, Germany, Greece, Hungary, Italy, the Netherlands, Romania, Spain, Sweden and UK (Figure 57). Among these, the legislations of Denmark, Germany, the Netherlands, Sweden and UK refer to EU pollutant emissions standard as the criterion. In Italy, there is no national scheme; however, vehicles restriction criteria are based on Euro standards in almost all cases. Finally, different solutions have been adopted in Greece, Hungary, Romania and Spain:

- In Athens (Greece), the license-plate-based traffic restrictions limit the access to the vehicles on alternate days based on odd-even license plates.
- In Hungary, municipalities are entitled by the Act on Municipalities and the Road Transport Act to impose restrictions like parking/protected zones and weight restriction. For instance, the Castle District in Budapest is a protected area, which means that only pass holders may drive into the zone; and the downtown of the city of Szentendre cannot be accessed by vehicles over 3,5 tonnes.
- In Romania, City councils approved ARS regulations focused mainly on charging issues based on vehicles weight.
- In Spain, there is no national scheme; the councils set legal rules at local level. For instance, the ARS in Letras and Cortes (Madrid) allow access, among the others, to residents registered in the addressed area, public transport, etc[39].

[39] Official Gazette of the Community of Madrid - No. 71, Wednesday 25/03/2009.

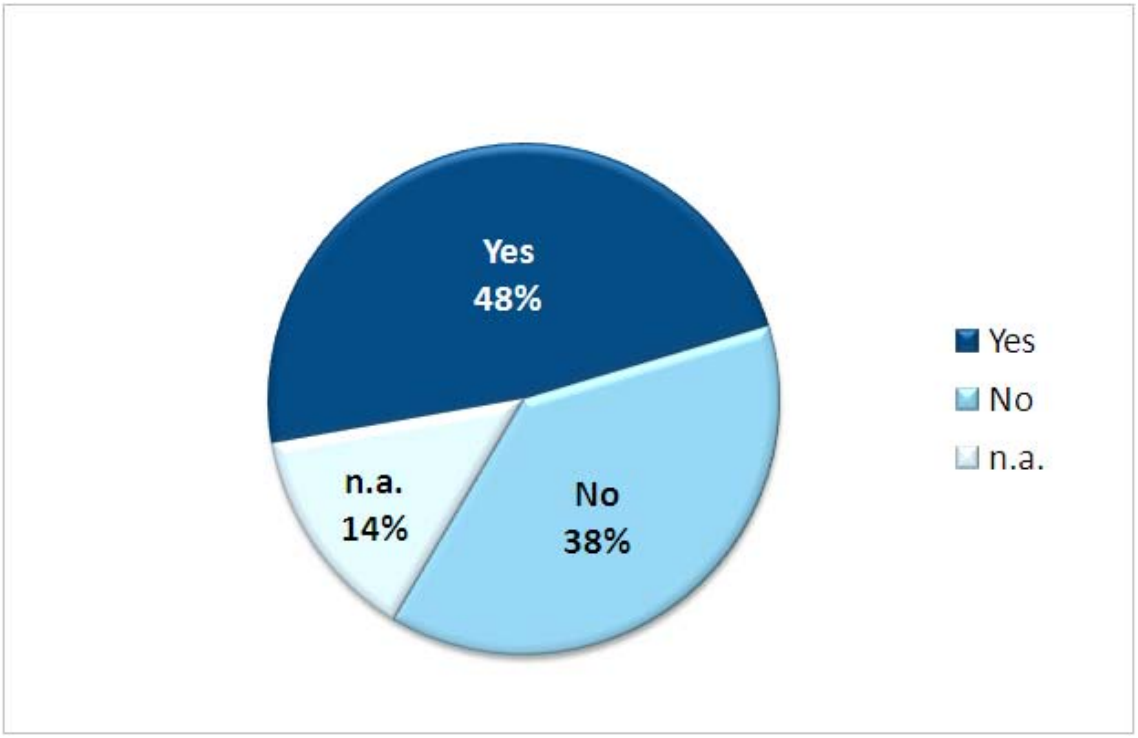


Figure 57 – Legal basis considering vehicle restriction standards

Figure 58 gives an overview of the specific **contents of the legal basis**. In most of the analyzed situations, national laws provide the opportunity for generic temporary and/or permanent traffic bans. It must be emphasized that few legal bases contain specific guidance in terms of area, time slots and charging. Finally, legislations of several countries regulate traffic restrictions for pedestrian areas only (e.g. Belgium, France and Luxembourg).

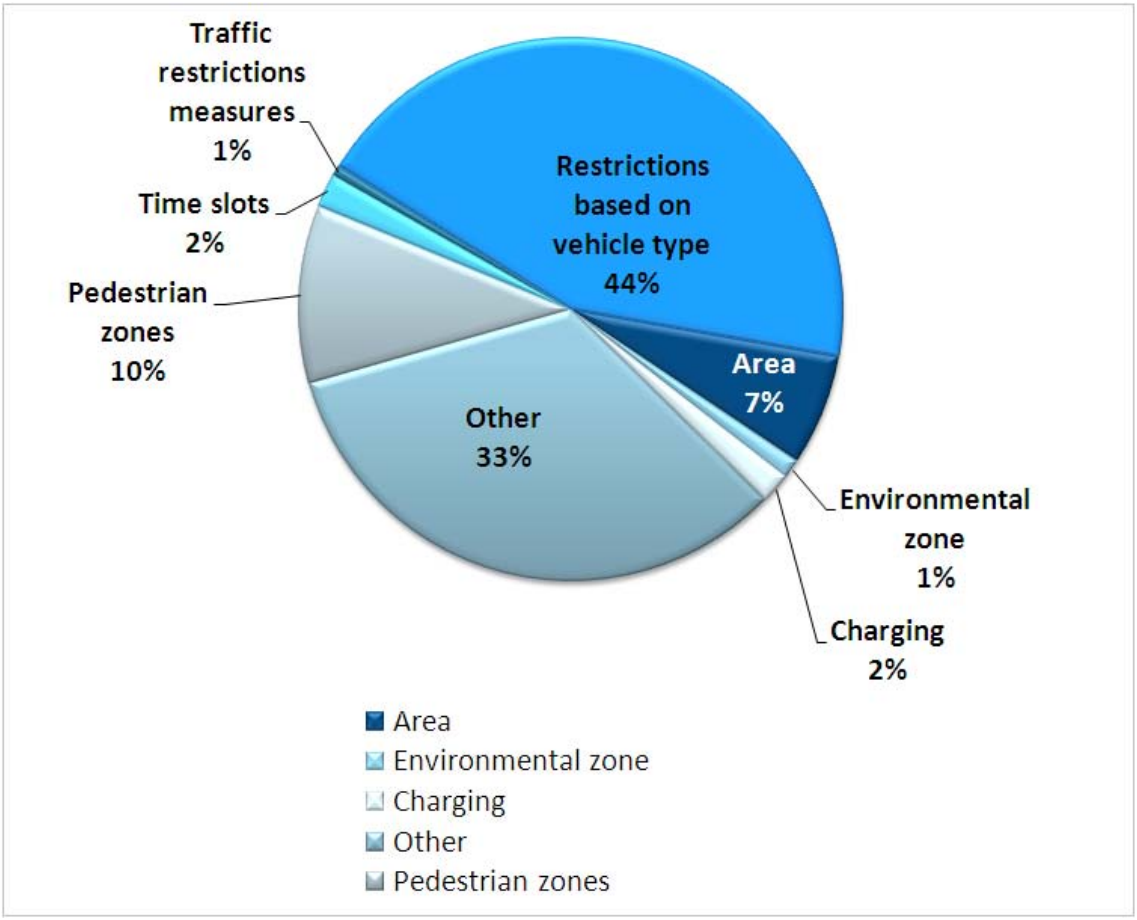


Figure 58 – Specific contents of the legal basis

In most countries, the **legal basis for access restriction schemes is integrated in the road codes**. However, some countries legislation provide for dedicated regulations, like in Denmark, Germany and the Netherlands[40]:

In Denmark, the Parliament has passed an act, which allows the four largest cities in Denmark to introduce environmental zones.

In the Netherlands, environmental zones can be established by an agreement between municipalities, superior authorities and sectoral organizations. A National environmental zones covenant "Promoting clean trucks and environmental zoning" (*Het convenant "Stimulering schone vrachtauto's en milieuzonering"*) has been signed by the Dutch government, municipalities and other stakeholders, whereby all Zones adopt Euro standards as the criterion for access restriction.

A particular case is represented by the German Federal Government, which adopted the Regulations on the marking (sticker) of low emission vehicles (Marking Regulations) with the Federal Council approval. The Regulations establish provisions on the marking of passenger cars and commercial vehicles in accordance with the quantity of their particulate emissions. These Regulations administer vehicle marking only, not green zones or driving restrictions.

[40] For additional information, see the Danish, German and Dutch cases in the Annex 7 – Legal basis analysis at country level.

The specific formulation of the national legislation varies significantly between countries. As shown in the Annex 7 – Legal basis analysis at country level, most of the national legislations provide only for **generic provisions on traffic measures**, for example:

- In Austria, the Air Pollution Act (*Immissionsschutzgesetz-Luft*) regulates traffic restriction measures like for heavy-duty vehicles (e.g. traffic-free days, number plate measures, parking restrictions on certain roads for heavy vehicles).
- In Estonia, the Estonian Traffic Act (*Liiklusseadus*) regulates general restrictions on traffic of motorized vehicles.
- In Portugal, the Highway Code provides for temporary or permanent traffic restrictions of certain vehicles and related sanctions.

Through the city survey, only three local authorities reported relationships with existing EU legislation/ regulation; namely, the city of London (United Kingdom) with reference to the LEZ scheme and the cities of Berlin and Hannover (Germany). In all three schemes, the **EU legislation on Air quality has been reported as a driver** for the planning and implementation of the schemes (see Box 1) even though it is clear that it is the national legislation that actually allows the implementation of the scheme.

As for Hannover, the Council Directive 96/62/EC on ambient air quality assessment and management is reported as a driver for the scheme planning.

Both Berlin and London reported the Directive 2008/50/EC on ambient air quality and cleaner air for Europe as a driver. According to the information gathered from the survey for the London LEZ, Directive 2008/50/EC «drove the scheme because it imposed minimum air quality standards to meet. The scheme aims to address those standards directly».

The Berlin response to the survey cites the lack of a harmonized scheme for the approval of particle filters retrofit kits as a critical issue; this is reported as a market barrier for filter manufacturers and an issue for foreign operators of retrofitted vehicles in order to get their vehicles properly classified in accordance with the German labeling regulation. Moreover, this issue is presented as a consequence of the delay by two year as in the enforcement of stage II of the Environmental zone for Euro 3 foreign vehicles (Annex 9 – Cities questionnaire responses).

Moreover, in Florence (Italy), the air quality framework[41] of the traffic restriction measures is based, among others, on Council Directive 1999/30/EC, Directive 2000/69/EC and Directive 2008/50/EC[42].

In establishing vehicles standard restrictions, **several national legislations refer to EU pollutant emissions standards** (see Box 2) like in Denmark, Germany, the Netherlands, Sweden and UK[43]:

- As for the Danish environmental zone, the Consolidation Act on Environmental Protection No. 1757 of 22 December 2006 refers to Euro III and IV on §15d.
- In Germany, the Ordinance on the marking of vehicles lays down the criteria based on Euro standard that vehicles have to meet for the different kinds of stickers.

[41] Comune di Firenze, Provvedimenti di limitazione della circolazione (Blocchi del traffico). Available at http://centroservizi.lineacomune.it

[42] For additional information, see the Italian case in theAnnex 7 – Legal basis analysis at country level.

[43] For additional information, see the Danish, German, Dutch, Swedish and UK cases in the Annex 7 – Legal basis analysis at country level

- As for the Netherlands, the national environmental zones covenant "Promoting Clean trucks and environmental zoning" (art.5) lays down the admission criteria based on Euro standards (*Toegangscriteria Milieuzone*).
- In Sweden, Euro standards are used as a basis for deciding which vehicles are permitted to enter an environmental zone.
- In UK, the emissions standards for the Low Emission Zone are based on Euro standards.

Box 1 – Air Quality – EU Legislation

European Community legislation on ambient air quality adopted by the Council and the European Parliament:

Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe (**New Air quality directive**) entered into force on 11 June 2008. The Directive includes the following key elements:

The merging of most of existing legislation into a single directive (except for the fourth daughter directive) with no change to existing air quality objectives

New air quality objectives for PM2.5 including the limit value and exposure related objectives

The possibility to discount natural sources of pollution when assessing compliance against limit values

The possibility for time extensions of three years (PM10) or up to five years (NO2, benzene) for complying with limit values, based on conditions and the assessment by the European Commission

Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management (**Air Quality Framework Directive**). The Directive describes the basic principles as to how air quality should be assessed and managed in the Member States; and it lists the pollutants for which air quality standards and objectives will be developed and specified in legislation.

Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air (**First Daughter Directive**). The Directive describes the numerical limits and thresholds required to assess and manage air quality for the pollutants mentioned; and It addresses both PM10 and PM2.5 but only establishes monitoring requirements for fine particles.

Directive 2000/69/EC of the European Parliament and of the Council of 16 November 2000 relating to limit values for benzene and carbon monoxide in ambient air (**Second Daughter Directive**). This Directive established the numerical criteria relating to the assessment and management of benzene and carbon monoxide in air.

Directive 2002/3/EC of the European Parliament and of the Council of 12 February 2002 relating to ozone in ambient air (**Third Daughter Directive**). This Directive established target values and long-term objectives for the concentration of ozone in air. In addition, it describes monitoring requirements relating to volatile organic compounds and nitrogen oxides in air.

Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air (**Fourth Daughter Directive**). This Directive completes the list of pollutants described in the Framework Directive. Target

values for all pollutants except mercury are defined for the listed substances. The target for polycyclic aromatic hydrocarbons (PAHs) is defined in terms of concentration of benzo(a)pyrene. Only monitoring requirements are specified for mercury.

97/101/EC: Council Decision of 27 January 1997 establishing a reciprocal exchange of information and data from networks and individual stations measuring ambient air pollution within the Member States (**EoI Decision**). The Decision describes the procedures for the dissemination of air quality monitoring information by the Member States to the Commission and to the public.

2004/461/EC: Commission Decision of 29 April 2004 laying down a questionnaire to be used for annual reporting on ambient air quality assessment under Council Directives 96/62/EC and 1999/30/EC and under Directives 2000/69/EC and 2002/3/EC of the European Parliament and of the Council. This Decision specifies the format and content of Member States' Annual Report on ambient air quality in their territories.

2004/224/EC: Commission Decision of 20 February 2004 laying down arrangements for the submission of information on plans or programmes required under Council Directive 96/62/EC in relation to limit values for certain pollutants in ambient air.

Council Directive 80/779/EEC of 15 July 1980 on air quality limit values and guide values for sulphur dioxide and suspended particulates, as last amended by Directive 89/427/EEC (Council Directive 89/427/EEC of 21 June 1989 amending Directive 80/779/EEC on air quality limit values and guide values for sulphur dioxide and suspended particulates).

Council Directive 85/203/EEC of 7 March 1985 on air quality standards for nitrogen dioxide, as last amended by Council Directive 85/580/EEC (Council Directive 85/580/EEC of 20 December 1985 adapting, on account of the accession of Spain and Portugal, Directive 85/203/EEC on air quality standards for nitrogen dioxide).

Source: Environment Directorate-General, http://ec.europa.eu/dgs/environment/index_en.htm

Box 2 – Road vehicles – EU Legislation

European Community legislation on pollutant emissions from road vehicles regulates separately light-duty and heavy-duty vehicles.

For **light-duty vehicles**, motor vehicle emissions have originally been regulated by **Directive 70/220/EEC** (Council Directive 70/220/EEC of 20 March 1970 on the approximation of the laws of the Member States relating to measures to be taken against air pollution by gases from positive-ignition engines of motor vehicles) and amendments. Following, some of the most important steps in the pollutant emission regulations:

Euro 5 and 6: **Commission Regulation (EC) No 692/2008** of 18 July 2008 implementing and amending Regulation (EC) No 715/2007 of the European Parliament and of the Council on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information. Euro 5 applies as of 1 September 2009; Euro 6 is scheduled to enter into force in January 2014.

Euro 4: **Directive 98/69/EC** of the European Parliament and of the Council of 13 October 1998 relating to measures to be taken against air pollution by emissions from motor vehicles and amending **Council Directive 70/220/EEC**, which defined the emission standard currently in force (Euro 4).

Euro 3: **Directive 98/69/EC** of the European Parliament and of the Council of 13 October 1998 relating to measures to be taken against air pollution by emissions from motor vehicles and amending **Council Directive 70/220/EEC**.

Euro 2: **Directive 94/12/EC** of the European Parliament and the Council of 23 March 1994 relating to measures to be taken against air pollution by emissions from motor vehicles and amending Directive 70/220/EEC (i.e. passenger cars only) or **Directive 96/69/EC** of the European Parliament and of the Council of 8 October 1996 amending Directive 70/220/EEC on the approximation of the laws of the Member States relating to measures to be taken against air pollution by emissions from motor vehicles (i.e. passenger cars and light trucks).

Euro 1: **Council Directive 91/441/EEC** of 26 June 1991 amending Directive 70/220/EEC on the approximation of the laws of the Member States relating to measures to be taken against air pollution by emissions from motor vehicles (i.e. passenger cars only) or **Council Directive 93/59/EEC** of 28 June 1993 amending Directive 70/220/EEC on the approximation of the laws of the Member States relating to measures to be taken against air pollution by emissions from motor vehicles (i.e. passenger cars and light trucks).

For **heavy-duty vehicles**, motor vehicle emissions have originally been regulated by **Directive 88/77/ EEC** (Council Directive 88/77/EEC of 3 December 1987 on the approximation of the laws of the Member States relating to the measures to be taken against the emission of gaseous pollutants from diesel engines for use in vehicles) and amendments. Following, some of the most important steps in the pollutant emission regulations for **heavy-duty vehicles**:

Euro VI: **Regulation (EC) No 595/2009** of the European Parliament and of the Council of 18 June 2009 on type-approval of motor vehicles and engines with respect to emissions from heavy duty vehicles (Euro VI) and on access to vehicle repair and maintenance information and amending Regulation (EC) No 715/2007 and Directive 2007/46/EC and repealing Directives 80/1269/EEC, 2005/55/EC and 2005/78/EC. The Commission's proposal for a regulation on Euro VI was adopted in June 2009. Work is ongoing on the

implementing measures for this act, which should be adopted by the end of 2010.

Euro IV, Euro V: **Directive 2005/55/EC** of the European Parliament and of the Council of 28 September 2005 on the approximation of the laws of the Member States relating to the measures to be taken against the emission of gaseous and particulate pollutants from compression-ignition engines for use in vehicles, and the emission of gaseous pollutants from positive-ignition engines fuelled with natural gas or liquefied petroleum gas for use in vehicles.

Commission Directive 2005/78/EC of 14 November 2005 implementing Directive 2005/55/EC of the European Parliament and of the Council on the approximation of the laws of the Member States relating to the measures to be taken against the emission of gaseous and particulate pollutants from compression-ignition engines for use in vehicles, and the emission of gaseous pollutants from positive ignition engines fuelled with natural gas or liquefied petroleum gas for use in vehicles and amending Annexes I, II, III, IV and VI thereto.

Euro III: **Directive 1999/96/EC** of the European Parliament and of the Council of 13 December 1999 on the approximation of the laws of the Member States relating to measures to be taken against the emission of gaseous and particulate pollutants from compression ignition engines for use in vehicles, and the emission of gaseous pollutants from positive ignition engines fuelled with natural gas or liquefied petroleum gas for use in vehicles and amending Council Directive 88/77/EEC), as well as the fuel quality Directive 98/70/EC.

Euro I, Euro II: **Council Directive 91/542/EEC** of 1 October 1991 amending Directive 88/77/EEC on the approximation of the laws of the Member States relating to the measures to be taken against the emission of gaseous pollutants from diesel engines for use in vehicles.

Source: Environment Directorate-General, http://ec.europa.eu/environment/air/transport/road.htm

Enterprise and Industry Directorate -General, http://ec.europa.eu/enterprise/sectors/automotive/environment

In conclusion the systematic assessment carried out on the legal basis behind ARS at national level draws a relatively varied picture ranging from countries where no specific legal provision exists to deal with access restrictions (although in some cases local rules are issued) to others where road codes and other specific pieces of legislation offer more explicit legal grounds. In most countries, the legal basis for access restriction schemes is integrated in the road codes.

It must be noticed that local norms (pieces of legislation issued by Regional Governments, Council Resolutions at city level) represent often the regulatory support to the implementation of ARS both in the absence of national legislation and as local policy features, regardless of the size of the cities/towns.

The reference to the EU air quality legislation is not explicitly reported in the national legislation; nevertheless, some cities have indicated it as a driver for the implementation or planning of an access restriction scheme.

Many schemes are obviously based on forbidding access to the most polluting vehicles. To avoid complex implementation of such ARS on foreign vehicles, such schemes are requiring harmonised criteria applicable to all vehicles circulating in the EU. Accordingly, the Euro standard legislation is widely reported in both national and local ARS-related regulations.

3. Building on Past and Current ARS Experience: a SWOT Analysis

3.1 Assessing the Practical Operation of different systems

The Stakeholders Consultation performed as part of the Study has explicitly addressed the issues of the effectiveness of different types of schemes to improve the urban quality of life. Seven macro-types of ARS have been considered; in order to ensure the necesary coherence between the stakeholders evaluation and the assessment of the ARS, the same classification is considered hereafter.

The answers obtained from cities having implemented or planned an ARS and the opinion of the stakeholders consulted lead to the conclusion that there is no automatic link between the general ARS characteristics and its capability to achieve the scheme's objectives.

Evidence shows that some charging schemes, for instance, have produced strong traffic reductions in the restricted area, whereas other have been much less effective, for a number of reasons including charges' level, availability of alternatives to access the area, distribution of vehicles by Euro standard (in case the charges are differentiated according them), etc.

Besides, the objectives of ARS are not completely homogeneous for a given type of ARS, so it is arduous to build a logical connection between the type of scheme, its objectives and the level of achievement of them.

Accordingly, the SWOT presented here is primarily aimed at stressing the peculiar characteristics of the seven ARS-types identified, i.e. the ones that really differentiate them in terms of positive and negative impacts on specific issues or categories of users (*strengths* and *weaknesses*), with specific reference on the adequacy to achieve the stated objectives of each type of ARS (that are presented in the second column).

Besides, the SWOT highlights also side-impacts, i.e. additional potential benefits that might be achieved (*opportunities*), and other effects that might generate damages menacing the overall success and acceptance of the schemes (*threats*).

Thus, the SWOT may support the decision-making process for ARS selection, since it highlights the main factors, internal and external to the context of analysis, which may influence the success of the scheme.

The assessment of strengths and weaknesses is based on

a) the observed effects of the ARS in operation, as resulting of the consultation of the cities having implemented them;
b) the specific strengths / weaknesses stated by the stakeholders during the consultation (including the workshop carried out in Brussels on September 28th);
c) the available literature and
d) the expert assessment of the project team.

General issues that are common for any ARS, independently on the scheme type – such as information to stakeholders before the implementation, information to users during implementation, cost and efficiency of the control solution (manned or unmanned), congestion on roads around the restricted zone etc. – are not addressed in the SWOT table.

3.2 Common aspects on design and functioning of ARS

The literature on ARS and also the feedback received in step 2 of the Consultation highlight a number of aspects that are common to all types of regulation restricting the road vehicles' access to a given portion of the urban area. Such aspects do not represent, automatically, a strength or a weakness of ARS, since their actual effect depends on the way there are managed by the authorities in charge of the design and implementation of the scheme.

The following table tries to present the positive and negative characteristics of the most relevant aspects of ARS implementation, from the design to the actual implementation. Positive and negative effects that are almost certainly generated are listed respectively under "Strengths" and "Weaknesses", while likely positive and negative side-impacts are presented under "opportunities" and "threats". The "approach / level" column contains, for each ARS feature, alternative approaches or implementation level; needless to say, it would be practically impossible to list all possible practices for informing the users, consulting the stakeholders etc., but this column includes the most typical and contrasting situations.

FEATURE	Approach / level	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
EX-ANTE INFORMATION TO STAKEHOLDERS	No information	▪ Quick decision making	▪ Limited view on likely (actual and perceived) impacts on stakeholders ▪ Opposition in the implementation phase	-	▪ Ineffective ARS design due to lack of appreciation of all schemes' impacts
	Information delivered without discussion	▪ Quick decision making ▪ Concept disseminated before implementation	▪ Limited view on likely (actual and perceived) impacts on stakeholders	▪ Explaining scheme's targets and not just its functioning, so to build a consensus	▪ Risk of opposition in the implementation phase
	Negotiation	▪ Consensus building / higher acceptance	▪ Longer decision making	▪ Improve the knowledge on likely	▪ Considering conflicting interests

FEATURE	Approach / level	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
				(actual and perceived) impacts on stakeholders ▪ Prevent negative side-impacts	might generate ambiguous solutions
INFORMATION TO USERS	Only on site (access points)	▪ Low cost	▪ No remote (pre-trip) information	-	▪ Lack of pre-trip information might generate confusions, queues and/or undesirable movements(e.g. turning back) at access point
	On site + website	▪ Information easily available to users (including non-residents)	▪ Remote (pre-trip) information requires internet access	▪ Integration with online payment system (in case of charging schemes) ▪ Delivery of other information on the city (e.g. parking, events etc.)	-
	Onsite + website + information campaign	▪ Information reach also users / citizens that are not looking for it ▪ Information easily	▪ High cost	▪ Web: Integration with online payment system (in case of charging schemes) ▪ Delivery of other	▪ Any modification in the scheme requires to repeat the information campaign

FEATURE	Approach / level	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
		available to users (including non-residents)		information on the city (e.g. parking, events etc.) ▪ Explanation of ARS targets / benefits for the citizens	
ENFORCEMENT	Manned	▪ Low capital cost	▪ High operating costs ▪ Lower precision	▪ Easier handling of exceptional conditions (e.g. derogation in case of emergency)	▪ Might generate queues at access points ▪ Not all vehicles actually controlled
	Technology	▪ Low operating cost ▪ Higher precision ▪ All vehicles are controlled	▪ High capital costs	▪ More complex restriction schemes	▪ Potentially long running-in period for testing the technology
MONITORING	None	▪ Zero cost	▪ No information on scheme actual effectiveness against initial objectives	-	▪ Missing appreciation (& then no intervention) in case of ineffective (or even damaging) scheme
	Periodic	▪ Some information is collected, at low cost ▪ Easy elaboration /	▪ Incomplete data	▪ Progressive fine-tuning the frequency of monitoring in order to	▪ Wrong choice of period of monitoring

FEATURE	Approach / level	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
		aggregation of data		optimize cost and completeness of results	
	Continuous	▪ Completeness ▪ No need of pre-defining monitoring period	▪ High cost	▪ Utilization of data for other purposes related to TDM (travel demand management)	▪ Data elaboration / aggregation requiring too much time / resources, so they might remain unexploited

3.3 SWOT table of specific ARS

While the previous table was focused on general aspects of the preparation and functioning of all ARS, the following one is more focused on **the capability of different types of ARS to meet the specific objectives** that characterize them (as specified in the second column).

The "**Strengths**" of each ARS represent, therefore, either the effectiveness of the scheme in meeting its specific objectives, plus other positive impacts that are emerged as very likely in the literature, or in the consultations or according to the expert assessment of the project team; the source of evaluation – when other than our expert assessment - is specified between brackets (with legend at the end of the table).

Under "**Weaknesses**" are listed, on the other hand, the negative effects that are considered as being linked "by design" to the given scheme. Additional (positive and negative) side-effects that might occur in certain cases, depending to the way the scheme is managed, are presented as resp. "**Opportunities**" and "**Threats**".

Type of ARS	Main scheme objectives	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
LEZS BASED UPON PERMIT RELEASE (ACCORDING TO EURO STANDARDS)	• **Reducing polluting emissions from road transport**	▪ Effective for reducing local air pollution (NOx, PM10) ▪ Good contribution to the improvement of the urban quality of life (SC) ▪ Encouraging replacement of old vehicles with new, low-polluting ones	▪ Increase in vehicle ownership by residents (if they are exempted) (CC)	▪ Easy combination with other sustainable mobility measures (e.g. pedestrian areas, 30 km/h limits) ▪ Improvement of traffic safety in particular less accidents concerning pedestrians and cyclist (CC)	▪ Potential economic inefficiency (imposing replacement of vehicles before the end of their economic life) (SC) ▪ Lack of mutual recognition of filter might create barriers to foreign vehicles (SC) ▪ Difficult recognition of Euro standards of foreign vehicles (CC)

Type of ARS	Main scheme objectives	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
LEZS FOR HEAVY DUTY VEHICLES	• Reducing polluting emissions from road freight transport	▪ No limitation on passenger mobility ▪ The measure address the vehicles that are perceived as the most impacting one, and whose dimension are less compatible with the urban structure of city centres	▪ Measure addressing only a category of vehicles, i.e. not likely to generate very high reduction of some pollutants ▪ Same tonnage to / from city centers shall be split among many LGV: this will generate more traffic in terms of vehicle.km (SC)	▪ If based on Euro standards, this measure is encouraging replacement of old HGV with new, low-polluting ones	▪ Increase of inbound/outbound transport costs for companies insides the restricted area (the in/out flows will be split in many LGV loads) (SC) ▪ Not efficient impact on transport companies, because imposing replacement of vehicles before the end of their economic life (SC) ▪ For through traffic, the solution requires effective alternative (e.g. ring motorways) otherwise congestion will take place in the areas around the center (CC)
ACCESS ZONE RESTRICTED TO ALL VEHICLES WITH THE EXCEPTION OF RESIDENTS	• Impeding road traffic access to city centers	▪ Rated as most effective scheme to improve urban quality of life (SC)	▪ Increase in vehicle ownership by residents (CC) ▪ Equity issue for		▪ Access impossible for vehicle of non-residents might threaten the survival of economic activities

Type of ARS	Main scheme objectives	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
			disabled people and elderly (if not exempted) requiring access to functions located in the city centre (PT might not be a real alternative)		with market area larger that the city center (in case their business require direct access with private vehicles) ▪ No access for tourist bus and coaches may threaten tourism attractiveness (SC)
CHARGED ACCESS BASED UPON TARIFFS PROPORTIONAL TO EMISSIONS LEVELS (EURO STANDARDS)	• Reducing polluting emissions from road transport	▪ Effective for reducing local air pollution (NOx, PM10) ▪ Revenues raised from scheme implementation ▪ Encouraging replacement of old vehicles with new, low-polluting ones ▪ Likely traffic reduction in the restricted area (depending on the age of the vehicles circulating in the city) and related	▪ Low acceptability from citizen / lower acknowledgement of effectiveness to improve traffic situation (EUB) ▪ Equity issues (older, more polluting vehicles are often owned by low income people, who will be asked for paying higher charges)	▪ Availability of funds to be invested on urban mobility improvements	▪ Potential economic inefficiency (imposing replacement of vehicles before the end of their economic life) (SC) ▪ Lack of mutual recognition of filter might create barriers to foreign vehicles (SC) ▪ Difficult recognition of Euro standards of foreign vehicles (CC)

Type of ARS	Main scheme objectives	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
		outcomes (e.g. air pollution reduction, better traffic safety, higher speed of public transport) (CC)			
CONGESTION CHARGING WITHOUT ANY EURO STANDARD DIFFERENTIATIONS	• Reducing traffic congestion in city centers • Raising revenues to be invested in public transport and sustainable mobility initiatives	▪ Revenues raised from scheme implementation ▪ Traffic reduction in the restricted area and related outcomes (e.g. air pollution reduction, better traffic safety, higher speed of public transport) (CC)	▪ Relatively low contribution to the improvement of the urban quality of life (SC) ▪ Not supporting low-pollution vehicles diffusion ▪ Low acceptability from citizen / lower acknowledgement of effectiveness to improve traffic situation (EUB)	▪ Availability of funds to be invested on urban mobility improvements	▪ Potentially not effective to reduce local air pollution
CONGESTION CHARGING ACCORDING TO EURO STANDARD DIFFERENTIATION FOR ALL MOTORISED PRIVATE VEHICLES INCLUDING LORRIES	• Reducing polluting emissions from road transport • Reducing traffic congestion in city centers • Raising revenues	▪ Effective for reducing local air pollution (NOx, PM10) (CC, SC) ▪ Traffic reduction in the restricted area (depending on the age of the vehicles circulating in the	▪ Low acceptability from citizen / lower acknowledgement of effectiveness to improve traffic situation (EUB) ▪ Equity issues (older, more polluting	▪ Availability of funds to be invested on urban mobility improvements	▪ Potential economic inefficiency (imposing replacement of vehicles before the end of their economic life) (SC) ▪ Lack of mutual recognition of filter

Type of ARS	Main scheme objectives	STRENGTHS	WEAKNESSES	OPPORTUNITIES	THREATS
	to be invested in public transport and sustainable mobility initiatives	city) and related outcomes (e.g. air pollution reduction, better traffic safety, higher speed of public transport) (CC) ▪ Good contribution to the improvement of the urban quality of life (SC) ▪ Revenues raised from scheme implementation ▪ Encouraging replacement of old vehicles with new, low-polluting ones	vehicles are often owned by low income people, who will be asked for paying higher charges)		might create barriers to foreign vehicles (SC) ▪ Difficult recognition of Euro standards of foreign vehicles (CC)
EXTENSION OF MEASURES TO INCLUDE MOTORISED TWO-WHEELERS	• Regulating 2-wheels vehicle access to city center	▪ ARS taking into account the 2-wheelers contribution to environmental pollution, which is not negligible	▪ Relatively low contribution to the improvement of the urban quality of life (SC) ▪ Narrowing the alternatives to access with private cars	▪ Increase in traffic safety (2-wheelers are among the most involved in urban road accidents)	

Sources:
CC = consultation of the cities
SC = stakeholders consultation
LIT = literature
EUB =Eurobarometer (Attitudes on issues related to EU Transport Policy, 2007)
Not specified = expert assessment

The SWOT tables presented in this chapter summarize the common and specific features of ARS as resulting from the different activities undertaken during the study: review of existing literature, consultation of city authorities, consultation of stakeholders, internal expert assessment through brainstorming and fine-tuning of documents.
While the identification of each strong or weak point of ARS will probably appear as relatively straightforward, and in some cases also a bit too simplified, the possibility to map all of them together, and to support the assessment with the opinions expressed in the two consultations, has produced in our view a useful summary of the findings of the study, to be used as basis for developing the recommendations.

3.4 Summary and conclusions of the SWOT analysis

While the identification of each strong or weak point of ARS will probably appear as relatively straightforward, and in some cases also a somehow simplified, the possibility to map all of them together, and to support the assessment with the opinions expressed in the two consultations, has produced in our view a useful summary of the findings of the study, to be used as a basis for developing the recommendations.

Many of the drivers, enablers and barriers experienced by cities that decide to implement an ARS, are common to all types of schemes, irrespective of the specific features of the scheme itself. These common aspects – listed in chapter 3.2 – are in particular those related to the information (ex-ante & during implementation), enforcement and monitoring. A common aspect of such features is that the more sophisticated and advanced the design (of ARS-related information, enforcement, monitoring systems), the more expensive and complex will be the ARS implementation. Cities deciding to implement ARS shall then seek an adequate balance between these two aspects, jointly considering available resources and local environment (e.g. no need for an extensive ex-ante survey on ARS acceptation if the local community may be investigated by approaching opinion-makers and important stakeholders through for, or – conversely – necessity to survey as many people as possible in case the local community is highly fragmented and does not clearly express recognized representatives).

Almost all different types of ARS analyzed appear to be relatively strong in terms of achievement of objectives, since their design is clearly driven by the final aim of the restriction (e.g. zones open only to residents are effective in improving the quality of life, EURO-based differentiation are likely to generate a reduction on air pollution, etc.).

However, the positive effects shall be weighed against the weaknesses of each scheme, which in several cases appear to be potentially significant. Among the most critical weaknesses, the following ones stand out:

I. for the schemes based on restrictions on HGV, risk to generate the split of their load into many LGV, thus ultimately increasing traffic in terms of vehicle.km;
II. for the schemes exempting residents, risk to push the latter to increase the number of vehicles owned;
III. reduction of access to critical functions for elderly and disabled people (if not exempted), for which public transport is not always a feasible alternative;
IV. especially for charge-based schemes, potential barriers only for low income people (that usually own old, more polluting vehicles).

To some extent, these weaknesses may be managed by a proper scheme design, but not completely avoided (for that reason they are considered among the “weaknesses” and not as “threats”). Accompanying policies (e.g. economic incentives to replace old vehicles in the case of point IV, proper exemption systems in case of point III) are helpful to reduce the highlighted weaknesses.

Most of the schemes analyzed appear to have more “threats” than “opportunities”, i.e. the risk of potentially negative side-effects shall be carefully controlled. In particular, schemes differentiated by Euro standards are considered likely to impose replacement of vehicles well before the end of economic life; besides, this kind of schemes may penalize foreign vehicles (see SWOT table of specific ARS).

Accordingly, the choice of adopting a specific type of ARS should be:

- based on a clear understanding of the final objectives to be achieved;
- supported by an analysis of existing, similar schemes, but also of the specific issues related to the local environment (e.g. existence of tourist flows to the city center or not, presence of sites that have to be accessed by elderly and disabled people in the restricted area, structure of the vehicle park in terms of age and pollution standards etc.);
- accompanied by a careful ARS design aimed at minimizing the weaknesses, capturing the opportunities and avoiding the threats (considering both overall SWOT of ARS presented in chapter 3.2 and aspects specific to the adopted schema as listed in chapter 3.3);
- tested with a pilot period to fine-tune that design.

The proposed SWOT analysis is a preliminary reference framework for decision making, based on a comprehensive summary of the outcomes of different project activities (city consultation, stakeholder consultation, literature analysis, expert assessment). As support to decision-making of local authorities or other stakeholders, such kind of tool cannot replace a detailed multi-criteria assessment tailored to the local situation, but it could orientate such assessment by identifying the critical areas to be analyzed.

4. Stakeholders Consultation

As previously outlined, the stakeholders consultation was carried out through (i) a questionnaire and (ii) a stakeholders workshop. The questionnaire (see Annex 10: Consultation Phase Questionnaire Template) generated ca. 60 usable responses. It included both ”closed” and “open” questions. The insights gathered through the latter (open questions), together with the outcome of the stakeholders workshop, are illustrated in the last section of this document (Conclusions and recommendations).

The outcome of the former (closed questions) is presented below in the form of summary tables and graphs. Additional, more detailed statistics are shown in Annex 11: Opinions of the different groups of stakeholders.

As can be seen from Figure 59 below, the composition of the stakeholders sample of ca. 60 respondents was reasonably balanced, with however a under-representation of Governmental Agencies.

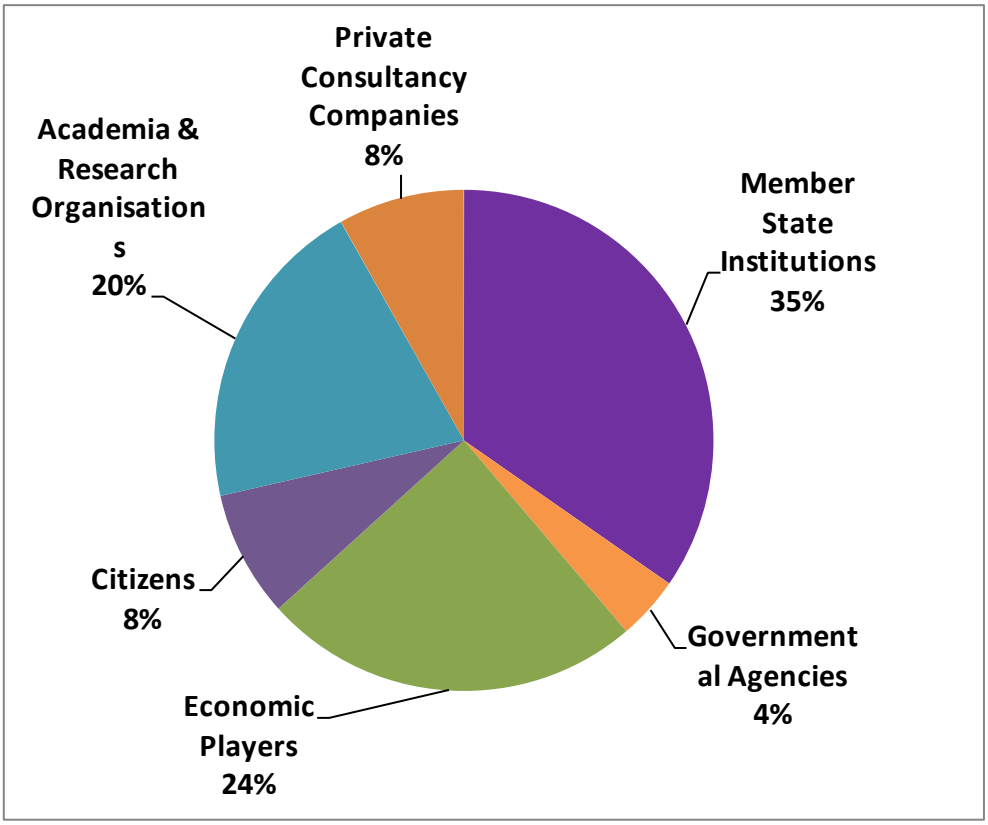


Figure 59 – Split of received questionnaires received by group of stakeholders

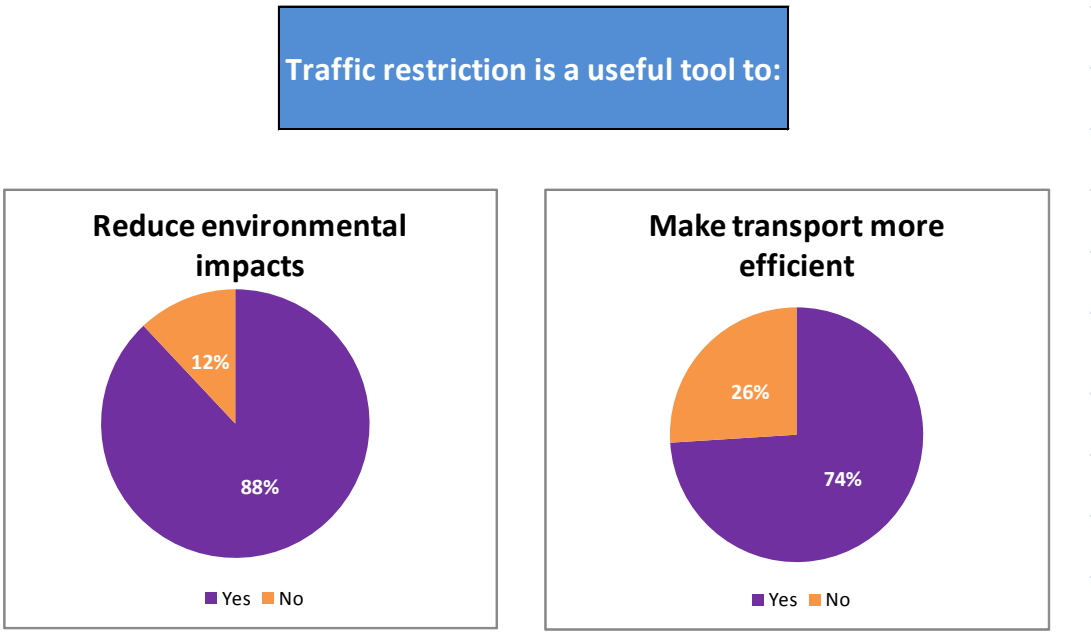


Figure 60 shows that the overall perception of respondents is that ARS are effective instruments both to improve air quality and to reduce congestion, with however more emphasis on environmental effects.

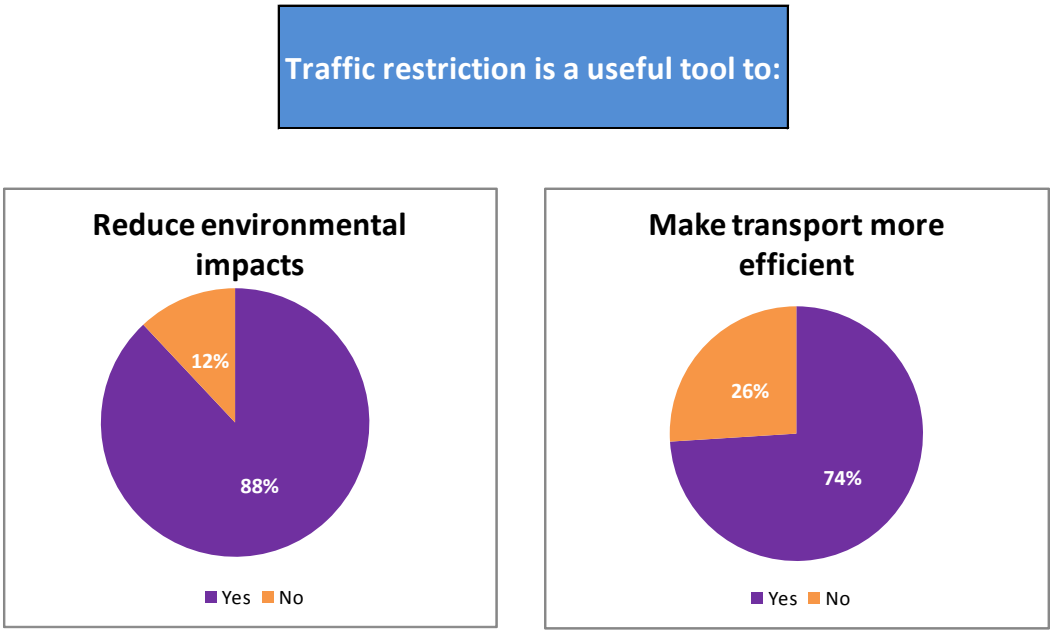


Figure 60 – Traffic restriction usefulness

As illustrated in Figure 61 and Figure 62, consensus is rather generalised across stakeholders groups, with the partial exception of Governmental Agencies and Economic Players. As remarked above, Governmental Agencies were rather under-represented in the sample of respondents, which makes it difficult to draw meaningful conclusions. In any instance, a possible explanation of the apparently mild endorsement of ARS as effective instruments might be that respondents in this group represent MS that have only recently

accessed the EU, and social and environmental goals are not as high on their agenda as they are for most EU15 MS.

As for economic players, responses are probably affected by some degree of underlying concern that any restriction to the movement of citizens and goods represent a possible threat to the performance of the corresponding economic activities (shops, tourism etc.).

These interpretations are consistent with the results shown in Figure 63 and Figure 64: when moving from an "abstract" judgment on ARS to a more concrete question ("would you support the implementation of a scheme in your city"), the overall consensus remains high, while the resistance of specific stakeholders groups emerges in a slightly more evident manner.

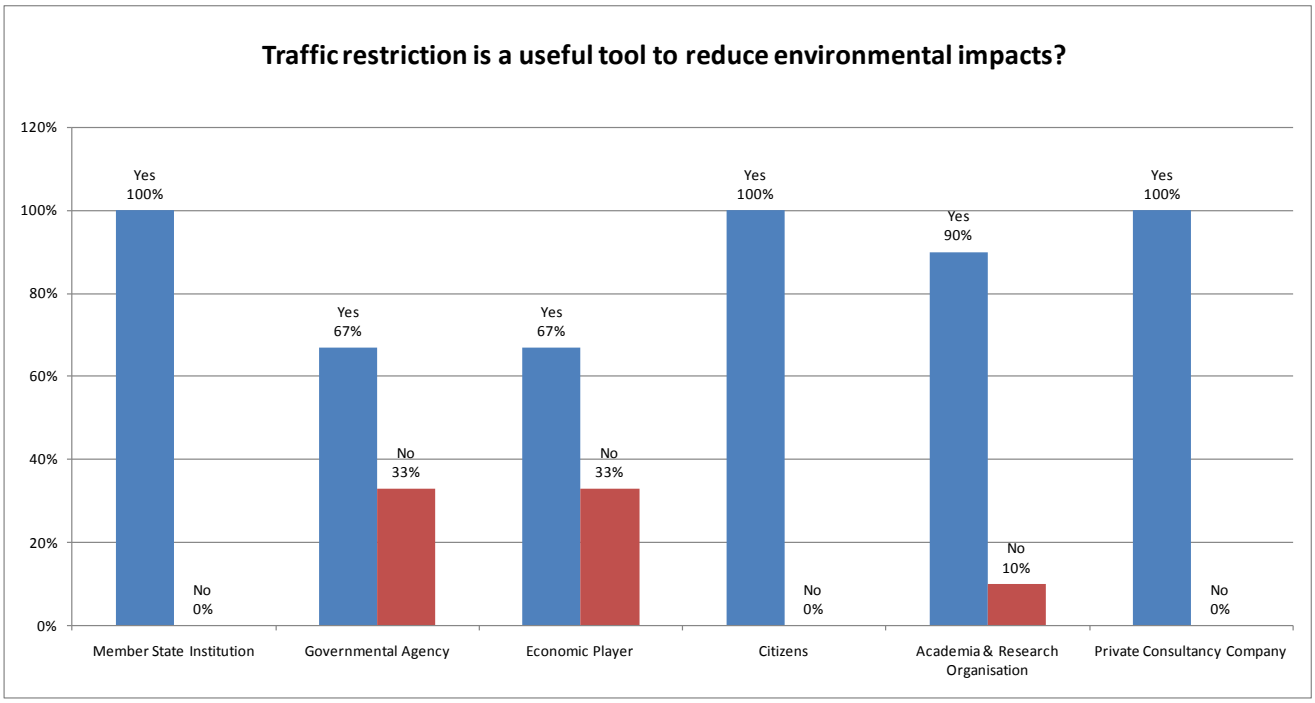


Figure 61 – Traffic restriction environmental impacts: opinions of different stakeholders groups

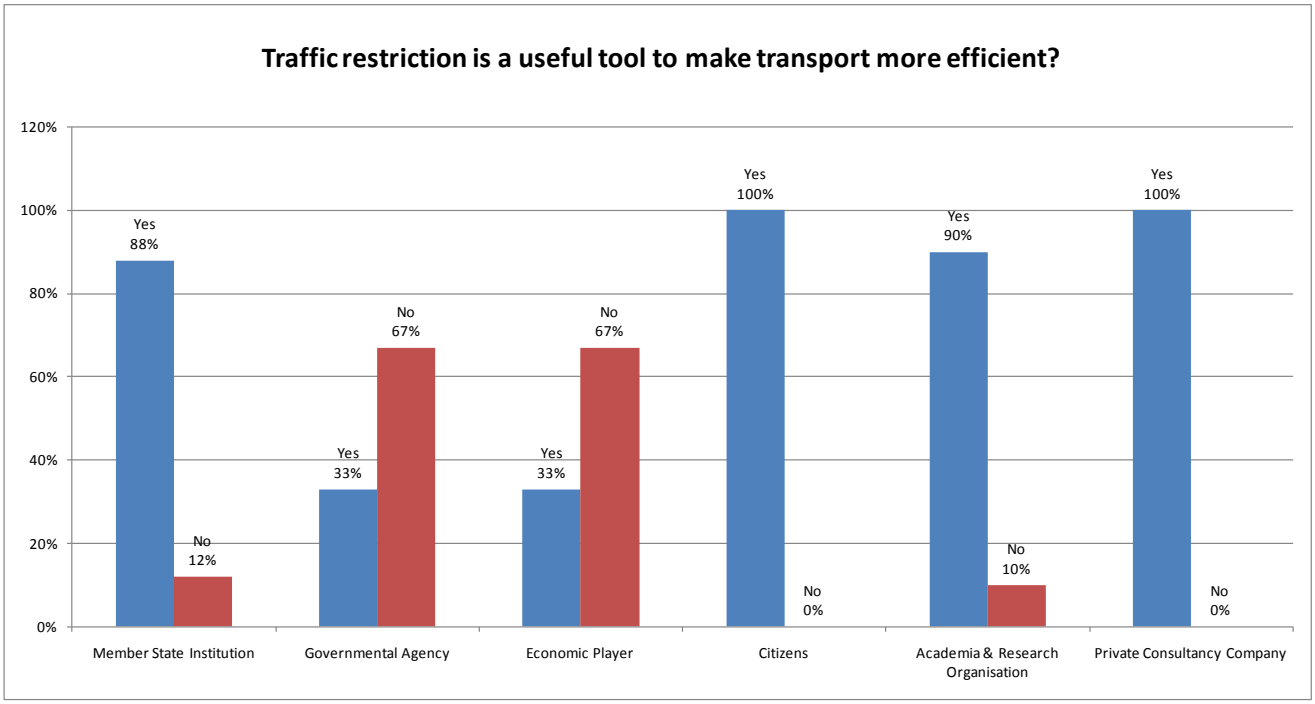


Figure 62 – Traffic restriction efficiency: opinions of different stakeholders groups

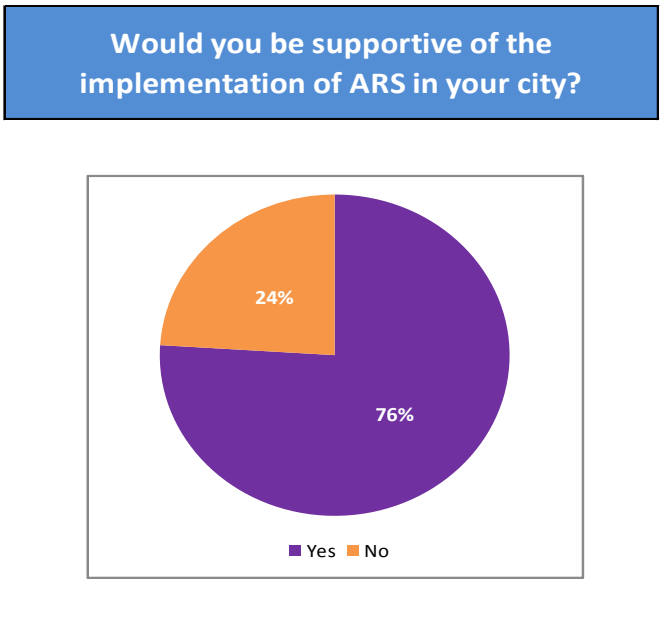


Figure 63 – Willingness of implementing an ARS in their city

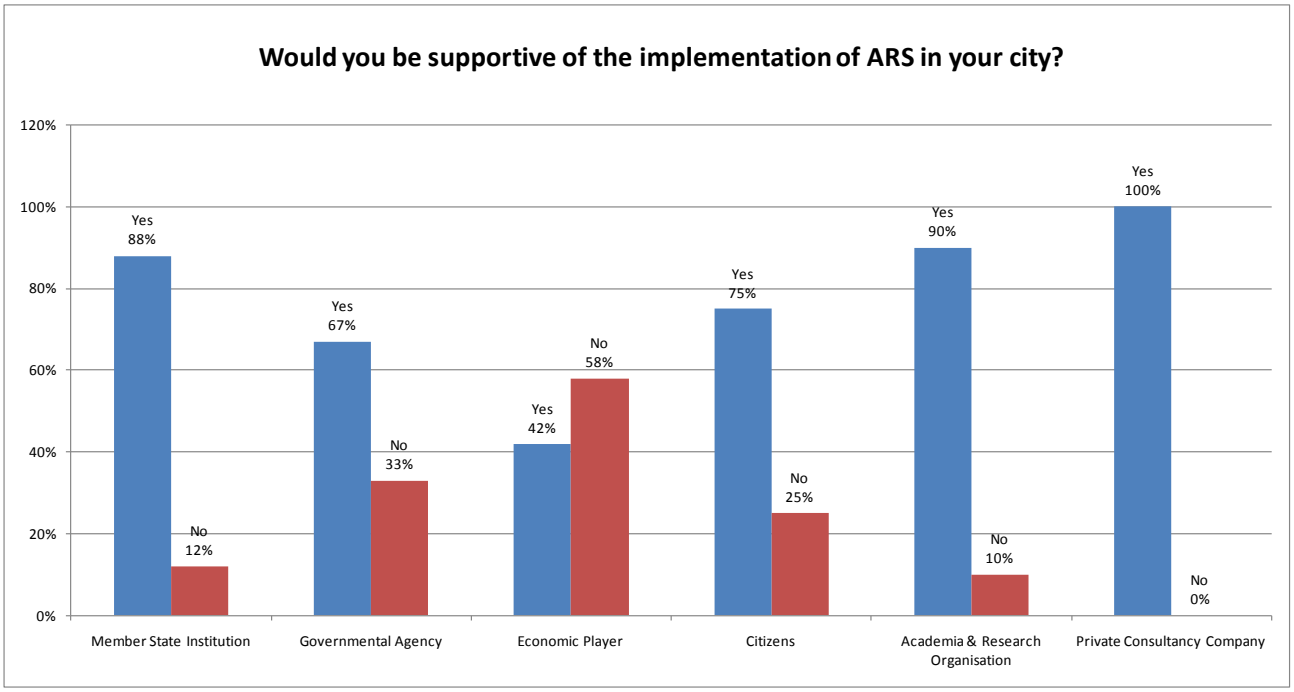


Figure 64 – Willingness of implementing an ARS in their city: opinions of different stakeholders groups

Figure 65 and Figure 66 should be analysed jointly.

On the one hand, respondents express their views – in general terms - on the main challenges faced by EU cities: air quality and congestion clearly emerge as the two main concerns, followed by the need to increase the role of non motorised modes and of collective transport. Road safety and climate change are also important issues for the majority of respondents, while all other aspects receive less attention.

When asked about the potential contribution of ARS to addressing such challenges, respondents exhibit a good level of confidence for what concerns the two main challenges (congestion and air quality), with however an even higher expectation regarding the effect of ARS on the promotion of collective transport. Safety and Climate change objectives are mostly considered as rather insensitive to ARS implementation, while all other goals are deemed to possibly benefit, if only marginally, from restriction schemes.

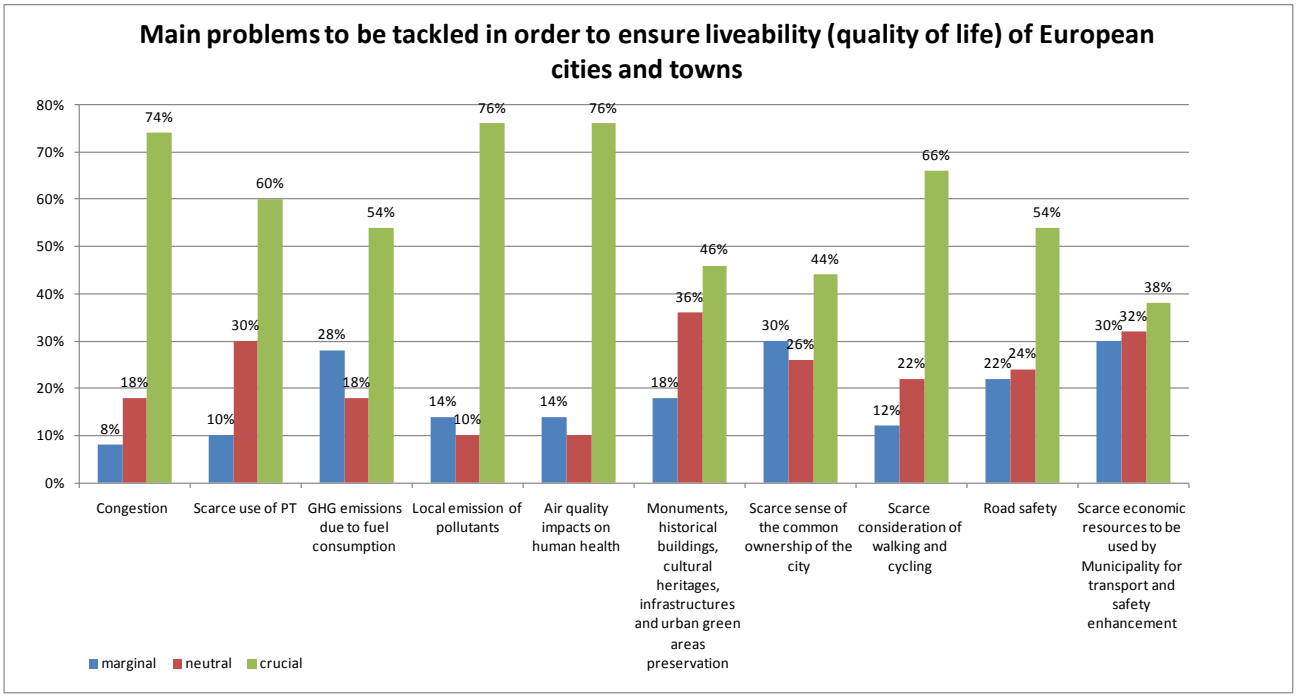


Figure 65 –Crucial problems to be tackled in cities

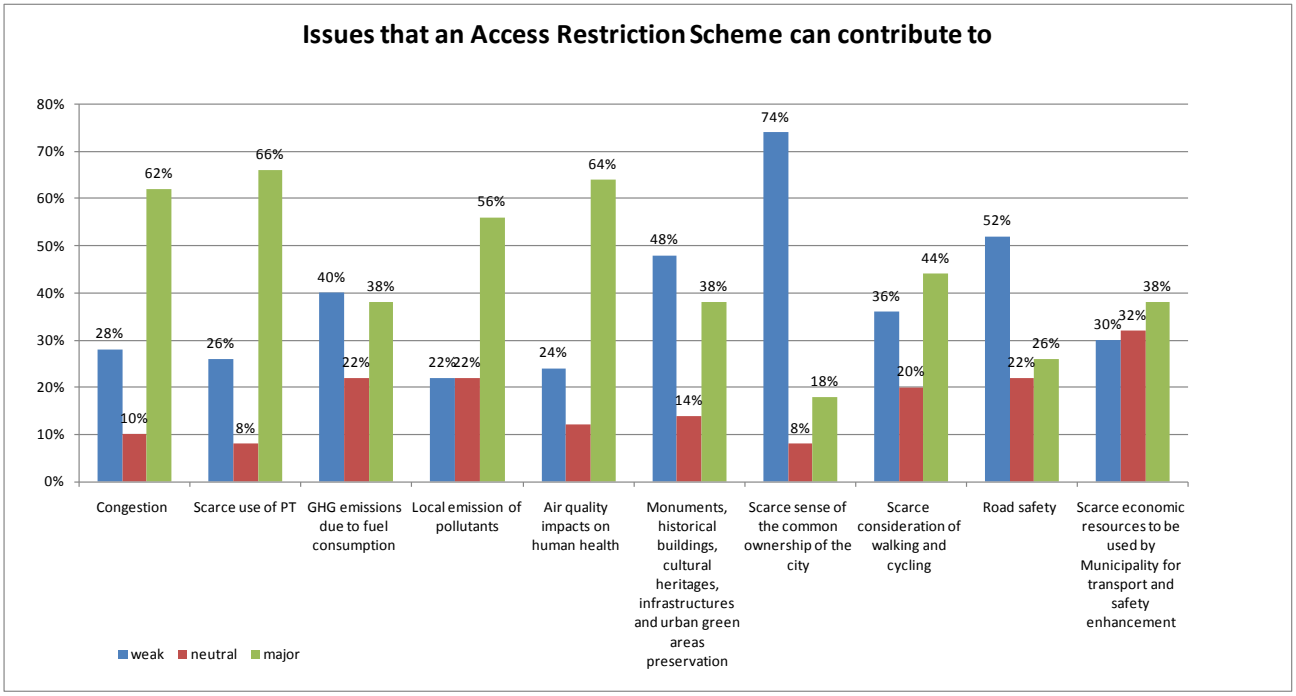


Figure 66 – Possible contributions of an Access Restriction Scheme

In summary, it appears that not only ARS are widely trusted to significantly contribute to the two main recognized priorities, but they can also be decisive in promoting a more sustainable modal split.

When it comes to identifying the most effective ARS configuration (Figure 67), respondents have expressed their preference for non-charged schemes, whether one that targets all vehicles or a permit-based LEZ targeting fright traffic.

Charge-based schemes receive positive notes provided they are based on EURO classes, while the extension of restrictions to two-wheelers is clearly deemed irrelevant by the majority of respondents.

A general conclusion is that options based on the environmental performance of vehicles are on top of most stakeholders preferences, whether the scheme is explicitly targeting air quality as its primary objective or whether it is originally conceived to address congestion concerns.

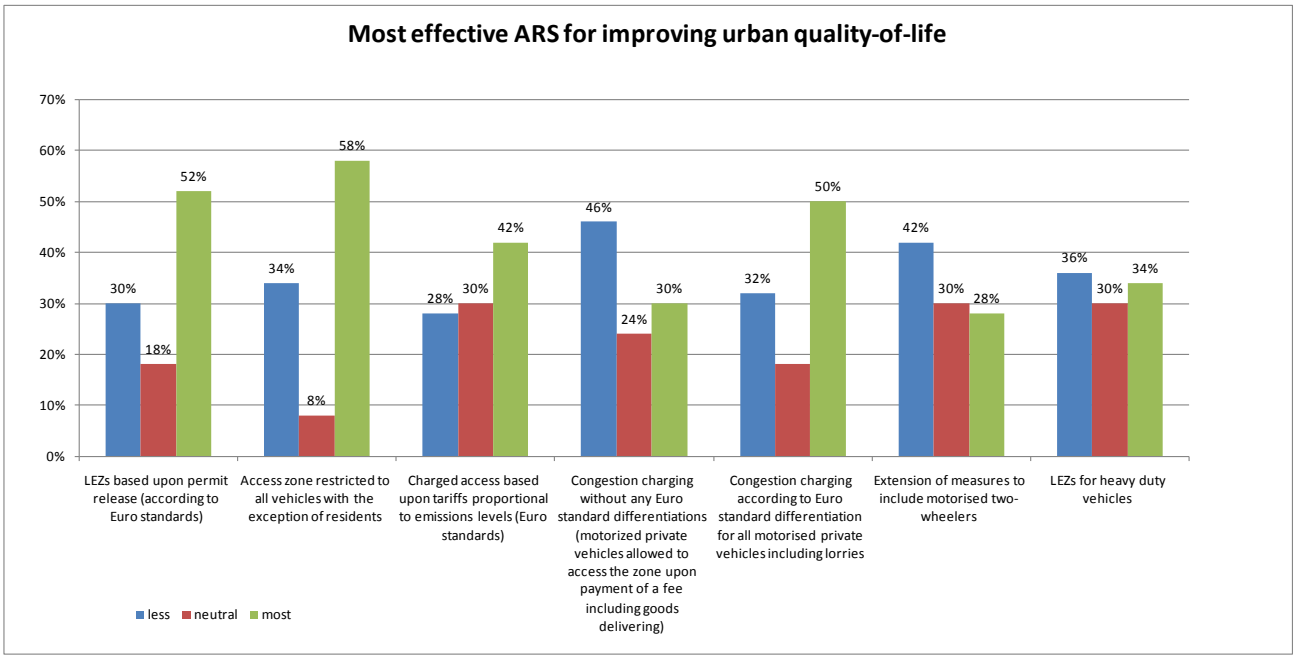


Figure 67 – Most effective Access Restriction Schemes

Finally, there is an overwhelming consensus (Figure 68) that citizens residing within the restricted zone are those who benefit more from the implementation of ARS, followed by economic players whose activity is located within the restricted zone. For most other players, the picture seems more balanced, with opinions clearly varying at times considerably across respondents

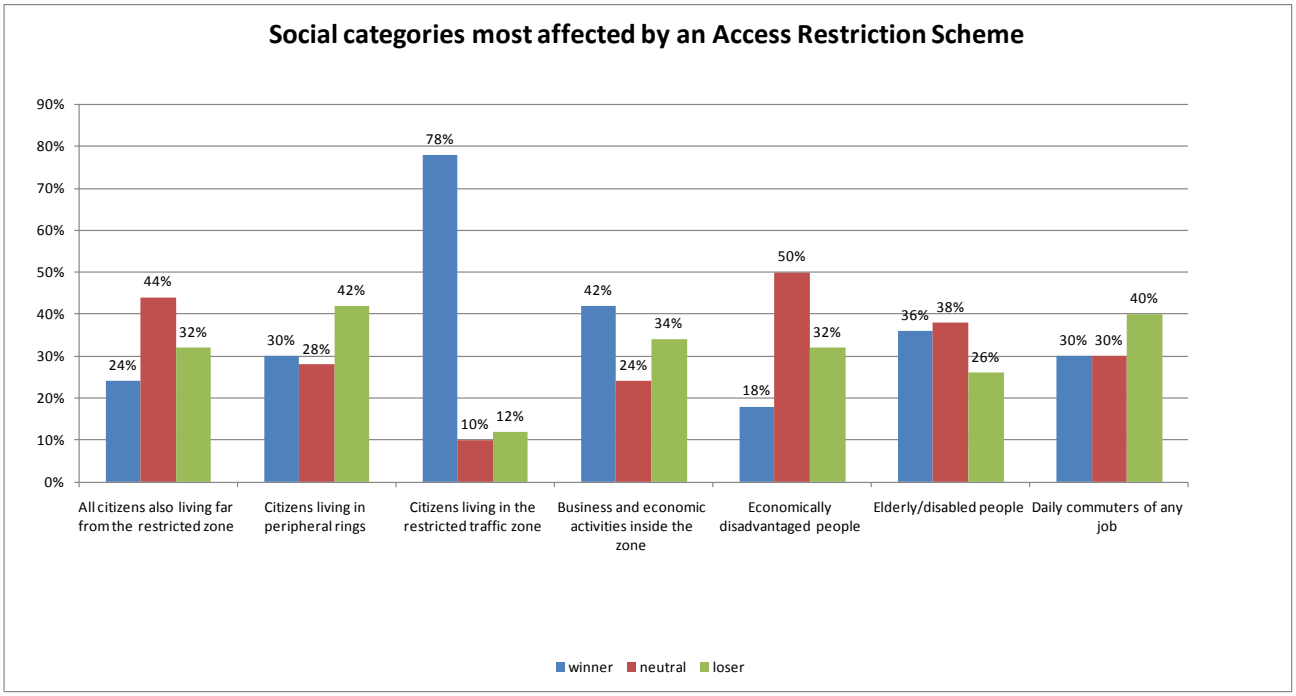


Figure 68 – Social categories most affected by an Access Restriction Scheme

5. Conclusions and Recommendations

5.1 Introduction

In line and within the limits of the Urban Action Plan, the ultimate goal of the study on Access Restriction Schemes was to identify actions in which the European Union could engage to promote better awareness of the ARS concept, of the implementation options and of their effects, and to foster the dissemination and exchange of best practice in this field.

This chapter therefore presents a list of such suggested actions together with a short explanation of their rationale.

On the other hand, any initiative aiming at the promotion of good practice can only be successful to the extent that good practices are actually defined. This prompts an additional section of this chapter, where recommendations target city administrators and, in general, the social and economic players potentially involved in the design, implementation and management of ARS.

This section draws its contents from (i) the lessons learned from past experience in the design, development and evaluation of ARS (documented in the fact finding phase of this study), (ii) the information provided by respondents to the two questionnaires used in the study (cities + other stakeholders), and (iii) the discussion that took place during the stakeholders workshop on September 28th, 2010 and the suggestions/recommendations then formulated by participants.

As outlined above:

- the recommendations directed to the EU concern actions that could be undertaken within the boundaries of the EU mandate, notably in consideration of the subsidiarity and proportionality principles, and, consistently, of the contents of the 2009 Action Plan.
- a second series of recommendations is primarily directed to city authorities, but also, to some extent, to other stakeholders involved in the decision processes relating to the establishment, operation and monitoring of ARS.
- the two parts are linked inasmuch as the first (and certainly among the most important) of the recommendations formulated to the EU concerns the issuance of guidance to help/support EU cities in the adoption of ARS. The outline of such guidance is then in fact presented in the second part of the section.

To conclude the chapter, a short section summarises the main lessons learned from the methodological standpoint, which could prove helpful in the design and implementation of a possible follow-up to this study.

5.2 Recommendations for EU action

5.2.1 Regulation, harmonisation, standardization

Harmonised guidance

In keeping with the spirit and the substance of the subsidiarity principle, the 2009 Action Plan has set clear boundaries to the mandate of the EU when it comes to possible interventions at city level, whereby such EU interventions should in fact concentrate on the effective dissemination, interpretation and use of all evidence, data and information characterising good practices, thus paving the way to their possible replication, adaptation and generalisation.

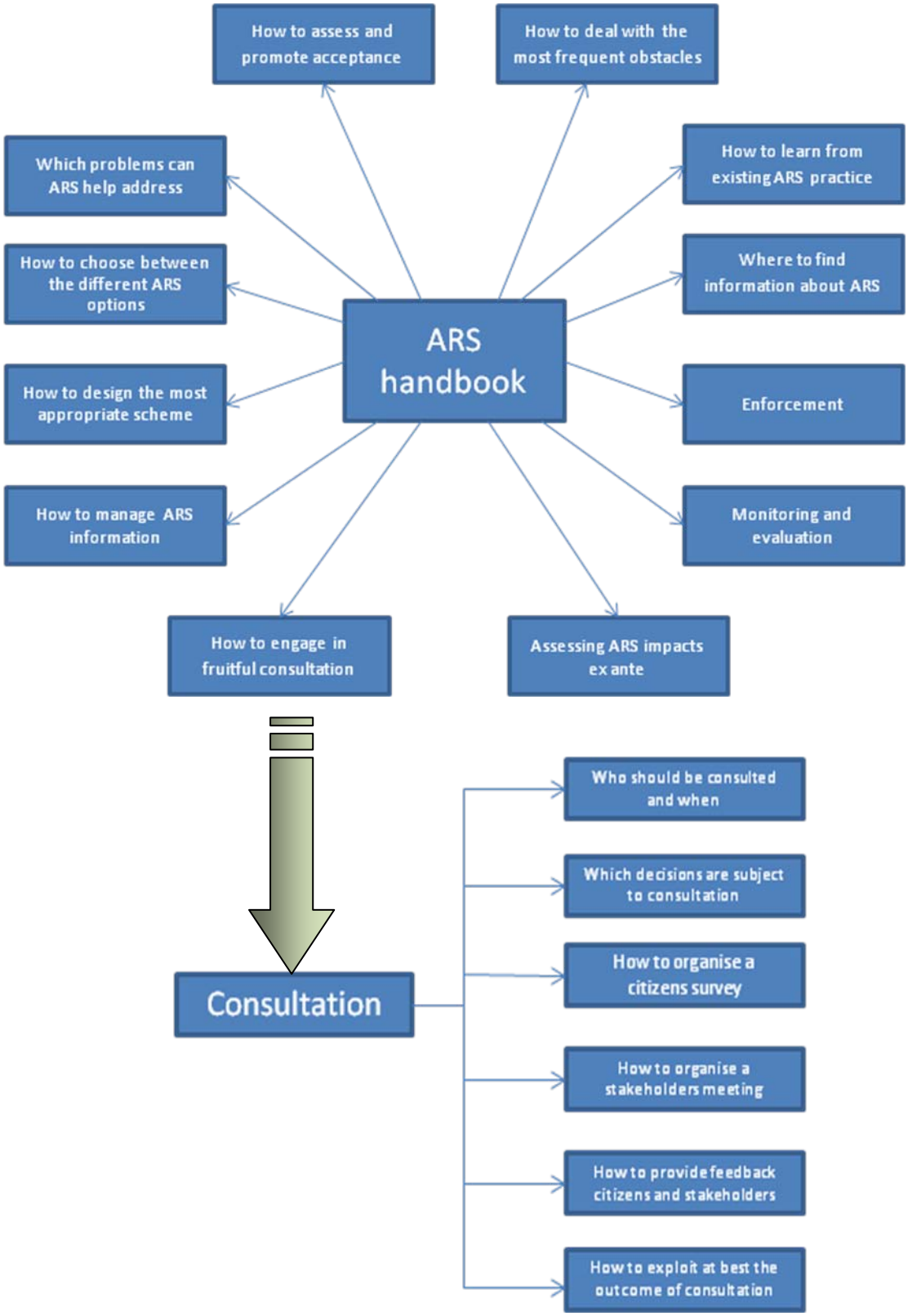
Accordingly, standardization initiatives, or even regulated harmonization that would directly constrain the choices of individual cities, do not fall within the EU mandate.

Such boundaries are largely accepted - and in fact agreed upon – by the majority of involved stakeholders, notably in recognition of the diversity of contexts and therefore of the fact that the "best" ARS option is not an absolute notion, but rather one that varies with the specific characteristics (morphological, cultural, socio-economic, etc.) of the city at hand.

On the other hand, there also appears to be a wide consensus on the need for some harmonizing guidance to assist cities in their decision making process. In other words, cities should not be told what to do (e.g. whether or not to adopt an ARS in the first place, and, if so, which scheme to implement, with which technology, etc.), but they could be told how to proceed in their decision making process (which criteria to consider, which impacts to assess, etc.).

What is therefore advocated is a harmonised framework that, without ultimately constraining local choices, may ensure that such choices are appropriately informed and that they are based on consistent criteria and comparable evidence. Recurring to the typical wording of the industrial production community, this amounts to providing harmonized rules on the *process*, without pre-empting the nature or the functionalities of the *product*.

The guidance could be developed in the form of an on-line resource, accessible through a flexible, hyperlink-based query system, such as sketched in the diagram below, where each box provides access to a basic topic and each topic can then be investigated in detail as shown for the example of the "consultation" topic below.



Recommendation 1: the EU should develop a *harmonizing guidance* to assist cities in their decision making process concerning the possible adoption of ARS (which criteria to consider, which impacts to assess, etc.). The guidance could be in the form of an on-line resource, accessible through a flexible, hyperlink-based query system.

Harmonised information

A common vocabulary to define concepts, mechanisms and instruments is the cornerstone of any European strategy. Specifically, a standard nomenclature should be established to designate signalling systems and symbols, as well as a common classification of the different ARS options. The idea is that a European citizen travelling from one country to another, and from one city to another, might indeed be confronted with varying sets of rules, but he/she should at least be ensured that there is no risk of ambiguity in the understanding and the interpretation of such varying rules.

Recommendation 2: the EU should actively promote – notably in the framework of the UN-ECE-led enforcement process of the Vienna convention of 1968 - a standardized nomenclature for signals, symbols, and in general concepts and instruments associated to urban access restriction schemes.

National road codes

National legislation and regulations concerning urban access restriction are – and most likely will continue to be – extremely diversified (as clearly reflected in the legal assessment section of this report). Whatever the substance of the legal provisions in force in individual MS, the EU should require that these are explicitly included in the national Road Codes, and that they are illustrated in the same common vocabulary advocated above.

Recommendation 3: the EU should require Member States to explicitly include all legal provisions behind access restriction measures in the national Road Codes.

EURO standards

The classification of vehicles according to their environmental performance (EURO classes) is a compulsory standard for vehicle manufacturers. A large share of ARS uses the EURO class as a basic criterion to grant access or/and to determine the amount of the charge[44]. It is moreover likely that an increasing number of ARS will adopt such criterion, especially considering that EURO classes are deemed by most stakeholders consulted in this study to be one of the most effective criteria to differentiate access rights. It follows quite naturally that the EURO class should be explicitly mentioned in the vehicle papers. The EU should accordingly take action to make such mention compulsory.

Recommendation 4: the EU should require from Member States that the EURO class is explicitly mentioned in the vehicle papers

Certification

Significant progress has been made towards the harmonisation of technological devices and systems (e.g. the notable example of the EURO classes). However, more should be done to promote the steady uptake of best available technological options. Certification mechanisms are a case in point, particularly for what concerns critical issues like the retrofitting of vehicles, whose practice varies considerably across MS, leading to possible discriminations when specific ARS are based on environmental performance of vehicles. Similarly, standardized rules for the verification and certification of e.g. filters would be highly beneficial.

[44] See also section 5.2.5 below.

As for all other recommendations in this section, it should be further stressed that what is being recommended is not a common, compulsory technical standard for vehicles to be allowed to enter this or that particular restricted zone, but rather a common set of criteria to classify vehicles in a fair manner.

Recommendation 5: the EU should establish standardized rules for the verification and certification of vehicle performances, notably in the context of retrofits

Assessment methods and tools

The study has confirmed that only in a very limited number of cases ARS are actually undergoing a systematic and well-planned assessment process (whether ex ante or/and ex post). This points at one of the most severe weaknesses observed in this study, as it is well known that the lack of (or the insufficient attention devoted to) impact assessment

- seriously weakens the decision making process and limits the capability of the policymaker to convincingly "sell" the scheme to his/her constituency
- makes it impossible to assess whether the scheme has actually achieved its original objectives and, at times even more importantly, whether it has generated ancillary effects that can be even more relevant

When it comes to disseminating best practices, insufficient assessment evidence is even a greater obstacle, as the primary argument for transferring good practice is precisely to demonstrate that it is good. In the case of ARS assessment (as for most urban policies that are strongly dependent on the local context), a harmonised assessment framework is therefore a priority.

Recommendation 6: the EU should issue guidance on recommended best practice for the assessment of ARS, including notably:

- **A recommended evaluation framework to ensure the necessary level of comprehensiveness (i.e. covering all important impact areas)**
- **Standard definitions for key assessment indicators and of the corresponding metrics**
- **Monetary valuation parameters (or/and methodologies) to be used in Cost Benefit Analyses**
- **Recommended minimum data requirements for the main ARS impact areas (e.g. traffic levels inside and outside the restricted zone, travel time to cross the restricted zone for private and public transport, pollution levels with main focus on local effects such as PM10 and NOx, accident rate inside the restricted area)**
- **Methodological guidance on how to conduct surveys, how to carry out consultation exercises, etc.**

5.2.2 Information management

Many of the stakeholders that have contributed to this study (either by answering one or the other of the questionnaires, or/and by actively participating to the consultation workshop) have shown explicit appreciation for the EC initiative of carrying out the study in the first place. The main reason behind such appreciation is the recognition of the insufficient and insufficiently shared knowledge on ARS, their rationale, their functioning and their potential benefits.

Consistently, consensus was rather unanimous on further recommending that the EU should promote:

- the establishment and maintenance of a comprehensive database with information on all cities that have either implemented an ARS or are planning to do so, further including cities that have decided not to implement an ARS. The database should be accessible on-line for consultation by the wider public, and should at least include such basic information as currently shown in the experimental table informed by this study[45]. The database should be regularly updated, to ensure the provision of more and better information to citizens and to city administrations about existing ARS and their impacts. In particular, such information campaign should allow authorities to gain early understanding of the consequences of an ARS decision, while in parallel raising the awareness of citizens on the costs and benefits of access restriction schemes
- the establishment and maintenance of a database of ARS best practices, where detailed information is provided to planners and practitioners to support the decision making process, including the design and the implementation phases
- the establishment and maintenance of a single window for access to information on ARS, including (i) the monitoring of what happens in reality, (ii) all information necessary for trip planning and (iii) interactive transactions (obtaining permits, paying charges, etc.). One of the options to implement this recommendation is to extend the existing LEEZEN website in order to ensure the coverage of all ARS types (and not only Low Emissions Zones), and enhance it to allow for interactive operations , notably vehicle registration and payment of charges as required
- the linkage of EU information resources with MS national websites

Recommendation 7: the EU should establish a comprehensive information resource, publicly available, providing updated information on ARS, in the form of a single window also allowing for interactive vehicle registration and charge payment.

5.2.3 Governance issues

As previously remarked, the stakeholders involved in this study forcefully advocated that the information and consultation effort initiated with this study be sustained over the years in order to ensure continuity and multiplier effects.

Notably, it is thus suggested that:

- a permanent "advisory group" (or similar denomination) be set up to discuss, assess, and recommend. The functioning model for this group could be the stakeholders' workshop staged in September 2010, therefore implying very limited costs while ensuring continuity to the debate and to the best practice identification and dissemination effort
- considering the fast pace of evolution in the ARS field (with new schemes frequently emerging, existing schemes often undergoing substantial reshaping, and novel assessment evidence being generated), further, periodic assessments should be carried out regularly in order to ensure that the information available to stakeholders, practitioners and the public at large is appropriately updated and therefore remains meaningful
- coordination among cities is actively promoted
- key issues related to legal requirements and the compliance of ARS schemes with EU law are clarified through ad hoc information initiatives directed to national and local governments

Recommendation 8: the EU should establish a permanent advisory group to regularly review ARS developments and accordingly recommend actions to enhance best practice exchange.

[45] A sample section of the table is shown in Annex 1.

5.2.4 Funding

Targeted infrastructure funding can obviously contribute to the successful uptake of ARS, whereby access restrictions should systematically be accompanied by the provision of alternative options to transport users for which the restriction would otherwise amount to a limitation of their freedom of movement. Accordingly, all funding lines that support the provision of e.g. bus and coach terminals, P&R facilities and, of course collective transport systems and services are deemed to contribute to the diffusion of ARS.

More specifically, however, and in line with the EU mandate and its subsidiarity limits, the EU could significantly enhance its role in ensuring awareness, knowledge sharing and diffusion of best practices by funding the development of large scale ARS demonstrators, with a high showcase value and including detailed exploitation plans to make the most of the demonstrators.

Given the severe lack of data that was observed for what concerns ARS impacts, any initiative promoted and funded by the EU should include as a basic prerequisite an adequate effort to generate high quality impact data. The guidance advocated above could suggest a harmonised format illustrating the minimum requirements for impact data to be concretely usable for replication or/and transferability purposes.

Recommendation 9: the EU should fund the development of large scale ARS demonstrators, with explicit emphasis on the generation of high quality impact data.

5.2.5 Open and/or controversial issues

<u>EURO standards</u>

A lively debate took place in the course of the consultation process concerning the perspective of future EURO standards.

On the one hand, it was argued that EURO standards should progressively escalate (i.e. become increasingly stringent) to ensure continuing improvements in the environmental performance of transport systems.

On the other hand, operators (notably in the freight and in the tourism businesses) voiced their fear that rapidly changing thresholds threaten the economic viability of their operations, whereby, for instance, an important share of the European coach fleet is now made of EURO 3 vehicles, that represent a considerable investment on behalf of the operators. Such investment must be protected to avoid economic disruption.

Possible solutions allowing for acceptable trade-offs, include:

- the issuance of regulations/standards that would be based on loads (e.g. payload, or axle load) rather than or in combination with emissions standards
- adjusting permits validity to the life cycle of vehicles

Recommendation 10: the EU should consider the gradual introduction of stricter EURO standards for vehicles in operation as an alternative to access restriction for older vehicles.

Conflicts of interest

Conflicts of interests may arise between e.g. private operators providing transport services to cities and the city administration involved: strong claims or even delicate negotiations initiated by operators might ultimately inhibit/jeopardize their competitiveness, and their commercial operations. Guidance from the EU to ensure fairness of treatment would be welcome.

Summary of recommendations to the EU

1. To develop a **harmonizing guidance** to assist cities in their decision making process concerning the possible adoption of ARS (which criteria to consider, which impacts to assess, etc.).
2. To actively promote – notably in the framework of the UN-ECE-led enforcement process of the Vienna convention of 1968 - a **standardized nomenclature** for signals, symbols, and in general concepts and instruments associated to urban access restriction schemes.
3. to require Member States to explicitly include all legal provisions behind access restriction measures in the **national Road Codes**
4. to require from Member States that the **EURO class is explicitly mentioned** in the vehicle papers
5. to establish standardized rules for the **verification and certification** of vehicle performances, notably in the context of retrofits
6. to issue guidance on recommended **best practice for the assessment** of ARS, including on issues like evaluation frameworks, key indicators, monetary valuation parameters, minimum data requirements, and methodological guidance in general on e.g. how to conduct surveys and consultation exercises
7. to establish a **comprehensive information resource**, publicly available, providing updated information on ARS, in the form of a single window also allowing for interactive vehicle registration and the payment of access charges.
8. to establish a **permanent advisory group** to regularly review ARS developments and accordingly recommend actions to enhance best practice exchange
9. fund the development of **large scale ARS demonstrators**, with explicit emphasis on the generation of high quality impact data
10. consider the **gradual introduction of stricter EURO standards** for vehicles in operation as an alternative to access restriction for older vehicles

5.3 Suggested Best Practices (recommendations to cities)

Although quite recent (with few well known exceptions such as e.g. the Norwegian urban pricing schemes), the experience in the design and implementation of ARS allows to draw a first series of lessons, which can guide forthcoming developments. Most of the suggestions below - grouped according to the various steps of the development of a scheme – reflect the existence of a wide consensus across the consulted stakeholders.

5.3.1 Planning and design of ARS

- Information and awareness campaigns should be built-in any ARS development plan, with adequate dedicated resources and the recourse to professional competencies. Even the best scheme (i.e. appropriately tailored to the specific needs of the city) will fail in the absence of an adequate information effort. Informing citizens and users is not an ancillary function that may marginally increase its chances of success, it is rather a critical, indispensable component of the scheme itself
- City authorities must engage in ad hoc dialogue with users and stakeholders, possibly leading to negotiation. This engagement must take place in the very early stages of the ARS lifecycle, with the dual objective of (i) eliciting users needs explicitly and incorporating them in the scheme design, and (ii) ensure transparency. Dedicated consultation exercises must be launched to address industry's concerns, with particular regard to tourism operators
- Plans for the establishment of ARS must undergo a formal ex ante assessment. Ideally, this can take the form of a fully fledged Cost Benefit Analysis (CBA). Alternatively, quali-quantitative techniques can be adopted (e.g. Cost Effectiveness – CEA, or Multi Crtieria - MCA). Whatever the methodology adopted, the assessment must be transparently shared with stakeholders, including users.
- Depending on the resources available, and on the scope of the plan, ARS assessments may be more or less comprehensive and detailed. In any instance, it is recommended that specific factors which are often overlooked be taken explicitly into account, notably including the assessment of the ARS potential impact on inequalities
- Design and implement alternatives for transit traffic. In general: ARS must be one component of an integrated approach, with measures enhancing the volume and quality of the public transport supply playing a prominent role in the facilitation of ARS
- Devise specific solutions for citizens with limited mobility (notably handicapped)
- ARS plans must include – as built-in features - the monitoring and evaluation along the entire lifecycle (ex ante identification/specification of tools, data requirements, costs, responsibilities, etc.)

5.3.2 Implementation and accompanying measures

- Pilot runs of the scheme have proved extremely helpful in several ARS cities. However, they must be of the highest quality to avoid backfiring, and associated to adequately planned information and awareness campaigns
- The bureaucratic/procedural process associated to the scheme (notably for what concerns vehicle registration) must be as simple as possible. In particular, it is highly recommended that the process is handled through a single window (one stop shop)
- Provide ARS information on-line (also) in languages other than the local language
- Provide timely information to local and visiting operators
- Increase effectiveness/stringency of enforcement
- Improve non motorised modes infrastructure (reclaim road space), and promote them

5.3.3 Assessment

- ARS implementation obviously impact also outside the restricted area. These effects must be explicitly considered and included in the ARS assessment exercises
- Citizens should be actively involved in the assessment process
- Ex post evaluation is extremely important for the authorities to be able to assess the level of achievement of the initial goal, and to provide feedback to users and stakeholders in order to reinforce the legitimacy of the intervention. However, ex post assessment can only be carried out

effectively if the instruments (data collection through technical devices such as air quality stations, vehicle counts, surveys) are planned and budgeted at the outset

5.4 Comments on the study approach, methodology etc.

This section summarises the main comments and suggestions that have emerged from the consultation process for what concerns the design of the study, its scope and scale, and its methodological approach. They might serve as a basis to adjust the study specifications in the perspective of future studies.

5.4.1 Methodology

Buses and coaches should be singled out as separate vehicle categories, both for what concerns the classification of the ARS and in terms of the specific measures/characteristics of ARS that target these type of vehicles.

5.4.2 Consultation process

Step 1 (focus on cities)

City selection/identification criteria: the study proceeded along a pragmatic approach, whereby cities investigated were selected primarily on the basis of pre-existing knowledge (of ARS being planned/implemented) and, most importantly, on the expected accessibility of potential respondents.

Accordingly, the set of cities analysed in the study cannot claim to be fully exhaustive. A higher degree of comprehensiveness could theoretically be achieved by establishing direct individual contacts with all cities (e.g. above a certain size threshold). However, there is no guarantee that the rate of response would then allow to actually achieve completeness of information.

Step 2 (focus on other stakeholders)

- Involvement of visitors (motorists/tourists…) would also be beneficial
- More information and focus on cities that have carried out their own consultation process could partly compensate for the lack of direct information elicited from citizens
- In general, data could/should be complemented with other (wider ranging) sources, e.g. Eurobarometer
- Impact data are severely lacking. Additional efforts in this direction might improve (marginally) the picture, but it should be recognised that impact data are simply not available in most cases

Annex 1 – Cities general information on ARS

COUNTRY		CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICITON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
1	Austria	Graz LEZ			X		X		Private Cars & Freight		X	X			tbc			X		
2	Austria	Vienna		X																
3	Belgium	Antwerp			X	X			Private Cars & Freight								X			
4	Belgium	Bruges		X																
5	Belgium	City of Brussels		X																
6	Belgium	Gent	X			X			Private Cars	X			X			X	X			X
7	Belgium	Hasselt		X																
8	Belgium	Kortrijk		X																
9	Belgium	Turnhout	X			X			Private Cars & Freight	X			X			X		X		X
10	Belgium	Verviers	X			X			Private Cars & Freight	X			X	X			X			X

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
11	Bulgaria	Sliven		X																
12	Bulgaria	Sofia	X				X		Freight	X			X					X		
13	Cyprus	Nicosia	X			X			Private cars & Freight									X		
14	Czech Republic	Brno	X				X		Freight		X	X						X		
15	Czech Republic	Ostrava		X																
16	Czech Republic	Prague	X			X			Private Cars	X			X				X		X	
17	Czech Republic	Prague LEZ	X				X		Freight		X							X	X	
18	Czech Republic	Usti-nad-Laben		X																
19	Denmark	Aalborg LEZ	X				X		Freight		X	X		X				X		X
20	Denmark	Aarhus			X		X		Freight		X	X								
21	Denmark	Copenhagen	X				X		Freight		X	X			X		X			

COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
		Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
22	Denmark	Frederiksberg	X				X		Freight		X	X			X		X				
23	Denmark	Odense	X				X		Freight		X	X									
24	Estonia	Tallinn	X				X		Freight		X	X		X					X		
25	Estonia	Pärnu	X				X		Freight								X				
26	Finland	Helsinki			X	X			Private Cars	X									X	X	
27	Finland	Helsinki LEZ	X				X		Freight		X	X		X			X		X		
28	France	Bordeaux	X			X			Private Cars & Freight		X		X			X	X				
29	France	Clermont-Ferrand		X																	
30	France	Grasse		X																	
31	France	La Rochelle	X			X			Private Cars & Freight		X		X	X			X			X	
32	France	Lille		X																	

COUNTRY		CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Man ual	Sticke rs	Tech	Y	N		
33	France	Lyon		X																
34	France	Lyon LEZ	X				X		Freight		X	X				X		X		
35	France	Marseille		X																
36	France	Montpellier	X				X		Freight		X	X		X				X		
37	France	Nantes	X			X			Private Cars & Freight	X			X		X		X			
38	France	Nice		X																
39	France	Niort		X																
40	France	Paris		X																
41	France	Poitiers			X	X			Private Cars	tb c			tbc							X
42	France	Rennes		X																
43	France	Saint Etienne		X																

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
44	France	Strasbourg		X																
45	France	Toulouse	X			X			Private Cars		X	X		X				X		X
46	France	Tours		X																
47	Germany	Augsburg	X				X		Freight		X	X			X		X			
48	Germany	Berlin	X				X		Private Cars & Freight		X	X			X		X			X
49	Germany	Bochum	X				X		Freight		X	X			X		X			
50	Germany	Bonn	X				X		Freight		X	X			X		X			
51	Germany	Bottrop	X				X		Freight		X	X			X		X			
52	Germany	Bremen	X				X		Freight		X	X			X		X			
53	Germany	Chemnitz		X																
54	Germany	Cologne	X				X		Freight		X	X			X		X			

COUNTRY		CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
55	Germany	Dortmund	X				X		Freight		X	X			X		X			
56	Germany	Dresden		X																
57	Germany	Duisburg	X				X		Freight		X	X			X		X			
58	Germany	Dusseldorf	X				X		Freight		X	X			X		X			
59	Germany	Essen	X				X		Freight		X	X			X		X			
60	Germany	Frankfurt am Main	X				X		Freight		X	X			X		X			
61	Germany	Freiburg	X				X		Freight		X	X			X		X			
62	Germany	Gelsenkirchen	X				X		Freight		X	X			X		X			
63	Germany	Gera		X																
64	Germany	Gottingen		X																
65	Germany	Hagen		X																

COUNTRY		CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
66	Germany	Halle		X																
67	Germany	Hamburg		X																
68	Germany	Hannover	X				X		Private Cars & Freight	X		X			X		X			X
69	Germany	Heidelberg	X				X		Freight		X	X			X		X			
70	Germany	Heilbronn	X				X		Freight		X	X			X		X			
71	Germany	Herrenberg	X				X		Freight		X	X			X		X			
72	Germany	Ilsfeld	X				X		Freight		X	X			X		X			
73	Germany	Ingolstadt		X																
74	Germany	Karlsruhe	X				X		Freight		X	X			X		X			
75	Germany	Leipzig			X		X		Freight		X	X			X		X			
76	Germany	Leonberg	X				X		Freight		X	X			X		X			

COUNTRY		CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
77	Germany	Ludwigsburg	X				X		Freight		X	X			X		X			
78	Germany	Mannheim	X				X		Freight		X	X			X		X			
79	Germany	Markgröningen	X				X		Freight		X	X			X		X			
80	Germany	Marktredwitz		X																
81	Germany	Muhlacker	X				X		Freight		X	X			X		X			
82	Germany	Muhlheim	X				X		Freight		X	X			X		X			
83	Germany	Munich	X				X		Private Cars & Freight		X	X			X		X			X
84	Germany	Munster	X				X		Freight		X	X			X		X			
85	Germany	Neuss	X				X		Freight		X	X			X		X			
86	Germany	Neu-Ulm	X				X		Freight		X	X			X		X			
87	Germany	Nuremberg		X																X

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
88	Germany	Oberhausen	X				X		Freight		X	X			X		X			
89	Germany	Osnabruek	X				X		Freight		X	X			X		X			
90	Germany	Pfinztal	X				X		Freight		X	X			X		X			
91	Germany	Pforzheim	X				X		Freight		X	X			X		X			
92	Germany	Pleidelsheim	X				X		Freight		X	X			X		X			
93	Germany	Recklinghausen	X				X		Freight		X	X			X		X			
94	Germany	Regensburg			X		X		Freight		X	X			X		X			
95	Germany	Reutlingen	X				X		Freight		X	X			X		X			
96	Germany	Ruhr	X				X		Freight		X	X			X		X			
97	Germany	Scghwabish-Gmund	X				X		Freight		X	X			X		X			
98	Germany	Stuttgart	X				X		Private Cars & Freight		X	X			X		X			X

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
99	Germany	Tubigen	X				X		Freight		X	X			X		X			
100	Germany	Ulm	X				X		Freight		X	X			X		X			
101	Germany	Wolfsburg		X																
102	Germany	Wuppertal	X				X		Freight		X	X			X		X			
103	Greece	Athens	X			X			Private Cars & Freight		X	X		X			X			
104	Hungary	Budapest			X	X			Private Cars	X			X					X	X	
105	Hungary	Budapest LEZ			X		X		Freight		X	X						X	X	
106	Hungary	Debrecen	X			X			Private Cars		X	X						X		X
107	Hungary	Győr	X				X		Freight		X	X						X		
108	Hungary	Pécs	X				X		Freight		X	X						X		
109	Ireland	Cork	X			X			Private Cars & Freight		X		X	X		X		X		X

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
110	Ireland	Dublin	X			X			Private Cars & Freight		X		X				X			
111	Island	Reykjavik			X	X														
112	Italy	Acqui Terme	X			X			Private Cars & Freight		X	X		X			X			
113	Italy	Ala LEZ	X				X		Private Cars & Freight		X	X					X			
114	Italy	Alba LEZ	X				X		Private Cars & Freight		X		X	X			X			
115	Italy	Alessandria LEZ	X				X		Private Cars & Freight		X		X	X			X			
116	Italy	Ancona	X			X			Private Cars & Freight		X		X	X			X			
117	Italy	Appiano (Eppan) LEZ	X				X		Private Cars & Freight		X	X			X		X			
118	Italy	Asti	X				X		Private Cars & Freight	X			X			X	X			
119	Italy	Bari	X			X			Private Cars & Freight		X	X				X	X			

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
120	Italy	Beinasco LEZ	X				X		Private Cars & Freight		X		X	X			X			
121	Italy	Bergamo LEZ	X				X		Private Cars & Freight		X		X	X			X			
122	Italy	Biella LEZ	X				X		Private Cars & Freight		X		X	X			X			
123	Italy	Bologna	X			X			Private Cars & Freight	X			X			X	X			X
124	Italy	Bologna LEZ	X				X		Private Cars & Freight		X	X		X			X		X	X
125	Italy	Bolzano LEZ	X				X		Private Cars & Freight		X	X			X		X			
126	Italy	Borgaro Torinese LEZ	X				X		Private Cars & Freight		X		X	X			X			
127	Italy	Borgomanero LEZ	X				X		Private Cars & Freight		X		X	X				X		
128	Italy	Bra LEZ	X				X		Private Cars & Freight		X		X	X			X			
129	Italy	Brescia	X			X			Private Cars & Freight		X	X				X	X			

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICITON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
130	Italy	Brescia LEZ	X				X		Private Cars & Freight		X		X	X			X			
131	Italy	Bressanone LEZ (Brixen)	X				X		Private Cars & Freight		X	X			X		X			
132	Italy	Bronzolo LEZ (Branzoll)	X				X		Private Cars & Freight		X	X			X		X			
133	Italy	Brunico LEZ (Bruneck)	X				X		Private Cars & Freight		X		X		X		X			
134	Italy	Calenzano LEZ	X				X		Private Cars & Freight		X	X		X			X			
135	Italy	Campi Bisenzio LEZ	X				X		Private Cars & Freight		X	X		X			X			
136	Italy	Cagliari	X			X			Private Cars & Freight		X		X	X			X			
137	Italy	Carmagnola LEZ	X				X		Private Cars & Freight		X		X	X			X			
138	Italy	Carpignano LEZ	X				X		Private Cars & Freight		X	X		X			X			
139	Italy	Carrara LEZ	X				X		Private Cars & Freight		X	X		X			X			

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
140	Italy	Casale Monferrato LEZ	X			X			Private Cars & Freight		X		X	X			X			
141	Italy	Cassino	X			X			Private Cars & Freight		X	X		X			X			
142	Italy	Cermes LEZ (Tscherms)	X				X		Private Cars & Freight		X	X		X			X			
143	Italy	Chieri LEZ	X				X		Private Cars & Freight		X		X	X			X			
144	Italy	Chivasso LEZ	X				X		Private Cars & Freight		X		X	X			X			
145	Italy	Collegno LEZ	X				X		Private Cars & Freight		X		X	X			X			
146	Italy	Como	X			X			Private Cars & Freight		X	X				X	X			
147	Italy	Como LEZ	X				X		Private Cars & Freight		X	X		X			X			
148	Italy	Cremona	X			X			Private Cars & Freight		X	X				X	X			
149	Italy	Cremona LEZ	X				X		Private Cars & Freight		X	X		X			X			

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
149	Italy	Cuneo LEZ	X				X		Private Cars & Freight		X		X	X			X			
150	Italy	Dovera	X			X			Private Cars & Freight		X	X				X	X			
151	Italy	Dovera LEZ	X				X		Private Cars & Freight		X	X		X			X			
152	Italy	Empoli LEZ	X				X		Private Cars & Freight		X	X		X			X			
153	Italy	Ferrara	X			X			Private Cars & Freight		X	X				X	X			X
154	Italy	Ferrara LEZ	X				X		Private Cars & Freight		X	X		X			X			
155	Italy	Florence	X			X			Private Cars & Freight		X	X				X	X			
156	Italy	Florence LEZ	X				X		Private Cars & Freight		X	X		X			X			
157	Italy	Forlì	X			X			Private Cars & Freight		X	X				X	X			
158	Italy	Forlì LEZ	X				X		Private Cars & Freight		X	X		X			X			

COUNTRY		CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
159	Italy	Fossano LEZ	X				X		Private Cars & Freight		X		X	X			X			
160	Italy	Genoa	X			X			Private Cars & Freight	X		X				X	X			X
161	Italy	Gorizia	X			X			Private Cars & Freight		X	X		X			X			
162	Italy	Grosseto	X			X			Private Cars & Freight		X	X		X			X			
163	Italy	Grugliasco LEZ	X				X		Private Cars & Freight		X		X	X			X			
164	Italy	Imola	X			X			Private Cars	X			X			X	X			X
165	Italy	Ivrea LEZ	X				X		Private Cars & Freight		X		X	X			X			
166	Italy	L'Aquila	X			X			Private Cars & Freight		X	X		X			X			
167	Italy	Lagundo LEZ (Algund)	X				X		Private Cars & Freight		X	X			X		X			
168	Italy	Laives LEZ (Leifers)	X				X		Private Cars & Freight		X	X			X		X			

COUNTRY		CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
169	Italy	Lana LEZ	X				X		Private Cars & Freight		X	X		X			X			
170	Italy	Lastra a Signa LEZ	X				X		Private Cars & Freight		X	X		X			X			
171	Italy	Lavis LEZ	X				X		Private Cars & Freight		X	X		X			X			
172	Italy	Lecco	X			X			Private Cars & Freight		X	X				X	X			
173	Italy	Lecco LEZ	X				X		Private Cars & Freight		X	X		X			X			
174	Italy	Levico Terme LEZ	X				X		Private Cars & Freight		X	X			X		X			
175	Italy	Livorno LEZ	X				X		Private Cars & Freight		X	X		X			X			
176	Italy	Lodi	X			X			Private Cars & Freight		X	X				X	X			
177	Italy	Lodi LEZ	X				X		Private Cars & Freight		X	X		X			X			
178	Italy	Lucca	X			X			Private Cars & Freight		X	X		X			X			

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
179	Italy	Lucca LEZ	X				X		Private Cars & Freight		X	X		X			X			
180	Italy	Mantova	X			X			Private Cars & Freight		X	X				X	X			
181	Italy	Mantova LEZ	X				X		Private Cars & Freight		X	X		X			X			
182	Italy	Marlengo LEZ (Marling)	X				X		Private Cars & Freight		X	X			X		X			
183	Italy	Merano LEZ (Meran)	X				X		Private Cars & Freight		X	X			X		X			
184	Italy	Mezzocorona LEZ	X				X		Private Cars & Freight		X	X		X			X			
185	Italy	Mezzolombardo LEZ	X				X		Private Cars & Freight		X	X		X			X			
186	Italy	Milan	X				X		Private Cars	X			X			X	X			X
187	Italy	Milan LEZ	X				X		Private Cars & Freight		X	X		X			X			
188	Italy	Modena	X			X			Private Cars & Freight	X		X		X			X			X

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
189	Italy	Modena LEZ	X				X		Private Cars & Freight		X	X		X			X			
190	Italy	Moncalieri LEZ	X				X		Private Cars & Freight		X		X	X			X			
191	Italy	Mondovì LEZ	X				X		Private Cars & Freight		X	X		X			X			
192	Italy	Monza	X			X			Private Cars		X	X				X	X			X
193	Italy	Monza LEZ	X				X		Private Cars & Freight		X	X		X			X			
194	Italy	Naples	X			X			Private Cars & Freight		X	X		X			X			
195	Italy	Nichelino LEZ	X				X		Private Cars & Freight		X		X	X			X			
196	Italy	Novara LEZ	X				X		Private Cars & Freight		X		X	X			X			
197	Italy	Novi Ligure LEZ	X				X		Private Cars & Freight		X		X	X			X			
198	Italy	Orbassano LEZ	X				X		Private Cars & Freight		X		X	X			X			

COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
		Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
199	Italy	Palermo	X			X			Private Cars & Freight		X	X		X			X		X		
200	Italy	Palermo LEZ	X				X		Private Cars & Freight		X		X		X		X		X		
201	Italy	Parma	X			X			Private Cars & Freight		X	X				X	X		X		X
202	Italy	Parma LEZ	X				X		Private Cars & Freight		X	X		X			X		X		
203	Italy	Pavia	X			X			Private Cars & Freight		X	X				X	X		X		
204	Italy	Pavia LEZ	X				X		Private Cars & Freight		X	X		X			X		X		
205	Italy	Perugia	X			X			Private Cars & Freight	X			X			X	X		X		X
206	Italy	Perugia LEZ	X				X		Private Cars & Freight		X	X		X			X		X		
207	Italy	Piacenza	X			X			Private Cars & Freight		X	X		X			X		X		
208	Italy	Piacenza LEZ	X				X		Private Cars & Freight		X	X		X			X		X		

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
209	Italy	Pinerolo LEZ	X				X		Private Cars & Freight		X		X	X			X			
210	Italy	Pisa	X			X			Private Cars & Freight		X	X				X	X			
211	Italy	Pisa LEZ	X				X		Private Cars & Freight		X	X		X			X			
212	Italy	Ponte a Signe LEZ	X				X		Private Cars & Freight		X	X		X			X			
213	Italy	Ponte San Giovanni	X			X			Private Cars & Freight		X	X		X			X			
214	Italy	Ponte San Giovanni LEZ	X				X		Private Cars & Freight		X	X		X			X			
215	Italy	Porto di Mezzo LEZ	X				X		Private Cars & Freight		X	X		X			X			
216	Italy	Postal LEZ (Burgstall)	X				X		Private Cars & Freight		X	X			X		X			
217	Italy	Potenza	X			X			Private Cars	X			X	X				X		X
218	Italy	Prato LEZ	X				X		Private Cars & Freight		X	X		X			X			

COUNTRY		CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
219	Italy	Ravenna	X			X			Private Cars & Freight	X			X			X	X			X
220	Italy	Reggio Emilia	X			X			Private Cars & Freight		X	X				X	X			
221	Italy	Reggio Emilia LEZ	X				X		Private Cars & Freight		X	X		X			X			
222	Italy	Riva del Garda	X			X			Private Cars & Freight		X	X				X	X			
223	Italy	Riva del Garda LEZ	X				X		Private Cars & Freight		X	X		X			X			
224	Italy	Rivoli LEZ	X				X		Private Cars & Freight		X		X	X			X			
225	Italy	Rome	X			X			Private Cars & Freight	X			X			X	X		X	X
226	Italy	Rome LEZ	X				X		Private Cars & Freight		X	X		X			X		X	
227	Italy	Salerno	X			X			Private Cars & Freight		X	X		X			X			
228	Italy	San Lorenzo LEZ (St. Lorenzen)	X				X		Private Cars & Freight		X	X			X		X			

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
229	Italy	San Mauro Torinese LEZ	X				X		Private Cars & Freight		X		X	X			X			
230	Italy	Savigliano LEZ	X				X		Private Cars & Freight		X		X	X			X			
231	Italy	Sesto Fiorentino LEZ	X				X		Private Cars & Freight		X	X		X			X			
232	Italy	Settimo Torinese LEZ	X				X		Private Cars & Freight		X		X	X			X			
233	Italy	Siena	X			X			Private Cars & Freight		X	X				X	X			
234	Italy	Terni	X			X			Private Cars & Freight		X	X		X			X			
235	Italy	Terni LEZ	X				X		Private Cars & Freight		X	X		X			X			
236	Italy	Tirolo LEZ (Tirol)	X				X		Private Cars & Freight		X	X			X		X			
237	Italy	Tortona LEZ	X				X		Private Cars & Freight		X	X		X			X			
238	Italy	Trento LEZ	X				X		Private Cars & Freight		X		X	X			X			

COUNTRY		CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
239	Italy	Turin	X			X			Private Cars & Freight		X		X			X	X			
240	Italy	Turin LEZ	X				X		Private Cars & Freight		X	X		X			X			
241	Italy	Vadena LEZ (Pfatten)	X				X		Private Cars & Freight		X	X			X		X			
242	Italy	Valenza LEZ	X				X		Private Cars & Freight		X		X	X			X			
243	Italy	Valle Salimbene LEZ	X				X		Private Cars & Freight		X	X		X			X			
244	Italy	Varese	X			X			Private Cars & Freight		X	X				X	X			
245	Italy	Varese LEZ	X				X		Private Cars & Freight		X	X		X			X			
246	Italy	Varna LEZ (Vahrn)	X				X		Private Cars & Freight		X	X			X		X			
247	Italy	Venaria Reale LEZ	X				X		Private Cars & Freight		X		X	X			X			
248	Italy	Venice	X			X			Private Cars & Freight		X	X				X	X			

COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
		Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
249	Italy	Vercelli LEZ	X				X		Private Cars & Freight		X		X	X			X			
250	Italy	Verona	X			X			Private Cars	X			X	X			X			X
251	Italy	Viareggio LEZ	X				X		Private Cars & Freight		X	X		X			X			
252	Latvia	Bauska		X																X
253	Latvia	Cçsis		X																
254	Latvia	Riga			X	X			Private Cars & Freight	X		X				X	X			X
255	Luxemburg	Luxemburg	X			X			Private Cars & Freight		X		X		X		X			
256	Malta	Valletta	X			X			Private Cars	X			X			X	X			X
257	Norway	Bergen	X					X	Private Cars	X			X			X	X		X	X
258	Norway	Bergen LEZ			X		X		Freight	X		X				X	X		X	
259	Norway	Nord-Jæren	X					X	Private Cars	X			X			X	X			X

COUNTRY		CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
260	Norway	Oslo	X					X	Private Cars	X			X			X	X		X	X
261	Norway	Oslo LEZ			X		X		Freight	X		X				X	X		X	
262	Norway	Trondheim	X					X	Private Cars	X			X			X	X		X	X
263	Norway	Trondheim LEZ			X		X		Freight	X		X				X	X		X	
264	Poland	Gdansk	X			X			Private Cars		X	X		X				X		X
265	Poland	Krakow	X			X			Private Cars	X			X		X		X		X	X
266	Poland	Poznan LEZ			X		X		Private Cars & Freight	tbc		tbc		X				X		X
267	Poland	Szczecinek	X			X			Private Cars		X	X		X				X		X
268	Portugal	Coimbra	X			X			Private Cars & Freight		X		X	X				X		
269	Portugal	Funchal	X			X			Private Cars & Freight		X	X		X				X		X
270	Portugal	Lisbon	X			X			Private Cars & Freight		X		X	X				X		

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
271	Portugal	Porto	X			X			Private Cars & Freight		X		X	X				X		
272	Portugal	Vila Nova de Gaia	X			X			Private Cars & Freight		X		X	X				X		
273	Romania	Arad	X				X		Freight	X		X		X			X			
274	Romania	Bacau	X			X			Private Cars & Freight	X		X		X			X			
275	Romania	Baia Mare	X				X		Freight	X		X		X			X			
276	Romania	Bucharest	X				X		Freight	X		X		X			X			
277	Romania	Cluj Napoca	X				X		Freight	X		X		X			X			
278	Romania	Craiova	X			X			Private Cars		X		X	X			X			X
279	Romania	Giurgiu	X				X		Freight	X		X		X			X			
280	Romania	Hunedoara	X				X		Freight	X		X		X			X			
281	Romania	Iasi	X				X		Private Cars & Freight	X		X		X			X			

COUNTRY		CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
282	Romania	Miercurea Ciuc	X				X		Freight	X		X		X			X			
283	Romania	Mures	X				X		Freight	X		X		X			X			
284	Romania	Oradea	X				X		Freight	X		X		X			X			
285	Romania	Pitesti	X				X		Freight	X		X		X			X			
286	Romania	Resita	X				X		Freight	X		X		X			X			
287	Romania	Sfantu	X				X		Freight	X		X		X			X			
288	Romania	Suceava LEZ	X				X		Private Cars & Freight		X	X		X			X			
289	Romania	Timisoara	X				X		Freight	X		X		X			X			
290	Slovenia	Ljubljana	X				X		Freight		X		X	X				X		
291	Slovenia	Maribor		X																
292	Slovenia	Nova Gorica		X																

COUNTRY		CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICITON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
293	Spain	Barcelona	X			X			Private cars & Freight		X	X		X				X		
294	Spain	Bilbao	X			X			Private cars & Freight		X	X		X			X			
295	Spain	Burgos	X			X			Private Cars & Freight		X		X	X				X		X
296	Spain	Girona	X			X			Private Cars & Freight		X	X		X				X		
297	Spain	Granada	X			X			Private Cars & Freight		X	X		X				X		
298	Spain	Madrid	X			X			Private Cars & Freight		X	X		X			X			
299	Spain	Malaga	X			X			Private Cars & Freight		X	X		X				X		
300	Spain	Murcia	X			X			Private Cars & Freight		X	X		X				X		
301	Spain	Ponferrada (Léon)	X			X			Private Cars & Freight		X	X		X				X		
302	Spain	Santiago de Campostela	X			X			Private Cars & Freight		X	X		X				X		

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
303	Spain	Vigo	X			X			Private Cars & Freight		X	X		X				X		
304	Spain	Vitoria Gasteiz	X			X			Private Cars & Freight		X	X				X	X			
305	Sweden	Göteborg	X			X			Private Cars & Freight	X			X			X	X		X	X
306	Sweden	Göteborg LEZ			X		X		Freight		X	X							X	X
307	Sweden	Helsingborg LEZ	X				X		Freight		X	X		X			X			
308	Sweden	Lund LEZ	X				X		Private Cars & Freight		X	X			X		X			X
309	Sweden	Malmö LEZ	X				X		Freight		X	X			X		X			
310	Sweden	Mölndal LEZ	X				X		Freight		X	X			X		X			
311	Sweden	Örebro		X																X
312	Sweden	Stockholm	X			X			Private Cars & Freight	X			X			X	X		X	X
313	Sweden	Stockholm LEZ	X				X		Freight		X	X			X		X		X	X

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
314	Switzerland	Genève	X			X			Private Cars & Freight		X	X		X				X		
315	Switzerland	Zurich	X			X			Private Cars & Freight		X	X		X				X		
316	The Netherlands	Alkmaar		X																
317	The Netherlands	Amersfoort		X																
318	The Netherlands	Amsterdam	X			X			Private Cars		X		X			X		X	X	X
319	The Netherlands	Amsterdam LEZ	X				X		Freight		X	X		X		X	X		X	
320	The Netherlands	Arnhem LEZ			X		X		Freight		X	X					X			
321	The Netherlands	Breda LEZ	X				X		Freight			X		X		X	X			
322	The Netherlands	Delft LEZ	X				X		Freight		X	X		X		X	X			
323	The Netherlands	Den Bosch LEZ	X				X		Freight		X	X		X		X	X			
324	The Netherlands	Deventer		X																

COUNTRY		CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
325	The Netherlands	Eindhoven LEZ	X				X		Freight		X	X		X		X	X			
326	The Netherlands	Gouda		X																
327	The Netherlands	Haarlem		X																
328	The Netherlands	Heerlen		X																
329	The Netherlands	Helmond			X		X										X			
330	The Netherlands	Leiden LEZ	X				X		Freight		X	X		X		X	X			X
331	The Netherlands	Leidschendam		X																
332	The Netherlands	Maastricht LEZ	X				X		Freight		X	X		X		X	X			
333	The Netherlands	Nieuwegein		X																
334	The Netherlands	Nijmegen LEZ			X		X										X			
335	The Netherlands	Rijswijk LEZ			X		X											X		

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
336	The Netherlands	Rotterdam LEZ	X				X		Freight		X	X		X		X	X			X
337	The Netherlands	Schiedam LEZ			X		X											X		
338	The Netherlands	Sittard-Geleen LEZ			X		X		Freight		X	X						X		
339	The Netherlands	The Hague	X			X			Private Cars		X		X			X		X	X	X
340	The Netherlands	The Hague LEZ	X				X		Freight		X	X		X		X	X		X	
341	The Netherlands	Tilburg LEZ	X				X		Freight		X	X		X		X	X			
342	The Netherlands	Utrecht LEZ	X				X		Freight		X	X		X		X	X			X
343	United Kingdom	Bath			X	X			Private Cars & Freight		X		X				X			
344	United Kingdom	Belfast		X																
345	United Kingdom	Birmingham	X			X			Private Cars & Freight		X		X	X				X		
346	United Kingdom	Bradford		X																

COUNTRY		CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
347	United Kingdom	Brighton & Hove			X	X														
348	United Kingdom	Bristol	X			X			Private Cars & Freight		X		X	X				X		X
349	United Kingdom	Bromley		X																
350	United Kingdom	Cambridge	X			X			Private Cars & Freight		X	X				X	X			X
351	United Kingdom	Derby			X	X			Private Cars	X			X			X		X		
352	United Kingdom	Durham	X			X			Private Cars & Freight	X			X	X			X			X
353	United Kingdom	Edinburgh	X			X			Private Cars & Freight	X			X			X	X			X
354	United Kingdom	Exeter	X			X			Private Cars & Freight		X		X	X			X			
355	United Kingdom	Gateshead		X																X
356	United Kingdom	Glasgow LEZ			X		X		Private Cars & Freight	X			tbc			tbc	X			
357	United Kingdom	Hammersmith and Fulham		X																

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Man ual	Sticke rs	Tech	Y	N		
358	United Kingdom	Kingston-Upon-Hull		X																
359	United Kingdom	Leeds	X			X			Private Cars & Freight & 2-wheels		X	X				X	X			
360	United Kingdom	Leicester			X	X			Private Cars	X			X			X	X			
361	United Kingdom	Liverpool		X																
362	United Kingdom	London	X			X			Private Cars & Freight	X			X			X	X		X	X
363	United Kingdom	London LEZ	X				X		Private Cars & Freight		X	X				X	X		X	X
364	United Kingdom	Manchester			X	X			Private Cars & Freight	X			X			X	X			X
365	United Kingdom	Newcastle upon Tyne		X																
366	United Kingdom	Northampton		X																
367	United Kingdom	Norwich LEZ	X				X		Local Buses		X	X					X			

	COUNTRY	CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
368	United Kingdom	Nottingham			X	X			Private Cars & Freight	X			X			X		X		
369	United Kingdom	Oxford	X			X			Private Cars		X		X			X	X		X	
370	United Kingdom	Oxford LEZ	X				X		Private Cars & Freight		X		X			X		X	X	
371	United Kingdom	Plymouth		X																
372	United Kingdom	Preston		X																
373	United Kingdom	Reading	X			X			Freight	X		X				X	X			X
374	United Kingdom	Sheffield		X																
375	United Kingdom	Southampton		X																
376	United Kingdom	Suffolk		X																
377	United Kingdom	Sunderland		X																
378	United Kingdom	Sutton		X																

COUNTRY		CITY	RESTRICTION SCHEME			PRIMARY OBJECTIVE			VEHICLES RESTRICIT ON	CHARGE		TIME SLOT		VEHICLE IDENTIFICATION			INFO ON WEB		LEZ & ARS	CITY WITH CONTACT
			Y	N	Will Be	Congest.	Environ.	Other		Y	N	24 h	Day Time	Manual	Stickers	Tech	Y	N		
379	United Kingdom	Winchester		X																
380	United Kingdom	York			X	X			Private Cars & Freight		X		X			X	X			

Annex 2 – Overall coverage and profiles of the 58 cities responding to the questionnaire

The survey template that was designed and systematically adopted to describe the investigated ARS is rather comprehensive and features a relatively high number of questions, some calling for qualitative, some for quantitative answers. Such a structure was deliberately adopted in the hope of maximizing both the amount of collected information and their level of detail, with a view to enrich the interpretation process.

The key sections of questionnaire template cover the city profile, scheme objectives and typology, targeted traffic, encountered barriers and enablers, information to users, results achieved or expected.

As will be seen in the following sections, two immediate conclusions emerged from the fact finding process:

- A variable, but in all instances not negligible, number of the questions included in the template remained unanswered for the majority of investigated cities. This did not come as a major surprise, but nevertheless entails that meaningful interpretations are limited to a subset of the questions/issues investigated.
- An ARS classification that would mirror a clear cut differentiation between cities does not emerge spontaneously from a quick analysis of the filled templates (more comments are provided on this aspect further in this report).

An *ad hoc* interpretation framework is therefore needed, to allow for a broad classification of individual cities into homogeneous categories - or clusters – that, based on high level similarities between urban contexts, might help identifying characteristic features at the cluster level.

In the specific context of this study the basic idea is that cities can be differentiated according to the varying nature and severity of the sustainability issues they are concerned with, and that it is precisely such degree of severity that drives (or should drive) the choice of policy options, including the decision of whether an ARS might be effective and, if so, which type of ARS might better respond to the specific pressures to be faced.

In turn, the level of sustainability pressures can be primarily traced back to a limited number of critical parameters characterising each city:

- Population density, taken as a measure of the physical (theoretical) pressure associated to the ratio between available space and potential mobility demand.
- Presence of a “historical city centre”, as a signal of increased vulnerability, and of subsequent increased motivation to protect high value assets.
- Private motorisation (cars/inhabitant), which provides an indication of the potential density of private traffic.
- Extension of the Public Transport network, as a measure of the capacity to match mobility demand with collective transport.
- Modal shares, as a concrete measure of how current mobility patterns contribute to worsen/alleviate sustainability pressures.

Accordingly, Figures 69 through 71 below present the structure of the investigated sample with respect to the above critical indicators. Considering that the ultimate objective is to define a limited number of city profiles, each of the indicators is graded as High, Medium or Low along a specific, though rough, scale, i.e.

	High	Medium	Low
Population Density *(Inhab./km2)*	> 3000	1000 ÷ 3000	< 1000
Historical Centre*			
Private Motorisation *(cars/1000 Inhab.)*	> 600	400 ÷ 600	< 400
PT Network Extension *(km/km2)*	> 10	3 ÷ 10	< 3
Modal Shares: *(%)*			
Non-Motorised	> 30%	10% ÷ 30%	< 10%
Public Transport	> 20%	20% ÷ 35%	< 20%
Private Vehicles	> 50%	30% ÷ 50%	< 30%

(*The only source available is the UNESCO Historical Centre definition based upon a yes or no classification therefore this indicator has not been used for cities' classification)

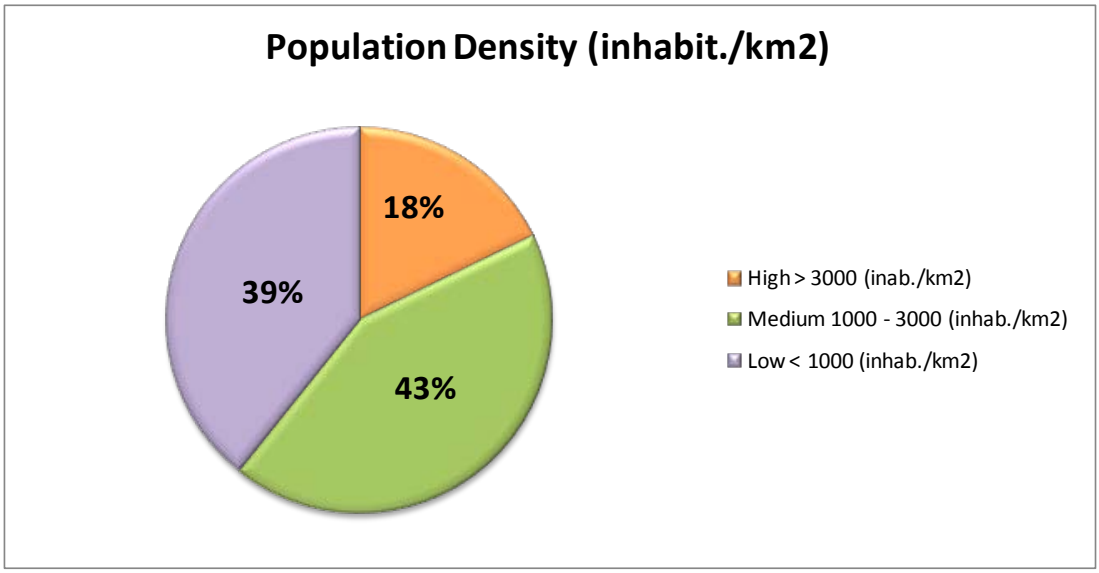


Figure 69 – Population Density Distribution

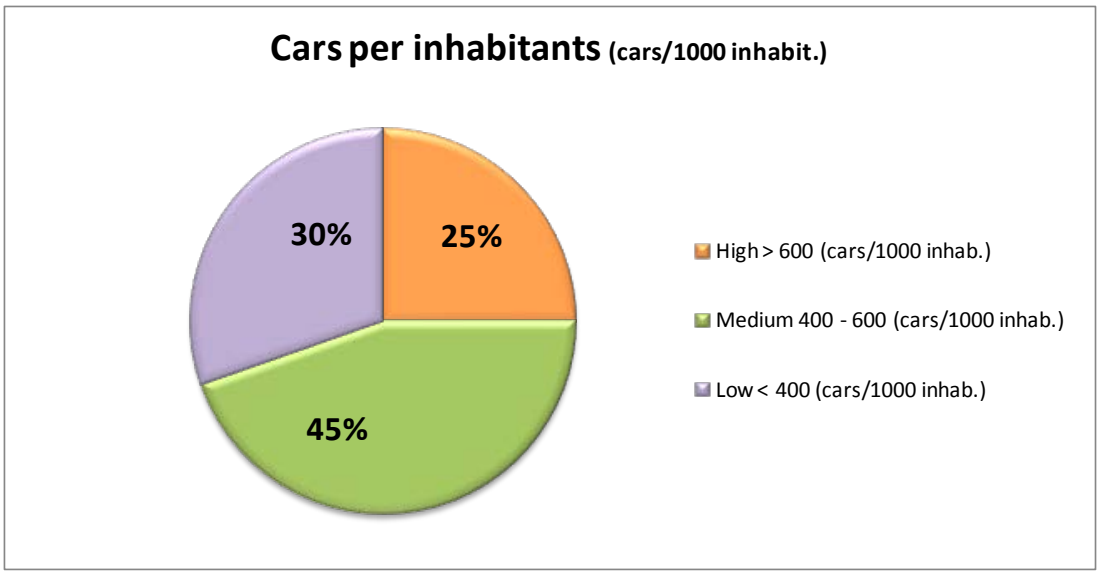


Figure 70 – Cars per Inhabitants

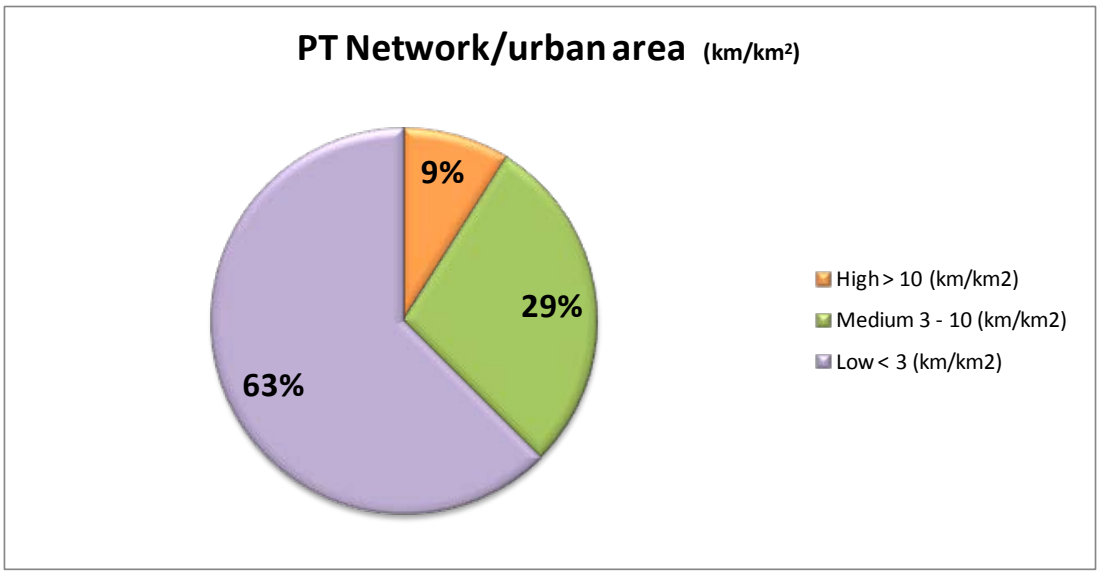


Figure 71 – Length of Public Transport Network per km2 of Urban Area

Remarks:

- The car density distribution is typical of western cities due to the marginal weight of eastern countries.
- The parameter relative to PT gives a rough indication of the coverage of the network, but is not representative of the level of service offered; such data were not available, in any significant amount, neither from the survey nor from other sources.

The modal split are reported in figure 72 to 74 covering non motorized modes, the PT and the private vehicles.

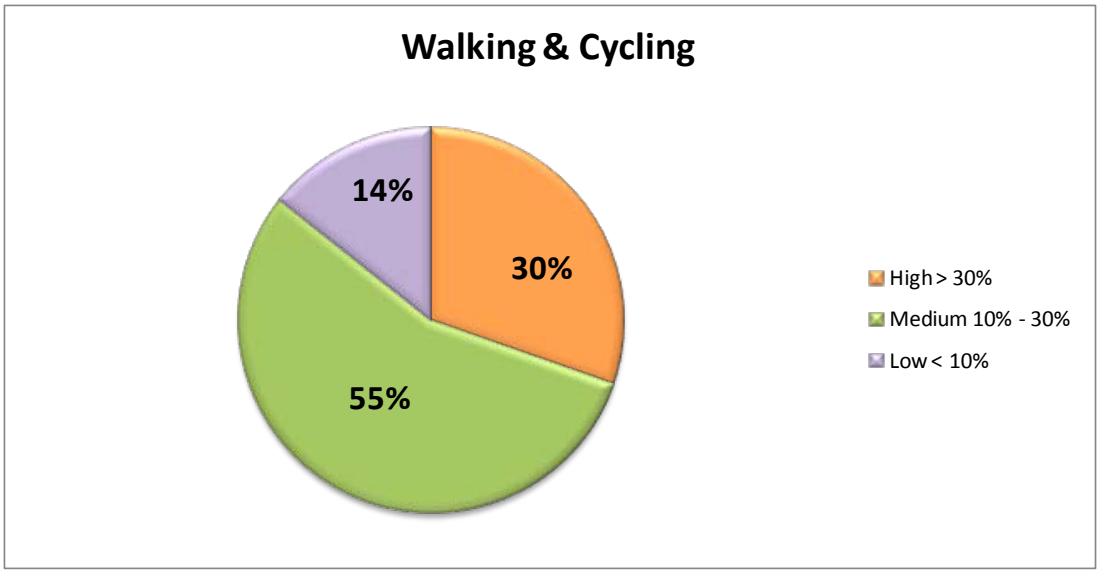


Figure 72 – Walking & Cycling

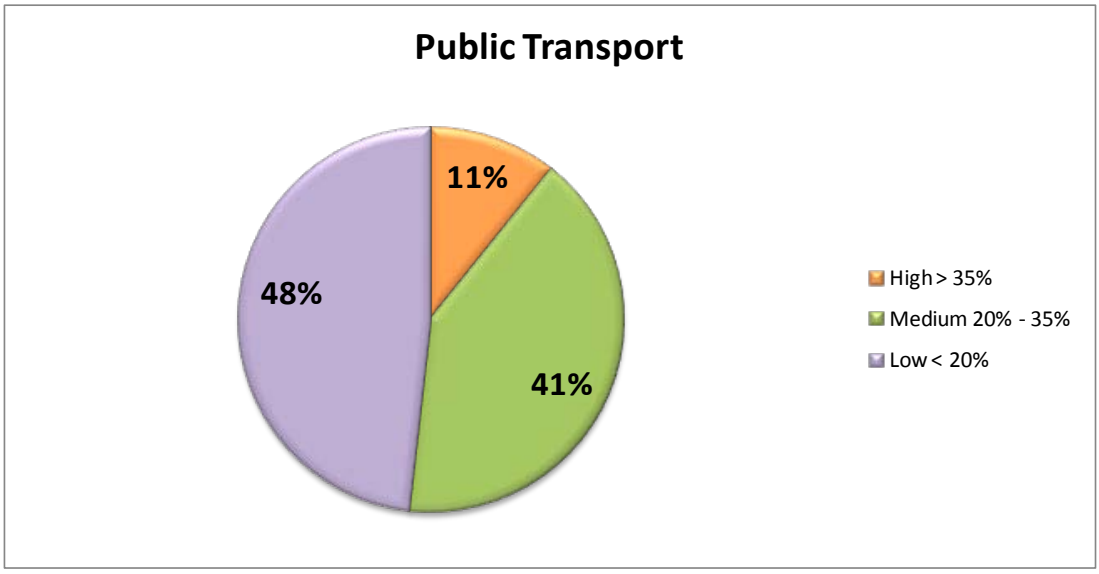


Figure 73 – Public Transport

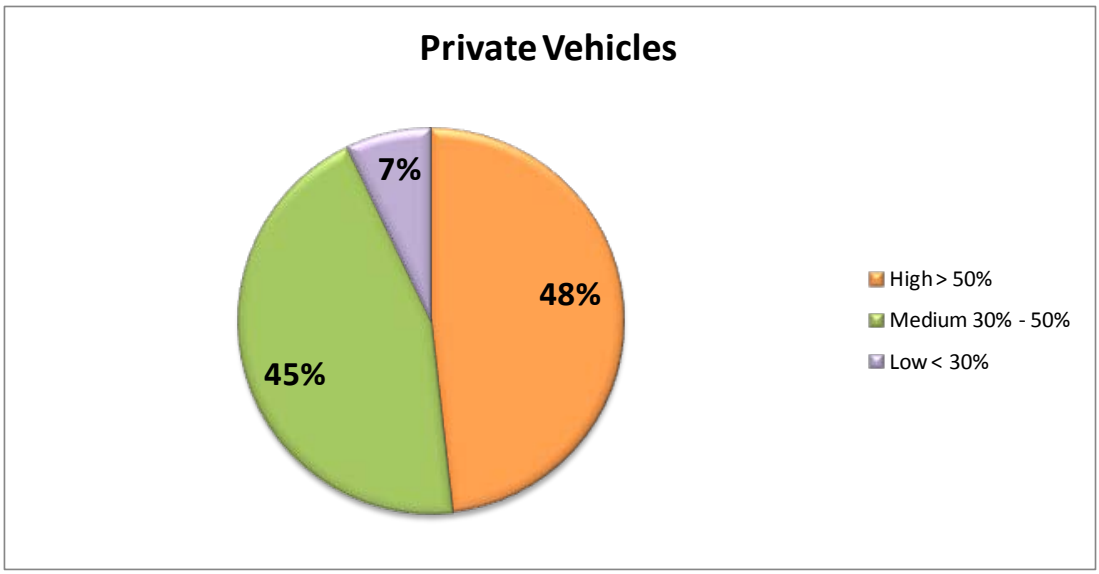


Figure 74 – Private Vehicles

As expected the private vehicles mode is largely prevalent.

Among the above indicators have been chosen the ones mostly representative; their combination result in the identification of three main clusters as follows:

- **"Critical cities"**, where very high traffic intensity is combined with a high use of private cars and relatively low shares of collective transport and non motorised modes. Such cities are considered "critical" in that they are most likely affected by acute air quality problems and high congestion levels.
- **"Semi-critical cities"**, for which although the intensity of traffic is high – thus entailing high congestion level – modal shares are more favourable (Public Transport and/or walking and cycling play a significant role), thus mitigating the overall picture.
- **"Non critical cities"**, where even an unfavourable modal split does not offset the major advantage of a relatively low traffic intensity.

The figures from 75 through 77 report the population of each cities sample of this classification.

		Pop. Dens.	Cars/inhab.	Non motorised	PT	Private
Critical Cities	Monza	H	H	L	L	H
	Toulouse	H	H	M	L	H
	Modena	L	H	L	L	H
	Perugia	L	H	L	L	H
	Rome	M	H	L	M	H
	Durham	L	H	M	L	H
	Ferrara	L	H	M	L	H
	Imola	L	H	M	L	H
	Potenza	L	H	M	L	H
	Verona	M	H	M	L	H
	Bristol	L	M	L	L	H
	Cambridge	L	L	L	L	H
	Cork	H	L	H	L	H
	Eindoven	M	M	M	L	H
	Gent	M	M	M	L	H
	La Rochelle	L	M	M	L	H
	Oslo	L	L	M	L	H
	Trondheim	L	L	M	L	H
	Ravenna	L		M	L	H
	Bauska	M	H	H	L	M
	Manchester	M	L	L	M	H
	Parma	L	M	M	L	H
	Verviers	M	L	L	M	H
	Aalborg	L	M	H	L	H
	Örebro	L	M	H	L	H

Figure 75 – Critical Cities

		Pop. Dens.	Cars/inhab.	Non motorised	PT	Private
Semi-Critical Cities	Utrecht	H	M	H	L	M
	Bologna	M	H	M	M	M
	Milan	M	H	M	M	M
	Funchal	M	M	M	M	H
	Amsterdam	H	L	M	M	M
	Szczecinek	L	H	M	M	M
	Munich	H	M	H	M	M
	Gateshead	M	M	M	M	M
	Riga	M	M	M	M	M
	Gdansk	M	M	M	M	M
	Stuttgart	M	M	M	M	M
	Nuremberg	M	M	H	M	M
	The Hague	H	L	M	M	M
	Hannover	M	M	H	L	M
	Göteborg	M	L	M	M	M
	Genova	M	L	M	H	M
	Helsinki	M	L	H	M	M
	Debrecen	L	L	M	M	M
	Stockholm	L	M	H	M	M
	Poitiers	L	M	H	L	H
	London	H	L	H	M	M
	Rotterdam	M	L	H	L	M

Figure 76 – Semi-Critical Cities

		Pop. Dens.	Cars/inhab.	Non motorised	PT	Private
Non Critical Cities	Turnhout	L	M	H	L	M
	Edinburgh	L	L	M	M	H
	Craiova	M	L	M	H	M
	Reading	H	M	H	H	L
	Krakow	M	M	H	H	L
	Berlin	L	L	M	H	M
	Lund	M	L	H	L	L
	Bergen	L	M	H	L	H
	Burgos	H	L	H	H	L
	Nord-Jaeren	L	M	H	H	H

Figure 77 – Non-Critical Cities

The outcomes of the scheme adopted by each city have been "analyzed" according to the three levels of cities clustering , as reported by the Figure 78 below.

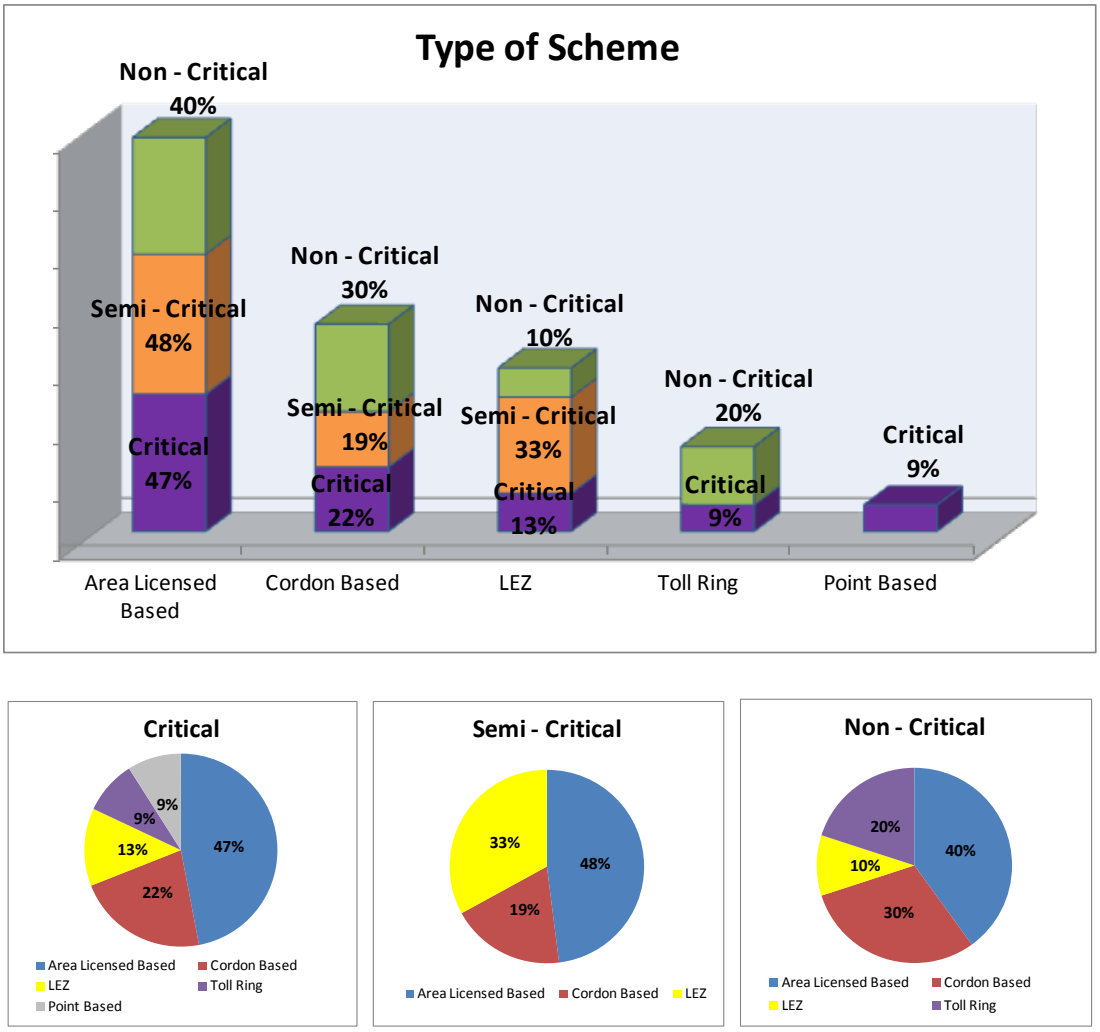


Figure 78 – Type of Scheme

The outcomes confirm the prevalence of the adoption of the area licensed based scheme, solution selected by the large majority of critical cities.

Looking at the scheme objectives per city typology, the critical ones aim as first objective to traffic/congestion reduction as expected; it is also understandable that the semi-critical ones could identified the environment as primary interest. Less understandable are the choices of the sample classified as non-critical cluster.

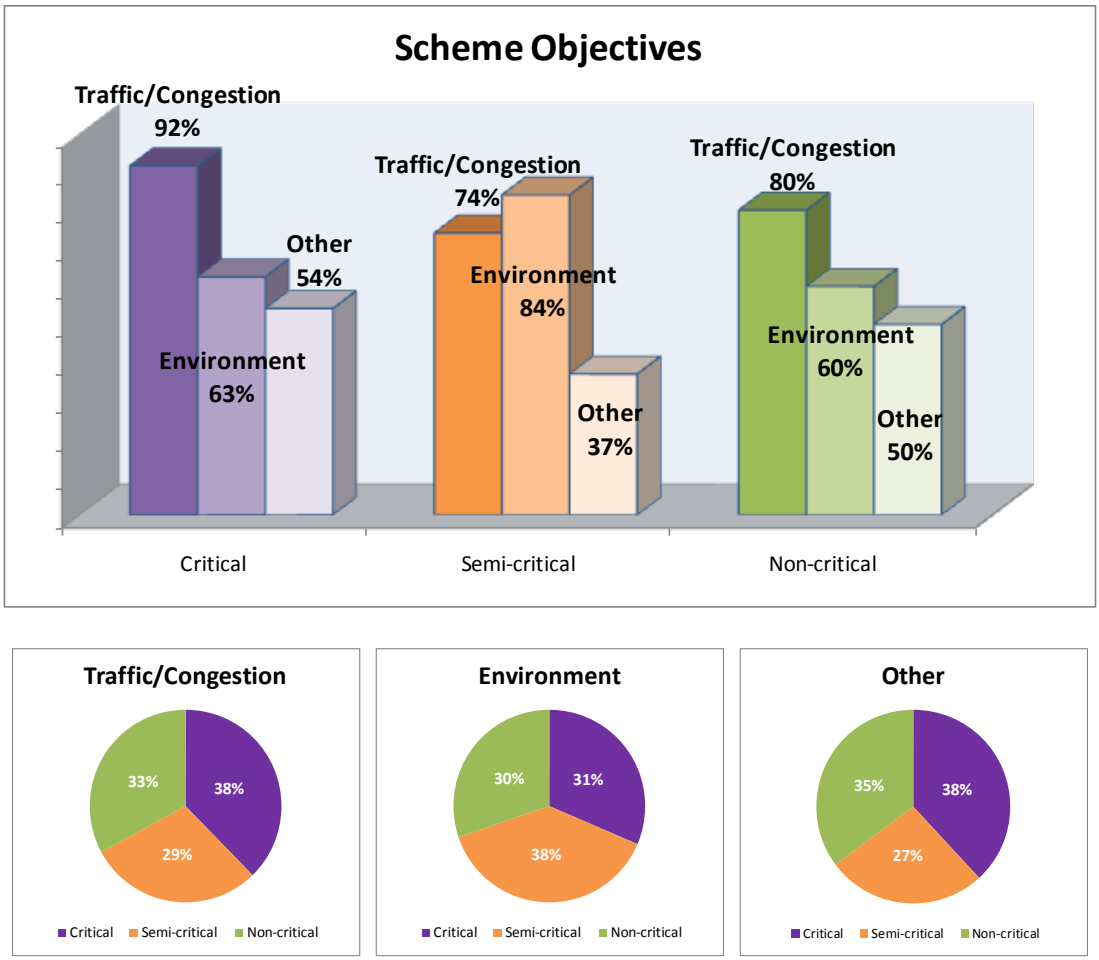


Figure 79 – Scheme Objectives

The targeted traffic priorities are quite uniform through the three clusters. It is interesting to note the relative importance given to the freight traffic representing a more critical issue in presence of a relative low overall vehicular pressure (See Figure 80).

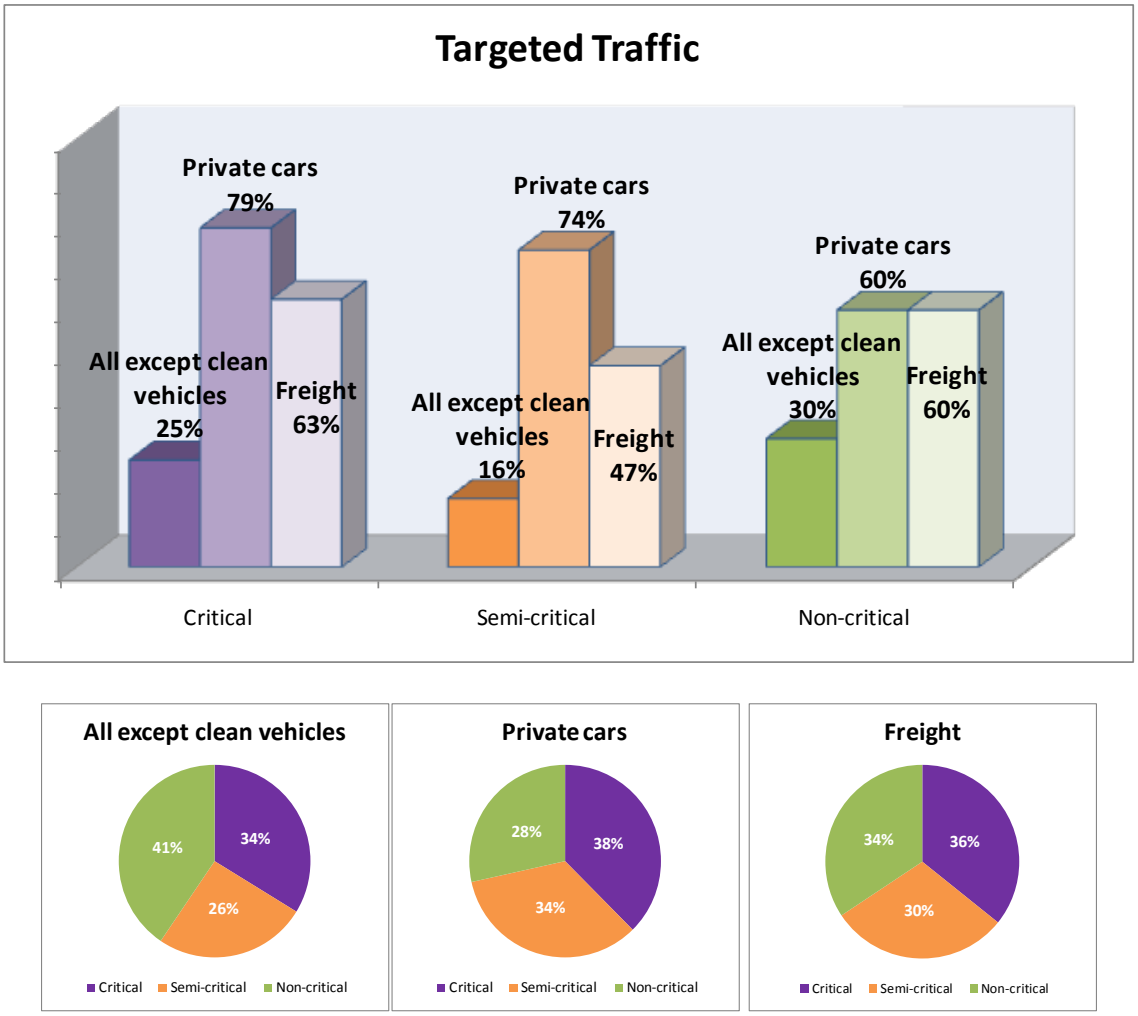
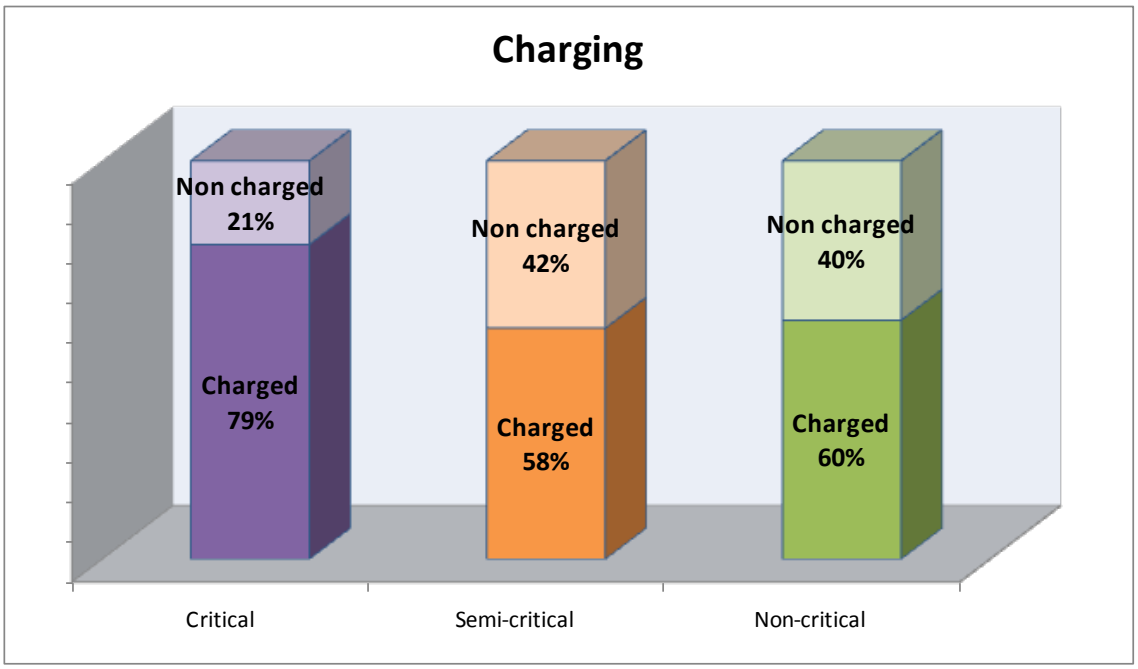
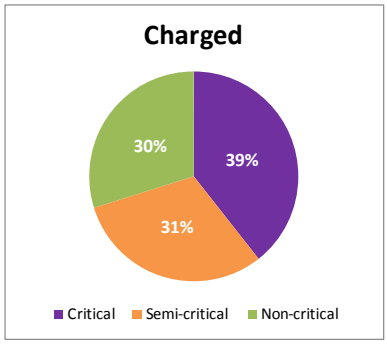


Figure 80 – Targeted Traffic

Analyzing the same features (i.e. charging, technology, level of exemptions, time of the operation, pricing) under the light of cities clustering, the results are reported in figures 81 to 85.





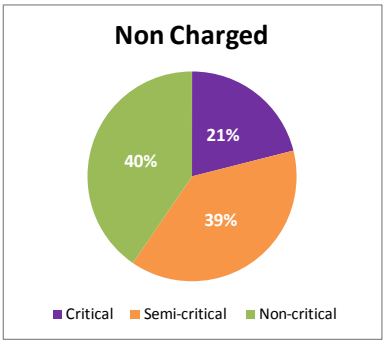
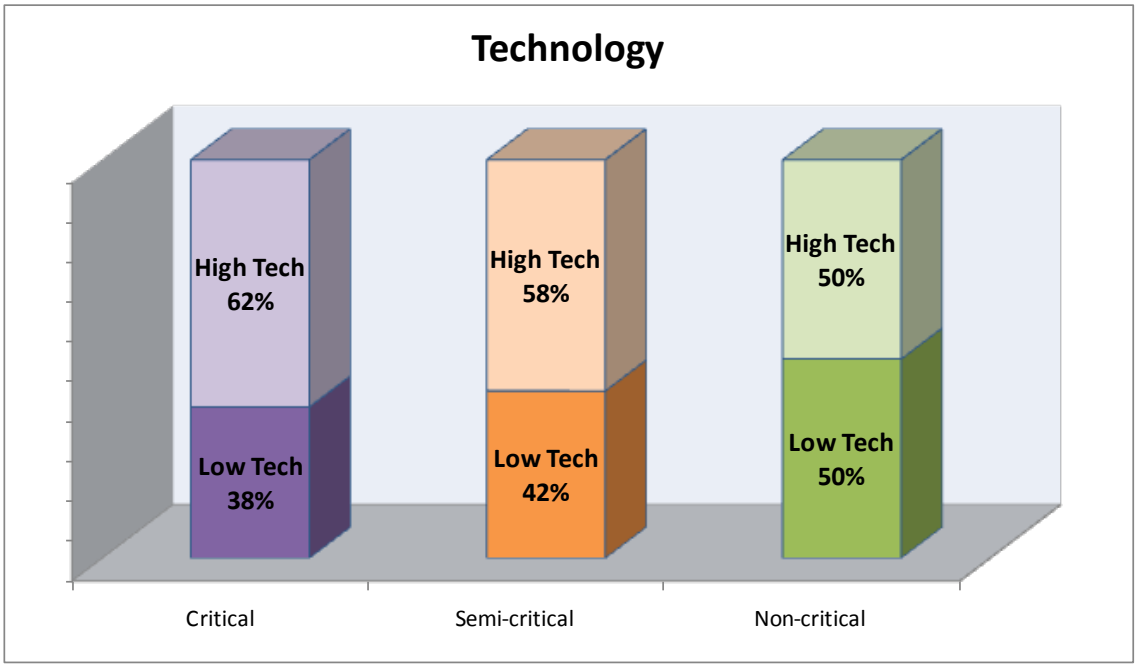
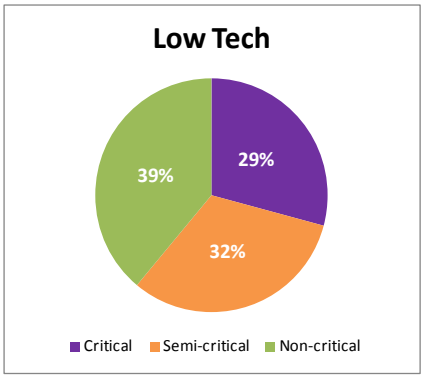


Figure 81 – Charging





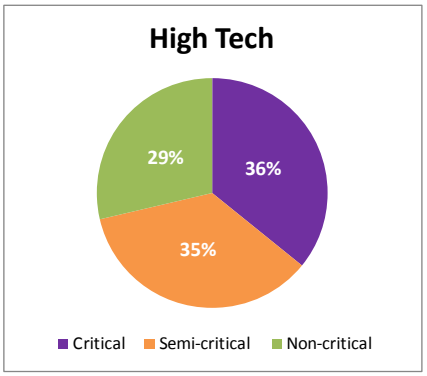


Figure 82 - Technology

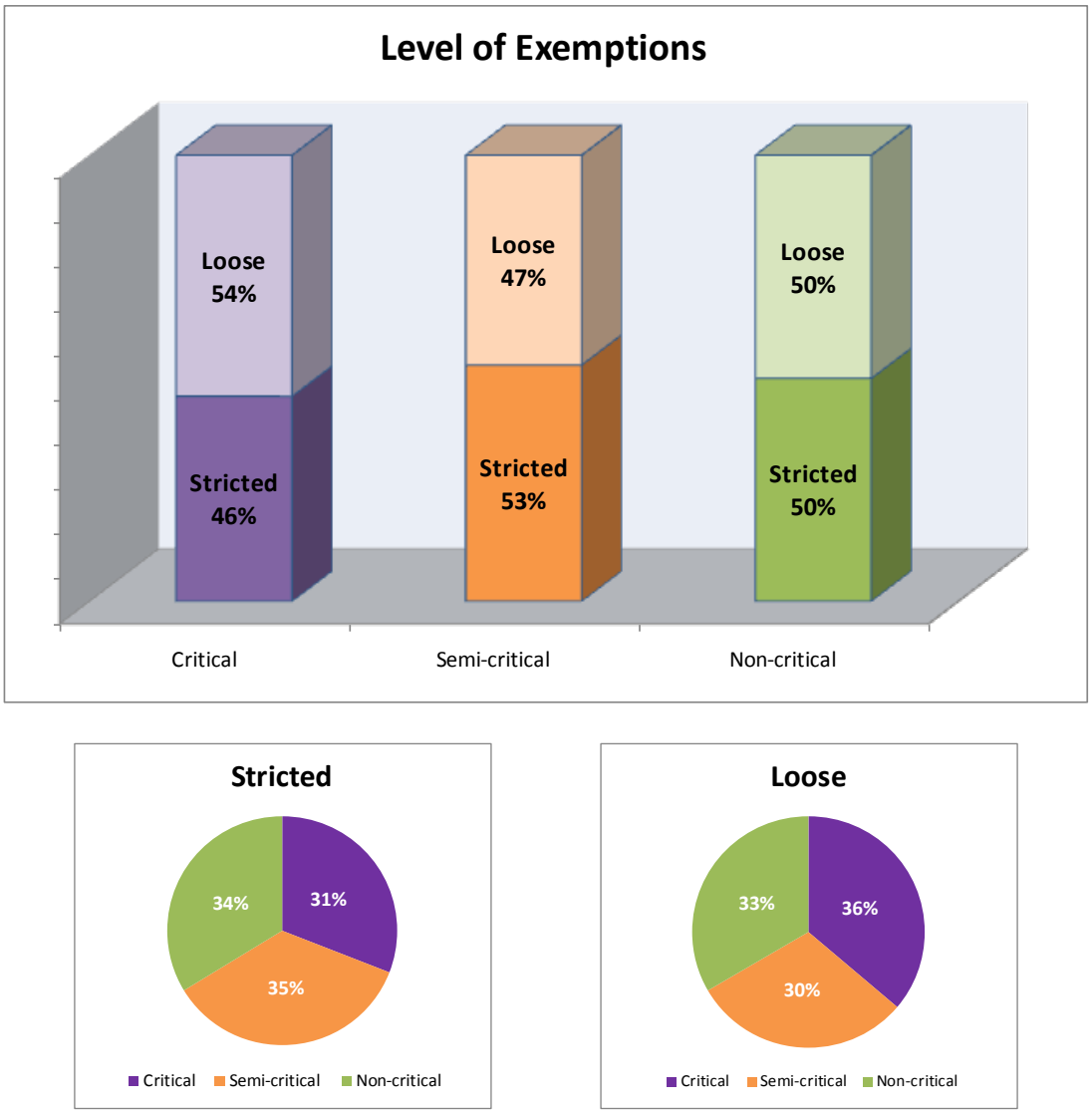


Figure 83 – Level of Exemptions

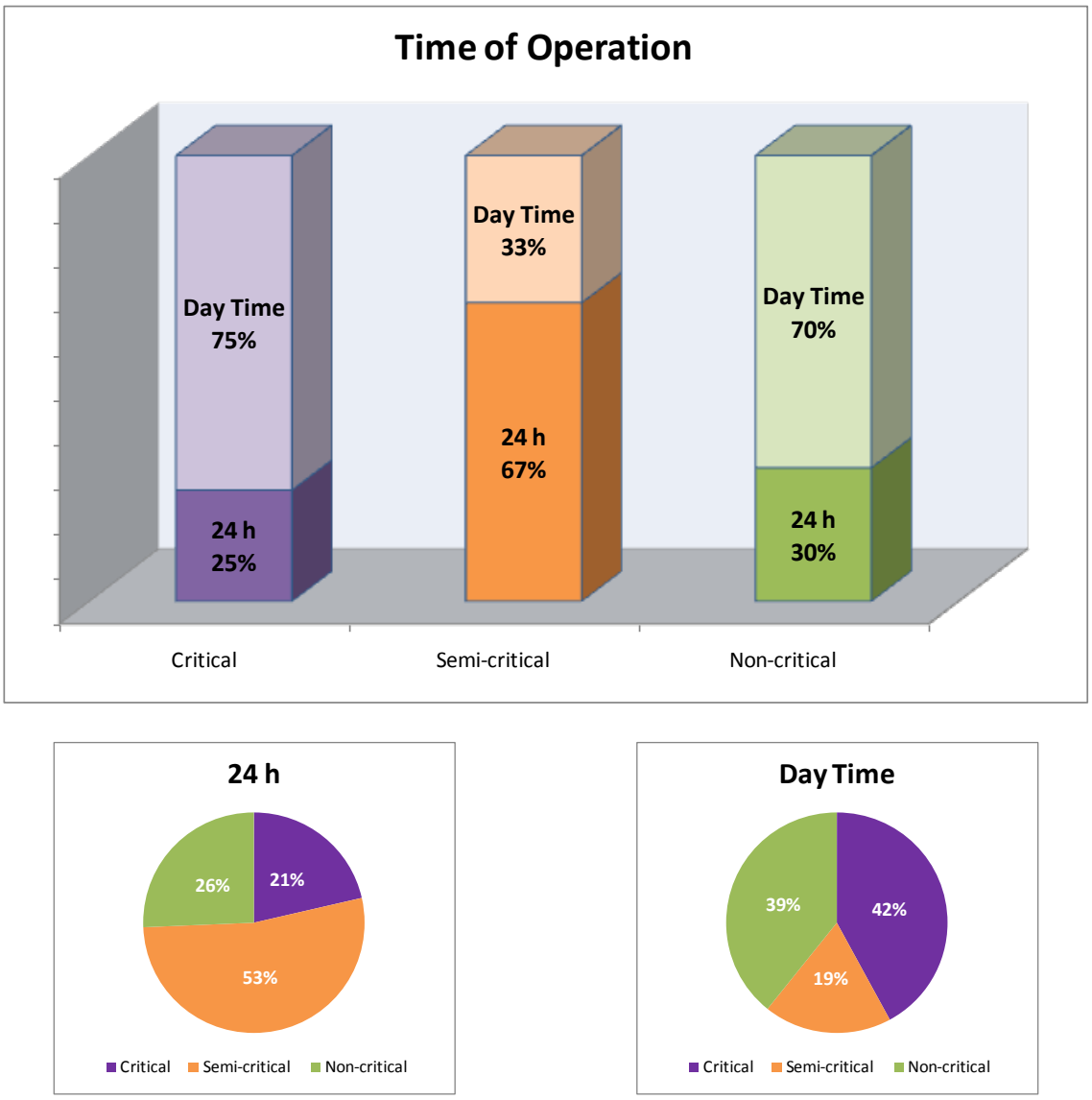
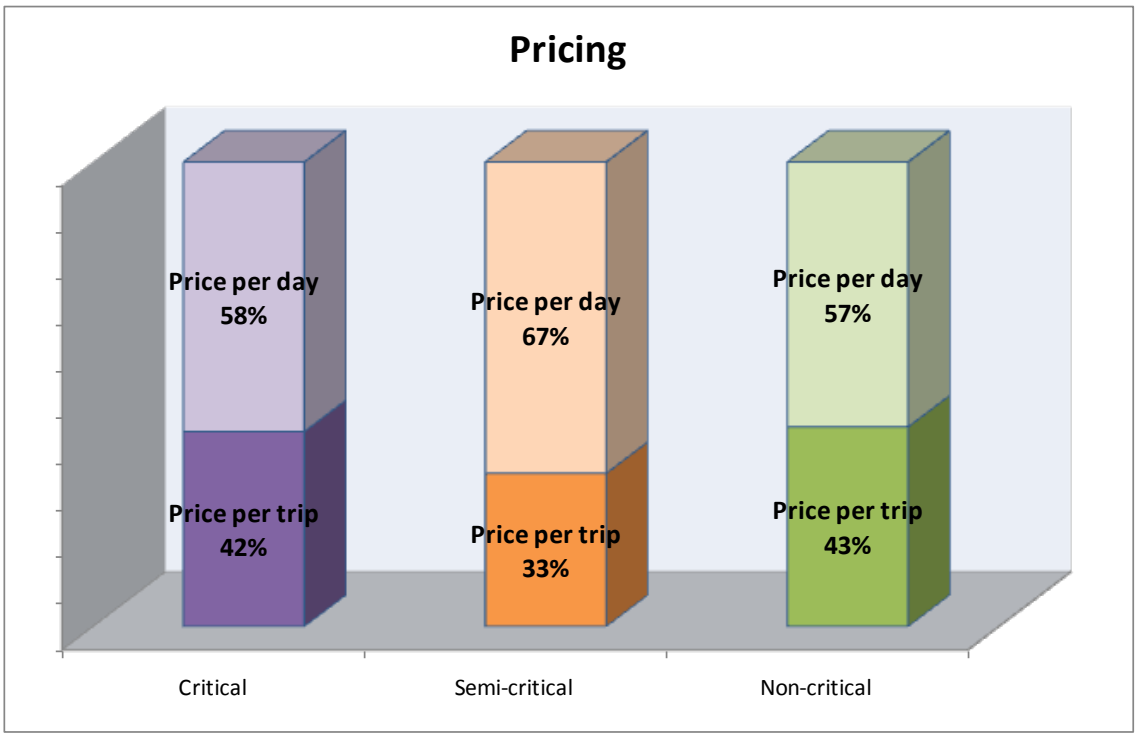
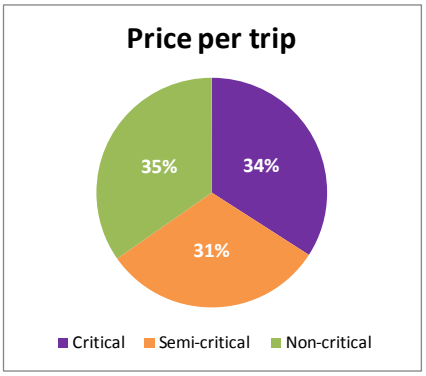


Figure 84 – Time of Operation





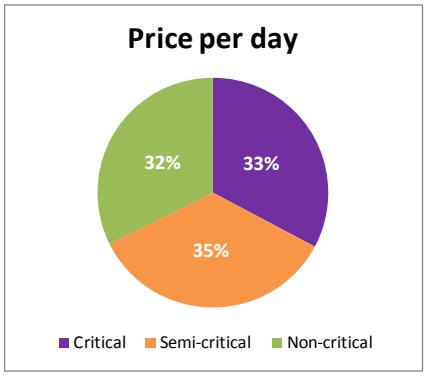


Figure 85 – Pricing

Results are dealing to the following considerations.

Critical cities adopt in large majority **charging** schemes implemented with an high rate of **technology**, **priced** per day and enforced in the **day time** period; **exemptions** are quite balanced (loose vs. strict).

Semi-critical and non critical cities behave in similar way concerning **charging**; schemes are almost balanced in terms of charging/no charging solutions, therefore quite far from the policy of critical cities. Adoption of **high tech** solutions is quite uniform across the three classes (slightly over 50%). The latter consideration applies to the level of **exemptions** too. Similarities can also be found comparing the **pricing**, where the per day charging is prevalent, whereas the day time enforcement largely adopted in the schemes of critical and non-critical clusters is a kind of residual policy for the semi-critical cities.

Regardless the scheme solution adopted the citizen representatives, the service providers and the supply chain operators are largely involved in all cities dealing with ARS policy.

Looking at this issue though the three clusters no major differences can be identified.

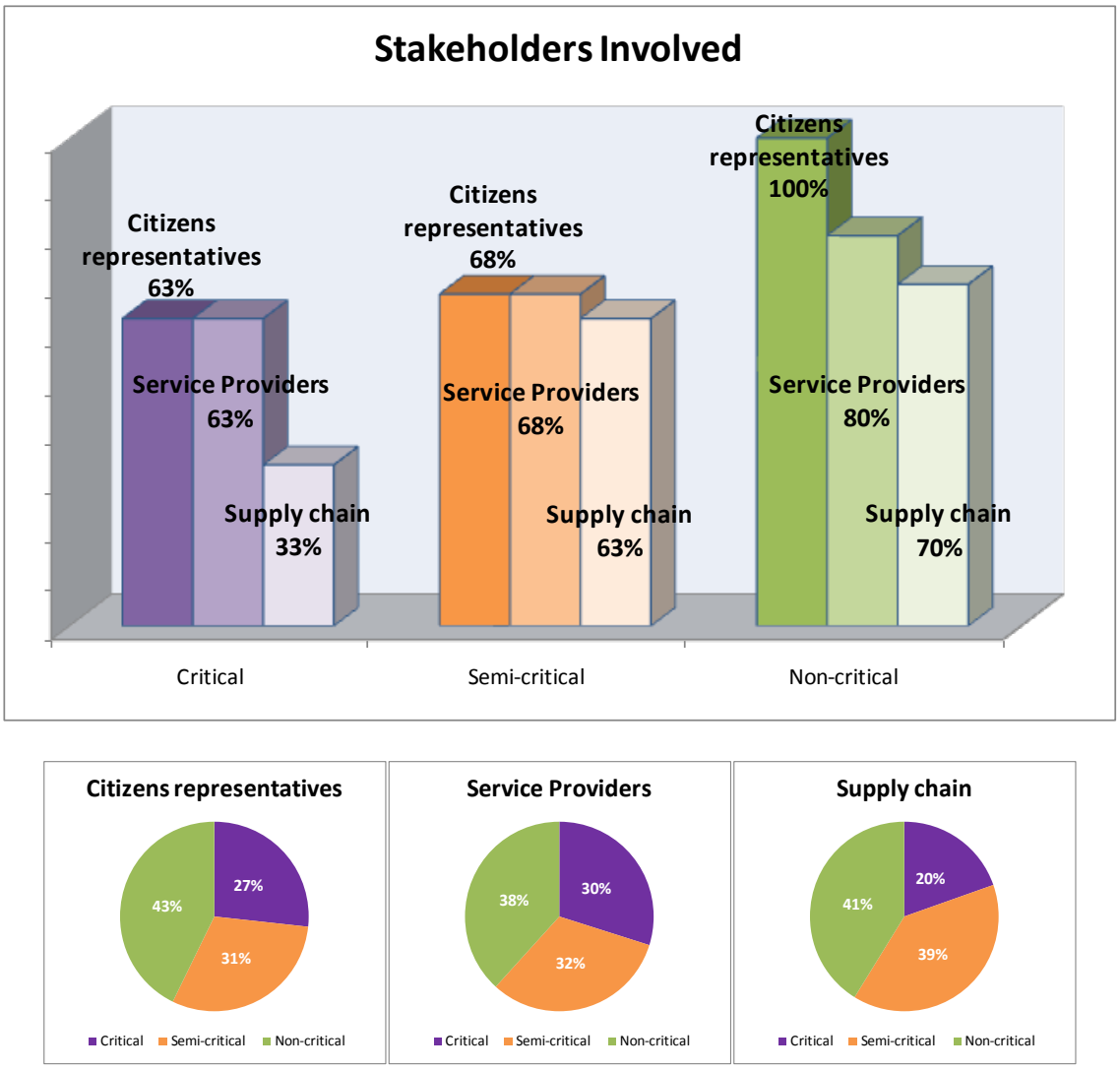


Figure 86 – Stakeholders Involved

Users and stakeholders represents also one of the major barriers the cities had/have to overcame during the process of implementation of any kind of scheme in any of their typology (critical, semi-critical, non-critical).

Again, regardless of the scheme adopted and its typology, other relevant barriers always encountered by cities are represented by the local a**dministrations constrains** and e**conomic issues.**

Legislation is not perceived as a major obstacle in critical cities; on the contrary represents an issue according to the cities belonging to the semi-critical and non-critical clusters. However, the legislation regulating the access restrictions in cities is very inhomogeneous throughout the European countries and is not suitable to be an aggregated indicator (Figure 87 and Figure 88).

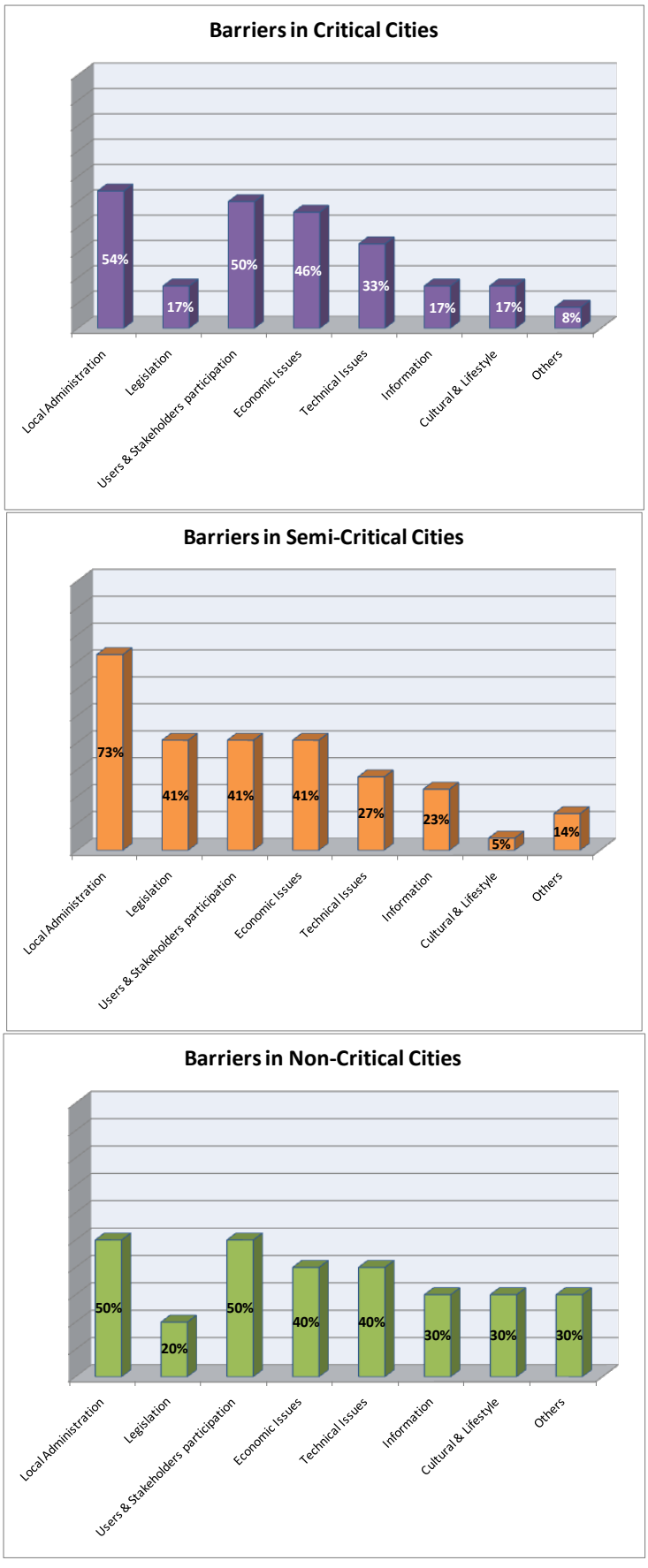


Figure 87 – Barriers in Critical, Semi-Critical and Non-Critical Cities

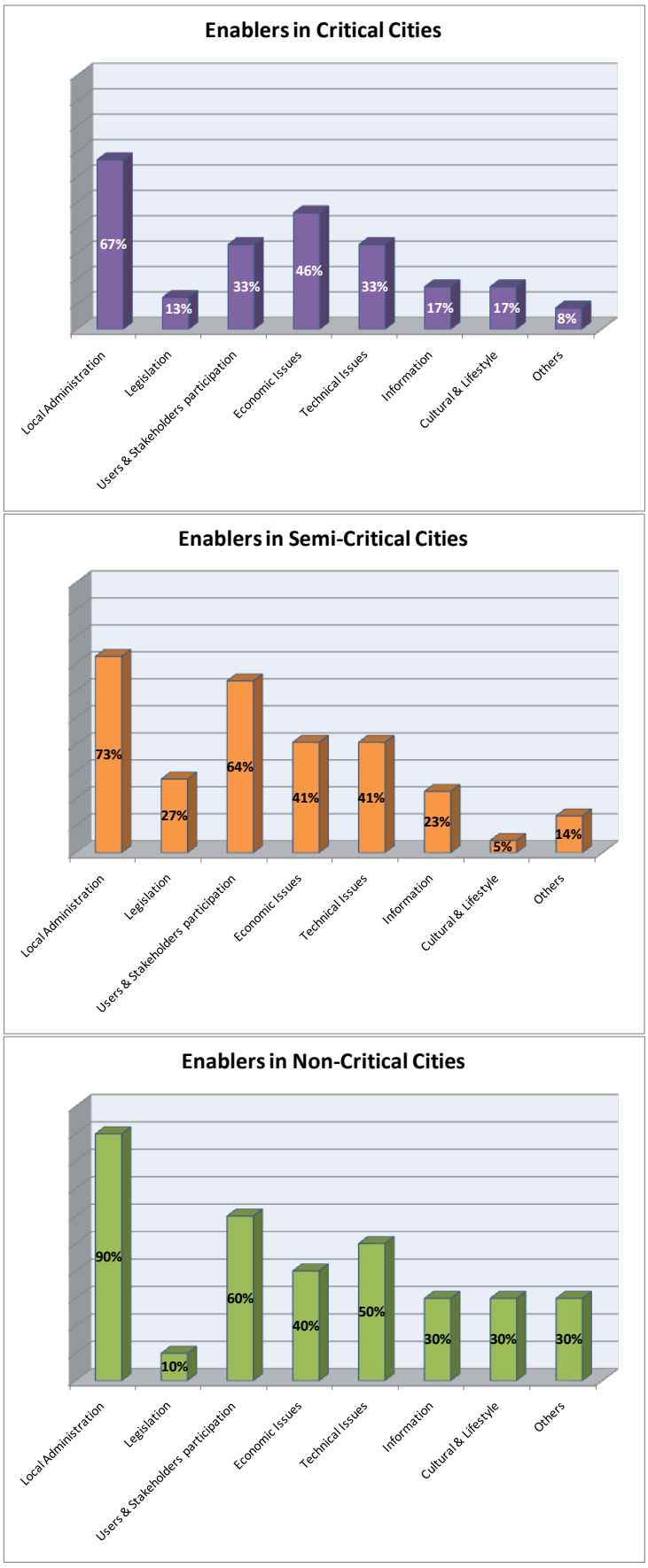


Figure 88 – Enablers in Non-Critical Cities

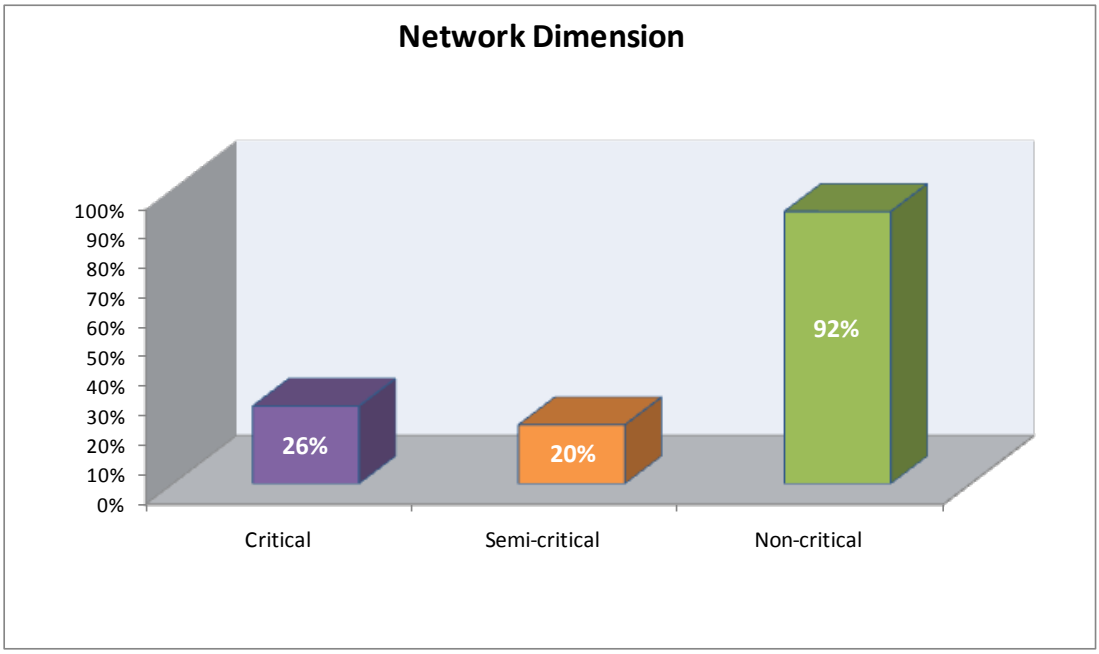


Figure 89 – Network Dimension by Type of City

By considering the network indicators from the type of city criterion perspective, it can be seen (Figure 89) that critical cities, due to the pressing need of decreasing traffic congestion, have achieved on average a good decrease closed to 30%, while the semi-critical cities are characterised by a mean percentage decrease of 20%; finally, the non-critical cities, due to their low share of private motorised users, can reach significant results – in our case closed to 90% on average.

Annex 3 – Information on ARS impacts on network dimension from questionnaires

City	ARS impacts on network dimension
Bergen	Despite a slight decrease in the beginning, there has been an average annual traffic growth of 2-3%.Since there are no natural detours, there has been little impact on route choices.
Bologna	Decrease in number of vehicles entering the zone (% vehicles/day): in the LTZ 25% and inside the "T zone" 3%. Unauthorized use of bus lanes: - 70%. Reduction of 27% of freight operators permits and 10% of total permits (operators plus citizens) to access in the LTZ has been achieved.
Burgos	Decrease number of vehicles entering the zone: -97% inside LTZ.
Cork	50% reduction in lane capacity on St. Patrick's Street and a 2% reduction in the overall level of car traffic.
Durham	The introduction of the scheme achieved an 85% reduction in vehicular traffic (from over 2000 to approximately 200 vehicles per day).
Edinburgh	Significant reduction in traffic levels and delays within the city centre. An increase of 5% in total journeys terminating in the city centre by all modes. A small reduction in overall traffic levels and delays between the inner and outer cordons, and only small changes outside the outer cordon. Slight increase in orbital traffic between the cordons, with some localized changes that would require mitigation measures. An increase in public transport use of around 10%.
Gent	Decrease in number of vehicles entering the zone: 40% within the area and 75% cut through traffic.
Göteborg C.C.	Decrease in number of vehicles entering the zone: -15%
Göteborg LEZ	48% reduction in vehicle traffic despite increased vehicle ownership by residents
La Rochelle	Change in average vehicle speed in the zone (km/h): +30%
London C.C.	Decrease in number of vehicles entering the zone (% vehicles/day): -16% and in West Extension Zone: 14% Change in average vehicle speed in the zone (km/h): 1.2 km/h increase in average speeds in the central area until 2006-2009 when this dropped 2.1 km/s Mean excess travel rate was 2.3mins/km in 2002, 1.6mins/km in 2003, and

City	ARS impacts on network dimension
	back to 2.3mins/km in 2008
Lund	Decrease in number of vehicles entering the zone (% vehicles/day): -80%
Milan	Vehicles accessing the Ecopass Area: -67% of Euro 0, Euro 1 and Euro 2 vehicles; +16% Euro 3, Euro 4 and electric/hybrid vehicles The traffic reduction, both private and commercial during the enforcement: within Ecopass area -17.1%; -8.4% outside the zone. Commercial speed of PT increased by 8.1%. The increase of passengers using the metro for travelling towards and within Ecopass area has been 6.2% during the first year of implementation, while during the second year has been only 3%.
Modena	Decrease in number of vehicles entering the zone (% vehicles/day): -21%
Munich	Decrease in number of vehicles entering the zone (% vehicles/day): none Change in average vehicle speed in the zone (km/h): none
Nuremberg	After one year, traffic in the historic city reduced by -25 % and the increase in traffic in adjacent street ranging between 4 and 19 %
Oslo	The Oslo Toll Ring is in the short term calculated to increase road traffic by 8-10%. (It should be considered that the expected traffic growth from 2001 to 2025 without the toll ring is around 30 %)
Ravenna	Number of LDV trips in the restricted area has been reduced by 4%.
Reading	12% of HGVs (560 vehicles) would be affected, of which 70% would pay (and others upgrade or switch vehicles to avoid the LEZ) – [Estimate]
Rome	Decrease in number of vehicles entering the zone (% vehicles/day): -18% Change in average vehicle speed in the zone (km/h) : +4% private cars; +5% PT
Stockholm	Decrease in number of vehicles entering the zone (% vehicles/day): 22% Reduction in queuing between -3 and -50%
Stuttgart	Decrease in number of vehicles entering the zone (% vehicles/day): 10% HGV (forecast 2005). There has been a change towards cleaner vehicles.
The Hague	Reduction of rush-hours car trips by about -50%. Shift to public transport occurred, but with a moderate percentage.
Toulouse	Decrease in number of vehicles entering the zone (% vehicles/day): -60%

City	ARS impacts on network dimension
Trondheim	Inbound car traffic through the toll cordon decreased by -10% during charged periods, almost offset by an 8-9 % increase during uncharged periods. The total increase for working days constituted 7.5 %. Traffic in 2006 between 05:00 and 06:00 decreased by 11 % whilst traffic between 06:00 and 07:00 increased by 11 %. In the afternoon, shifts in departure times to avoid being charged are even more evident.
Turnhout	Decrease in number of vehicles entering the zone (% vehicles/day): -100%

Annex 4 – Information on ARS impacts on economic dimension from questionnaires

City	ARS impacts on economic dimension		
	Investment costs	Operating Costs	Revenues
Bergen	-	-	First toll ring revenue used for road infrastructure investments New one funds also PT infrastructure
Bologna	-	-	In 2007, € 108,000 were earned The revenues will be used to finance the building of news roads, for maintenance of the existing ones, and for improving PT network
Burgos	€ 3.000.000	€ 300,000 (per year)	€ 0 (per year) - Revenues from charges € 1,000 (per year) - Revenues from fines
Cork	€ 500.000	€ 30,000 (per year)	-
Durham	-	-	Revenues raised have been used to support a frequent bus service to and from the charging area i.e. the WHS
Eindoven	-	-	Revenues from fines go to the Central Government
Göteborg C.C.	€ 100.000.000	€ 20,000,000 (per year)	€ 100,000 (per year) - Revenues from charges
La Rochelle	€ 251.000	€ 3,000 maintenance costs and € 70,000 operational costs, per year	-
London C.C.	€ 250,000,000 (at 2002 prices and exchange rate)	(mil. € per year): £131m = c.€144m (2010 exchange rate)	€ 215,000,000 (per year) - Revenues from charges (2010 exchange rate) €83,000,000 - Revenues from fines (2010 exchange rate)
London LEZ	€ 65,000,000 (at 2008 exchange rate)	€11,900,000 (at 2010 exchange rate)	€5,500,000 – 7,800,000 (per year) - Revenues from charges *[ESTIMATE]*
Lund	€ 1.000	-	-
Manchester	-	-	One of the conditions for funding any proposed scheme was that any revenue raised would be re-invested into public transport schemes.
Milan	-	-	During the period between January 2008 and September 2009 the revenues from Ecopass tickets have been € 19,500,000; of which 68.7% comes from the paper tickets sold by authorized shops.
Modena	€ 370,000 (Dec. 2008)	€ 147,000 (Dec. 2008)	€ 150,000 (per year) - Revenues from charges -€ 3,700,000 (per year) - Revenues from fines

City	ARS impacts on economic dimension		
	Investment costs	Operating Costs	Revenues
Munich	none	-	-
Nord-Jaeren		€1,440,000 (estimate for first year of operation) Actual cost more than twice and increasing every year.	The revenue raised by the Nord Jæren package will be used for both road, rail and cycling/walking.In addition some revenue will also be used to improve the local environment and liveability of the area.
Oslo	€ 35,800,000 (tolling system in Oslo package 1)	€ 16.800.000	By the end of 2007, the toll ring of Oslo package 1 has contributed 13,235.4 mill NOK (2007 value) (1,654 M€) to infrastructure investments in the Oslo region. In addition the toll ring has covered all operational costs and interest. The fare hike in the toll ring from Oslo package 2 will provide another 1,169 mill NOK (2007) in infrastructure investments by the end of 2007. In Oslo package 1, 20% of the investments were allocated to public transport infrastructure. All the extra revenue raised by Oslo package 2 has been earmarked for public transport infrastructure.
Perugia	€ 450,000 (2002)	€ 160,000 (2008)	€ 240,000 (per year) - Revenues from charges (2009) € 1,800,000 (per year) - Revenues from fines (2009)
Poitiers	€ 27.000.000	-	-
Reading	£1,990,000 (for design and implementation of the LEZ)	£ 540,000 (per year)	£ 1,150,000 (per year) - Revenues from charges
Rome	€ 1.900.000	€ 1,500,000 (per year)	€ 15,000,000 (per year) - Revenues from charges € 74,800,000 (per year) - Revenues from fines (includes costs and revenues for the entire LTZ system in Rome)
Rotterdam	€ 500.000	€ 100,000 (per year)	€ 500,000 (per year) - Revenues from charges
Stockholm	€ 200.000.000	€ 25,000,000 (per year)	€ 85,000,000 (per year) - Revenues from charges + revenues
Stuttgart	€ 200,000 (only signage)	€ 0 (only surveillance)	€ 0 (per year) - Revenues from charges
Toulouse	€ 500.000	€ 150,000 (per year)	-
Trondheim	-	10-11% of gross revenues throughout its period of operation.	1,818 million NOK (227.25€) in gross revenues.

Annex 5 – Information on surveys and/or consultations performed by cities to raise ARS acceptability

City	Survey	Consultation	Comments
Bergen	✓		Originally around two thirds of Bergen population was against the toll ring.-At present, the majority accepted the toll ring.
Berlin		✓	-
Burgos		✓	45% of favourable people before the scheme implementation
Cambridge	✓		The key issues arising from the consultation activities to date are that designers should consider: Discounts and exemptions of any proposed scheme; Outbound trips should be thought about as well as inbound trips; The cost of alternatives to car-borne travel; The need for alternatives to be in place before any charge; The extent of the charging zone; Timescales; and The need for action to reduce congestion.
Cork		✓	-
Craiova		✓	Consultation to be undertaken
Debrecen	✓		-
Edinburgh		✓	In 1999, there was a public consultation; around 19,000 responses to questionnaires were received with high levels of support (62%) shown for the strategic option including the concept of congestion charging. There was also extensive consultation with stakeholders. -The conclusions were that congestion charging was feasible, would reduce traffic levels, could generate substantial revenue for transport investment and would have no or very limited adverse economic impact if the charge was set at an appropriate level. In addition, there was a high degree of acceptance. Moreover, a comprehensive programme of consultation and market research was developed for the Council by the University of Westminster.
Göteborg C.C.	✓		25% of favorable people before the scheme implementation
La Rochelle	✓		between – 50% and 78% of favorable residents and professionals before the scheme implementation

City	Survey	Consultation	Comments
London C.C.	✓	✓	Percentage of favorable people before the scheme implementation: Stakeholders – 56% General public – 36% Other organizations – 25%
London LEZ	✓	✓	75% of favorable people before the scheme implementation
Manchester		✓	Before the public referendum three out of the ten local Metropolitan Borough Councils (Trafford, Stockport and Bury) had made clear statements that they opposed the planned scheme
Milan	✓		A survey carried out after one year of scheme implementation has shown that 74% of interviewees considers Ecopass totally useless in reducing air pollution; moreover the 60% would be in favor of a referendum about the real benefit of a city access charge. The 77% of residents interviewed thinks that alternative measures should be considered for air pollution abatement. 68% of respondents approves the proposal of the President of Milan province to increase of 0.20 € the highways tolls for drivers heading toward Milan and using the incomes for PT improvements (mainly metro and trains).
Modena	✓		70% of favourable people before the scheme implementation (2007)
Munich	✓		

City	Survey	Consultation	Comments
Oslo	✓		Each year since 1989 a survey of attitudes towards the toll ring has been carried out among the citizens in Oslo and Akershus. Results show that there is no overwhelming public support for the packages. Acceptance has increased over time since each scheme was introduced. The introduction of Oslo package 2 in 2001, and the corresponding fee increase, reduced acceptability. After a few years acceptability was back to the pre-Oslo package 2 levels. In 1989, more than 60% of the people in favour of the toll ring explained their reason as reduced car traffic, and 25% explained it as providing increased funds for road investments. In 2006 this had reversed, with more than 50% being in favour due to more funds for road investments and 25% due to reduced car traffic, this situation had been quite stable since 1994, indicating that the change occurred from 1989 to 1994. The reasons why people are negative to the toll ring has much to do with the overall tax level of car usage.
Poitiers		✓	-
Reading		✓	Consultation stages are to be undertaken
Rome	✓		Neither residents nor shop owners are in favor of the removal of the access control and its replacement with a full road-pricing policy. However, the percentage of residents who think that a full road-pricing scheme is not a good idea is greater than that of shop owners. Moreover, this percentage increased from 44% to 51.2% for residents, while it decreased from 44.5% to 38.0% for the shop owners.
Stockholm	✓		35 – 37% of favorable people before the scheme implementation (Autumn 2005)

City	Survey	Consultation	Comments
Trondheim	✓		A shopping survey in 1990 concluded that 25% of respondents in Trondheim and surrounding areas were likely to change their shopping behaviour because of the toll ring. The follow-up study in 1992 revealed that only 10% of respondents had changed their shopping behaviour. A Trondheim Chamber of Commerce carried out a special of trade turnover in Trondheim starting September 1991 and ending September 1992. The Chamber of Commerce in its own study concluded that there was hardly any effect of the toll ring on trade at all. Opinion polls on the attitudes to the Trondheim toll ring indicated decreased opposition after implementation. In 2003, the support decrease. This was related to negative publicity and discussions at that time about the immediate introduction of five new charge stations close to the city centre. When respondents in 2005 were asked about their attitudes to urban tolling, taking into account the use of revenues, the negative share decreased from 47% to 38%, and the positive share increased from 19% to 30%. In 2006, the negative share dwindled to 27% and the positive share increased to 48%.

Annex 6 – Relevant statistical data showing the key impacts in the charging area and in Inner and Outer London of charges at £5 and £8 per day

	units	charge	Central	Inner	Outer	
Vehicle km per charging day	000	£0	1532	15100	32929	
including induced trips		£5	1276	14722	32708	
		£8	1237	14678	32684	
Vehicle km reduction per charging day	000	£5	256	378	221	
including induced trips		£8	295	422	245	
	%	£5	16.7%	2.5%	0.7%	
	%	£8	19.3%	2.8%	0.7%	
Vehicle km reduction per year	million	£5	63.232	93.366	54.587	
including induced trips		£8	72.865	104.234	60.515	
Vehicle hours per charging day	000	£0	109	691	1018	
		£5	78	657	1004	
		£8	73	653	1003	
Vehicle speeds, km per hour		£0	14.1	21.9	32.2	
		£5	16.4	22.4	32.4	
		£8	16.9	22.5	32.4	
Hours saved per charging day		£5	11953	14245	5812	
by remaining traffic		%	37%	45%	18%	
allowing for induced traffic and out of hours savings		£8	14312	16059	6409	
		%	39%	44%	17%	
Values of time, 2005 values and prices						
per person hour	£ per hour		25.06	16.79	12.81	
per vehicle hour	£ per hour		30.33	22	17.64	
Value of time saved	£ million	£5	89.5	80.4	26.6	
	%		46%	41%	14%	
		£8	107.2	91.3	29.2	
	%		47%	40%	13%	
including induced traffic						
Fuel consumption	million litres	£0	65.0	513.1	989.2	
	per year	£5	51.9	493.5	978	
		£8	50.1	491.6	977.2	
Litres saved	million litres	£5	13.1	19.6	11.2	
	per year	£8	14.9	21.5	12	
Value of fuel saved - resource cost	£ million	£5	2.9	4.3	2.4	
		£8	3.3	4.7	2.6	
Value of fuel saved - fuel duty	£ million	£5	7.4	11.1	6.4	
		£8	8.5	12.2	6.8	
Value of fuel saved - VAT	£ million	£5	1.8	2.7	1.5	
		£8	2.1	3.0	1.6	
	£ million	£0	45.7	292.5	509.1	
		£5	35.1	281.6	504.6	
		£8	33.6	280.5	504.2	
Value of non-fuel costs saved - resource costs		£5	10.6	10.9	4.5	
	£ million	£8	12.1	12	4.9	
Value of time saved						
chargepayers	%	£5	44.3	7.7	3.4	
	£ million		39.6	6.2	0.9	46.7
	%	£8	44.3	7.7	3.4	
	£ million		47.5	7.0	1.0	55.5
non-chargepayers	%	£5	55.7	92.3	96.6	
	£ million		49.9	74.2	25.7	149.8
	%	£8	55.7	92.3	96.6	
	£ million		59.7	84.3	28.2	172.2

Annex 7 – Legal basis analysis at country level

Austria

Currently, Austria does not have any regular Low Emission Zones (LEZs). In 2011, Graz will probably start a LEZ. There is a motorway low emission zone in Tyrol[46].

The Air Pollution Act[47] (*Immissionsschutzgesetz-Luft*) regulates traffic measures (art.14) like spatial and temporal restrictions on movement of heavy vehicles for all or only certain types. The measures include, among the others, traffic free days, number plate measures, parking restrictions on certain roads for heavy vehicles.
At regional level, the Governor[48] (*Landeshauptmann*) can issue regulations to encourage the reduction of air pollutants from vehicles. These regulations may provide for speed reductions, night driving bans and polluting trucks bans[49].

Belgium

In Belgium, several cities have already adopted an access restriction scheme. The reasons for the development and implementation of a scheme are related to congestion problems and their impacts in terms of noise and emissions, the preservation of city centre and quality of life[50].

The Highway Code[51], namely '*Arrêté royal portant règlement général sur la police de la circulation routière et de l'usage de la voie publique*' regulates access restrictions specifying the type of vehicles that can access to:

- roads for pedestrians, cyclists, motorcyclists (art. 22d – Traffic on the roads for pedestrians, cyclists, motorcyclists);
- pedestrian areas (art. 22e – Traffic in pedestrian areas);
- plays streets (*rues réservées au jeu*) (art. 22f – Traffic in plays streets);
- roads reserved to agricultural vehicles, pedestrians, cyclists, motorcyclists (art. 22g – Traffic on the roads reserved to agricultural vehicles, pedestrians, cyclists, motorcyclists).

The cities and the municipalities through notably decree of the city's Mayor then develop the urban freight transport regulations for access restrictions and/or delivery time, while the local police is responsible for enforcement and control[52].

[46] About driving abroad website. Available at http://www.aboutdrivingabroad.co.uk
[47] Gesamte Rechtsvorschrift für Immissionsschutzgesetz - Luft, Fassung vom 16.06.2010. Available at http://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&Gesetzesnummer=10011027
[48] The Landeshauptmann is the head of the executive of the nine Austrian states. The Landeshauptmann is elected by the Landtag, the state parliament of the respective state.
[49] ICE, Rapporti Paese congiunti Ambasciate/Uffici ICE estero, Aggiornamento al 2^ Semestre 2009 Austria. Available at http://www.esteri.it/rapporti/pdf/austria.pdf
[50] BESTUFS, DELIVERABLE D 2.2 Best Practice Handbook (Year 2006), Theme 3: Control and Enforcement in Urban Freight Transport, Theme 4: City Access Restriction Schemes. Available at http://www.bestufs.net/download/BESTUFS_II/key_issuesII/BESTUFS_BPH2.pdf
[51] 1 DECEMBRE 1975 - Arrêté royal portant règlement général sur la police de la circulation routière et de l'usage de la voie publique (M.B. 09.12.1975). Available at http://www.code-de-la-route.be/wet.php?wet=1

Bulgaria

An access restriction scheme for freight transport has been implemented in Sofia. According to the Bulgarian Law for the Roads[53], the National Agency of Road Infrastructures shall introduce prohibitions for public and special use of individual roads for some types of vehicles when it is necessary for providing traffic safety. Such prohibitions shall be introduced upon coordination with the bodies of the Ministry of Home Affairs, and for the special lay-by sectors with the Ministry of Defence (Chapter III, art. 9, par. 4, 5).

Czech Republic

In the Czech Republic, some cities have already adopted an access restriction scheme mainly for freight transport.

In Prague, the objectives of the road pricing are the reduction of congestion, the improvement of air quality, the prevention of climate change and the raise of funds for transport. The legislation foresees the possibility of charging non-residents or business users for entering in the restricted zones.[54].

Denmark

On December 2006, the Danish parliament has passed an act allowing the establishment of environmental zones in the municipalities of Copenhagen, Frederiksberg, Aarhus, Odense and Aalborg[55]. This regulation does not allow for the introduction of environmental zones in other towns or cities[56]. In September 2008, Copenhagen and Frederiksberg implemented this kind of access restriction; Aalborg followed on February 2009, while Odense and Aarhus will implement the environmental zone on July 2010 and September 2010 respectively.

The rules are the same in all environmental zones in Denmark. Issues concerning geography and transit roads are individual[57]. The resolution establishing an environmental zone scheme is taken by the City Council, which also decides the zone boundaries[58]. Before adopting an environmental zone, the city council shall carry out a consultation. After the city council has published the final decision, at least 14 months should elapse before the Zone comes into force[59].

These environmental zones apply to diesel lorries and buses of more than 3.5 tonnes, specifically:

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[52] BESTUFS, DELIVERABLE D 2.2 Best Practice Handbook (Year 2006), Theme 3: Control and Enforcement in Urban Freight Transport, Theme 4: City Access Restriction Schemes. Available at http://www.bestufs.net/download/BESTUFS_II/key_issuesII/BESTUFS_BPH2.pdf

[53] Law for the Roads. Available at http://www.napi.government.bg/pdocs/doc_580.pdf

[54] Commission for Integrated Transport, 2006, World review of road pricing: Phase 2 - final report. Available at http://cfit.independent.gov.uk/pubs/2006/wrrp/wrrp2/03.htm. Further information is needed on the legal basis scenario.

[55] The Danish legal framework consists of:

- Consolidation Act on Environmental Protection No. 1757 of 22 December 2006, paras 15a-d
- Order No. 66 of 22 January 2007 on environmental zones
- Decree No. 327 of 25 April 2008 for grants to reduce particulate emissions from heavy vehicles
- Order No. 57 of 28 January 2009 filters, control and marking of trucks and buses in urban green zones established etc.

Available at http://www.mst.dk/Virksomhed_og_myndighed/Luft/Miljoezoner/Lov_og_bekendtgoerelser

[56] Cities with environmental zones. Available at http://greenzones.dk/cities-with-environmental-zones

[57] Project no. 218940 ARCHIMEDES Achieving Real Change with Innovative Transport Measures Demonstrating Energy Savings Seventh Framework Programme – TREN/FP7TR/218940"ARCHIMEDES" Collaborative project Measure 63, task 7.1 Environmental Zone. Available at http://www.civitas.eu/docs/Deliverable%20T631%20-%20Aalborg.pdf.pdf

[58] Aarhus, Baggrund og lovgrundlag. Available at http://aarhuskommune.dk/borger/trafik/Trafik--og-anlaegsplaner/Miljoezone/Baggrund-og-lovgrundlag.aspx

[59] Ibidem.

- **Until 1 July 2010 –** Engines must meet the Euro III standard or have particle filters installed
- **Until 1 July 2010** – Lorry or a bus of more than 3.5 tonnes must meet at least the Euro III standard
- **After 1 July 2010** – Engines must meet the Euro IV standard or have particle filters installed[60]

All Danish diesel-fuelled vehicles over 3.5 tonnes that enter the Environmental Zone must be inspected and show an Environmental zone sticker on the front windscreen. Diesel Euro III or IV diesel vehicles can be inspected immediately for driving into the Zone. Older diesel vehicles must have an approved particle filter installed. Foreign vehicles must meet the particle filter requirement, but they do not need an Environmental zone sticker[61].

The municipality of Aalborg, for instance, has introduced an environmental restriction under the Act on Environmental Zone. Vehicles have to show an Environmental zone mark in the windscreen proving the compliance with the requirements (Table I)[62].

Table I – Aalborg Environmental zone marks

	The **green mark** is given to vehicles complying with Euro 4 or fitted particulate filter
	The **white and green mark** applies to vehicles complying with the Euro 3 norm until 2010
	The **red mark** shows that vehicle has dispensation to ride in the environmental zone without a particulate filter

Since the restriction applies also to foreign vehicles, the Danish Environmental Protection Agency (EPA) will spread information on LEZ in different languages and in relevant forums[63].

On the enforcement side, violation of regulations inside the LEZ is under responsibility of Danish law. The authority to enforce these regulations is the Police. When the Aalborg Municipality Environmental Department performs its regular environmental controls in companies situated in the environmental zone, they control vehicles and make reports on violations to the police.[64]

Estonia

[60] EPA, Environmental zones in Denmark. Available at http://www.mst.dk/English/ECO-technology/environmental_zones_in_Denmark/default.htm

[61] Miljøzone, The Environmental Zone in Copenhagen/Frederiksberg. Available at http://www.miljozone.dk/vognmand_english.php

[62] Hvad gælder i miljøzonen. Available at http://www.aalborgkommune.dk/Borger/trafik-og-veje/Trafikken/miljoezone/Sider/Hvad-gaelder-i-miljoezonen.aspx

[63] Miljøzone English Summary. Available at http://www.aalborgkommune.dk/borger/trafik-og-veje/trafikken/miljoezone/sider/english-summary.aspx

[64] Project no. 218940 ARCHIMEDES Achieving Real Change with Innovative Transport Measures Demonstrating Energy Savings Seventh Framework Programme – TREN/FP7TR/218940"ARCHIMEDES" Collaborative project Measure 63, task 7.1 Environmental Zone. Available at http://www.civitas.eu/docs/Deliverable%20T631%20-%20Aalborg.pdf.pdf

The Estonian Highway Code[65] does not consider access restriction schemes. The Traffic Act[66] regulates general restrictions on traffic of motorized vehicles (§ 48).

Finland

In Finland, there is no legal basis for access restriction at the moment. The Ministry of Transport and Communications carried out a study to examine the expected impacts if congestion charging were to be introduced in the Helsinki region. The study, undertaken between spring 2008 and summer 2009, involved extensive cooperation with the different parties concerned in the region. Forming the backdrop to the study are the goals set out in the Government Programme and in the Government Transport Policy Report, and the expectations of society at large regarding the transport system in the region.

The study considered whether congestion charging could help achieve the transport policy objectives (e.g. improved traffic flow, enhanced competitiveness of public transport, reduced greenhouse gas emissions and improvements in road safety) and be beneficial to society at large, and whether it could do this in a cost-effective manner. In addition, the study looked at whether the objectives set for the region could be achieved in a better and more cost-effective manner using other means than congestion charging. The study produced an abundant and diverse array of information on the use of congestion charging as a transport policy tool. This information provides the basis for debate and decision-making on whether to go ahead with preparations for congestion charging in the Helsinki region[67].

France

The French Highway Code regulates movement prohibitions and restrictions (section 3 articles R411-18 – R411-24)[68]. According to the article R411-18, prefect may temporarily forbid the movement of one or more classes of vehicles on certain portions of the road network. Orders of Minister of Home Affairs and the Minister of Transport may prohibit the movement of categories of vehicles during specific periods on portions or the entire road network. For measures aiming at limiting the extent and effects of pollution peaks on the population, the prefect defines perimeter of the addressed areas, movement suspension or restriction and information sources and modalities (art. R411-19).

In the urban areas, there are three special traffic zones (e.g. *zones de circulation particulières en milieu urbain*): pedestrian area, pedestrian-priority zone (*zone de rencontre*), and zone 30:

- In the pedestrian areas, as defined under the art. R110-2, only vehicles needed to service the internal area are allowed to move to (art. R110-2)[69]
- The pedestrian priority zone is open to all forms of transport but pedestrians have priority over all other forms of transport except trams. Motorised vehicles are limited to 20 km/h and may only stop and park in designated areas[70]

[65] Estonian Traffic Code (*Liikluseeskiri*). Available at http://www.legaltext.ee/en/andmebaas/tekst.asp?loc=text&dok=X50043K1&pg=1&tyyp=SITE_X&query=traffic&ptyyp=I&keel=en

[66] Estonian Traffic Act (*Liiklusseadus*). Available at http://www.legaltext.ee/en/andmebaas/tekst.asp?loc=text&dok=X50012K5&keel=en&pg=1&ptyyp=I&tyyp=SITE_X&query=traffic

[67] The Ministry of Transport and Communications, 2009, Summary of The Helsinki Region Congestion Charging Study. Available at http://www.ruuhkamaksu.fi/tiedostot/RUMAsummary310809.pdf

[68] Code de la route (Section 3: interdictions et restrictions de la circulation) 1er janvier 1996 (mis à jour le 18 mars 2010) Prévention des risques. Available at <http://www.legifrance.gouv.fr/>

[69] Le Centre d'études sur les réseaux, les transports, l'urbanisme et les constructions publiques (CERTU), L'aire piétonne. Available at http://www.developpement-durable.gouv.fr/IMG/spipdgmt/pdf/Plaquette_CERTU_aire_pietonne_cle062738.pdf

[70] University College London Centre for Transport Studies, July 2009, Evaluation of Pedestrian Priority Zones in the European area, Report to the Korea Transport Institute KoTI. Available at http://eprints.ucl.ac.uk/18963/1/18963.pdf

- In the zone 30, vehicles are limited to a speed of 30 km/h. In this area, cyclists and pedestrians benefit from improved safety[71]

Germany

The Air Quality Directive (Directive 1999/30/EC) established limit values for the concentration of particulate matter (PM10) and other pollutants such as nitrogen dioxide (NO2) in the local air[72]. In 2005 and 2006, measuring stations in numerous German cities recorded values exceeding this limit. Among the measures analyzed by the Federal Environmental Agency, green zones (*Umweltzone*) represented the most effective tool to reduce particulate emissions[73]. Around 40 green zones have been already implemented.

In 2006, the German Federal Government adopted the Regulations on the marking (sticker) of low emission vehicles (Marking Regulations) with the Federal Council (*Bundesrat*)[74] approval. The Regulations established provisions on the marking of passenger cars and commercial vehicles in accordance with the quantity of their particulate emissions. These Regulations administer vehicle marking only, not green zones or driving restrictions. The Regulations will allow cities and municipalities to establish a Green Zone in high-level particulate emissions area thereby improving air quality in city centers and other areas with high traffic volumes.

These areas will be marked with the traffic sign '*Umweltzone'*. In order to enter into the green zone, additional signs will state which emission sticker needs to be displayed. However, unmarked vehicles may not enter a green zone. Offenders face a fine of 40 Euros and one penalty point on their license even if the unmarked vehicle entering the green zone is eligible for the sticker. Vehicles, which are registered in another country, also require the sticker[75].

The Marking Regulations define four emission groups, which apply to cars as well as to trucks [76]. The four groups are based on the Euro-norms for diesel vehicles. Through retrofitting with a particulate filter these vehicles can achieve higher emission groups. For vehicles with petrol engines there are only two levels (

Table J):

- Emission group 1 without a sticker for vehicles lower than Euro 1 or
- Emission group 4 for all vehicles with Euro 1 or higher, which means with a regulated catalytic converter

[71] Ibidem.
[72] The Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air describes the numerical limits and thresholds required to assess and manage air quality for the pollutants mentioned. It addresses both PM10 and PM2.5 but only establishes monitoring requirements for fine particles.
[73] Federal Ministry of Transport, Building and Urban Development, Green zones to ensure cleaner air in inner cities. Available at http://www.bmvbs.de/en/Transport/Mobility-and-Technology-,1902.1027555/Green-zones-to-ensure-cleaner-.htm
[74] The Regulations entered into force on March 2007. On December 2007, the first amendment established further provisions for diesel vehicles retrofitted with particulate traps and for older vehicles.
[75] Federal Ministry of Transport, Building and Urban Development, Green zones to ensure cleaner air in inner cities. Available at http://www.bmvbs.de/en/dokumente/-,1872.1027555/Artikel/dokument.htm
[76] Berlin, The Environmental Zone-Vehicle/ Sticker. Available at http://www.berlin.de/sen/umwelt/luftqualitaet/en/luftreinhalteplan/umweltzone_fahrzeug_plakette.shtml

Table J – German particulate stickers

Emission groups	1	2	3	4
Stickers	no stickers			
Requirements for **diesel engines**	Euro 1 or worse	Euro 2 or Euro 1 + particulate filter	Euro 3 or Euro 2 + particulate filter	Euro 4 or Euro 3 + particulate filter
Requirements for **petrol engines**	Without a catalytic converter			Euro 1 with catalytic converter or better

The assignment of the emission stickers for foreign vehicles is regulated by the Marking Ordinance (§ 6). If registration papers do not identify the European emission standard of the vehicle, the date of the vehicle's first registration is used as a basis for sticker classification[77] (Table K).

Table K – German classification of foreign vehicles based on the date of initial registration

Euro level	Emission-group	Initial registration car	Initial registration truck	Sticker
Diesel				
Euro 1 or older	1	before 01.01.1997	before 01.10.1996	None
Euro 2	2	from 01.01.1997 to 31.12.2000	from 01.10.1996 to 30.09.2001	Red
Euro 3	3	from 01.01.2001 to 31.12.2005	from 01.10.2001 to 30.09.2006	Yellow
Euro 4	4	from 01.01.2006	from 01.10.2006	Green
Petrol engine				
before Euro 1 (without G-Kat*)	1	before 01.01.1993		None
Euro 1 and better	4	from 01.01.1993		Green

**Geregelter Katalysator catalytic converter)*

The National framework sets out emissions classes and main rules that can be used by each German city for Umweltzone. Afterwards, cities or regions decide whether, where and when to implement an access restriction scheme, and which emissions standards will be required[78].

Greece

In the Athenian access restriction scheme (Ring), vehicles are not allowed to access in the central area in order to reduce traffic congestion[79]. The restrictions do not apply to foreign vehicles who are visiting the

[77] Federal Ministry of Transport, Building and Urban Development, Low emission zone / emissions-control windscreen sticker. Available at http://www.bmu.de/english/air_pollution_control/general_information/doc/40740.php

[78] Low Emission Zones in Europe, Europe-wide information on LEZ s Low. Available at http://www.lowemissionzones.eu

[79] Athens Ring restrictions apply from early September to mid July.

country, or to rental cars[80]. The access restriction scheme have been established through the Decision of the Greek Directorate of Road Construction Works Studies[81] (*Διεύθυνση Μελετών Έργων Οδοποιίας – ΔΜΕΟ*), which set the area boundaries, vehicles restrictions based on license plate number and time slots. In the Legislative Act 181/16.09.2009[82], the establishment of the Athenian Green Ring represents one of the measures to tackle air pollution from road traffic.

Hungary

According to the Hungarian legal basis, urban access restriction schemes may be adopted by the municipalities. The municipalities are entitled by acts of the Parliament to issue decrees on access restrictions within the boundaries of the city and decide on the type and level of the restriction. However, restrictions must be in line with the acts and the decrees governing road transport and the Hungarian Highway Code (Közlekedés Rendészeti Szabályok – KRESZ).

The municipalities are entitled by the Act on Municipalities and the Road Transport Act to impose the basic types of restrictions like parking/protected zones and weight restriction. For instance, such restrictions are:

- *Parking zones, protected zones*: a fee is charged for parking in the zone, parking in the zone is prohibited, access to the zone is prohibited or limited by type of motor vehicle, by the time or date of the access, by the aim of the access etc. (for example the Castle District in Budapest is a protected area which means that only pass holders may drive into the zone)
- *Weight restrictions*: motor vehicles with a weight above a given level may not pass bridges or be driven on specific roads within the city (for example the downtown of the City of Szentendre cannot be accessed by vehicles over 3.5 tonnes)

Ireland

In Ireland, the main reason for the implementation of an access restriction scheme is the improvement of accessibility by preventing congestion[83]. In Dublin, a new scheme called 'College Green Bus Corridor' to be implemented on 27th July 2010 will deliver improved speed, punctuality and reliability for public transport, improved taxi speeds, a traffic calmed environment with easier access for shoppers and businesses in the area and an improved environment with less delays for pedestrians[84].

In Cork, the scheme objectives were to provide a safer, healthier, more comfortable environment for pedestrians and cyclists in the city centre, reduce lane capacity on the main arterial route, redirect motor traffic, increase the numbers of cycle parking facilities within the city centre, enhance citizen awareness on sustainable transport patterns, promote access to the city centre by public transport, reduce traffic levels[85].

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[80] About driving abroad website. Available at http://www.aboutdrivingabroad.co.uk

[81] Αριθμ. ΔΜΕΟ/οικ/6154/στ Available at http://netlaw.gr/media/File/Legislation/YA_6154_1800_2008_daktylios.pdf

[82] ΠΡΑΞΗ ΝΟΜΟΘΕΤΙΚΟΥ ΠΕΡΙΕΧΟΜΕΝΟΥ (ΦΕΚ Α΄ 181/16.09.2009). Available at http://www.athens-recycling.com/gr/component/content/article/35-news/81-fekcar2009

[83] BESTUFS, DELIVERABLE D 2.2 Best Practice Handbook (Year 2006), Theme 3: Control and Enforcement in Urban Freight Transport, Theme 4: City Access Restriction Schemes. Available at <http://www.bestufs.net/download/BESTUFS_II/key_issuesII/BESTUFS_BPH2.pdf>

[84] Dublin City Council, New traffic management scheme for College Green comes into effect on July 27th. Available at http://www.dublincity.ie/PRESS/DCCPRESSPACKS/Pages/NewtrafficmanagementschemeforCollegeGreencomesintoeffectonJuly27th.aspx

[85] CIVITAS, MIRACLES Project Deliverable D 4.2 REPORT ON EVALUATION RESULTS Annex 4 – 2nd Implementation Report for Cork, Version N°4.0 31st March 2006. Available at http://www.civitas-initiative.org/docs1/Cork_Evaluation_Results_Report.pdf

The Roads Act 1993[86] regulates protected roads (art.45, part IV motorways, bus ways and protected roads) These roads, as public road or proposed public road specified to be a protected road in a protected road scheme approved by the Minister, may be characterized by prohibitions or restrictions to specific types of classes of vehicles, except ambulances, fire brigade vehicles, and vehicles used by members of the *Garda Síochána*[87] or the Defence Forces.

Italy

The Italian Highway code[88] regulates traffic in built-up areas (art. 7). Municipalities may restrict the movement of all or selected vehicles categories by order of the Mayor to prevent pollution and to protect the artistic, environmental and natural heritage, in accordance with the directions given by the Minister of Infrastructure and Transport, after consultation with the Minister of Environment and Protection of Natural Resources and the Minister for Cultural and Environmental Heritage, within their respective competences.

By decision of the Council, Municipalities shall define pedestrian and access restriction areas (ZTL – *Zona a Traffico Limitato*) considering traffic effects on road safety, health, public order, environmental and cultural heritage and territory. Under distress conditions, amendment or addition to the Council decision, the measure may be adopted by order of the Mayor. Moreover, Municipalities shall define other relevant urban areas in respect of which there are special traffic requirements. Municipalities shall make subject to charging the entry or movement of motor vehicles within the access restriction areas[89].

As for the enforcement approach, infringements are subject to the payment of administrative sanctions set in the Highway Code itself. In the Emilia Romagna and Lombardy regions, penalties are set by the Regional Laws.

There is no an Italian national Low Emission Zone scheme. There is a regional scheme for the northern Italian regions of Lombardy, Piemonte, Emilia-Romagna and Umbria, Bolzano and Trentino Provinces. The regional schemes have similar standards, with slight differences from region to region. The regional schemes include also other measures, such as financial assistance for cleaner vehicles and better public transport.[90].

In Rome, the aims of the scheme in the San Lorenzo district, for example, are to improve the urban quality through traffic calming plus noise and air pollution reduction.

In Florence, the air quality framework[91] of the traffic restriction measures is given, among the others, by:

- The Council Directive 1999/30/EC of 22 April 1999 relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air;
- The Directive 2000/69/EC of the European Parliament and of the Council of 16 November 2000 relating to limit values for benzene and carbon monoxide in ambient air[92],

[86] Road Act, 1993. Available at http://www.irishstatutebook.ie/1993/en/act/pub/0014/index.html
[87] *Garda Síochána* is the police force of the Republic of Ireland.
[88] The Italian Highway code (Legislative Decree No. 285 April 30, 1992 amended) consists of 245 articles. It is accompanied by a Regulation implementation that includes 408 articles and 19 appendices. The Highway Code came into force on 1 January 1993. Available at http://www.aci.it/index.php?id=61
[89] Within a year after entry into force of this Code, the Direction enacted by the Inspectorate-General for Traffic and Road Safety shall identify the types of Municipalities that may avail themselves of that possibility and the payment collection modalities and exempted vehicles categories.
[90] Low Emission Zones in Europe, Europe-wide information on LEZ s Low. Available at http://www.lowemissionzones.eu
[91] Comune di Firenze, Provvedimenti di limitazione della circolazione (Blocchi del traffico). Available at http://centroservizi.lineacomune.it

- The Directive 2008/50/EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe[93].

Latvia

In Latvia, Road users' duties and rights are set in the Road Traffic Law (art. 19, Chapter IV road users' rights and obligations)[94].

An access restriction scheme will be implemented in Riga[95]. The level of the access restriction legal basis is urban[96]. Currently, the City Executive Order nr. 2 of 13 January 2010 established new rules for vehicles to access to the pedestrian and bike streets of the Old Town area. The Order had been issued because of the need to improve marketing and other corporate banking and property management in the Old Town area. The Order set new regulations on the type of vehicles having access to the addressed area, the allowed period and conditions[97]. According to the Order, the Riga City Council's Public Relations Unit shall provide information to newspapers, radio and television on the change in vehicle traffic[98].

Lithuania

In Lithuania, there is no specific regulation or legislation on national level on access restriction schemes. Decisions on urban freight transport restrictions are taken on municipal level. Restrictions include weight limitations, height limitations or total lorry ban[99].

Luxembourg

In Luxembourg City, several pedestrian areas have been established. The City Council is responsible for taking any measures necessary to regulate traffic and parking on local roads in its urban territory and on state roads located within the town. To ensure traffic flows and public safety during unforeseen events, the *Collège échevinal*[100] may ratify special measures through emergency regulations. These Regulations cease to have effect immediately, if the *Conseil communal* (Council) does not confirm them during its next meeting. The *Collège des bourgmestres et échevins*[101] may also enact traffic regulations whose effects do

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[92] This Directive established the numerical criteria relating to the assessment and management of benzene and carbon monoxide in air.

[93] This Directive includes the following key elements:

- The merging of most of existing legislation into a single Directive (except for the fourth daughter Directive) with no change to existing air quality objectives
- New air quality objectives for PM2.5 (fine particles) including the limit value and exposure related objectives – exposure concentration obligation and exposure reduction target
- The possibility to discount natural sources of pollution when assessing compliance against limit values
- The possibility for time extensions of three years (PM10) or up to five years (NO2, benzene) for complying with limit values, based on conditions and the assessment by the European Commission

[94] Rīga, Informācija par satiksmes organizāciju Vecrīgā no 2009.gada 1.janvāra. Available at http://www.riga.lv/LV/Channels/Riga_today/Satiksmes_ierobezojumi/Vecrigas+satiksmes+shema.htm

[95] On 1st February 2009 was formally decided to adopt the access restriction scheme (results of the performed survey)

[96] Results of the performed survey

[97] Rīgas domes Satiksmes departamentu, Satiksme Vecrīgā. Available at http://www.rdsd.lv/?ct=satiksmevecrigaa

[98] Rīgas Pilsētas Izpilddirektors, Rīkojums Nr.2-ir. Available at http://www.rdsd.lv/box/files/13janrikojumagrozijumivecriga.doc

[99] BESTUFS, DELIVERABLE D 2.2 Best Practice Handbook (Year 2006), Theme 3: Control and Enforcement in Urban Freight Transport, Theme 4: City Access Restriction Schemes. Available at http://www.bestufs.net/download/BESTUFS_II/key_issuesII/BESTUFS_BPH2.pdf

[100] *Collège échevinal* helps the mayor run the administration

[101] The *Collège des bourgmestre et échevins* is the executive and administrative agency of the municipality. Its members are chosen among the Municipal Councillors. The *Collège* is responsible for the publication and implementation of the Council resolutions, the

not exceed 72 hours, which are exempted from the Council confirmatory deliberation. All Council deliberations on traffic regulations are subject to the approval of the Minister of Home Affairs and the Minister of Transport[102].

Malta

Traffic restrictions in the Maltese cities of Valletta and Mdina have been implemented through the adoption of subsidiary legislations.

In Valletta, the access restriction scheme rules are given by the Vehicle Access Zones (Control) Regulations[103]. According to this Subsidiary Legislation (S.L.65.31), any Council of the city may establish one or more charging zones. The charging areas shall be those prescribed and controlled access within the respective charging zone shall remain in force throughout the periods and days of the week prescribed in the S.L.65.31. In the S.L.65.31, the First Schedule specifies the localities designated as charging zones and prescribed periods for Valletta. S.L.65.31 also regulates the controlling access into the charging zone by the use of Vehicle Access Control System (art. 4), the vehicles access (art. 5), the exemptions (art. 6) and the conditions under which exemptions may be granted (art. 7). In any charging zone, pedestrian areas may be established in which vehicles access shall be prohibited or restricted (art. 12). The Controlled Vehicular Access (CVA) system in Valletta, which was launched on the 1st of May 2007 forms an integral part of the Maltese Government's commitment to increase accessibility in the Capital City[104].

As for Mdina, access has been restricted by the Mdina (Restriction of Access and Transit of Vehicles) Regulations and 2004 (S.L.65.27)[105]. These Regulations prohibit access to vehicles, other than *karrozzin* (carriage drawn by a horse) within the city at any time, in any street or square. S.L.65.27 also regulates the exemptions (art. 3) and temporary access through permits granted by the Mdina Local Council (art. 4)

Netherlands

In the Netherlands, the main driver of ARS is to help improving air quality in urban areas where the standards for fine particles and nitrogen dioxide are being exceeded. Several cities have already adopted an access restriction scheme.

Environmental zones (*Milieuzones*) can be established by an agreement between municipalities, superior authorities and sectoral organizations. A National Environmental Zones Covenant "Promoting Clean trucks and environmental zoning" (*"Het convenant "Stimulering schone vrachtauto's en milieuzonering"*) had been signed by Dutch government, municipalities and other stakeholders, whereby all Zones apply the same Euro standards[106]: from 1 January 2010, only lorries with Euro 3 (less than eight years old and fitted with a particle filter), Euro 4 and Euro 5 engines are allowed to enter environmental zones.

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administration of the municipal assets, revenue management etc. Available at http://www.vdl.lu/Attributions-p-1565865.html?highlight=coll%C3%A8ge+des+bourgmestre+et+%C3%A9chevins

[102] Règlements de la circulation. Available at http://www.vdl.lu/R%C3%A8glements+de+la+circulation.html

[103] Subsidiary Legislation 65.31 Vehicle Access Zones (Control) Regulations 1st May, 2007. Legal Notice 105 of 2007, as amended by Legal Notices 408 of 2007 and 269 of 2008; and Act XV of 2009. Available at http://www.gov.mt/frame.asp?l=2&url=http://www2.justice.gov.mt/lom/home.asp

[104] CVA website. Available at http://www.cva.gov.mt/en/cva_system_purpose_of.asp

[105] Subsidiary Legislation 65.27 Mdina (Restriction of Access and Transit of Vehicles) Regulations 13th July, 2004 Legal Notice 359 of 2004, as amended by Legal Notices 329 of 2005 and 408 of 2007 and 269 of 2008; and Act XV of 2009. Available at http://www.mjha.gov.mt/frame.asp?l=2&url=http://www2.justice.gov.mt/DownloadDocument.aspx?app=lom/home.asp&itemid=9213 .

[106] Centrum Milieuzones.nl Available at http://www.milieuzones.nl

«The environmental classes of trucks and lorries are designated by the vehicle's registration plate. The vehicle registration plates and environmental classes of all trucks and lorries are registered. The Netherlands is not introducing stickers to show the emission levels of engines (like German *Feinstaubplakette*). The authorities in the Netherlands are currently examining the possibility of registering foreign vehicles»[107].

Norway

According to the Norwegian National Transport Plan 2010-2019, access restriction schemes (*Lavutslippssone*) will help to limit the local particulate matter and NO2 concentrations. Among the critical aspects, the Plan considered the scheme high administrative costs and the enforcement arrangement for foreign vehicles[108]. Several cities have already adopted an access restriction scheme.

Currently, a national scheme to be applied by any city is under consideration. Such scheme will impose that vehicles less than Euro 4 standard are charged for entry into the zone. A public inquiry has confirmed such payment scheme and charges. In October 2008, the Norwegian Public Road Administration submitted to the Norwegian Ministry of Transport a proposal for a LEZ starting as soon as possible, which outlines the LEZ costs. Afterwards, the Norwegian Government and Parliament will likely make a decision on LEZ scheme legislation[109].

Poland

In Poland, access restriction schemes have been implemented in Krakow and Gdansk so far.

The Regulation of the Minister Infrastructure on 'periodic traffic restrictions and prohibition of certain types of vehicles on the road of 31 July 2007', in particular, related to the ban on the traffic of vehicles on definite time[110].

In Krakow, The City Council adopted a new transport policy with the Resolution XVIII/225/07 City Council on 4 July 2007. The Policy set the reduction of traffic as a goal to be achieved through limited traffic and parking zones (*strefy ograniczonego ruchu i parkowania*), parking fees and the implementation of the new traffic arrangements in the city centre[111].

In the centre of Krakow, there are three limited traffic and parking zones:

- Zone A prohibits vehicle traffic and is designated only for pedestrians and cyclists
- Zone B gives priority to pedestrians and the maximum driving speed should not exceed 20km/h. Parking is permitted only in designated areas
- Zone C where parking time limitations for vehicles are not obligatory. Parking cards can be purchased at kiosks, post offices, the City Hall of Krakow, and from traffic wardens patrolling parking zones.

[107] Low emission zone Eindhoven. Available at http://www.eindhoven.nl/nieuwsbericht/Low-emission-zone-Eindhoven.htm#6. what about foreign vehicles?

[108] Norwegian Ministry of Transport and Communications, National Transport Plan 2010-2019 Report no. No. 16 (2008-2009). Available at http://www.regjeringen.no/nb/dep/sd/dok/regpubl/stmeld/2008-2009/stmeld-nr-16-2008-2009-.html?id=548837

[109] Low Emission Zones in Europe, Europe-wide information on LEZs. Available at http://www.lowemissionzones.eu

[110] Rozporządzenie Ministra Transportu z dnia 31 lipca 2007 r. w sprawie okresowych ograniczeń oraz zakazu ruchu niektórych rodzajów pojazdów na drogach (Dz. U. z dnia 14 sierpnia 2007 r.). Available at http://lex.pl/serwis/du/2007/1040.htm

[111] BIP, Polityka transportowa. Available at http://www.bip.krakow.pl/?sub_dok_id=19585

The information boards D-44 signal entrance to the zone where parking fees are collected. Parking fees are enforced using parking cards or subscribed parking permits[112]. Parking cars in these zones without payment of parking fees is prohibited, except in the case of vehicles belonging to person or organizations granted free access and parking public transportation vehicles in designated areas. Parking cards are forms filled out individually and may be purchased at kiosks, post offices, commercial facilities marked with special icons, and from patrolling traffic wardens. Parking cards may also be ordered at the Parking Zone Office; subscribed parking permits can only be obtained at the Parking Zone Office[113]. The addressed zones and the related fees are set the City Council Resolution XXXII/268/03 of 26 November 2003[114].

Portugal

In Portugal, several cities have already adopted an access restriction scheme. The Portuguese Highway Code[115] provides for temporary or permanent traffic restrictions of certain vehicles and related sanctions (art. 10). Moreover, the restrictions have to be preceded by public communications.

Romania

In Romania, several cities have already adopted an access restriction scheme. The Romanian Highway code[116] regulates vehicles access in pedestrian area (art. 192): only residents and vehicles providing public services "from door to door" can access in the addressed area.

City councils approved ARS regulations focused mainly on charging issues (Table L). By setting the fee contents, most of the city or local council decisions address also areas, vehicle types and time slots restrictions.

Table L – Romanian regulations

City	Regulation	Contents
Bistrita	City Council Decision Nr. 153/25.09.2008, Annex 2	Charging
Bacau	City Council Decision Nr.438/22.12.2008, Annex 5	Charging
Cluj Napoca	Local Council Decision Nr. 506/3.12.2009, article 1	Vehicles restrictions
	Local Council Decision Nr. 189/2006	Areas, charging and time slots
Timisoara	City Council Decision Nr. 196/26.05.2009, Annex 5	Charging
	Timis County Council Nr. 127/30.11.2009,	Vehicles restrictions

[112] The D-45 information board end of parking zone designates the exit from the limited traffic and parking zone.
[113] Krakow, Practical information on transport. Available at http://www.krakow.pl/en/turystyka/?id=transport.html
[114] Uchwała nr XXXII/268/03 Rady Miasta Krakowa z dnia 26 listopada 2003 r. Available at http://www.bip.krakow.pl/_inc/rada/uchwaly/show_pdf.php?id=17657
[115] Código da Estrada Alterado e republicado pelo Decreto-Lei nº 44/2005, de 23 de Fevereiro Diário da República nº 38, Série IA, Págs. 1585-1625. Available at <http:// www.legixengracias-silva.pt/docspdf/CodEstrada.pdf >
[116] REGULAMENT de aplicare a Ordonantei de urgenta a Guvernului nr. 195/2002 privind circulatia pe drumurile publice. Available at <http://instructorauto.bynet.ro/regulament-aplicare-oug-195.php >

City	Regulation	Contents
	Annex 3 City Council Decision Nr. 21/29.01.2008	
Iasi	Local Council Decision Nr. 172/2008, Annex 8.2	Vehicles restrictions
Miercurea Ciuc	City Council Decision Nr. 49/2006	Vehicles restrictions, charging
Sfantu Gheorghe	Local Council Decision Nr. 115/2008,	Vehicles restrictions, charging
Resita	Local Council Decision Nr. 20/24.22004	Charging
Oradea	Local Council Decision Nr. 663/28.08.2008	Charging
Pitesti	Local Council Decision Nr. 498/2006	Charging
Hunedoara	City Council Decision Nr. 253/2008	Charging
Baia Mare	City Council Decision Nr. 566/28.11.2006	Areas, vehicles restrictions, charging and time slots
Arad	Local Council Decision Nr. 146/31.5.2007	Areas, vehicles restrictions and charging
Bucharest	Decision of the General Council of Bucharest* Nr.134/2004 Decision of the General Council of Bucharest* Nr.132/2005 Decision of the General Council of Bucharest* Nr.300/2006	Areas, vehicles restrictions and charging

European Transport Exchange, Restrictii de circulatie. Source: Available at http://www.euload.com/info.php?catID=15#99 > and < http://www.euload.com/info.php?catID=13#71

**HCGMB: Hotararea Consiliului General al Municipiului Bucuresti (Decision of the General Council of Bucharest)*

Slovakia

According to the available information on the national legal basis, traffic restrictions are implemented only on temporary basis (e.g. road maintenance, construction, etc.).

There is no special program for access restrictions for urban freight transport in the Slovak Republic[117].

Slovenia

The Slovenian Road Transport Act[118] does not include specific provisions for traffic restrictions.

[117] BESTUFS, DELIVERABLE D 2.2 Best Practice Handbook (Year 2006), Theme 3: Control and Enforcement in Urban Freight Transport, Theme 4: City Access Restriction Schemes. Available at http://www.bestufs.net/download/BESTUFS_II/key_issuesII/BESTUFS_BPH2.pdf

[118] Zakon o Prevozih v Cestnem Prometu Neuradno Prečiščeno Besedilo (ZPCP-2-NPB1). Available at http://www.dz-rs.si/index.php?id=101&vt=7&sm=k&q=Zakon+o+prevozih+v+cestnem+prometu&mandate=-1&unid=UPB|503636466CA0F147C1257535004863333&showdoc=1

As for urban freight transport, regulations are adopted at the municipal level in order to control the transport in a specific city centre. At city level, municipal authorities regulate transport based on their own decrees. As for Ljubljana, the Decree on Road Traffic Regulation provides for regulation of traffic[119].

Spain

In Spain, the municipalities introduced access restriction schemes mainly to reduce congestion in city centers rather than environmental or cost related aspects[120].

According to the Spanish Constitution[121], municipalities enjoy the autonomy to manage their respective interests (art. 137). The Law 7/1985[122] established areas in which municipalities exercise jurisdiction, including traffic management of vehicles and people on urban roads (art. 25, paragraph 2b) and the Law on Traffic and Road Safety[123] detailed among the powers of municipalities the closure of urban streets if needed (art. 7, paragraph f)[124].

There is no legal basis for the access restriction schemes at national level; Councils set legal rules at local level[125]. As for Madrid, three access restriction schemes had been implemented (*Áreas de Prioridad Residencial – APR*): APR Embajadores, APR Letras and APR Cortes. For instance, the objectives of Decree[126] for such access restriction schemes of Letras and Cortes were to establish areas boundaries, access conditions and functioning[127].

Sweden

[119] BESTUFS, DELIVERABLE D 2.2 Best Practice Handbook (Year 2006), Theme 3: Control and Enforcement in Urban Freight Transport, Theme 4: City Access Restriction Schemes. Available at http://www.bestufs.net/download/BESTUFS_II/key_issuesII/BESTUFS_BPH2.pdf

[120] Ibidem.

[121] Spanish Constitution of 29 December 1978. Available at http://www.servat.unibe.ch/icl/sp00000_.html

[122] Ley 7/1985, de 2 de abril, Reguladora de las Bases del Régimen Local. Available at http://www.ruidos.org/Normas/Ley_7_1985.html

[123] Texto articulado de la Ley sobre Tráfico, Circulación y Seguridad Vial aprobado por RDL 339/1990. Available at http://www.ruidos.org/Normas/RDL_339_1990.html#Art.%207

[124] Dirección General de Tráfico, TEMA 37 el la circulación urbana: su regulación. Competencias de los municipios. El peatón y su comportamiento: circulación de peatones por vías urbanas e interurbanas. Pasos para peatones. Prioridad de paso de los vehículos sobre los peatones: excepciones. Problemas específicos de las zonas escolares. Available at http://www.dgt.es/was6/portal/contenidos/documentos/la_dgt/recursos_humanos_empleo/oposiciones/TEMA_037.doc

[125] Results of the performed survey.

[126] Official Gazette of the Community of Madrid - No. 71, Wednesday 25/03/2009. Available at http://www.madrid.org/cs/Satellite?blobcol=urlordenpdf&blobheader=application%2Fpdf&blobkey=id&blobtable=CM_Orden_BOCM&blobwhere=1142537192339&ssbinary=true

[127] As for the access restriction schemes of Letras and Cortes in Madrid, the legal basis had been:

- Law 7/1985 art. 25 paragraph 2b; Law on Traffic and Road Safety articles 7 and 16 (art. 16 refers to the 'Special cases for traffic');
- General Traffic Regulation art. 37 'Special traffic management for safety or flow of traffic reasons' [Reglamento General de Circulación (vigente hasta el 23 de enero de 2004). Available at < http://noticias.juridicas.com/base_datos/Derogadas/r1-rd13-1992.t2.html>];
- Mobility Ordinance for the City of Madrid art. 88 regulates the traffic and parking restrictions by Governing Board or delegated authority [Ordenanza de Movilidad para la Ciudad de Madrid. Available at < http://www.munimadrid.es/boletines-vap/generacionPDF/ANM2005_48.pdf?idNormativa=9aba46ec02e4f010VgnVCM1000009b25680aRCRD&nombreFichero=ANM2005_48&cacheKey=45>];
- Mayor Decree of 24 June 2004 articles 1 and 2; and the Agreement Governing Board of the City of Madrid articles Governing Board of the City of Madrid articles 1.2.l and 3.d.

In Sweden, a number of cities have already adopted an access restriction scheme. The main driver for the establishment of access restriction zone is given by the emissions reduction of nitric oxide and particulate matter. By imposing urban restrictions on heavy vehicles (total weight over 3.5 tons), environmental zone (*Miljözon*) is seen as «a much-needed complement to emission stipulations for new vehicles, preventing vehicles that are too old or with emissions that are too high from being used in our towns and cities»[128].

The local regulations are based on the rules laid down in the Swedish Road Traffic Ordinance (SFS 1998:1276, Chapter 10). The EU environmental classification system is used as basis for deciding which vehicles are permitted to enter an environmental zone[129]:

- All heavy, diesel trucks and buses are permitted to be driven in an environmental zone for at least six years, calculated from when the vehicle is first registered, regardless of the country of registration
- Euro II or III vehicles can be driven in an environmental zone for eight years. In both cases the time is calculated from the year in which the vehicle was first registered
- Euro IV vehicles can be driven in an environmental zone up to and including 2016, regardless of the year of registration
- EuroV5 vehicles can be driven up to and including 2020, regardless of the year of registration

Municipalities can only decide whether to adopt an environmental zone and to determine the area extension, which is regulated by the local traffic regulations[130].

United Kingdom

In the United Kingdom, several access restriction schemes have been implemented. The low emission zones are developed, implemented and managed by local authorities[131]. The legal basis under which local authorities are empowered to introduce an area (or zone) with traffic or parking controls based on vehicle emission criteria are[132]:

- The Traffic Regulation Orders (TROs) under the Road Traffic Regulations Act (RTRA) 1984 for enforceable restrictions on the public highway. TROs are commonly introduced to manage traffic flow at specific locations, to define on-street parking conditions, or as part of a broader traffic management scheme. Highway authorities are empowered under the RTRA 1984 to make TROs to regulate the speed, movement and parking of vehicles and to regulate pedestrian movement;
- The Section 106 agreements as planning obligations for development sites and private land. Local planning authorities can impose conditions on planning permissions only where there is a clear land-use planning justification for doing so.

The following table summarizes the main options and key aspects for the introduction of Low Emission Zone schemes.

[128] Environmental Zones, Heavy vehicles – trucks and buses in Sweden. Available at http://www.lowemissionzones.eu/images/stories/pdf_jan2010/Miljozon_engelska2009.pdf
[129] Ibidem.
[130] Stockholms Stad Trafikkontoret, Miljözon för tung trafik i Stockholm 1996-2007. Available at www.stockholm.se/tk
[131] DEFRA, 2007, The Air Quality Strategy for England, Scotland, Wales and Northern Ireland. Available at http://www.defra.gov.uk/environment/quality/air/airquality/strategy/documents/air-qualitystrategy-vol1.pdf
[132] Local Air Quality Management Practice Guidance 2 Practice Guidance to Local Authorities on Low Emissions Zones, February 2009. Available at http://www.defra.gov.uk/environment/quality/air/airquality/local/guidance/documents/practice-guidance2.pdf

Table M – UK scheme options and key aspects for introducing LEZs

Scheme options	Vehicle restrictions	Parking restrictions	Using the planning system
Legal basis	TRO under RTRA 1984: Enables access by permitted vehicles, which can be based on environmental criteria	*Traffic Regulation Order under RTRA 1984:* Enables differential charging, which can be based on environmental criteria	*S106 agreement:* Enables obligations based on environmental objectives
Vehicle emission standards and type	Can be based on one or more of: • Euro standards • Vehicle age • Emission abatement retrofit technology • Fuel type/engine technology • Carbon dioxide (CO2) rating • Engine size Vehicle classification should also be specified: • Type(s) of vehicle • Weight • Other specifications	As per vehicle restrictions Most common approach is to base on CO2 ratings/ engine size	As per vehicle restrictions
Management of permitted vehicles	Scheme rules must be accessible to all vehicle owners, including non-UK owners Allowing/providing certification routes for compliance by retrofit can be useful	UK schemes have tended to focus on residents parking or season ticket holders, which provides a management system to build upon	See Government policy on planning obligations
Enforcement powers and penalties	Outside London the relevant moving vehicle offences are currently enforceable by Police. Powers under Traffic Management Act 2004 (TMA	TMA 2004 now provides for the civil enforcement of most types of parking contraventions. Local authority appointed Civil	Following a breach of planning control the Planning Authority (Local Authority or Council) has the option to take

Scheme options	Vehicle restrictions	Parking restrictions	Using the planning system
	2004) may provide civil enforcement powers to local authorities. These are necessary to effectively enforce a scheme	Enforcement Officers can issue Penalty Charge Notices (PCN) for parking contraventions	enforcement action. This may take the form of Enforcement notices, (temporary) stop notices, Breach of Condition Notices, planning contravention notices, or High Court or county court injunctions
Vehicle detection	Various methods, which can be combined in one scheme: • manual observation • Automatic Number Plate Recognition (ANPR) cameras (fixed sites or mobile units) • Tag and beacon or swipe-card technology	Generally done by manual observation, although camera (CCTV) systems have been used	In principal the same methods as for Traffic Restrictions would be available

Source: Local Air Quality Management Practice Guidance 2 Practice Guidance to Local Authorities on Low Emissions Zones, February 2009

Concerning the city of London, the aim of the Low Emission Zone is to improve air quality in the city by deterring the most polluting vehicles from driving in the area[133]; while, the Congestion Charging aims to reduce traffic congestion and make journeys quicker by encouraging people to choose other forms of transport[134]. The Mayor's legal authority to implement a congestion charging scheme is derived from the Greater London Authority Act 1999, as amended, and from secondary legislation or regulations. «The Scheme Order is the legal framework for the congestion charging scheme and contains the definitions of what the charge is, where it applies, details on discounts and exemptions, penalty charges, refunds and so on. Scheme Orders are made under the powers set out in Schedule 23 of the Greater London Authority Act 1999. Changes to the Scheme Order are made through a procedure known as a Variation Order. Each Variation Order is subject to public consultation before the Mayor considers Transport for London's response to the representations received and decides whether or not to confirm the change (with or without modifications) and make it part of the Scheme Order»[135].

[133] Tfl, About LEZ. Available at http://www.tfl.gov.uk/roadusers/lez/2021.aspx
[134] TfL, About the Congestion Charge. Available at http://www.tfl.gov.uk/roadusers/congestioncharging/6710.aspx
[135] Transport for London, 2007, Central London Congestion Charging, Impacts monitoring, Fifth Annual Report, London. Available at http://www.tfl.gov.uk/assets/downloads/fifth-annual-impacts-monitoring-report-2007-07-07.pdf

Annex 8 – Questionnaire Template

1. CONTACTS

City name

Organisation name

Contact name

Department

Job title

email

Telephone number

2. CITY STATISTICS

For the following questions, please provide the data and specify its source (e.g. year and type of latest survey, or other sources).

General facts	Data	Source	Date
Urban area population (1000 inhabit.)			
Urban Area (km^2)			
Population Density (inhabit./km^2)			
Cars per inhabitants (cars/1000 inhabit.)			
Car density (cars/km^2)			
Number of private cars			
Number of Light Duty Vehicles (LDV) (less than 3.5 tons) circulating in urban area			

Transport facts			
What is the modal split (%) for:	Data	Source	Data
Walking			
Cycling			
Bus			
Light rail			
Metro			
Commuter rail			
Car			
Motorcycle/scooter			

Other Transport information

What is the overall traffic volume (vehicle km/year)?	
What proportion of traffic does freight represent?	
Total number of motorised trips in the city per day	
... of which external (commuting)	
Average motorised trip travel time (*please, specify unit of measurement*)	
Average motorised trip length (km)	
Total number of non-motorised trips (walking/cycling) in the city per day	
Average non-motorised (walking/cycling) trip travel time (*please, specify unit of measurement*)	

Average non-motorised (walking/cycling) trip length (km)

3. IMPLEMENTATION STAGE

Which is the implementation stage of your access restriction scheme?

☐ Being in operation (Please, go to **SECTION A**)

☐ Foreseen to be implemented in the near future (Please, go to **SECTION B**)

☐ NEITHER implemented NOR foreseen (Please, go to **SECTION C**)

SECTION A (For cities with access restriction scheme in operation)

A.4 ACCESS RESTRICTION SCHEME

Main characteristics of the scheme:

Which are the main access restriction scheme objectives?

- ☐ Congestion reduction
- ☐ Traffic flows improvement
- ☐ Air quality improvement
- ☐ CO_2 emissions reduction
- ☐ Road safety improvement
- ☐ Increasing urban economy
- ☐ Liveability
- ☐ Equity
- ☐ Future generations
- ☐ Other, *please specify: …*

Which is the targeted traffic?

- ☐ Private cars
- ☐ LDV
- ☐ Euro 4 vehicles and under
- ☐ All except Compressed Natural Gas (CNG) and electric vehicles

Which is the adopted scheme design?

- ☐ Point based
- ☐ Cordon based
- ☐ Multi-cordon or zonal based

	☐ Area licensed based ☐ Distance based ☐ Time based ☐ Environmental zones ☐ Other, *please specify*: ...
Which is the technology used?	☐ Manual toll collection ☐ Automatic coin collection machines ☐ Paper licenses ☐ Automatic Number Plate Recognition (ANPR) / Virtual licences ☐ Dedicated Short Range Communication (DSRC) ☐ Global Navigation Satellite Systems/Cellular Networks (GNSS/CN) ☐ Other, *please specify*: ...
Which kind of enforcement has been adopted?	☐ Manual ☐ Technology based, *please specify*: ... ☐ % of illegal entrances per day
Which are the exempted categories?	☐ PT vehicles ☐ Taxi ☐ Two-wheelers

☐ Foreign vehicles

☐ Emergency vehicles

☐ Electric vehicles

☐ Other, please specify: ...

Which is the time of the day the scheme works?

Please, specify hours and days of the week (if applicable)

How much is being charged?

A.5 SCHEME IMPLEMENTATION

Which organisation has been in charge of the scheme design?

Which organisation was in charge of the scheme implementation?

Which other stakeholders have been involved during the scheme implementation?

☐ Citizens representatives

☐ PT company

☐ Service providers

☐ Retailers

☐ Freight distributors

When was formally decided to adopt the access restriction scheme? Date ....

When did the scheme come into operation? Date ....

Which barriers did you encounter during the scheme design and/or implementation?

- ☐ Politics and Strategy – Opposition
- ☐ Politics and Strategy – Conflict
- ☐ Planning – Technical
- ☐ Planning – Economic
- ☐ Planning – Policy Conflict
- ☐ Planning – User Assessment
- ☐ Institution – Administrative Structures and Practices
- ☐ Institution – Legislation and Regulation
- ☐ Cooperation – Partnership and Involvement
- ☐ Cooperation – Key Individuals
- ☐ Citizens Participation
- ☐ Information and Public Relation
- ☐ Technology
- ☐ Public Funds and Subsidy
- ☐ Exchange and Mutual Learning
- ☐ Cultural and Lifestyle
- ☐ Problem Pressure
- ☐ Public Funds and Subsidy

Which drivers have played a significant role during the scheme design and/or implementation?

- ☐ Politics and Strategy – Commitment
- ☐ Politics and Strategy – Coalition

☐ Planning – Technical

☐ Planning – Economic

☐ Planning – Policy Synergy

☐ Planning – User Assessment

☐ Institution – Administrative Structures and Practices

☐ Institution – Legislation and Regulation

☐ Cooperation – Partnership and Involvement

☐ Cooperation – Key Individuals

☐ Citizens Participation

☐ Information and Public Relation

☐ Technology

☐ Public Funds and Subsidy

☐ Exchange and Mutual Learning

☐ Cultural and Lifestyle

☐ Problem Pressure

☐ Public Funds and Subsidy

A.6 SCHEME RESULTS

Please, describe which are the main scheme results achieved in terms of:
Environment:

	Data	Source	Date
CO_2 emissions abatement (%)			
CO emissions abatement (%)			
NOx emissions abatement (%)			
Particulate emissions abatement (%) *of PM10*			
Particulate emissions abatement (%) *of PM 2,5*			
Particulate emissions abatement (%) *of PM Tot*			
CO levels decrease [concentration] (%)			

NOx levels decrease [concentration] (%)

Network:

Decrease in n° of vehicles entering the zone (% *vehicles/day or)*
Change in average vehicle speed in the zone (km/h)
Other *(please, specify)*

Financial and Economics:

Investment costs (mil. €)
Operational costs (mil. € per year)

Revenues from charges (€ per year)

Revenues from fines (€ per year)

Other *(please, specify)*

Urban economy increase/decrease (Please specify indicator used)

Indicator ……
Data ……
Source ……
Date ……

Acceptance:

How have citizens been consulted?

☐ Survey

☐ Referendum

	☐ Other…
Which was the percentage of favourable people **before** the scheme implementation? % ..... Source ……. Date …….. **Equity:**	
Who can be considered a “scheme winner”?	☐ Private motorised users ☐ PT users ☐ Shop keepers/Retailers ☐ Residents in the restricted zone ☐ Residents out of the restricted zone ☐ Freight distributors ☐ Other *(please, specify)* ...
Who can be considered a “scheme loser”?	☐ Private motorised users ☐ PT users ☐ Shop keepers/Retailers ☐ Residents in the restricted zone ☐ Residents out of the restricted zone ☐ Freight distributors ☐ Other *(please, specify)* ...

A.7	INFORMATION DISSEMINATION	
Which type of information has been disseminated?		☐ Scheme and its rules ☐ Alternative options ☐ Charges and sanctions ☐ Scheme results
To whom the information has been disseminated?		☐ Private motorised users ☐ PT users ☐ Shop keepers/Retailers ☐ Residents in the restricted zone ☐ Residents out of the restricted zone ☐ Freight distributors ☐ Other *(please, specify)* ...
When did you disseminate the information?		☐ Before the scheme implementation ☐ During the scheme implementation ☐ After the scheme implementation
Which type of media has been used?		☐ The press ☐ Radio - TV ☐ Internet ☐ Posting ☐ VMS (Variable Message Signs) ☐ Posters ☐ Leafleting ☐ Other *(please, specify)* ...

A.8 SCHEME LEGAL ASPECTS

Please, specify which is the type of your access restriction scheme legal framework:

☐ Air quality legislation

☐ Road code prescription

☐ Other *(please specify)*

Please, specify which is the level of your access restriction scheme legal basis:

☐ Urban

☐ Regional

☐ National

☐ European

Please provide any additional information on legal aspects of your access restriction scheme:

Is there any EU legislation/regulation that has driven/constrained you in the planning, design and/or implementation of the scheme? Please give details.

A.9 ADDITIONAL INFORMATION AND DATA

Please, provide any additional comments or data in the space given below.

Please, indicate which sources of information (e.g. websites, reports, studies) are available to supplement the information provided by filling this questionnaire:

A.10 FUTURE PLANS

Please provide any information on scheme future developments and/or upgrading in the space given below.

SECTION B (For cities with access restriction scheme just planned)

B.4 ACCESS RESTRICTION SCHEME

Main characteristics of the scheme:

Which will be the main access restriction scheme objectives?

- ☐ Congestion reduction
- ☐ Traffic flows improvement
- ☐ Air quality improvement
- ☐ CO_2 emissions reduction
- ☐ Road safety improvement
- ☐ Increasing urban economy
- ☐ Liveability
- ☐ Equity
- ☐ Future generations
- ☐ Other*, please specify: ...*

Which will be the targeted traffic?

- ☐ Private cars
- ☐ LDV
- ☐ Euro 4 vehicles and under
- ☐ All except CNG and electric vehicles

Which will be the adopted scheme design?

- ☐ Point based

	☐ Cordon based ☐ Multi-cordon or zonal based ☐ Area licensed based ☐ Distance based ☐ Time based ☐ Environmental zones ☐ Other, *please specify: ...*
Which will be the technology used?	☐ Manual toll collection ☐ Automatic coin collection machines ☐ Paper licenses ☐ Automatic Number Plate Recognition (ANPR) / Virtual licences ☐ Dedicated Short Range Communication (DSRC) ☐ Global Navigation Satellite Systems/Cellular Networks (GNSS/CN) ☐ Other, *please specify: ...*
Which will be the adopted type of enforcement?	☐ Manual ☐ Technology based, *please specify: ...* ☐ % of illegal entrances per day

Which will be the exempted categories?	☐ PT vehicles ☐ Taxi ☐ Two-wheelers ☐ Foreign vehicles ☐ Emergency vehicles ☐ Electric vehicles ☐ Other, *please specify*: ...
Which will be the time of the day the scheme works? *Please, specify hours and days of the week (if applicable)* *Hours…….* *Days……*	
How much is being charged? ……..	

B.5 SCHEME IMPLEMENTATION

Which organisation is in charge of the scheme design?

Which organisation will be in charge of scheme implementation?

Which other stakeholders will be involved during the scheme implementation?	☐ Citizens representatives ☐ PT company ☐ Service providers ☐ Retailers ☐ Freight distributors
When was formally decided to adopt the access restriction scheme?	Date: ...
When is the scheme going to come into operation?	Date: ...

Which barriers did you encounter so far during the planning phase of the scheme?

- ☐ Politics and Strategy – Opposition
- ☐ Politics and Strategy – Conflict
- ☐ Planning – Technical
- ☐ Planning – Economic
- ☐ Planning – Policy Conflict
- ☐ Planning – User Assessment
- ☐ Institution – Administrative Structures and Practices
- ☐ Institution – Legislation and Regulation
- ☐ Cooperation – Partnership and Involvement
- ☐ Cooperation – Key Individuals
- ☐ Citizens Participation
- ☐ Information and Public Relation
- ☐ Technology

- [ ] Public Funds and Subsidy
- [ ] Exchange and Mutual Learning
- [ ] Cultural and Lifestyle
- [ ] Problem Pressure
- [ ] Public Funds and Subsidy

Which drivers have played a significant role so far during the planning phase of the scheme?

- [ ] Politics and Strategy – Commitment
- [ ] Politics and Strategy – Coalition
- [ ] Planning – Technical
- [ ] Planning – Economic
- [ ] Planning – Policy Synergy
- [ ] Planning – User Assessment
- [ ] Institution – Administrative Structures and Practices
- [ ] Institution – Legislation and Regulation
- [ ] Cooperation – Partnership and Involvement
- [ ] Cooperation – Key Individuals
- [ ] Citizens Participation
- [ ] Information and Public Relation
- [ ] Technology
- [ ] Public Funds and Subsidy
- [ ] Exchange and Mutual Learning
- [ ] Cultural and Lifestyle
- [ ] Problem Pressure

☐ Public Funds and Subsidy

B.6 SCHEME RESULTS

Please, describe which will be the foreseen main scheme results in terms of:

Environment	Data	Source	Date
CO2 emissions abatement (%)			
CO emissions abatement (%)			
NOx emissions abatement (%)			
Particulate emissions abatement (% of PM10)			
Particulate emissions abatement (% of PM2,5)			
Particulate emissions abatement (% of PM Total)			
CO levels decrease [concentrations] (%)			
NOx levels decrease [concentrations] (%)			

Network:	Data	Source	Date
Decrease in n° of vehicles entering the zone *(vehicles/day)*			
Change in average vehicle speed in the zone (km/h)			

Other *(please, specify)*

Financial and Economics:

Investment costs (mil. €)
Operational costs (mil. € per year)

Revenues from charges (€ per year)
Revenues from fines (€ per year)
Urban economy increase/decrease

Indicator……

Data ……

Source……

Date……..

Acceptance:

How have citizens been consulted?

☐ Survey

☐ Referendum

Which was the percentage of favourable people before the scheme implementation?

% .....

Source ……

Data ……

Equity:

Who can be considered a "scheme winner"?

- ☐ Private motorised users
- ☐ PT users
- ☐ Shop keepers/Retailers
- ☐ Residents in the restricted zone
- ☐ Residents out of the restricted zone
- ☐ Freight distributors
- ☐ Other *(please, specify)* ...

Who can be considered a "scheme loser"?

- ☐ Private motorised users
- ☐ PT users
- ☐ Shop keepers/Retailers
- ☐ Residents in the restricted zone
- ☐ Residents out of the restricted zone
- ☐ Freight distributors
- ☐ Other *(please, specify)* ...

B.7 INFORMATION DISSEMINATION

Which type of information is going to be disseminated?	☐ Scheme and its rules ☐ Alternative options ☐ Charges and sanctions ☐ Scheme results
To whom the information will be disseminated?	☐ Private motorised users ☐ PT users ☐ Shop keepers/Retailers ☐ Residents in the restricted zone ☐ Residents out of the restricted zone ☐ Freight distributors ☐ Other *(please, specify)* ...
When do you disseminate the information?	☐ Before the scheme implementation ☐ During the scheme implementation ☐ After the scheme implementation
Which type of media is going to be used?	☐ The press ☐ Radio - TV ☐ Internet ☐ Posting ☐ VMS (Variable Message Signs) ☐ Posters

☐ Leafleting

☐ Other *(please, specify)* ...

B.8 SCHEME LEGAL ASPECTS

Please, specify which will be the type of your access restriction scheme legal framework:

☐ Air quality legislation

☐ Road code prescription

☐ Other *(please specify)*

Please, specify which will be the level of your access restriction scheme legal basis:

☐ Urban

☐ Regional

☐ National

☐ European

Please provide any additional information on legal aspects of your access restriction scheme:

Is there any EU legislation/regulation that has driven/constrained you in the planning of the scheme? Please give details.

B.9 ADDITIONAL INFORMATION AND DATA

Please, provide any additional comments or data in the space given below.

Please, indicate which sources of information (e.g. websites, reports, studies) are available to supplement the information provided by filling this questionnaire:

B.10 FUTURE PLANS

Please provide any information on how and when are you going to implement the scheme in the space given below.

SECTION C (For cities with access restriction scheme neither implemented nor foreseen)

Please, specify why you do not foresee any access restriction scheme:

☐ There is no need for such a scheme

☐ I don't think that an access restriction scheme could solve any problems of the city

☐ I would like to implement such a scheme but there are too many obstacles to be overtaken

☐ Other *(please, specify)*

Annex 9 – Cities questionnaire responses

City	Primary Objectives	Targeted Traffic	Level of Technology	Time of Operation	Pricing
Aalborg	Environment	Private Cars	Low Tech	24h	No Charge
Amsterdam	Traffic Congestion	Private Cars	High tech	Day Time	No Charge
Bauska	No scheme will be implemented in the next years				
Bergen	Traffic Congestion	Private Cars	High tech	Day Time	Per Trip
Berlin	Environment	Private Cars Freight	Low Tech	24h	No Charge
Bologna	Environment Traffic Congestion	Private Cars Freight	High tech	Day Time	Per Day
Bristol	Environment Traffic Congestion	Private Cars Freight	High tech	Day Time	Per Day
Burgos	Traffic Congestion	Private Cars	Low Tech	Day Time	No Charge
Cambridge	Traffic Congestion	Private Cars Freight	High tech	Day Time	Per Trip
Cork	Traffic Congestion	Private Cars Freight	Low Tech	Day Time	No Charge
Craiova	Environment Traffic Congestion	Private Cars	Low Tech	Day Time	No Charge
Debrecen	Environment Traffic Congestion	Private Cars	High tech	24h	No Charge
Durham	Traffic Congestion	Private Cars Freight	Low Tech	Day Time	Per Trip
Edinburgh	Traffic Congestion	Private Cars Freight	High tech	Day Time	Per Day
Eindhoven	Environment Traffic Congestion	Freight	High tech	Day Time	Per Day
Ferrara	Environment Traffic Congestion	Private Cars Freight	Low Tech	24h	Per Day
Funchal	Environment Traffic Congestion	Private Cars Freight	Low Tech	24h	No Charge
Gateshead	No scheme will be implemented in the next years				
Gdansk	Traffic Congestion	Private Cars	High tech	24h	No Charge
Genoa	Environment Traffic Congestion	Private Cars Freight	High tech	24h	Per Day
Ghent	Environment Traffic Congestion	Private Cars	High tech	Day Time	Per Day
Göteborg LEZ	Environment	Freight	Low Tech	24h	No Charge
Göteborg C.C.	Traffic Congestion	Private Cars Freight	High tech	Day Time	Per Trip
Hannover	Environment Traffic Congestion	Private Cars Freight	Low Tech	24h	Per Trip
Helsinki	Environment Traffic Congestion	Private Cars Freight	High tech	To be decided	To be decided

City	Primary Objectives	Targeted Traffic	Level of Technology	Time of Operation	Pricing
Imola	Environment Traffic Congestion	Private Cars	Low Tech	Day Time	Per Day
Krakow	Environment Traffic Congestion	Private Cars	Low Tech	Day Time	Per Trip
La Rochelle	Traffic Congestion	Private Cars Freight	Low Tech	Day Time	No Charge
London C.C.	Traffic Congestion	Private Cars Freight	High tech	Day Time	Per Day
London LEZ	Environment	Private Cars Freight	High tech	24h	Per Day
Lund	Environment	Private Cars	Low Tech	24h	No Charge
Manchester	Traffic Congestion	Private Cars	High tech	Day Time	Per Day
Milan	Environment Traffic Congestion	Private Cars	High tech	Day Time	Per Day
Modena	Environment Traffic Congestion	Private Cars Freight	High tech	24h	Per Trip
Monza	Environment Traffic Congestion	Private Cars	Low Tech	24h	No Charge
Munich	Environment	Private Cars Freight	Low Tech	24h	Per Day
Nord-Jæren	Traffic Congestion	Private Cars Freight	High tech	Day Time	Per Trip
Nuremberg	No scheme will be implemented in the next years				
Örebro	No scheme will be implemented in the next years				
Oslo	Traffic Congestion	Private Cars Freight	High tech	Day Time	Per Trip
Parma	Environment Traffic Congestion	Private Cars Freight	High tech	24h	Per Day
Perugia	Environment Traffic Congestion	Private Cars Freight	High tech	Day Time	Per Day
Poitiers	Environment Traffic Congestion	Private Cars	Low Tech	To be decided	Per Day
Potenza	Environment Traffic Congestion	Private Cars	Low Tech	Day Time	Per Day
Poznan	No scheme will be implemented in the next years				
Ravenna	Traffic Congestion	Private Cars Freight	High tech	Day Time	Per Day
Reading	Environment	Freight	High tech	24h	Per Day
Riga	Environment Traffic Congestion	Private Cars Freight	High tech	24h	Per Day
Rome	Environment Traffic Congestion	Private Cars Freight	High tech	Day Time	Per Day
Rotterdam	Environment	Freight	Low Tech	24h	Per Trip
Stockholm	Environment Traffic Congestion	Private Cars Freight	High tech	Day Time	Per Trip

City	Primary Objectives	Targeted Traffic	Level of Technology	Time of Operation	Pricing
Stuttgart	Environment	Private Cars Freight	Low Tech	24h	No Charge
Szczecinek	Environment Traffic Congestion	Private Cars	Low Tech	24h	No Charge
The Hague	Traffic Congestion	Private Cars	High tech	Day Time	No Charge
Toulouse	Environment Traffic Congestion	Private Cars	High tech	24h	No Charge
Trondheim	Traffic Congestion	Private Cars Freight	High tech	Day Time	Per Trip
Turnhout	Environment Traffic Congestion	Private Cars Freight	High tech	Day Time	Per Day
Utrecht	Environment	Freight	Low Tech	24h	Per Day
Verona	Environment Traffic Congestion	Private Cars	High tech	Day Time	Per Trip
Verviers	Environment Traffic Congestion	Private Cars Freight	Low Tech	Day Time	Per Trip

Aalborg

AALBORG – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Cars per inhabitants: 500 (cars/1000 inhabit.) – Population 196,292 – Urban Area 179,637 – Population density (inhabitants per km^2): 171.6	SURVEY Statistical Yearbook 2009 www.dst.dk
Context Description	– Modal Split: o Walking: 19% o Cycling: 15% o Bus: 5% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car (incl passengers): 58% o Motorcycle/scooter: 3%	SURVEY
Scheme Objectives	– Air quality improvement	SURVEY
Targeted Traffic	– Euro 4 vehicles and under	SURVEY
Scheme Design	– Environmental zones	SURVEY
Technology Used	– Paper licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of City of Aalborg. – PT company, Service providers, Retailers and Freight distributors have been involved during the scheme implementation. – The scheme came into operation on 1st February 2009. – The scheme works 24/7. – No charge has been foreseen, but fees have to be paid if the restrictions are not fulfilled by the vehicles. – Type of enforcement adopted: o Manual based – Exempted categories: o Foreign vehicles o Emergency vehicles – The scheme will be evaluated in 2010-2012. The restriction will change from the 1st of July 2010 where all HGVs and Buses above 3.5 tonnes need to fulfill the EURO IV norm or have installed a particulate filter.	SURVEY
Encountered Barriers	– Planning – Technical – Institution – Legislation and Regulation	SURVEY
Encountered Drivers	– Politics and Strategy – Commitment – Politics and Strategy – Coalition – Planning – Policy Synergy – Cooperation – Partnership and Involvement – Cooperation – Key Individuals	SURVEY

AALBORG – CITY LEVEL		
	– Citizens Participation – Information and Public Relation	
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	–	
Acceptability	–	
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules – To whom: o Residents in the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation – Type of media used: o The press o Radio - TV o Internet o Posting o Posters o Leafleting	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[136]	– Air quality legislation – Level of access restriction scheme legal basis: o urban o National – The possibility for implementing environmental zones are given through national legislation to the 5 biggest municipalities in Denmark, including Aalborg. This possibility was given from 1. January 2007	SURVEY

[136] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

AALBORG – CITY LEVEL		
Relationships with Existing EU legislation/regulation	–	

Amsterdam

AMSTERDAM – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	– Urban area population: 756.347 (1000 inhab.) – land area in km^2:165.12 – population density per km^2 land: 4,581	Amsterdam in cijfers 2009 http://www.os.amsterdam.nl/tabel/11013/
Context Description	– Passengers public transport, 2008 (x 1 mln.): 264 – Passengers public transport - km^2, 2008(x 1 mln.): 967 – Modal split (proportion of journeys to work by car), 2004: o Car 41% o Motor cycle 3% o Bicycle 22% o Walking 4% o Public transport (rail, metro, bus, tram) 30%	Amsterdam in cijfers 2009 http://www.urbanaudit.org/DataAccessed.aspx
Scheme Objectives	– deal with traffic jams in the short term (decrease number of car kilometres in rush hours by a minimum of 5%). – make motorists and employers more aware of possible options (telecommuting, public transport, earlier/later working hours). – assess motorist behaviour. – provide operational experience with the new technology (including satellite technology). – give the commercial sector the opportunity to gain experience with the system. – improve accessibility – gain insight in behavioral effects – stimulate awareness of mobility choices	http://www.verkeerenwaterstaat.nl
Targeted Traffic	– volunteers	
Scheme Design	– Cordon based – Pay driving trial	
Technology Used	– GPS based system	
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Through the pilot automobilists are offered alternatives for driving in peak hours such as driving during at other times and/or with other modes of transportation. – Participants of the pilot receive a monthly allowance. After that, they will pay per kilometer driven. Those who leave the car at home, especially during peak hours, can earn money. The consortium will take care of settling the bill with the participants, of a webportal and a servicedesk for participants. It will also provide information for the evaluation of the pilot. The participants will receive personalized travel information, also during the trip itself. They can receive this information through multiple media such as PC, mobile phone, smartphone and traffic radio. Text messages such as SMS will be converted into spoken messages to ensure traffic safety. The pilot is the first step towards the kilometer pricing that will be introduced throughout the Netherlands within a few years. The next step in the pilot is the announcements of the tariffs, the price that participants will pay per kilometer. These tariffs will be known soon. After that the recruitment of the participants will start. The expectation is that the first participants of the pilot will be	"Pilot Road Pricing in Amsterdam", Buffing 2009

AMSTERDAM – CITY LEVEL		
	driving during the spring of 2010. The coming months the associated technology will be further developed and tested. – This trial was set up for 10,000 volunteers and is being conducted in phases (start: 1,000). Participants pay for every kilometre driven (in the country) on weekdays, in a GPS-based system. The participants receive a monthly amount for this. In addition, the major roads to and from Amsterdam are subject to a rush hour surcharge. This pilot is contributing to improving the accessibility of the Amsterdam region. – Participants get their road taxes reimbursed (100€) and they are going to pay per kilometer – If they change their behavior they profit (if they keep on driving as usual, they won't). – Participants pay 6.5 ct per kilometer and an extra 4, 6 or 8 cents per km in rush-hours on selected roads.	
Encountered Barriers	–	
Encountered Drivers	– Politics and Strategy – Commitment – Politics and Strategy – Coalition – Cooperation – Partnership and Involvement – Cooperation – Key Individuals – Citizens Participation – Technology – Public Funds and Subsidy	
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	–	
Acceptability	–	
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – More accessible – Smarter	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Charges and sanctions – To whom: o Private motorized users – When the information has been disseminated: o Before the scheme implementation – Type of media used: o The press	

AMSTERDAM – CITY LEVEL		
	o Radio - TV o Internet: ▪ Central Milieuzones – national level website in Dutch language www.milieuzones.nl/) ▪ Nieuw Amsterdams Klimaat – City level website in Dutch language www.nieuwamsterdamsklimaat.nl/milieuzone)	
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[137]	–	
Relationships with Existing EU legislation/regulation	–	

[137] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Bauska

BAUSKA – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 10 (1000 inhabit.) - Urban Area: 6.14 km2 - Population Density: 1,660 inhabit./km2 - Cars per inhabitants: 4.22 (cars/1000 inhabit.) - Car density (cars/km2): 687 - Number of private cars: 3,900 - Number of Light Duty Vehicles (LDV) (less than 3.5 tons) circulating in urban area: 4,800	PMLP 2009 CSB 2009 CSDD 2010
Context Description	– Modal Split: o Walking: 51% o Cycling: 1% o Bus: 2% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car (incl passengers): 44% o Motorcycle/scooter: 2% – Overall traffic volume (vehicle km/year): 1.52m – Proportion of traffic represented by freight: 20% – Total number of motorised trips in the city per day: 4 – ... of which external (commuting) 2 – Average motorised trip travel time: 20mins – Average motorised trip length (km): 7 – Total number of non-motorised trips (walking/cycling) in the city per day: 4 – Average non-motorised (walking/cycling) trip travel time: 30 mins – Average non-motorised (walking/cycling) trip length (km): 3	BAUSKA 2010
	– Via Baltica - a European importance (TEN-T) highway connecting Helsinki crosses Bauska old town. In order to preserve the old centre and render it usable by all, a limited access for heavy duty vehicles to decrease air pollution could be interest of local municipality. Option could be to implement toll system to increase income to local budget and to improve traffic safety measures. Due to lack of ring road until 2020 any solutions are impossible.	SURVEY

Bergen

BERGEN – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	– Bergen is located on the western coast. With a population of close to 250'000 inhabitants, it is the second largest city in Norway. The Bergen region has a population of close to 350'000. – Population: 256,600 – Area km^2: 445.3 – Population per km^2: 576.2 – Car per inhabitants: 405.9 – Proportion of households with the use of a car: 62%	CURACAO http://www.ssb.no/english/municipalities/1201
Context Description	– The background for the system was an increase in the traffic and a lack of public funds. The Local Public Roads Administration was a driving force behind this solution, both formally and informally. Two alternatives were put forward: Either the city could rely on public funds and have a suitable trunk road system within 30 years, or they could introduce a toll ring and have the same trunk road system in 12 years. One of the slogans for the tolling system was "As many as possible pay as little as possible for the shortest period as possible for a common good – a suitable trunk road system" At the same time a local political coalition between the major political parties was established. The Bergen toll ring was due to expire at the end of 2000. However, it was prolonged for two years awaiting the new Bergen program.	CURACAO
Scheme Objectives	– The goal of the Bergen toll ring was to speed up a solution to the increasing traffic problems in Bergen. Thus, the pricing objective was to raise funds for road investment. – Also with the new Bergen programme, the pricing objective is to raise funds for investments. This time, however, the use of the revenue will be split between road investment and investments in public transport infrastructure, primarily a new city tram. With the introduction of the Bergen programme, road pricing has been discussed. However, the political parties have been reluctant to introduce such schemes.	CURACAO
Targeted Traffic	– The system charges all vehicles (other than buses in regular service)	Konsult Knowledgebase
Scheme Design	– Toll ring	
	– Flat fee for entering the city's central business district and operates between 6AM and 10PM, from Monday to Friday. – In order to support the shops business, Saturday was free from tolls.	Konsult Knowledgebase
Technology Used	– The toll ring offers electronic toll collection with the use of on-board units, the Auto-Pass system. – Subscribers with on-board units can achieve up to a 50 per cent discount depending on the amount prepaid. – In 2004 electronic toll collection was harmonized throughout Norway. Most toll roads now use the Auto-Pass system. The system will gradually be expanded further in to provide for payment on ferries, for parking, etc. – The Auto-PASS concept is owned and managed by the Norwegian Public Roads Administration (NPRA). The concept covers all Auto-PASS tags and Auto-PASS equipment at the charging points (Auto-PASS roadside equipment). The concept also covers all the specifications for the tags, roadside equipment, central systems, interfaces between the system elements, Auto- PASS logo and trademark, Auto-PASS contractual framework and the Auto-PASS security architecture. –	CURACAO

BERGEN – CITY LEVEL		
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Bergen was the first Norwegian city to introduce a toll ring scheme. On January 2, 1986, toll collection was introduced on the main roads into Bergen. Due to the geographical location it was possible to make a tight ring with fee collection on only 6 locations. – The Bergen toll ring started operation with six toll plazas on the main roads into the city centre. – Until 2001 the operation of the system was on weekdays from 6AM to 10PM. The hours of operation were not based on a road pricing approach, but more on a cost versus revenue consideration of a 24-7 operation. With the prolongation of the ring in 2001, 24-hour operation was introduced on weekdays. – Gradually, the system has expanded to make the burden more equally split. In 2006, a second ring was introduced and later the ring was made fully automated with the use of the Auto-PASS system. All car drivers must pass the toll ring when they drive in the direction of the city centre. – Tolls must be paid 24 hours a day all year round including weekends and holidays. There is no extra peak surcharge. Drivers are only charged for one trip per hour and there is a maximum payment of 50 trips per month for users of the Auto-Pass system. – The public owned company, Bergen Bompengeselskap AS is legally responsible for the toll ring. – They have outsourced (after tendering) the operation of the toll ring to Bro Tunnelselskapet AS. The current fees are given in the table below. The fee is collected through 19 toll plazas for inbound traffic. **Vehicle registered for total weight** **Less than 3 500 kg** / **From 3 500** NOK / Approx EURO / NOK / Approx EURO **Without AutoPass agreement** 15,- / 2,- / 30,- / 4,- **Discounts with AutoPass** 10% discount, no prepayment: 13,5 / 1,8 / 27,- / 3,6 30% discount, 25 trips prepaid: 10,5 / 1,4 / 21,- / 2,8 40% discount 175 trips prepaid: 9,0 / 1,2 / 18, / 2,4 – The fee is collected from all vehicles with the following exceptions: o buses in regular routes o emergency vehicles o motorcycles and mopeds o electric operated vehicles o people with a disability parking permit (must apply)	CURACAO
Encountered Barriers	– The main barrier in the process of the Bergen programme seems to be the public attitude and the reluctance by the Public Roads Administration to accept the city tram as a solution to the traffic problems in Bergen. The public roads administration has argued that the revenue could be more usefully spent on	CURACAO

<table>
<tr><th colspan="3">BERGEN – CITY LEVEL</th></tr>
<tr><td></td><td>other PT solutions.</td><td></td></tr>
<tr><td>Encountered Drivers</td><td>– Bekken and Osland (2004) investigated the political and administrative processes leading up to the Bergen programme. The study showed that negotiations between stakeholders and a broad political compromise have been important. Three important elements in that respect were earmarking some of the revenue for “high-profile” investments (the city tram), low fare levels with large discounts for heavy users, and no time variation in the toll levels.
– The main driver behind both the initial Bergen toll ring and the current Bergen Programme has been the lack of public funds to finance infrastructure, both road and public transport. This has been facilitated by the long tradition of using tolls as an alternative source of revenue.</td><td>CURACAO</td></tr>
<tr><th colspan="2">Section III - Results</th><th>Source</th></tr>
<tr><td>Environment</td><td>–</td><td></td></tr>
<tr><td>Network</td><td>– It was expected that the ring would decrease traffic volumes by around 3%.
– Despite a slight decrease in the beginning, there has been an average annual traffic growth of 2-3%.
– Since there are no natural detours, there has been little impact on route choices.</td><td>Konsult Knowledgebase</td></tr>
<tr><td>Economy</td><td>– The revenue from the initial Bergen toll ring was only used for road infrastructure investments. The new Bergen Programme also funds PT infrastructure. The table below illustrate this.
<table><tr><th>Source of funds</th><th>Mill NOK (2002)</th><th>Revenue use</th><th>NOK (2002)</th></tr><tr><td>State</td><td>1785</td><td>Road infrastructure</td><td>1585</td></tr><tr><td>Toll revenue</td><td>2280</td><td>Public transport infrastructure</td><td>1270</td></tr><tr><td>Municipality</td><td>150</td><td>Smaller investments*</td><td>820</td></tr><tr><td>City</td><td>100</td><td>Investments Bergen city centre</td><td>640</td></tr></table>* Traffic safety measures, walking and cycling measures, environmental measures and planning</td><td>CURACAO</td></tr>
<tr><td></td><td>– Annual income was higher than expected, around NOK 70M (€8.645 million). Of this, NOK 50M was spent on roads, NOK 14M was taken up in operating costs and NOK 7M was stored in a fund (whose use attracts great political debate).</td><td>Konsult Knowledgebase</td></tr>
<tr><td>Acceptability</td><td>– According to opinion polls, originally around two thirds of Bergen population was against the toll ring.
– At present, the majority accepted the toll ring. This change should be connected to the improvements in the local transport network despite relatively high levels of tax on motoring.</td><td>Konsult Knowledgebase</td></tr>
<tr><td>Equity</td><td>–</td><td></td></tr>
<tr><td>Liveability</td><td>–</td><td></td></tr>
<tr><td>Achievement of Green Paper Five Pillars Targets</td><td>– More fluid
– Smarter</td><td></td></tr>
</table>

BERGEN – CITY LEVEL		
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of media used: o Internet ▪ Luftkvalitet – National website (Norwegian language) o Brochure on environmental zone o Information for foreign tourists (German, English, French, Italian, Spanish, Turkish, Russian, Polish languages)	www.luftkvalitet.info/Default.aspx?pageid=1097 www.berlin.de/sen/umwelt/luftqualitaet/de/luftreinhaltep lan/doku_umweltzone.shtml
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[138]	–	
Relationships with Existing EU legislation/regulation	–	

[138] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Berlin

BERLIN – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Number of private cars: 1,098 m – Population density: 286 Inahbit./km2 – Urban area population: 4,971 (1000 inhab.) – Cars per inhabitants: 319.6 (cars/inhab.) – Less than 330 cars per 1,000 inhabitants	SURVEY www.stadtentwicklung.berlin.de/umwelt/umweltatlas/e_abb/eab606_01.xls http://spicycles.velo.info/Earlydocuments/Cities/Berlin/tabid/64/Default.aspx http://epp.eurostat.ec.europa.eu/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tgs00089&language=en http://epp.eurostat.ec.europa.eu/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tgs00080&language=en
Context Description	– Modal split (proportion of journeys to work by car), 2004: o Car 44.3% o Motor cycle 0.9% o Bicycle 7.4% o Walking 7.7% o Public transport (rail, metro, bus, tram) 39.7%	http://www.urbanaudit.org/DataAccessed.aspx
Scheme Objectives	– Air quality improvement	SURVEY
Targeted Traffic	– Private cars – LDV	SURVEY
Scheme Design	– Environmental zones	SURVEY
Technology Used	– wind screen stickers illustrating the Euro vehicle emission standard	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Senate Department for Health, Environment and Consumer Protection. – Citizens representatives, PT company, Service providers, Retailers, Freight distributors have been involved during the scheme implementation. – On 15th August 2005 was formally decided to adopt the access restriction scheme which came into operation on 1st January 2008. – The scheme works 24/7. – it's a traffic restriction, not a toll; penalty is 40€day. – Type of enforcement adopted: o Manual – Exempted categories: o Two-wheelers o Emergency vehicles o Electric vehicles	SURVEY

BERLIN – CITY LEVEL		
Encountered Barriers	– Politics and Strategy – Opposition – Politics and Strategy – Conflict – Planning – Technical – Planning – Economic – Institution – Administrative Structures and Practices – Institution – Legislation and Regulation – Information and Public Relation – Technology – Public Funds and Subsidy	SURVEY
Encountered Drivers	– Politics and Strategy – Commitment – Planning – Policy Synergy – Institution – Legislation and Regulation – Cooperation – Partnership and Involvement – Citizens Participation – Technology – Problem Pressure	SURVEY
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	–	
Acceptability	– Citizens have been consulted by means of: o formal public consultation	SURVEY
Equity	– Scheme winners: o PT users Residents in the restricted zone o Residents out of the restricted zone – Scheme losers: o Private motorized users o Freight distributors	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Alternative options o Charges and sanctions o Scheme results – To whom: o Private motorized users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors	SURVEY

BERLIN – CITY LEVEL		
	– When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o Internet: ▪ Feinstaubplakette (environmental badge) – national level website in German language www.feinstaubplakette.de) ▪ Federal Ministry for the Environment, Natural Conservation and Nuclear Safety – national level website www.bmu.de/english/air_pollution_control/general_information/doc/40740.php ▪ Berlin – City level website in German language www.berlin.de/sen/umwelt/luftqualitaet/de/luftreinhalteplan/doku_umweltzone.shtml) o VMS (Variable Message Signs) o Posters o Leafleting	
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[139]	– Air quality legislation – Level of access restriction scheme legal basis: o national o European – Labelling of the vehicles is based on a national labelling regulation, while the access criteria have been set by Berlin	SURVEY
Relationships with Existing EU legislation/regulation	– Driver was Dir 2008/50/EC, but the idea of what is lacking is a harmonised scheme for the type approval of retrofit kits for particle filters; this is a market barrier for filter manufactureres and created problems for foreign operators of retrofitted vehicles to get their vehicles properly classified in accordance with the German labelling regualtion. We therefore delayed the enforcement of stage 2 of the Low emission zone by 2 years for foreign Euro 3/III vehicles	SURVEY

[139] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Bologna

BOLOGNA – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 374,94 (1000 inhabit.) - Urban Area: 140.85 km2 - Population Density: 2,662 inhabit./km2 - Cars per inhabitants: 527 (cars/1000 inhabit.) - Car density: 1,403 (cars/km2) - Number of private cars: 197,561	Bologna Municipality (2008)
Context Description	– Modal Split: o Walking: 21.3% o Cycling: 6.9% o Bus: 25.6% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car: 35.6% o Motorcycle/scooter: 10.6% – Total number of motorised trips in the city per day: 436,000 (internal movements) – Total number of non-motorised trips (walking/cycling) in the city per day: 266,000 (internal movements)	Urban Traffic Master Plan (2001)
Scheme Objectives	– Congestion reduction – Air quality improvement – CO2 emissions reduction – Road safety improvement – Liveability	SURVEY
Targeted Traffic	– Private cars – LDV	SURVEY
Scheme Design	– Cordon based – Area licensed based – Environmental zones	SURVEY
Technology Used	– Automatic Number Plate Recognition (ANPR) / Virtual licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Bologna Municipality. – Citizens representatives, PT company, Retailers and Freight distributors have been involved during the scheme implementation. – On 15th June 1989 was formally decided to adopt the access restriction scheme which came into operation on 15th June 2005. – The scheme works 07.00 – 20.00 7 days a week. – Freight distribution vehicles can enter the Limited Traffic Zone with a charge linked to the pollution of vehicle level. – Type of enforcement adopted: o Telematics enforcement – Exempted categories: o PT vehicles o Taxi o Two-wheelers o Emergency vehicles o Electric vehicles	SURVEY

BOLOGNA – CITY LEVEL		
	– The LTZ access is based on authorising system and since 2005 the Municipality has activated an IT-based pricing system called "SIRIO". So 10 cameras were installed at the main LTZ access points. Between 7.00 a.m. and 8 p.m. every day except Saturday, the system automatically issues fines to car drivers not authorised to enter the LTZ. In parallel another IT system called "RITA" (14 cameras) has been put into action for controlling bus lanes 24 hours a day to avoid unauthorised cars driving in PT dedicated lanes and within the historic centre when forbidden. All the streets which give access to the city centre and the bus lanes are currently equipped with cameras in order to check if the vehicles accessing in the city centre are authorised. The cameras are able to read all car plates, check them with those contained in the database of authorised vehicles and, in case of violation, send the transgressor's data to the Municipal Police Dept which will issue a fine. Inside the LTZ there is another area called "T", very important for public transport; in this area the restriction are higher than in LTZ and also here the access is controlled by IT system. – The tariffs plan for annual delivery permits, according to pollution level norms, as follows: – a) "single car plate" permits (only 1 vehicle associated to the permit): o "pre-euro norm" vehicles: 100 €/year o "euro norm" vehicles: 80 €/year o methane / LPG: 25 €/year o operators located in LTZ: 25 €/year – b) "multi car plates" permits (2 or 3 vehicles associated to the permit) o if "eco" vehicles: 120 €/year o if "non eco" vehicles: 150 €/year – c) "no car plate" permits (more than 3 vehicles associated to the permit), vehicles are considered by default "non eco" and the permits costs 300 €/year. – Only 1 vehicle at a time can access the LTZ and the enforcement is performed by the IT camera system. – People not allowed to access the LTZ can buy a daily ticket for 5€ or a 4-days for 12€ (in this second case the days of use should be consecutive). – Due to the success of Urban Traffic the city of Bologna is now going to extend the LTZ for 14 hectares more (+4.4%) and install new "SIRIO" and "RITA" cameras.	CURACAO
Encountered Barriers	– Politics and Strategy – Opposition – Politics and Strategy – Conflict – Institution – Legislation and Regulation	SURVEY
Encountered Drivers	– Politics and Strategy – Commitment – Citizens Participation – Technology – Problem Pressure	SURVEY
Section III - Results		**Source**
Environment	–	
Network	– Decrease in n° of vehicles entering the zone (% vehicles/day): o LTZ: 25% o "T zone": 3% o Unauthorized use of bus lanes: 70%	CURACAO

BOLOGNA – CITY LEVEL		
	– Reduction of 27% of freight operators permits and 10% of total permits (operators plus citizens) to access in the LTZ has been achieved.	
Economy	– The revenues will be use to finance the building of news roads, for maintenance of the existing ones, and for improving public transport network. During the year 2007 108,000 € were earned – from "pay–to–access" permits sold.	CURACAO
Acceptability	– A good acceptability of the scheme has been expressed by the citizens.	CURACAO
Equity	– Scheme winners: o PT users o Residents in the restricted zone o Freight distributors – Scheme losers: o Private motorized users	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – More accessible – Smarter	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Alternative options o Charges and sanctions o Scheme results – To whom: o Private motorized users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o Internet (e.g. Bologna – city level website in Italian language www.comune.bologna.it/dettaglioIpNews.php?newsitemID=937&channelID=16) o VMS (Variable Message Signs) o Leafleting	SURVEY
Section V – Scheme Legal Aspects		**Source**

BOLOGNA – CITY LEVEL		
Scheme Legal Framework[140]	– Air quality legislation – Level of access restriction scheme legal basis: o urban	SURVEY
Relationships with Existing EU legislation/regulation	–	

[140] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Bristol

BRISTOL – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 1,006.6 (1000 inhabit.) - Urban Area: 110 km2 - Population Density: 615.7 inhabit./km2 - Cars per inhabitants: 449.9 (cars/1000 inhabit.) - Car density: (cars/km2) - Number of private cars: - The West of England sub region is made up of Bath and North East Somerset, the City of Bristol, North Somerset and South Gloucestershire. An all-purpose unitary council governs each of these four areas. The four councils are working together as the West of England Partnership to tackle transport and other major strategic issues in the sub region. - Around one million people live in the West of England, with Bristol being the biggest major urban centre. The population of the sub-region is set to grow by 19% and the number of jobs by 26% by 2026.	http://epp.eurostat.ec.europa.eu/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tgs00080&language=en http://epp.eurostat.ec.europa.eu/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tgs00089&language=en CURACAO
Context Description	– Modal split (proportion of journeys to work by car), 2001: o Car 79.9% o Motor cycle 2.1% o Bicycle 1.5% o Walking 1.4% o Public transport (rail, metro, bus, tram) 15.4%	http://www.urbanaudit.org/DataAccessed.aspx
Scheme Objectives	– Congestion reduction – Air quality improvement – Road safety improvement – Increasing urban economy – Liveability – Improve access to job opportunities – Help people to get to work and school efficiently	CURACAO
Targeted Traffic	–	
Scheme Design	–	
Technology Used	–	
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– The operational arrangements are still to be confirmed, but a weekday morning road user charge during the peak period (possibly 7am – 10am) could be implemented, with a daily charge of around £4 (€4.80). – The bid for TIF funding in the Greater Bristol area is part of a wider aspiration to implement a large package of improvements to the region's transport network, including: o The Greater Bristol Bus Network (GBBN) – a package of bus priority and other improvements on ten sub-regional corridors. It is hoped that scheme implementation will commence in the near future; o The Bath Package – a range of measures aimed at improving alternatives to the car by providing a modern,	CURACAO

BRISTOL – CITY LEVEL		
	integrated and easy-to-use public transport system; o South Bristol Link Road Phases 1 and 2 – improved orbital access in South Bristol and to Bristol International Airport, and to support regeneration and deal with traffic growth; o Weston-super-Mare Package Phase 1 – a range of measures aimed at supporting sustainable development, including improved interchange facilities, car parking and improving to town centre bus routes. A new park and ride is also planned; o 3 new Bus Rapid Transit (BRT) routes – starting with a scheme linking Emerson's Green and Ashton Vale, the BRT routes will feature segregated bus lanes on parts of the routes to provide fast and reliable journey times; o Improved rail services across the sub region; o Park and Ride – Expansion of existing and development of new park and ride sites serving Bristol and Bath; o Bus enhancements in addition to the GBBN package, incorporating better orbital routes, concessionary travel for young people and increased home to school bus provision; o Highway improvements and traffic management measures; o Improvements to walking and cycling routes, information and facilities; o Public Realm – Significant improvements to open spaces in Bath and Bristol; o Freight – Expansion of existing freight consolidation scheme in Bristol and extension to serve other areas; o Smarter choices – Substantial increase in the support for travel plans, provision of car clubs, travel awareness campaigns, personalized travel marketing and other smarter choices measures. – In October 2007 a document entitled "Our Future Transport" was submitted to the UK Government Department for Transport (DfT). This document outlined the sub region's 20 year transport vision and the part that the Transport Innovation Fund could play in realising this vision. – Since this submission, consultation has been conducted with a range of stakeholders and extensive further technical work undertaken in developing the detail of the proposals. In January 2008, the TIF project received a big boost when it was awarded an extra €850,000 by the UK Government to continue with the technical work needed to develop the proposals. – Subject to political approval by the four authorities, the proposals would be submitted to the UK government as an outline business case for the €1 billion package from the Transport Innovation Fund. Once, and if, this bid is submitted, extensive community and stakeholder consultation is to be carried out. A further three years technical refinement of the proposed transport measures and ongoing engagement will then follow.	
Encountered Barriers	– Politics and Strategy – Opposition – Politics and Strategy – Conflict – Cultural and Lifestyle	CURACAO
Encountered Drivers	–	

BRISTOL – CITY LEVEL		
Section III - Results		**Source**
Environment	–	
Network	–	
Economy		
Acceptability	–	
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	–	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	–	
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[141]	–	
Relationships with Existing EU legislation/regulation	–	

[141] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Burgos

BURGOS – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population: 180 (1000 inhabit.) - Urban Area: 25.77 km2 - Population Density: 7,000 inhabit./km2 - Cars per inhabitants: 140 (cars/1000 inhabit.) - Car density: 1,000 (cars/km2) - Number of private cars: 25,000 - Number of Light Duty Vehicles (LDV) (less than 3.5 tons) circulating in urban area: 2,200	National Statistics (2009)
Context Description	– Modal Split: o Walking: 35% o Cycling: 2% o Bus: 38% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car: 23% o Motorcycle/scooter: 2%	National Statistics (2009)
Scheme Objectives	– Congestion reduction – Road Safety improvement – Increasing urban economy – Liveability – Future generations	SURVEY
Targeted Traffic	– Private cars – LDV – Euro 4 vehicles and under – CNG – Electric vehicles	SURVEY
Scheme Design	– Zonal based	SURVEY
Technology Used	– Automatic bollards	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design has been in charge of City Council and Strategic Plan, while implementation has been in charge of City Council. – Citizens representatives, PT company, Service providers, Retailers and Freight distributors have been involved during the scheme implementation. – On 1st June 2004 was formally decided to adopt the access restriction scheme which came into operation on 1st September 2006. – The scheme works 10:00-15:00 and 17:00-8:00. – Type of enforcement adopted: o electronic bollards – Exempted categories: o PT vehicles o Taxi o Emergency vehicles o Electric vehicles – The main goal was to achieve the results thanks to the support of the stakeholders consultation during the whole process.	SURVEY

BURGOS – CITY LEVEL		
	– The idea of the Council is to increase the covered area.	
Encountered Barriers	– Planning – Technical – Planning – Policy Conflict – Planning – User Assessment – Cooperation – Partnership and Involvement – Cooperation – Key Individuals – Citizens Participation – Information and Public Relation – Exchange and Mutual Learning – Cultural and Lifestyle	SURVEY
Encountered Drivers	– Politics and Strategy – Commitment – Politics and Strategy – Coalition – Planning – Technical – Planning – Policy Synergy – Planning – User Assessment – Cooperation – Partnership and Involvement – Cooperation – Key Individuals – Citizens Participation – Information and Public Relation – Technology – Public Funds and Subsidy – Exchange and Mutual Learning – Cultural and Lifestyle – Public Funds and Subsidy	SURVEY
Section III - Results		**Source**
Environment	–	
Network	– Decrease in n° of vehicles entering the zone (% vehicles/day or): 97% – Change in average vehicle speed in the zone (km/h): 30 km/h	SURVEY
Economy	– Investment costs (mil. €): 3 M€ – Operational costs (mil. € per year): 0.3 M€ – Revenues from charges (€ per year): 0 € – Revenues from fines (€ per year): 1,000 € – Urban economy increase/decrease: o Indicator: Value of buildings Data: 600 €/m2 of increase Source: study, 2008	SURVEY
Acceptability	– Citizens have been consulted by means of: o Consultation meetings – Percentage of favorable people before the scheme implementation: 45%	City Survey 2005
Equity	– Scheme winners: o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone – Scheme losers:	SURVEY

BURGOS – CITY LEVEL		
	o Private motorized users o Freight distributors	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Alternative options o Charges and sanctions o Scheme results – To whom: o Private motorized users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o Posting o Posters o Leafleting	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[142]	– There is no legal scheme restriction in Spain (No legal aspects as it is only at local level [legal rules by the Council]) – Level of access restriction scheme legal basis: o urban	SURVEY
Relationships with Existing EU legislation/regulation	–	

[142] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Cambridge

CAMBRIDGE – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Population Density: 268.8 inhabit./km2 - Cars per inhabitants: 310 (cars/1000 inhabit.) – – Cambridge's population in 2001 was 108,863 (that included 22,153 students), and the population of the urban area which includes parts of South Cambridgeshire district is estimated to be approximately 130,000.	http://epp.eurostat.ec.europa.eu/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tgs00080&language=en http://epp.eurostat.ec.europa.eu/tgm/refreshTableAction.do?tab=table&plugin=1&pcode=tgs00089&language=en CURACAO
Context Description	– Cambridgeshire County Council, in their Local Transport Plan (LTP) 2006-11, set out a series of objectives, transport targets and programmes for addressing the challenges the county faces. – The plan identifies 2 key tools, "widening choice" and managing demand" to achieve their aims. The LTP sets out a package of measures that include improvements to bus services, demand management measures that include road pricing and funding mechanisms to realise their aims – such as the Transport Innovation Fund (TIF)19. To date, TIF funding has given Cambridgeshire County Council the opportunity to explore and develop an innovative proposal for a £500 million (€600 million) transport investment package of measures that would complement a road pricing scheme. – 61,800 new homes will be built in the Cambridge sub-region in the 20-year period between 2001 and 2021. This is part of a national government requirement for new homes across the UK. This is locally supported through development plans. This will inevitably add pressure to the road network and necessitate demand management measures to alleviate congestion. – In a 'do nothing' scenario, the number of car journey trips is predicted to increase to over 300,000 by 2021 from a baseline of approximately 275,000 in 2006. The predicted impact of a 'combination of improvements' or measures, indicates a fall in the number of car journeys to approximately 260,000, if substantial public transport, walking and cycling and highway improvements are introduced. This package of measures is considered an important component of the proposed scheme. – Modal split (proportion of journeys to work by car), 2001: o Car 79.9% o Motor cycle 2.1% o Bicycle 1.5% o Walking 1.4% – Public transport (rail, metro, bus, tram) 15.4%	CURACAO http://www.urbanaudit.org/DataAccessed.aspx
Scheme Objectives	– Traffic Impact Assessments/Transport Appraisals suggest that there will be an additional 20,350 'new' trips (all modes) in the morning peak period by 2021, an increase of approximately 20% compared to 2006 figures. This is predicted to cause increased delays on major routes in the county. – In the city of Cambridge city itself, increased levels of congestion are predicted to cause: o 84% increase in junction delays;	CURACAO

CAMBRIDGE – CITY LEVEL		
	o 30% increase in distance travelled; and o 46% increase in travel time.	
Targeted Traffic	–	
Scheme Design	– Cordon based	CURACAO
Technology Used	– The vehicle would be fitted with an 'on board' unit that would – register the vehicle passing or entering the charging zone. The Dedicated Short Range Communications (DSRC) transceiver and vehicle receiver unit would log entry. – This is backed up by Automatic Number Plate Recognition (ANPR) cameras mounted on the same pole and outrigger. Spatial matching would take place between the image read and recorded by the ANPR camera and the DSRC transaction.	CURACAO
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– The proposed charging scheme in Cambridge would have the following criteria: o It would be a one-off charge for anyone driving into, out of, or within Cambridge; o It would operate between the hours of 7.30-9.30am (Monday-Friday); o The proposed charge would be in the range of £3-5 (€3.60-€6). – In June 2008 Cambridgeshire County Council reported that there has been a mixed reaction during public consultation to the TIF proposals. This has led to the County establishing a commission of stakeholders that will assess the plans before moving forward. A timetable of review has not been established to date. – Cambridgeshire, like many UK local authorities, faces the many challenges of establishing a road pricing programme. Public and media pressure, mostly fear of the unknown and viewing road pricing in isolation and not as part of a package of demand management measures, do not help. This, combined with fears of a national recession and the rise in the cost of living in the – United Kingdom in the last 12 months, adds to the problems of considering a charging scheme. – It remains to be seen whether Cambridgeshire will progress with their Congestion Charging package scheme. At this time the proposal is on hold.	CURACAO
Encountered Barriers	–	
Encountered Drivers	–	
Section III - Results		**Source**
Environment	–	
Network	– The intention of the proposed charge would be to reduce traffic entering the city by 10% when compared to today's figures.	CURACAO
Economy	– Cambridgeshire has been awarded a total of £2.4 million (€2.9 million) of TIF funding to date. – Cambridgeshire also submitted a further bid for £500m (€600m) in	CURACAO

CAMBRIDGE – CITY LEVEL		
	October 2007 for a TIF Congestion Charging Scheme. Investigation and public engagement continues.	
Acceptability	– By February 2008 approximately 1000 people had visited road shows and approximately 2,240 people had completed an online survey. – The key issues arising from the consultation activities to date are that designers should consider: o Discounts and exemptions of any proposed scheme; o Outbound trips should be thought about as well as inbound trips; o The cost of alternatives to car-borne travel; o The need for alternatives to be in place before any charge; o The extent of the charging zone; o Timescales; and o The need for action to reduce congestion. o It is evident that the local authority should think about all these issues in any proposed scheme.	CURACAO
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – More accessible – Smarter	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Public acceptance is considered to be an important part of any proposed scheme in Cambridge. To that end a number of consultation activities have either taken place or are programmed, including: o Road shows across the county; o Online survey; o Stakeholder workshops (Cambridge x 3, Huntingdon, March, Ely, Sawston); o Breakfast briefings; o Special meetings – including Parish Councils, transport operators, the elderly, the disabled; o Hard-to-reach groups; o Engagement with schools – February 2008; and o Member and MPs – meetings and briefings.	CURACAO
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[143]	– Level of access restriction scheme legal basis: o urban	CURACAO
Relationships with Existing EU	–	

[143] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

CAMBRIDGE – CITY LEVEL		
legislation/regulation		

Cork

CORK – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 119,418 (1000 inhabit.) - Urban Area: 37.31 km2 - Population Density: 3.22 inhabit./km2 - Cars per inhabitants: 246 (cars/1000 inhabit.) - Car density: 787.91 (cars/km2) - Number of private cars: 29,397	CENSUS 2006
Context Description	– Modal Split: o Walking: 31.7% o Cycling: 2.1% o Bus: 9.5% o Light rail: N/A o Metro: N/A o Commuter rail: 0.3% o Car (incl passengers): 48.1% o Motorcycle/scooter: 0.6% o Other: 5.2% o Not Stated: 2.3%	Small Area Population Statistics Theme 11-1-Small Area Over 5's travelling to work, school or education CENSUS 2006
Scheme Objectives	– Road safety improvement – Increasing urban economy	SURVEY
Targeted Traffic	– Private cars – LDV	SURVEY
Scheme Design	– Zonal-based	SURVEY
Technology Used	– Automatic Access Restriction Bollards	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Cork city Council. – Retailers have been involved during the scheme implementation. – the scheme came into implementation during the European Mobility Week September 19-25th 2005 – The scheme works from 11:00 to 17:00 , 7 days a week for the Pedestrianised Area, But the number of lanes in a parallel road was reduced from four to two permanently. – No charge foreseen. – Type of enforcement adopted: o Manual (Random Police checks) o Traffic Warden GPRS Hand-held Units – Exempted categories: o Two-wheelers o Emergency vehicles – It is proposed to expand the Pedestrian Priority Zones to include Emmet Place which is another city centre location in Cork. This will create a zone flanking the Main shopping street Patrick Street. There are proposals to make St. Patrick's Street itself accessible only to Pedestrians, Cyclists, Public Transport and possibly Taxis. Then all the streets south-east of St. Patrick's Street linking through Oliver Plunkett Street to the South Mall would be inaccessible to all motorized transport between 11and	SURVEY

CORK – CITY LEVEL		
	5 as would all the streets North West of St. Patrick's Street lining to Emmet Place. However these are only proposals as of yet and must go through council and planning public consultation processes.	
Encountered Barriers	– Politics and Strategy – Opposition – Politics and Strategy – Conflict – Planning – Technical – Institution – Legislation and Regulation – Cooperation – Key Individuals – Public Funds and Subsidy	SURVEY
Encountered Drivers	– Planning – Technical – Planning – Economic	SURVEY
Section III - Results		**Source**
Environment	– Patrick's Street – Estimated pollutant concentrations using DMRB Screening Method based on Annual mean mg/m3 (2002 baseline - 2006): o CO: - 9.5% o Benzene: - 9.5% o 1,3-butadiene: - 11.1% o NOx: - 19.1% o NO2: - 14.2% o PM10: - 21.3% – Patrick's Street - Estimated annual emissions using DMRB Screening Method based on Annual mean Kg/year (2002 baseline - 2006): o CO: - 45.8% o NOx: - 28.7% o CO2: - 37.6% o PM10: - 34.3% – Estimated noise levels on St Patrick's St by using two methods based on Calculation of Road Traffic Noise (UK Department of Transport): o – 1.7 dBA	MIRACLES measures for Cork City – Ex Ante Evaluation – Draft Report (2005)
Network	– 50% reduction in lane capacity on St. Patrick's Street and a 2% reduction in the overall level of car traffic (expected results 2002 baseline - 2006)	MIRACLES
Economy	– Investment costs (mil. €): €500,000 – Operational costs (mil. € per year): €30,000	Tenders and quotations 2005 to 2009 Annual Budget January 2010
Acceptability	– Meeting with retailers before and after to which all were invited. Also formal public Consultation process of information and opportunity for submissions.	SURVEY
Equity	– Scheme winners: o Shop keepers/Retailers o Residents out of the restricted zone o Shoppers – Scheme losers: o Private motorized users o Residents in the restricted zone o Freight distributors	SURVEY
Liveability	– The estimated change in modal split on Patrick's Street is (2002 baseline - 2006): o Cars: - 5.8% o Bus: + 2.7% o Motorcycles: + 1.3%	MIRACLES measures for Cork City – Ex Ante Evaluation – Draft Report (2005)

CORK – CITY LEVEL		
	o Cycle: + 0.4% o LGV: + 0.6% o HGV: + 0.9% o Articulated: + 0.1%	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – Safer – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules – To whom: o Shop keepers/Retailers o Residents in the restricted zone – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o Internet o Signage beside bollards	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[144]	– National Regulations & Local By-Laws – Level of access restriction scheme legal basis: o urban o national – The Automatic Rising Bollards are being used to reinforce the Pedestrian Priority Zones established using Statuary Road signs and Time-plates specified in National Legislation.	SURVEY
Relationships with Existing EU legislation/regulation	–	

144 Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Craiova

CRAIOVA – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 229.43 (1000 inhabit.) - Urban Area: 81.4 km2 - Population Density (inhabit./km2): 2818	Yearly statistic 2008
Context Description	– Modal Split: o Walking: 10% o Cycling: N/A o Bus: 30% o Light rail: 10% o Metro: N/A o Commuter rail: N/A o Car (incl passengers): 40% o Motorcycle/scooter: N/A	SURVEY
Scheme Objectives	– Air quality improvement – Liveability	SURVEY
Targeted Traffic	– All except Compressed Natural Gas (CNG) and electric vehicles – Emergency vehicles are exempted	SURVEY
Scheme Design	– Zonal based	SURVEY
Technology Used	– Manual toll collection	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– The scheme is in operation during the weekends. – Scheme design and implementation will be in charge of Craiova Municipality. – Citizens representatives, PT company and Service providers have been involved during the scheme implementation. – The scheme came into operation in 2009. – An extension of restricted area is foreseen after the rehabilitation of historical City centre.	SURVEY
Encountered Barriers	– Technology	SURVEY
Encountered Drivers	– Institution – Administrative Structures and Practices	SURVEY
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	– No vehicles entering the zone during the weekends	SURVEY
Acceptability	– Consultation stages are to be undertaken.	SURVEY

CRAIOVA – CITY LEVEL		
Equity	– "scheme winners": o Residents in the restricted zone – "scheme losers": o Private motorized users o PT users o Shop keepers/Retailers	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules – To whom: o Private motorised users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation – Type of media used: o The press o Radio - TV	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[145]	– Air quality legislation – Level of access restriction scheme legal basis: o urban	SURVEY
Relationships with Existing EU legislation/regulation	–	

[145] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Debrecen

DEBRECEN – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 207 (1000 inhabit.) - Urban Area: 461 km2 - Population Density: 442 inhabit./km2 - Cars per inhabitants: 302 (cars/1000 inhabit.) - Car density: N/A (cars/km2) - Number of private cars: 62,576 - Number of Light Duty Vehicles (LDV) (less than 3.5 tons) circulating in urban area: 5,600	Statistics 2008
Context Description	– Modal Split: o Walking: 22% o Cycling: 8% o Bus: 25% o Light rail: 6% o Metro: N/A o Commuter rail: N/A o Car : 38% o Motorcycle/scooter: 1% – Average motorised trip travel time: 16 min – Average motorised trip length (km): 8	Official counting 2004
Scheme Objectives	– Congestion reduction – Traffic flows improvement – Air quality improvement – Liveability	SURVEY
Targeted Traffic	– Private cars	SURVEY
Scheme Design	– Environmental zones	SURVEY
Technology Used	– surface pedestrian area construction with access restriction	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Municipality. – Citizens representatives and PT company have been involved during the scheme implementation. – On 1st January 2000 was formally decided to adopt the access restriction scheme which came into operation on 1st January 2002. – The scheme works 24/7. – No charge. – Type of enforcement adopted: o Technology based – Exempted categories: o PT vehicles o Emergency vehicles o Electric vehicles	SURVEY
Encountered Barriers	– Politics and Strategy – Opposition – Politics and Strategy – Conflict – Citizens Participation – Public Funds and Subsidy	SURVEY

DEBRECEN – CITY LEVEL		
Encountered Drivers	– Politics and Strategy – Commitment – Politics and Strategy – Coalition	SURVEY
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	–	
Acceptability	– Citizens have been consulted by means of: o Survey o Through the elected politicians of the relevant areas	SURVEY
Equity	– Scheme winners: o PT users o Shop keepers/Retailers o Residents in the restricted zone – Scheme losers: o Private motorized users o Residents out of the restricted zone o Freight distributors	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Alternative options o Scheme results – To whom: o Private motorized users o PT users o Residents in the restricted zone o Residents out of the restricted zone – When the information has been disseminated: o Before the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o VMS (Variable Message Signs)	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[146]	–	

[146] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

DEBRECEN – CITY LEVEL		
Relationships with Existing EU legislation/regulation	–	

Durham

DURHAM – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Population, 1991: 86,060 - Intercensal increase, 1981-1991: 1,400 - Intercensal increase, % per year,1981-1991: 0.16 - - Population density: 604 inhab./km2 - Cars per inhabitants: 627	http://www.statistics.gov.uk/StatBase/xsdataset.asp?More=Y&vlnk=1856&All=Y&B2.x=46&B2.y=8 www.durham.gov.uk/PDFApproved/AAP2001CensusSummarySheetsv2.pdf
Context Description	– Durham city has a unique character and contains many fine buildings. The quality of the landscape surrounding the city centre affords it a unique setting amongst the historic cities of England and it is now a major tourist attraction. – Durham contains a number of major national and regional employers. It has remained a centre of economic activity in an area that has experienced decline of its traditional mining industries. – Major road building project in Durham in the late 1970's have been followed by a continuation of land use patterns. As Durham has continued in largely the same fashion, the problems of its existing city centre structure have compounded year on year for access and parking requirements of the many different users of the transport system. – Durham is a historic city facing the issue of rising traffic levels into the historic centre, much of the activity being generated by tourist traffic. In order to manage the level of traffic entering the centre of Durham, local decision makers decided to introduce charging for those vehicles wishing to access the historic core, in essence the Market Place, cathedral and castle. – The current traffic situation in Durham is as follows: o Lack of road space. The historic nature of the city and the river valley topography mean that road widening is not an option o The provision of bus and cycle lanes – has been limited due to the lack of road space to make this feasible o All the main radial routes are congested in the morning and evening peak periods – Total gridlock is only avoided in the very central area because the traffic is held back and stored on the approach routes. – Modal split, method of travel to work (major centre): o Work mainly at of from home 7.2% o Underground, metro, light rail, tram 0.1% o Train 1.9% o Bus, minibus, coach 7.0% o Motor cycle, scooter or moped 0.6% o Driving a car or van 57.4% o Passenger in a car or van 8.0% o Taxi or minicab 0.2% o Bicycle 1.5% o Walking 15.5% o Other 0.7%	CURACAO 2001 Census - Major Centre Profiles - Durham City http://www.durham.gov.uk/PDFApproved/DurhamCityMajorCentreFinal.pdf
Scheme Objectives	– Improve pedestrian safety – Improve access for the disabled – Enhance a world heritage site – Sustain the vitality of this part of the city centre – The scheme is designed to resolve the conflict between vehicles	CURACAO

DURHAM – CITY LEVEL		
	and pedestrians when accessing the historic centre.	
Targeted Traffic	–	
Scheme Design	– Durham's congestion charging zone, implemented in 2002, is one depicted by a cordon-based scheme, where drivers must pay to enter a fixed zone. Essentially the scheme covers just one road, Saddler Street, which provides access to Durham's World Heritage site on Durham's peninsula. The road provides access to the Market Place, Cathedral and castle, but was also being used as a temporary car park by shoppers, with the driver staying in the vehicle while the passenger visited the shops. – Drivers wishing to access the peninsula will be faced with a charge on exit. Drivers must stop at the stop line and red traffic indicator located alongside the payment machine. Following a successful transaction, the bollard will lower and, when fully retracted, the traffic signal will change to green and the driver can proceed safely out of the charged zone.	CURACAO
Technology Used	– Exit during the restricted period is controlled with an automatic bollard, which is linked to payment and permit detection apparatus. The pay machine will accept £2, £1, 50p, 20p and 10p coins. No change is given from the machine. – Vehicles will be recorded on the CCTV system and owners traced through the DVLA. – Drivers attempting to avoid the charge through driving out of the uncontrolled entrance will be committing a traffic offence. – This is monitored by the CCTV system and appropriate action will be taken against them.	CURACAO
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– The £2 (€2.40) charge is payable on exit from the area between 10:00am and 4:00pm Monday to Saturday. Entrance and exit from the area is free at all other times. – There are a number of categories of road users who are exempted from the charge: o Residents o Students o Public Transport Vehicles o Security and Postal Vehicles o Emergency services o Disabled Drivers – Drivers who fail to meet the charge will be permitted to proceed through the bollard system. However, a £30 (€36) charge notice is issued to the vehicle owner.	CURACAO
Encountered Barriers	–	
Encountered Drivers	–	
Section III - Results		**Source**
Environment	– Because of the reduction in general traffic levels, vehicle emissions have dropped substantially.	Konsult Knowledgebase

DURHAM – CITY LEVEL		
Network	– The introduction of the scheme achieved an 85% reduction in vehicular traffic (from over 2000 to approximately 200 vehicles per day).	CURACAO
Economy	– Urban economy increase/decrease: o It has been reported by businesses that the majority of businesses (83%) have not altered their servicing arrangements following the introduction of the charge. – The revenues raised have been used to support a frequent bus service to and from the charging – area i.e. the World Heritage Site.	CURACAO
Acceptability	– Essentially the Durham charging scheme is active along one road (Saddler Street) and has not created any problems such as boundary issues or traffic displacement on to other routes. It would appear, therefore, that the scheme is broadly non-controversial and therefore there was not a high level of opposition to the scheme being implemented. – As a historic city with a great deal of heritage, it is not hard to see why a road pricing measure was well received in Durham. The general public can acknowledge that the restraining of traffic in the centre is helping to preserve the city's heritage and therefore a charge to protect this has been well received. Additionally, because the charge only affects one street, there is little financial disbenefit to residents wishing to access the main part of Durham's city centre. – There was a significant improvement in the public perception of the scheme since its introduction – 70% (a 21% increase from before the scheme was introduced) now believe that the charge is a good idea. In broader terms, there has been a rise to 78% in those who consider Durham City Centre to be a safe place to visit.	CURACAO
Equity	–	
Liveability	– There appears to have been a re-distribution from cars to pedestrians – the big fall in the number of cars appears to have been replaced by the expansion in the pedestrian activity, suggesting that the area has now become a more accessible, safe and pleasant place to visit on foot. Therefore, pedestrians in Durham are within a definite group of winners as a result of the implementation of charging in Durham.	CURACAO
Achievement of Green Paper Five Pillars Targets	– More fluid – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of media used: o Internet ▪ Durham City website	http://www.durham.gov.uk/Pages/Service.aspx?ServiceId=6370
Section V – Scheme Legal Aspects		**Source**

DURHAM – CITY LEVEL		
Scheme Legal Framework[147]	– Level of access restriction scheme legal basis: o urban	CURACAO
Relationships with Existing EU legislation/regulation	–	

[147] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Edinburgh

EDINBURGH – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Population within the Lothians – Edinburgh and its immediate hinterland – is forecast to grow by 50,000 over 15 years, while employment growth is focused very much on the city itself, with an extra 35,000 jobs over the same period – Population: 452,194 – Area (km2): 120.11 – population density: 459.9 inhab./km2 – Cars per inhabitants: 330.6	CURACAO www.statistics.gov.uk/downloads/theme_compendia/fom2005/03_FOPM_UrbanAreas.pdf EUROSTAT 2003 / 2006
Context Description	– Modal split (proportion of journeys to work by car), 2001: o Car 53.7% o Motor cycle 0.7% o Bicycle 2.5% o Walking 13.1 % o Public transport (rail, metro, bus, tram) NA	http://www.urbanaudit.org/DataAccessed.aspx
Scheme Objectives	– Congestion reduction – Traffic flows improvement – Improve bus services – To distribute the benefits from the charging scheme fairly in respect of people paying the charge.	CURACAO
Targeted Traffic	– Private cars – LDV	
Scheme Design	– Cordon based	CURACAO
Technology Used	– Automatic Number Plate Recognition (ANPR) / Virtual licenses	
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– The scheme has been rejected in 2005. – The final charging scheme consisted of two cordons at which a charge would be levied for vehicles travelling inbound, towards the city centre. There would be an outer cordon around the edge of the built-up area of Edinburgh, just inside the outer city bypass, and an inner cordon around the centre of the city, broadly encompassing the World Heritage Site – The outer cordon would operate between 7am and 10am only; the inner between 7am and 6.30pm, Mondays to Fridays in both cases. The finish time of 6.30pm was amended from 7pm following early stages of consultation, and proposed charges at the outer cordon in the evening peak period were also dropped following consultation. – The charge was to be £2 (€2.40), levied no more than once per day on any single vehicle. If a vehicle were to cross both cordons, or to cross either cordon a number of times during the day, the charge would still only be applied once that day. In this sense, the scheme resembles an entry permit scheme. – A number of exemptions were proposed: o emergency service vehicles o buses	CURACAO

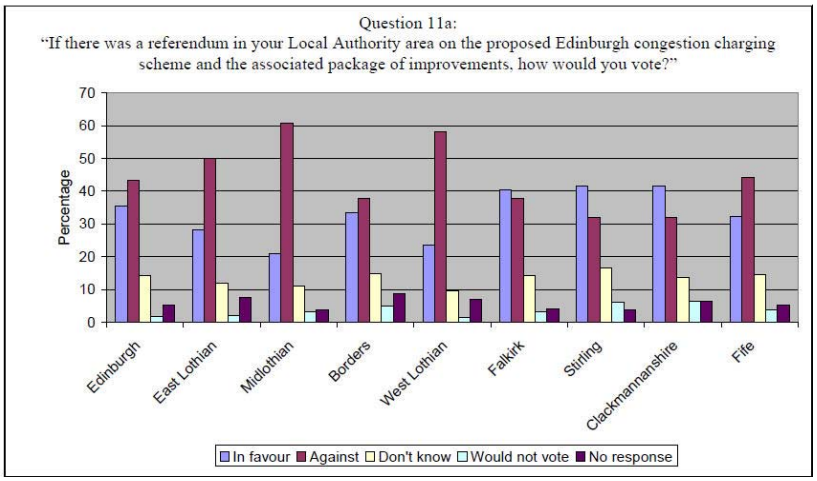
EDINBURGH – CITY LEVEL		
	o powered two-wheelers, o licensed taxis, o and vehicles belonging to an approved 'city car club' scheme. o Approved recovery vehicles were also to be exempt. – An exemption added at a late stage by the Council was that residents of the administrative area of the City of Edinburgh who live outside the outer cordon would not be liable for the outer cordon charge. It was justified by the Council on the grounds of fairness for all Edinburgh residents. However, it gave rise to considerable concern from residents of neighboring Council areas. – Throughout the development of the initiative, it was always clear that the charging scheme in particular was risky, and might fail at one of the decision-making stages. The Council therefore put forward two alternative strategies in its Local Transport Strategy (LTS) documents produced in 2000 and 2004. Each LTS included a 'Base Strategy' comprising measures fundable from expected conventional funding sources, and a 'Preferred Strategy' adding in the congestion charging scheme and associated investment. – Two pivotal decisions have influenced the evolution of the scheme, and arguably affected the eventual view taken by the public. The first decision, in autumn 2002, was to hold a referendum prior to making any final commitment to the congestion charging scheme. This decision was made at the same time as agreeing to submit the scheme to Ministers for approval in principle. – The Council view was that "the recent, independently analysed, public consultation showed very mixed opinion on the congestion charging proposals. There was not sufficient public support to reach a final conclusion on a single preferred scheme" and "To recognise therefore that before any finalised scheme could be agreed, there needed to be a further test of public opinion and that test should be in the form of a referendum." The Ministerial requirement for 'clear public support' to be demonstrated, although coming after the referendum decision, reinforced the Council in its view that this was the right approach to dealing with this controversial measure. However, Ministers gave no guidance (and still have not) as to how 'clear public support' should be demonstrated. – In spite of the referendum rejection, there are some positive aspects to the development of Edinburgh's charging scheme. Many challenges were overcome, not least achieving a positive outcome from a public inquiry. The work undertaken demonstrated a clear public view that congestion is a problem and public transport needs improvement. The experience of Edinburgh in meeting the statutory requirements for introducing a congestion charging scheme should be of some comfort to other cities considering a similar scheme, as should Edinburgh's success in developing cost-effective business systems for implementation.	
Encountered Barriers	– The public inquiry of 2004 did not identify any significant barriers to the implementation of the scheme. In hindsight, the timing of the referendum in one sense created a barrier to be overcome, in terms of the need to win a large enough share of public support at a time when public support for the scheme was likely to be at its lowest.	CURACAO
Encountered Drivers	– The main driver for the congestion charging scheme was the Local Transport Strategy. Over a period of time, starting in the early 90's, this strategy had been tracking trends in transport, identified the growing problem of increasing traffic growth and brought forward congestion charging as part of a preferred strategy going forward. – The evolution of the scheme broadly followed the guidance on development of an Integrated Transport Initiative (ITI) issued in August 2001 by the Scottish Executive35. This included a two stage decision-making process, with "in-principle" and "detailed" approvals required from Ministers for an ITI. As well as requiring technical appraisal (STAG36), the guidance sets out four policy criteria that Ministers require a charging scheme to meet:	CURACAO

	i. the charging scheme must reduce congestion and/or noise and emissions; ii. the net revenues from charging will be additional; iii. there is fair treatment of those who pay the charge (and/or suffer the congestion or environmental problem) and those who benefit from the scheme; iv. a range of public transport improvements are in place before charging is introduced, with further improvements to follow. – Separately from this guidance, Ministers also indicated when giving approval in principle to the scheme in December 2002, that they would expect "clear public support" for a scheme to be demonstrated at the detailed stage.	
Section III - Results		**Source**
Environment	– The investment package would have had further impacts on achievement of transport strategy objectives. These include environmental improvement (for example through grants for clean engines in buses and taxis, and city centre environmental enhancement); social inclusion, through the substantial improvement to public transport; and safety and residential amenity (more funding for 20mph zones and safe routes to schools). It would provide the ability to maintain higher standards of safety and comfort for road, footway and cycleway users through increased maintenance funding.	EDINBURGH PUBLIC INQUIRY
Network	– Significant reduction in traffic levels and delays within the city centre. – An increase of 5% in total journeys terminating in the city centre by all modes. – A small reduction in overall traffic levels and delays between the inner and outer cordons, and only small changes outside the outer cordon. – Slight increase in orbital traffic between the cordons, with some localized changes that would require mitigation measures. – An increase in public transport use of around 10%.	EDINBURGH PUBLIC INQUIRY
Economy	– The scheme was intended to operate for 20 years. It could directly have funded around £35m- £40m (€42m-€48m) of transport investment each year after deduction of collection and financing costs, providing a total package of £760m (€912m) at 2002 prices. – A very marginal impact on the Lothian economy – in terms of value added and jobs this is marginally negative. – A redistribution effect within the area of both jobs and population: population would be slightly higher in the city centre and outside the city; there would have been some movement of jobs out of the city into the surrounding areas.	CURACAO EDINBURGH PUBLIC INQUIRY
Acceptability	– Public views were always seen as a key issue in the development of the initiative. A major consultation was undertaken in 1999, including the distribution of a questionnaire throughout Edinburgh. The questionnaire sought views in relation to three strategic transport policy options, as well as testing key objectives and components of the transport strategy. Around 19,000 responses were received with high levels of support (62%) shown for the strategic option including the concept of congestion charging. – In addition to the public consultation, there was also extensive consultation with stakeholders. – The conclusions drawn from the consultation and an initial technical appraisal were that congestion charging was feasible, would reduce traffic levels, could generate substantial revenue for transport investment and would have no or very limited adverse economic impact if the charge was set at an appropriate level. In addition, there was a high degree of acceptance provided that the overall package was right. **Tab. I - Consultation results 1999** (see table below)	EDINBURGH PUBLIC INQUIRY CURACAO

	Option 1 Based on road	Option 2 Based on workplace	Option 3 Status quo	None of these

	user charging	parking levy		
Support	62%	51%	28%	-
Don't Know	6%	9%	8%	-
Oppose	32%	40%	64%	-
Preferred (all)	58%	22%	15%	5%
Preferred (business)	51%	18%	24%	6%

Consultation with the public and stakeholders was essential to assist scheme design and aimed to maximise the acceptability of the proposals. It also provided the opportunity for informing the
public about the objectives of the scheme. A comprehensive programme of consultation and market research was developed for the Council by the University of Westminster. The programme built on the initial consultation undertaken in 1999 and was supplemented by direct discussions with key stakeholders. Neighbouring local authorities were particularly important in this respect, particularly in regard to their concerns about the impact that an outer cordon would have on their citizens. The most recent market research illustrated below was carried out in Autumn 2003.



Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of media used: o Internet ▪ Traffic regulation orders – City website	www.edinburgh.gov.uk/internet/Transport/Traffic%20orders/Traffic%20regulation%20orders/CEC_traffic_regulation_or

EDINBURGH – CITY LEVEL		
		ders
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[148]	– Level of access restriction scheme legal basis: o urban	CURACAO
	– The City of Edinburgh Council is responsible for transport policy within policies laid down by the Scottish Executive. – In 1996, the Executive set up the Local Transport Strategy (LTS) policy documents for councils to produce for their area in the context of the strategic Structure Plan policies. – The City of Edinburgh Council is responsible for all roads within the city, but not for the trunk roads and motorways, which approach it. – The TIE (Transport Initiative Edinburgh) Ltd, owned by the City Council but managed by the private sector, is responsible for: o developing, procuring and managing major projects; o ensuring public acceptability; o procuring, implementing and operating the road pricing scheme; o raising funds in other ways.	Konsult Knowledgebase
Relationships with Existing EU legislation/regulation	–	

148 Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Eindhoven

EINDHOVEN – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 212.349 (1000 inhabit.) - Urban Area: 88.84 km2 - Population Density: 2,390 inhabit./km2 - Cars per inhabitants: 436 (cars/1000 inhabit.) - Number of private cars: 91,000 - Number of Light Duty Vehicles (LDV) (less than 3.5 tons) circulating in urban area: 10,800	SURVEY
Context Description	– Modal Split: o Walking: N/A o Cycling: 24% o Bus: 8% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car (incl passengers): 68% o Motorcycle/scooter: N/A – Proportion of traffic represented by freight: 10%	SURVEY
Scheme Objectives	– Air quality improvement – Road safety improvement – Liveability	SURVEY
Targeted Traffic	– The low emissions zone in Eindhoven affects heavy duty goods vehicles (over 3.5 tonnes Gross Vehicle Weight).	http://www.eindhoven.nl/nieuwsbericht/Low-emission-zone-Eindhoven.htm
Scheme Design	– Time based Environmental zones	SURVEY
Technology Used	– Automatic Number Plate Recognition (ANPR) / Virtual licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of the City Council. – Retailers and Freight distributors have been involved during the scheme implementation. – On 15th May 2007 it was formally decided to adopt the access restriction scheme which came into operation on 1st July 2007. – The LEZ works 24/7; time windows deliveries city shopping center between 7-11 a.m. and in going out area between 7a.m.-14 p.m. – LEZ charge: 160 €. – Type of enforcement adopted: o Manual – Exempted categories: o Trucks Euro 4 and cleaner o Two-wheelers o Emergency vehicles – As far as trucks and lorries with diesel engines are concerned, these must at least comply with the Euro 2 Emission Standard. Trucks and lorries with a Euro 0 or Euro 1 engine are not permitted to enter the low emissions zone. In addition, trucks and lorries with a diesel engine and which comply with the	SURVEY http://www.eindhoven.nl/nieuwsbericht/Low-emission-zone-Eindhoven.htm

EINDHOVEN – CITY LEVEL		
	Euro 2 or Euro 3 Standard must be fitted with a particle filter (particulate trap). Trucks and lorries with Euro 4 or Euro 5 engines can enter the low emissions zone without the need for any modifications. From 1st January 2010: only lorries Euro 3 with particle filter and not older than 8 years may enter the low emissions zone. Other Euro 2 and 3 engines are no longer permitted to enter the zone.	
Encountered Barriers	– Planning – User Assessment – Institution – Administrative Structures and Practices – Problem Pressure	SURVEY
Encountered Drivers	– Politics and Strategy – Coalition – Planning – Policy Synergy – Institution – Legislation and Regulation – Cooperation – Partnership and Involvement – Problem Pressure	SURVEY
Section III - Results		**Source**
Environment	– NOx: - 7 ÷17% – PM10: - 5 ÷10%	2007
Network	–	
Economy	– Revenues from fines (€ per year): go to the Central Government	SURVEY
Acceptability	– People have complained about air quality in city centre and wanted a severe approach.	SURVEY
Equity	– Scheme winners: o Private motorized users o Residents in the restricted zone o Freight distributors – Scheme losers: o Private motorized users o Freight distributors	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Alternative options o Charges and sanctions o Scheme results – To whom: o Private motorized users o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors o – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation	SURVEY

EINDHOVEN – CITY LEVEL		
	– o After the scheme implementation – Type of media used: o The press o Radio - TV o Internet: ▪Central Milieuzones – national level website (Dutch language) www.milieuzones.nl/ ▪City level website www.eindhoven.nl/nieuwsbericht/Low-emission-zone-Eindhoven.htm o Posters o Leafleting	
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[149]	– Air quality legislation – Level of access restriction scheme legal basis: o urban o national o European	SURVEY
Relationships with Existing EU legislation/regulation	– European legislation on norms for air quality as well as national translation of European laws. Appointments between the city and national government on solving air quality problems before 2015.	SURVEY

[149] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Ferrara

FERRARA – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 134 (1000 inhabit.) - Urban Area: 404.38 km2 - Population Density: 333 inhabit./km2 - Cars per inhabitants: 620 (cars/1000 inhabit.) - Car density: 206 (cars/km2) - Number of private cars: 83,000	ISTAT
Context Description	– Modal Split: o Walking: N/A o Cycling: 27% o Bus: 5% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car : N/A o Motorcycle/scooter: N/A – Overall traffic volume (vehicle km/year): 567 mil – Proportion of traffic represented by freight: 7% – Total number of motorised trips in the city per day: 315,000 – ... of which external (commuting) 170,000 – Average motorised trip travel time: 13.75mins – Average motorised trip length (km): 5	PUM 2008
Scheme Objectives	– Congestion reduction – Air quality improvement – Liveability	SURVEY
Targeted Traffic	– Private cars – LDV – Euro 4 vehicles and under – Natural Gas (CNG) and electric vehicles	SURVEY
Scheme Design	– Area licensed based	SURVEY
Technology Used	– Paper licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Ferrara Municipality. – Citizens representatives, PT company, Service providers, Retailers and Freight distributors have been involved during the scheme implementation. – On 1st July 1998 was formally decided to adopt the access restriction scheme which came into operation on 31st July 1998. – The scheme works 24/7. – Type of enforcement adopted: o Manual – Exempted categories: o Disabled person o PT vehicles o Taxi o Emergency vehicles o Electric vehicles – During 2010 will be installed electronic control system.	SURVEY

FERRARA – CITY LEVEL		
Encountered Barriers	– Politics and Strategy – Opposition – Politics and Strategy – Conflict – Citizens Participation – Cultural and Lifestyle	SURVEY
Encountered Drivers	– Politics and Strategy – Commitment – Politics and Strategy – Coalition – Planning – Technical – Information and Public Relation	SURVEY
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	–	
Acceptability	–	
Equity	– Scheme winners: o PT users o Residents in the restricted zone – Scheme losers: o None	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Charges and sanctions – To whom: o Private motorized users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation – Type of media used: o The press o Radio - TV o Internet (e.g. city level website - Italian language http://servizi.comune.fe.it/index.phtml?id=1706) o Posting	SURVEY
Section V – Scheme Legal Aspects		**Source**

FERRARA – CITY LEVEL		
Scheme Legal Framework[150]	– Air quality legislation – Road code prescription – Level of access restriction scheme legal basis: o urban o national	SURVEY
Relationships with Existing EU legislation/regulation	–	

[150] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Funchal

FUNCHAL – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 103.961 (1000 inhabit.) - Urban Area: 76 km2 - Population Density: 1,367 inhabit./km2 - Cars per inhabitants: 492 (cars/1000 inhabit.) - Car density: 637 (cars/km2) - Number of private cars: 48,500 - Number of Light Duty Vehicles (LDV) (less than 3.5 tons) circulating in urban area: 3,000 per day	Census 2001 Internal Studies 2008
Context Description	– Modal Split: o Walking: 16.5% o Cycling: 0% o Bus/Tram: 31% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car: 51.8% o Motorcycle/scooter: N/A o Other: 0.7% – Total number of motorized trips in the city per day: 209.236 of which 64.239 commuting – Average motorized trip travel time: 21.3 minutes – Total number of non-motorized trips (walking/cycling) in the city per day: 23,945 – Average non-motorized (walking/cycling) trip travel time: 19.7 min	Internal Study 2007
Scheme Objectives	– Congestion reduction – Traffic flows improvement – Increasing urban economy – Liveability	SURVEY
Targeted Traffic	– Private cars	SURVEY
Scheme Design	– Zonal based	SURVEY
Technology Used	– Manual (mobile small pillars using locks)	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Câmara Municipal do Funchal. – Retailers have been involved during the scheme implementation. – the scheme came into implementation more than 15 years ago. – No charge. – The current system to control limited traffic zones, implemented in the city of Funchal, is a manual system, closed by mobile small pillars using locks. – This system is open at certain time periods, depending on the type of street, and is closed manually by an employee of the Câmara Municipal do Funchal, as shown in the picture.	SURVEY

FUNCHAL – CITY LEVEL		
	 – Vehicles that have access to the streets closed to traffic are the vehicles which carry out loading and unloading. – This system poses deployment problems, making use of small pillars and locks which allow illegal entries through duplication of keys during the period in which these areas are closed.	
Encountered Barriers	– Technology	
Encountered Drivers	–	
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	–	
Acceptability	–	
Equity	– Scheme winners: o Residents in the restricted zone o Other citizens – Scheme losers: o Private motorized users	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at	– Type of information disseminated: o Scheme and its rules o Charges and sanctions – To whom:	SURVEY

FUNCHAL – CITY LEVEL		
city level	o Private motorized users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation – Type of media used: o The press o Radio - TV	
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[151]	– Road code prescription – Level of access restriction scheme legal basis: o national	SURVEY
Relationships with Existing EU legislation/regulation	–	

[151] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Gateshead

GATESHEAD – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 190.6 (1000 inhabit.) - Urban Area: 142 km^2 - Population density: 1,342 inhab./km2	ONS 2008 CENSUS 2001
	– In Gateshead, 7% of commuters travel to work by metro/train, 23% travel by bus, 0.6% travel by bicycle and 44% travel by private car.	http://www.citiesonwater.com/sito/switch/contents/newcastle.htm
	– Road user charging does not have local political support in the city region area. – Work place parking levies are being studied. – Area speed limitation (20mph zones) will be implemented. – Residential parking schemes are in place in some locations. – Bus and cycle lanes are in place.	SURVEY

Gdansk

GDANSK – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 458 (1000 inhabit.) - Urban Area: 265.5 km^2 - Population Density: 1,748 inhabit./km^2 - Cars per inhabitants: 410 (cars/1000 inhabit.) - Car density: 709 (cars/km^2) - Number of private cars: 188,341	STATISTICS 2007
Context Description	– Modal Split: o Walking: 23.6%N/A o Cycling: 1.4% o PT: 34% o Bus: N/A o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car: 41% o Motorcycle/scooter: N/A	SURVEY GEF
Scheme Objectives	– Restrictions are in the area of the Old Town only (closed or "permissions only" zone)	SURVEY
Targeted Traffic	– Private cars	SURVEY
Scheme Design	–	
Technology Used	– Paper licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Roads and Green Lands Management. – Type of enforcement adopted: o Technology based – Exempted categories: o Emergency vehicles	SURVEY
Encountered Barriers	– Planning – User Assessment – Institution – Administrative Structures and Practices – Citizens Participation	SURVEY
Encountered Drivers	–	
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	–	

GDANSK – CITY LEVEL		
Acceptability	–	
Equity	– Scheme winners: o Residents in the restricted zone o Freight distributors – Scheme losers: o Private motorized users	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – More accessible – Smarter	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	–	
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[152]	–	
Relationships with Existing EU legislation/regulation	–	

[152] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Genoa

GENOA – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 611.204 (1000 inhabit.) - Urban Area: 239.58 km2 - Population Density: 2,551 inhabit./km2 - Cars per inhabitants: 327.7 (cars/1000 inhabit.) - Car density: 1538.5 (cars/km2) - Number of private cars: 2.497m -	SURVEY
Context Description	– Modal Split: o Walking: 20% o Cycling: N/A o Bus + metro: 38% o Light rail: N/A o Commuter rail: 6% o Car: 25% o Motorcycle/scooter: 11% – Overall traffic volume (vehicle km/year): 2.312 bn – Total number of motorised trips in the city per day: 1,678,442 – ... of which external (commuting) 268,550 – Average motorised trip travel time: 39 mins – Average motorised trip length (km): 6.8	SURVEY
Scheme Objectives	– Congestion reduction – Air quality improvement – CO2 emissions reduction	SURVEY
Targeted Traffic	– Private cars – LDV	SURVEY
Scheme Design	– Limited traffic zone Cordon based	SURVEY
Technology Used	– Automatic Number Plate Recognition (ANPR) / Virtual licences	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Municipality of Genova, later Genova PArcheggi SpA – Citizens representatives, Service providers, Retailers and Freight distributors have been involved during the scheme implementation. – On 18th December 2008 was formally decided to adopt the access restriction scheme which came into operation on 2nd March 2009. – The scheme works 24/7. – Type of enforcement adopted: o Technology based – Exempted categories: o PT vehicles o Taxi o Emergency vehicles	SURVEY
Encountered Barriers	– Politics and Strategy – Conflict – Institution – Administrative Structures and Practices – Institution – Legislation and Regulation – Cooperation – Partnership and Involvement – Cooperation – Key Individuals	SURVEY

GENOA – CITY LEVEL		
	– Information and Public Relation	
Encountered Drivers	– Technology – Public Funds and Subsidy	SURVEY
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	–	
Acceptability	–	
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules – To whom: o Private motorized users o Shop keepers/Retailers o Residents in the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation – Type of media used: o The press o Radio - TV o Internet (e.g. city level in Italian language www.bluareagenova.it/it/ztl/ztl.asp) o Leafleting (e.g. brochure in Italian language www.bluareagenova.it/it/ztl/ztl.asp)	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[153]	– Road code prescription (limited traffic zone: atr.7 of Highway Code) – Level of access restriction scheme legal basis: o national	SURVEY

[153] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

GENOA – CITY LEVEL		
Relationships with Existing EU legislation/regulation	–	

Ghent

GHENT – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 240 (1000 inhabit.) - Urban Area: 156 km2 - Population Density: 1,535 inhabit./km2 - Car density: 420 cars/1000 inhab.	City Statistics 2009 EUROSTAT 2003/6
Context Description	– Modal split, 1998: o Foot and Cycle 17% o Public Transport 17% o Car 56%	www.vtpi.org/tdm/tdm80.htm
Scheme Objectives	– Reduce the amount of traffic in the pedestrian area – Congestion reduction – Road safety improvement – Liveability – Equity	SURVEY
Targeted Traffic	– Private cars – LDV – Euro 4 vehicles and under – All except CNG and electric vehicles	SURVEY
Scheme Design	– Area licensed based	SURVEY
Technology Used	– Automatic Number Plate Recognition (ANPR) / Virtual licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Ghent Municipal Parking Authority with the help of the police during the implementation phase. – Citizens representatives, PT company, Service providers, Retailers and Freight distributors have been involved during the scheme implementation. – The scheme works 11a.m. – 6 p.m. every day – Standard Civil Penalty charges, approximately 100 euros. – Unauthorized entry results in a civil penalty. – Type of enforcement adopted: o Technology based – Exempted categories: o PT vehicles o Taxi o Two-wheelers o Emergency vehicles – The access restriction scheme fully complies with the laws in force (i.e. Belgian Traffic Regulations, the act on the use of unmanned cameras, the privacy legislation). All administrative work and all actions related to the use of cameras in the pedestrian area are handled by police personnel, as is prescribed by law. This procedure consists of the following steps: o a speed camera captures an image of every car that enters the pedestrian zone, and o software reads the license plate and stores it for further processing, no longer than is absolutely necessary	SURVEY

GHENT – CITY LEVEL		
	(for which a notification was submitted to the Commission for the Protection of Privacy under the Act of 4th August 1996 to allow the use of manned and unmanned cameras for road traffic management, and the Royal Decree of 18th December 2002 on traffic offences that can be recorded with the help of unmanned cameras), o the license plate is compared to a database of license plate numbers of cars for which a permit for the use of the pedestrian area has been issued (these permits have been created in accordance with the list of categories as defined by the Belgian Traffic Regulations, article 22sexies, i.e. dealing with access to pedestrian areas). This comparison results in: ▪ a civil penalty in the event the vehicle is not permitted to access the pedestrian area (The charge is transferred to the Local Police Information System (Dutch: ISLP or Informatie Systeem Lokale Politie). Official charges come with statutory retention periods, which also apply for all infringements of article 22sexies of the Belgian Traffic Regulations (i.e. access to pedestrian areas)), or ▪ the immediate removal of the retained license plate information if no infringement is made. o In case the civil penalty is not paid for in due time, an application is submitted to the Public Prosecutor's Office.	
Encountered Barriers	– Politics and Strategy – Opposition – Politics and Strategy – Conflict – Planning – Policy Conflict – Institution – Legislation and Regulation	SURVEY
Encountered Drivers	– Planning – Technical – Technology – Public Funds and Subsidy	SURVEY
Section III - Results		**Source**
Environment	–	
Network	– Decrease in n° of vehicles entering the zone (% vehicles/day or): o 40% within the area o 75% cut through traffic	SURVEY (2008)
Economy	–	
Acceptability	–	
Equity	– Scheme winners: o PT users o Shop keepers/Retailers o Residents in the restricted zone – Scheme losers: o Private motorised users o Freight distributors	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener	

GHENT – CITY LEVEL		
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Alternative options o Charges and sanctions o Scheme results – To whom: o Private motorised users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o Internet o Posting o VMS (Variable Message Signs) o Posters o Leafleting	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[154]	– Road code prescription – Level of access restriction scheme legal basis: o national	SURVEY
Relationships with Existing EU legislation/regulation	–	

[154] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Göteborg LEZ

GÖTEBORG LEZ – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 500 (1000 inhabit.) - Urban Area: 451 km2 - Population Density: 1,110 inhabit./km2 - Cars per inhabitants: 349 (cars/1000 inhabit.) - Car density: 388 (cars/km2) - Number of private cars: 175,000	STATISTICS SWEDEN 2009 - 2007
Context Description	– Modal Split: o Walking: 14% o Cycling: 10% o Bus + Light rail + metro + commuter rail: 28% o Car: 47% o Motorcycle/scooter: N/A – Overall traffic volume (vehicle km/year): 2.72 bn – Total number of motorized trips in the city per day: 950,000 – Total number of non-motorized trips (walking/cycling) in the city per day: 352,000	Travelling Survey 2006
Scheme Objectives	– Air quality improvement	SURVEY
Targeted Traffic	– LDV	SURVEY
Scheme Design	– Environmental zones	SURVEY
Technology Used	– Paper licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Traffic and Public transport Authority. – Citizens representatives, PT company, Retailers and Freight distributors have been involved during the scheme implementation. – The 1st January 1996 was formally decided to adopt the access restriction scheme which came into operation the same date. – The scheme works 24/7. – No charge, just a ban for polluting vehicles. – Type of enforcement adopted: o % of illegal entrances per day – Plans to expand the zone regulations to also include personal cars.	SURVEY
Encountered Barriers	– Institution – Legislation and Regulation – Information and Public Relation	SURVEY
Encountered Drivers	– Politics and Strategy – Commitment – Cooperation – Partnership and Involvement – Cooperation – Key Individuals – Information and Public Relation	SURVEY
Section III - Results		**Source**
Environment	– Reduction of Carbon monoxide (CO): - 3.6% – Reduction of Hydrocarbons (HC): - 6.1%	Evaluation 2006

GÖTEBORG LEZ – CITY LEVEL		
	– Reduction of Nitrous oxide (NOx): - 7.8% – Reduction of Particulate matter PM10: - 33.2%	
Network	– 48% reduction in vehicle traffic despite increased vehicle ownership by residents; – Improved pedestrian and cycling conditions (45% reduction in pedestrian accidents); – Improved transit service.	Vukan R. Vuchic (1999), Transportation for Livable Cities, CUPR Press
Economy		
Acceptability	–	
Equity	– Scheme winners: o PT users o Shop keepers/Retailers o Residents in the restricted zone – Scheme losers: o Freight distributors	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Scheme results – To whom: o Shop keepers/Retailers o Residents in the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o Leafleting	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[155]	– Road code prescription – Level of access restriction scheme legal basis: o urban o national	SURVEY
Relationships with Existing EU legislation/regulation	– The possibility to get access to Euro classes from foreign vehicles should be very useful for the police when enforcing the zone regulation.	SURVEY

[155] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Göteborg C.C.

GÖTEBORG C.C. – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 500 (1000 inhabit.) - Urban Area: 451 km2 - Population Density: 1,110 inhabit./km2 - Cars per inhabitants: 349 (cars/1000 inhabit.) - Car density: 388 (cars/km2) - Number of private cars: 175,000	STATISTICS SWEDEN 2009 - 2007
Context Description	– Modal Split: o Walking: 14% o Cycling: 10% o Bus + Light rail + metro + commuter rail: 28% o Car: 47% o Motorcycle/scooter: N/A – Overall traffic volume (vehicle km/year): 2.72 bn – Total number of motorized trips in the city per day: 950,000 – Total number of non-motorized trips (walking/cycling) in the city per day: 352,000	Travelling Survey 2006
Scheme Objectives	– Congestion reduction	SURVEY
Targeted Traffic	– Private cars – LDV	SURVEY
Scheme Design	– Multi-cordon or zonal based	SURVEY
Technology Used	– Automatic Number Plate Recognition (ANPR)/ Virtual licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of National Road Administration in cooperation with traffic and public transport authority of Göteborg. – Citizens representatives, PT company, Service Providers, Retailers and Freight distributors have been involved during the scheme implementation. – The 30th June 2010 will be formally decided to adopt the access restriction scheme which will come into operation on 1st September 2013. – The scheme works Monday to Friday h. 06.00 – 18.30. – 1 or 2 Euro. – Type of enforcement adopted: o Technology based	SURVEY
Encountered Barriers	– Institution – Administrative Structures and Practices – Cooperation – Partnership and Involvement – Information and Public Relation	SURVEY
Encountered Drivers	– Politics and Strategy – Commitment – Politics and Strategy – Coalition – Cooperation – Key Individuals	SURVEY
Section III - Results		**Source**

GÖTEBORG C.C. – CITY LEVEL		
Environment	– CO2 emissions abatement: - 4% – NOx emissions abatement: - 10%	SURVEY
Network	– Decrease in number of vehicles entering the zone: - 15%	SURVEY
Economy	– Investment costs (mil. €): 100 – – Operational costs (mil. € per year): 20 – – Revenues from charges (€ per year): 100,000	SURVEY
Acceptability	– Citizens have been consulted by means of: o Survey – Percentage of favorable people before the scheme implementation: 25%	
Equity	– Scheme winners: o PT users o Shop keepers/Retailers o Residents in the restricted zone o Freight distributors – Scheme losers: o Private motorized users	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – More Accessible – Greener	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Charges and sanctions o Scheme results – To whom: o Private motorized users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o Internet o VMS (Variable Message Signs)	SURVEY
Section V – Scheme Legal Aspects		**Source**

GÖTEBORG C.C. – CITY LEVEL		
Scheme Legal Framework[156]	– Will be a change in legislation enabling local governments to take action. Today it is a national tax decided by the Parliament.	SURVEY
Relationships with Existing EU legislation/regulation	–	SURVEY

[156] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Hannover

HANNOVER – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 525 (1000 inhabit.) - Urban Area: 204 km2 - Population Density: 2,573 inhabit./km2 - Cars per inhabitants: 417 (cars/1000 inhabit.) - Car density: 1,074 (cars/km2) - Number of private cars: 191,648 - Number of Light Duty Vehicles (LDV) (less than 3.5 tons) circulating in urban area: 14,048	LHH 2009 - 2007
Context Description	– Modal Split: o Walking: 27% o Cycling: 13% o Bus + Light rail + metro + commuter rail: 17% o Car: 41% o Motorcycle/scooter: 2% – Total number of motorised trips in the city per day: 152,000 – ... of which external (commuting) 42,000 – Average motorised trip travel time: 19.9mins – Average motorised trip length (km): 12.9 – Average non-motorised (walking/cycling) trip travel time: 14.6/14.3mins – Average non-motorised (walking/cycling) trip length (km): 0.9/2.6	MOBILITAT IN DEUTSCHLAND 2002 LHH 2004
Scheme Objectives	– Air quality improvement – Liveability – Future generations	SURVEY
Targeted Traffic	– Private cars – LDV	SURVEY
Scheme Design	– Environmental zones	SURVEY
Technology Used	– Paper licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design has been in charge of Land government while implementation of City of Hannover (LHH). – Citizens representatives, PT company, Service providers, Retailers and Freight distributors have been involved during the scheme implementation. – On 12th July 2007 it was formally decided to adopt the access restriction scheme which came into operation on 1st January 2008. – The scheme works 24/7. – motor vehicles require a permit disc on the windscreen to drive into the low emission zone. Charge: 5 €; the penalty: 40 € and a penalty point. – Type of enforcement adopted: o Manual – Exempted categories: o agricultural tractors o disabled people o military motor vehicles o PT vehicles	SURVEY

HANNOVER – CITY LEVEL		
	o Two-wheelers o Emergency vehicles o Electric vehicles – The 2025 Hannover Mobility plan foresee an increase of 25% of PT users share, the Sundays without cars starting from 16th may 2010 and the car sharing promotion.	
Encountered Barriers	– Politics and Strategy – Opposition – Institution – Administrative Structures and Practices – Cultural and Lifestyle	SURVEY
Encountered Drivers	– Institution – Administrative Structures and Practices – Institution – Legislation and Regulation – Cooperation – Partnership and Involvement – Citizens Participation – Exchange and Mutual Learning	SURVEY
Section III - Results		**Source**
Environment	– NOx: - 10÷ 15%	NLÖ 2006
Network	–	
Economy	–	
Acceptability	– Citizens have been consulted by means of: o participation in planning	SURVEY
Equity	– Scheme winners: o PT users o Residents in the restricted zone o Residents out of the restricted zone – Scheme losers: o Users of motor vehicles with high emissions	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Alternative options o Charges and sanctions o Scheme results – To whom: o Private motorised users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation – Type of media used:	SURVEY

HANNOVER – CITY LEVEL		
	o The press o Radio - TV o Internet: ▪ Feinstaubplakette (environmental badge) – national level website in German language www.feinstaubplakette.de) ▪ Federal Ministry for the Environment, Natural Conservation and Nuclear Safety – national level website www.bmu.de/english/air_pollution_control/general_information/doc/40740.php) ▪ City level website http://www.hannover.de/de/umwelt_bauen/umwelt/lulaestr/luft/luft_rein/umw_zone/index.html o Leafleting (e.g. Brochure in German, English, Russian languages www.hannover.de/de/umwelt_bauen/umwelt/lulaestr/luft/luft_rein/umw_zone/) o Posting o Posters	
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[157]	– Air quality legislation – Level of access restriction scheme legal basis: o national	SURVEY
Relationships with Existing EU legislation/regulation	– driven in planning: Air Quality Framework Directive 96/62/EG	SURVEY

[157] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Helsinki

HELSINKI – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 577 (1000 inhabit.) - Urban Area: 213 km2 - Population Density: 2,707 inhabit./km2 - Cars per inhabitants: 384 (cars/1000 inhabit.) - Car density: 2,709 (cars/km2) - Number of private cars: 221,343	Facts about Helsinki (2009)
Context Description	– Modal Split: o Walking: 37% o Cycling: 5% o Bus: 12% o Light rail: N/A o Metro: 7% o Commuter rail: 3% o Car: 29% o Motorcycle/scooter: N/A – Total number of motorised trips in the city per day: 1,233,000 ... of which external (commuting) 396,000 – Average motorised trip travel time: 30mins – Average motorised trip length (km): 22	Helsinki City Transport (17.11.2009)
Scheme Objectives	– Congestion reduction – Traffic flows improvement – Air quality improvement – CO2 emissions reduction – Road safety improvement	SURVEY
Targeted Traffic	– Private cars	SURVEY
Scheme Design	– Distance based	SURVEY
Technology Used	– To be decided	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Exempted categories: o PT vehicles o Emergency vehicles – The Ministry of Transport and Communications has commissioned a study on how the introduction of congestion charges in the Helsinki region could contribute to reaching the set transport policy goals and social expectations for the Helsinki region transport system. The aim of the study is to assess the impacts of congestion charges on people, the region, and the whole of society. The study is a part of the transport system planning work in the Helsinki region and it will be carried out in partnership with stakeholders and interest groups.	SURVEY
Encountered Barriers	– Politics and Strategy – Conflict – Planning – Technical – Planning – Policy Conflict – Institution – Legislation and Regulation – Technology	SURVEY

HELSINKI – CITY LEVEL		
Encountered Drivers	– Politics and Strategy – Coalition	SURVEY
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	–	
Acceptability	–	
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Alternative options o Charges and sanctions o Scheme results – To whom: o Private motorized users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o Internet (e.g. City level website www.hel2.fi/ymk/Ilmansuojeluohjelma/summary.pdf)	SURVEY
Section V – Scheme Legal Aspects		**Source**

HELSINKI – CITY LEVEL		
Scheme Legal Framework[158]	– Road code prescription	SURVEY
Relationships with Existing EU legislation/regulation	–	

158 Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Imola

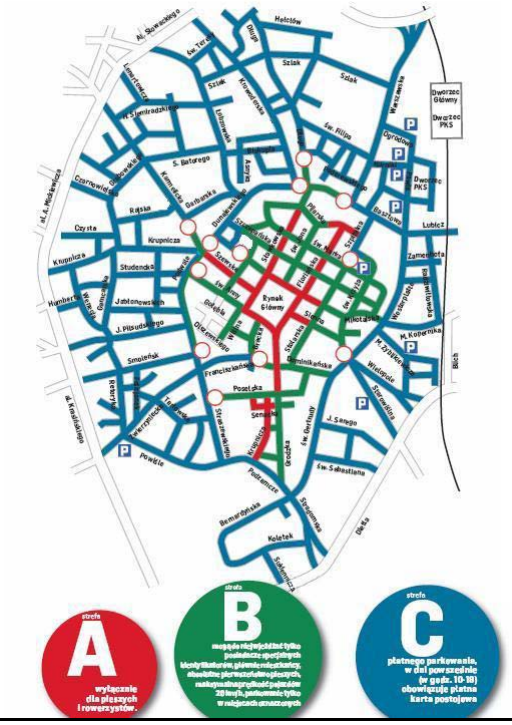
IMOLA – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 64.348 (1000 inhabit.) - Urban Area: 204.94 km2 - Population Density: 313.98 inhabit./km2 - Cars per inhabitants: 649 (cars/1000 inhabit.) - Car density: N/A - Number of private cars: 41,775 - Number of Light Duty Vehicles (LDV) (less than 3.5 tons) circulating in urban area: 7,332	ISTAT 2001 ACI 2007
Context Description	– Modal Split: o Walking: 8% o Cycling: 8% o Bus: 10% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car: 65% o Motorcycle/scooter: 4% – Total number of motorised trips in the city per day: 1,319 – Total number of non-motorised trips (walking/cycling) in the city per day: 5,570	ISTAT 2001
Scheme Objectives	– Congestion reduction – Air quality improvement – CO2 emissions reduction	SURVEY
Targeted Traffic	– LDV – Euro 4 vehicles and under – Natural Gas (CNG) and electric vehicles	SURVEY
Scheme Design	– Area licensed based	SURVEY
Technology Used	– Manual toll collection	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Imola Municipality. – Citizens representatives, Retailers and Freight distributors have been involved during the scheme implementation. – On 4th November 2008 was formally decided to adopt the access restriction scheme which came into operation on 8th January 2010. – The scheme works from Monday – Saturday 6,00 to 9.00 am and 13,30 to 16,00. – Exempted categories: o PT vehicles o PT vehicles o Taxi o Emergency vehicles o Electric vehicles	SURVEY
Encountered Barriers	– Politics and Strategy – Conflict – Planning – User Assessment – Institution – Administrative Structures and Practices – Cooperation – Partnership and Involvement – Citizens Participation	SURVEY

IMOLA – CITY LEVEL		
	– Information and Public Relation – Technology – Cultural and Lifestyle	
Encountered Drivers	– Politics and Strategy – Commitment – Planning – Technical – Planning – Policy Synergy – Planning – User Assessment – Citizens Participation – Information and Public Relation	SURVEY
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	–	
Acceptability	–	
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of media used: o Internet ▪ City level website in Italian language www.areablu.com/imola/centro-storico-area-blu/zona-traffico-limitato-imola.html; www.areablu.com/area-blu-chi-siamo/gestione-zona-traffico-limitiato-area-blu.html)	
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[159]	–	
Relationships with Existing EU legislation/regulation	–	

[159] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Krakow

KRAKOW – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 754.6 (1000 inhabit.) - Urban Area: 327 km2 - Population Density: 2,308 inhabit./km2 - Cars per inhabitants: 564 (cars/1000 inhabit.) - Car density: 1305 [426,691 cars total] (cars/km2) - Number of private cars: 335,554	City Status Report 2008
Context Description	– Modal Split: o Walking: 29% o Cycling: 2% o Bus/Tram: 43% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car: 27% o Motorcycle/scooter: N/A (approx. 1-3%) – Total number of motorized trips in the city per day: 1.5 mil of which 20% ca. commuting – Average motorized trip travel time: 18 minutes – Average motorized trip length (km): 10.3 km – Total number of non-motorized trips (walking/cycling) in the city per day: 350,000	Comprehensive study 2003
Scheme Objectives	– Congestion reduction – Air quality improvement – CO2 emissions reduction – Liveability	SURVEY
Targeted Traffic	– Private cars – LDV	SURVEY
Scheme Design	– Zonal-based – Area licensed based	SURVEY
Technology Used	– Paper licenses – Automatic Number Plate	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Municipality of Krakow and Roads and Transport Management Board. – Citizens representatives have been involved during the scheme implementation. – the scheme came into implementation in 1989. – The scheme works 24h/day all days – concerning Zones A and B – access restrictions and 10-18 working days – concerning paid parking zone. – No charge for entering, not possible to enter except vehicles exempted (PT, inhabitants, taxi, deliveries 19-10 and 13-14) – For parking in C zone, ca. 3 PLN/hour (less than 1 EUR). – Type of enforcement adopted: o Manual o Number plate recognition, in test phase – Exempted categories: o PT vehicles o Taxi	SURVEY

KRAKOW – CITY LEVEL		
	o Emergency vehicles o Electric vehicles – According to the fact that scheme of dividing city centre of Krakow to 3 zones (A,B,C) and paid parking (C zone)-(see map below) has been implemented already in late 80's it is very difficult to describe or obtain specific data and information about the scheme implementation or early results. 	
Encountered Barriers	– Politics and Strategy – Opposition – Institution – Administrative Structures and Practices – Institution – Legislation and Regulation – Citizens Participation – Information and Public Relation	SURVEY
Encountered Drivers	– Politics and Strategy – Commitment – Planning – Technical – Cooperation – Key Individuals – Cultural and Lifestyle	SURVEY
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	–	
Acceptability	–	
Equity	– Scheme winners: o Shop keepers/Retailers o Residents out of the restricted zone o Shoppers – Scheme losers:	SURVEY

KRAKOW – CITY LEVEL		
	o Private motorized users o Residents in the restricted zone	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Charges and sanctions – To whom: o Private motorized users o Shop keepers/Retailers o Residents in the restricted zone – When the information has been disseminated: o Before the scheme implementation – Type of media used: o The press o Radio - TV o Internert (e.g. City level website www.krakow.pl/en/turystyka/?id=transport.html)	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[160]	– Level of access restriction scheme legal basis: o urban	SURVEY
Relationships with Existing EU legislation/regulation	–	

[160] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

La Rochelle

LA ROCHELLE – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 150 (1000 inhabit.) - Urban Area: 206 km2 - Population density: 728 inhab./km2 - Cars per inhabitants: 566 (cars/1000 inhab)	INSEE 2008
Context Description	– Modal Split: o Walking: 8% o Cycling: 7.7% o Bus: 6.5% o Light rail: 2.1% o Car: 73% o Motorcycle/scooter: 2.7%	SURVEY
Scheme Objectives	– Traffic flows improvement – Road safety improvement	SURVEY
Targeted Traffic	– Private cars – LDV	SURVEY
Scheme Design	– Zonal based	SURVEY
Technology Used	–	
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Communaute d'agglomeration La Rochelle. – PT company and Freight distributors have been involved during the scheme implementation. – On 1st June 2006 was formally decided to adopt the access restriction scheme which came into operation on 1st June 2008. – The scheme comprehends three zones in La Rochelle: one of these is closed during the night. The other is open to buses only and the last one is a mixed zone closed to foreign vehicles. – Exempted categories: o PT vehicles o Two-wheelers o Emergency vehicles	SURVEY
Encountered Barriers	– Technology	SURVEY
Encountered Drivers	– Politics and Strategy – Commitment – Institution – Administrative Structures and Practices – Cooperation – Partnership and Involvement – Cooperation – Key Individuals – Citizens Participation – Information and Public Relation	SURVEY
Section III - Results		**Source**
Environment	– CO2: - 22% – CO: - 27% – PM10: - 21%	From Modeling

LA ROCHELLE – CITY LEVEL		
Network	– Change in average vehicle speed in the zone (km/h): + 30%	SURVEY
Economy	– Investment costs (€): 251,000€ o Operational costs (€ per year): 3,000€ maintenance costs and 70,000€ operational costs	SURVEY
Acceptability	– Citizens have been consulted by means of: o Survey – Percentage of favorable people before the scheme implementation: o between – 50% and 78% of residents and professionals	SURVEY May – Summer 2008
Equity	– Scheme winners: o PT users o Shop keepers/Retailers o Residents in the restricted zone o Freight distributors – Scheme losers: o Private motorized users o Residents out of the restricted zone	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules – To whom: o PT users o Residents in the restricted zone – When the information has been disseminated: o Before the scheme implementation – Type of media used: o Posting o Posters	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[161]	– Road code prescription – Level of access restriction scheme legal basis: o urban	SURVEY
Relationships with Existing EU legislation/regulation	–	

[161] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

London C.C.

LONDON C.C. – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 7,620 (1000 inhabit.) - Urban Area: 1,623 km2 - Population Density: 4,782 inhabit./km2 - Cars per inhabitants: 327.7 (cars/1000 inhabit.) - Car density: 1538.5 (cars/km2) - Number of private cars: 2.497m - Number of Light Duty Vehicles (LDV) (less than 3.5 tons) circulating in urban area: 340,000 – 440,000	GLA Demographic Update (2009) CENSUS 2001 Focus on London (ONS – 2007) TIL Report (TfL - 2009) Watkiss et al (2003)
Context Description	– Modal Split: o Walking: 31.4% o Cycling: 2.0% o Bus: 14.3% o Light rail: 0.5% o Metro: 7.2% o Commuter rail: 4.8% o Car (incl passengers): 37.9% o Motorcycle/scooter: 0.6% – Overall traffic volume (vehicle km/year): 31.8bn – Proportion of traffic represented by freight: 10% – Total number of motorised trips in the city per day: 21.6 – ... of which external (commuting) 20% – Average motorised trip travel time: 59.5mins/average day (7-day week) – Average motorised trip length (km): 14 – Total number of non-motorised trips (walking/cycling) in the city per day: 6.2 – Average non-motorised (walking/cycling) trip travel time: 10.5mins/average day (7-day week) – Average non-motorised (walking/cycling) trip length (km): 0.9	TIL Report (TfL - 2009)
Scheme Objectives	– Congestion reduction – Traffic flows improvement – Improve bus services – Make the distribution of goods and services more efficient	SURVEY
Targeted Traffic	– Private cars – LDV	SURVEY
Scheme Design	– Area licensed based	SURVEY
Technology Used	– Automatic Number Plate Recognition (ANPR) / Virtual licences – The cameras are linked to the automatic number plate technology in order to capture the vehicle registration plates on entry into the zone and to store details in a database until matched to a payment.	SURVEY International Perspectives on road Pricing
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Traffic for London. – Citizens representatives, PT company, Service providers, Retailers and Freight distributors have been involved during the scheme	SURVEY

LONDON C.C. – CITY LEVEL		
	implementation. – In 2001 was formally decided to adopt the access restriction scheme which came into operation in 2003. – The scheme works from Monday – Friday 0700 - 1800. – £8 per day if paid by midnight on the day of travel – £10 per day if paid by midnight on the following charging day – If the charge is not paid by midnight on the following charging day there will be a Penalty Charge Notice issued – A monthly charge ie 20 consecutive charging days for £136 will save £24 (the equivalent of three free days). – An annual charge ie 252 consecutive charging days for £1696 will save £320 (the equivalent of 40 free days). – Fleet vehicles pay a £7 daily charge if registered on Fleet Auto Pay.. – Type of enforcement adopted: o Technology based – Exempted categories: o PT vehicles o Taxi o Two-wheelers o Emergency vehicles o Electric vehicles o Disabled (Blue Badge holders) o Certain operational vehicles used by London Boroughs o Vehicles with 9 or more seats o Roadside recovery vehicles o NHS vehicles that are exempt from Road Tax o Armed forces o Royal Parks Agency o HM Coastguard and Port Authority – The Western Extension Zone (WEZ) was introduced in 2006 but may now be removed. A variation order on the scheme will be consulted on within the next year. This will result in the charging zone reverting back to its previous (central) area.	
Encountered Barriers	– Politics and Strategy – Opposition – Politics and Strategy – Conflict – Planning – Technical – Planning – Policy Conflict – Planning – User Assessment – Institution – Administrative Structures and Practices – Institution – Legislation and Regulation – Cooperation – Key Individuals – Technology – Public Funds and Subsidy	SURVEY
Encountered Drivers	– Politics and Strategy – Commitment – Politics and Strategy – Coalition – Planning – Technical – Planning – User Assessment – Institution – Legislation and Regulation – Cooperation – Partnership and Involvement – Cooperation – Key Individuals – Citizens Participation – Technology – Public Funds and Subsidy	SURVEY
Section III - Results		**Source**

LONDON C.C. – CITY LEVEL		
Environment	– CO2: - 16% – NOx: - 8% – PM10: - 6%	TIL Report (TfL - 2009) Pre (2002) and post (2003) introduction
Network	– Decrease in n° of vehicles entering the zone (% vehicles/day or): o 16% o WEZ: 14% – Change in average vehicle speed in the zone (km/h): 1.2 km/h increase in average speeds in the central area until 2006-2009 when this dropped 2.1 km/s – Mean excess travel rate was 2.3mins/km in 2002, 1.6mins/km in 2003, and back to 2.3mins/km in 2008	Central London 6th Annual Impacts Monitoring Report (TfL - 2008) - 2002 compared with 2007 / WEZ: 2005/6 compared with 2007 TIL Report (TfL - 2009) - Pre introduction (2000-2002) compared with post introduction (2003-2006 and 2006-2009) Central London 6th Annual Impacts Monitoring Report (TfL - 2008) - Base (2002) and post introduction (2003 and 2008)
Economy	– Investment costs (mil. €): £162m = c.€250m (at 2002 prices and exchange rate) – Operational costs (mil. € per year): £131m = c.€144m (2010 exchange rate) – Revenues from charges (€ per year): £195m = c.€215m (2010 exchange rate) – Revenues from fines (€ per year): £73m = c €83m (2010 exchange rate) – Urban economy increase/decrease: o Indicator: Sales growth in the Central Congestion Charging Zone Data: 2.1% per annum pre-charge (2000-2002), 4.4% per annum post-charge (2003-2007) o Indicator: Surveyed sales performance of retail businesses located within WEZ Data: 24% reported increase, 7% reported decrease	Central London Congestion Charging Scheme – Ex-post evaluation of the quantified impacts original scheme (TfL – 2007) – 2002 Central London 6th Annual Impacts Monitoring Report (TfL - 2008) - 2007/8 Central London 6th Annual Impacts Monitoring Report (TfL - 2008) Date: 2006/7 Central London 6th Annual Impacts Monitoring Report (TfL - 2008) Date: 2007
Acceptability	– Citizens have been consulted by means of: o Survey o Consultation meetings – Percentage of favorable people before the scheme implementation: o Stakeholders – 56% o General public – 36% o Other organizations – 25%	The Greater London (Central Zone) Congestion Charging Order 2001: Report to the Mayor February 2002
Equity	– Scheme winners: o Private motorized users o PT users o Shoppers o Freight distributors – Scheme losers:	SURVEY

LONDON C.C. – CITY LEVEL		
	o Private motorized users	
Liveability	– Between 60 (-2.8%) and 140 (-6.5%) fewer accidents are estimated to occur in the zone and inner ring road because of the scheme. The savings have been given a monetary value of £15 million per annum. – There is strong evidence that the reduced levels of traffic and the increased space and priority for pedestrians and cyclists represent a significant improvement in amenity in the zone. – Major increases in traffic diverting around the zone have not been an issue.	www.konsult.leeds.ac.uk/private/level2/instruments/instrument001/l2_001c.htm#lond
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – Safer – More accessible – Smarter	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Alternative options o Charges and sanctions o Scheme results – To whom: o Private motorized users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o Internet o Posting o Posters o Leafleting	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[162]	– Road code prescription – Level of access restriction scheme legal basis: o urban	SURVEY
Relationships with Existing EU legislation/regulation	–	

[162] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

London LEZ

LONDON LEZ – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 7,620 (1000 inhabit.) - Urban Area: 1,623 km2 - Population Density: 4,782 inhabit./km2 - Cars per inhabitants: 327.7 (cars/1000 inhabit.) - Car density: 1538.5 (cars/km2) - Number of private cars: 2.497m - Number of Light Duty Vehicles (LDV) (less than 3.5 tons) circulating in urban area: 340,000 – 440,000	GLA Demographic Update (2009) CENSUS 2001 Focus on London (ONS – 2007) TIL Report (TfL - 2009) Watkiss et al (2003)
Context Description	– Modal Split: o Walking: 31.4% o Cycling: 2.0% o Bus: 14.3% o Light rail: 0.5% o Metro: 7.2% o Commuter rail: 4.8% o Car (incl passengers): 37.9% o Motorcycle/scooter: 0.6% – Overall traffic volume (vehicle km/year): 31.8bn – Proportion of traffic represented by freight: 10% – Total number of motorised trips in the city per day: 21.6 – ... of which external (commuting) 20% – Average motorised trip travel time: 59.5mins/average day (7-day week) – Average motorised trip length (km): 14 – Total number of non-motorised trips (walking/cycling) in the city per day: 6.2 – Average non-motorised (walking/cycling) trip travel time: 10.5mins/average day (7-day week) – Average non-motorised (walking/cycling) trip length (km): 0.9	TIL Report (TfL - 2009)
Scheme Objectives	– Air quality improvement	SURVEY
Targeted Traffic	– LDV – Euro 4 vehicles and under	SURVEY
Scheme Design	– Environmental zones	SURVEY
Technology Used	– Automatic Number Plate Recognition (ANPR) / Virtual licenses	SURVEY
	– The cameras are linked to the automatic number plate technology in order to capture the vehicle registration plates on entry into the zone and to store details in a database until matched to a payment.	International Perspectives on road Pricing
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Traffic for London. – Citizens representatives, PT company, Service providers, Retailers and Freight distributors have been involved during the scheme implementation.	SURVEY

LONDON LEZ – CITY LEVEL		
	– On 3rd May 2007 it was formally decided to adopt the access restriction scheme which came into operation on 4th February 2008. – The scheme works 24/7. – If a vehicle does not meet Euro III: o Lorries, motor caravans and horse boxes over 3.5 tonnes pay £200 per day o Coaches and buses over 5 tonnes pay £200 per day – And from 4th October 2010: o Large vans and horse boxes between 1.205 – 3.5 tonnes pay £100 per day o Motor caravans between 2.5 – 3.5 tonnes pay £100 per day o Minibuses below 5 tonnes pay £100 per day – If the vehicle is not exempt and fails to pay these charges within 28 days, a Penalty Charge Notice (PCN) is issued. – Type of enforcement adopted: o Technology based – Exempted categories: o PT vehicles o Taxi o Two-wheelers o Electric vehicles o Euro III vehicles and above o Vehicles designed for off-road use but are allowed to use roads (eg. Tractors) o Historic vehicles (built before 1st Jan 1973) o Military vehicles o Cars o Minibuses (until 2012) o Large vans (until 2012) – By 2012, small vans and minibuses will have to meet Euro III standards to avoid paying the charge. – Also, proposal 94 in the Draft Mayor's Transport Strategy states: (note that this is subject to consultation). The Mayor, through TfL, will continue to operate the existing London LEZ. The Mayor will consider further tightening of the standards of the current LEZ, as well as the introduction of further emissions control schemes to encourage the use of cleaner vehicles in London: a) The current LEZ scheme will continue to operate to reduce emissions from the heaviest vehicles, and phase four will be introduced in 2012 b) The Mayor will defer the implementation of phase three of the scheme covering LGVs and minibuses (which was due to commence in 2010) to 2012 c) In 2015, the Mayor will, subject to technical feasibility, introduce an emissions standard for NOx (EuroIV) into the London LEZ for HGVs, buses and coaches (phase five) d) If necessary, the Mayor may consider introducing minimum requirements for other vehicles or tighter standards in particular locations within London e) The Mayor will work with boroughs that wish to take local action to address air quality through local LEZs or similar measures	
Encountered Barriers	– Politics and Strategy – Opposition – Planning – Technical – Planning – Economic – Planning – Policy Conflict	SURVEY

<table>
<tr><th colspan="3">LONDON LEZ – CITY LEVEL</th></tr>
<tr><td>Encountered Drivers</td><td>– Politics and Strategy – Commitment
– Politics and Strategy – Coalition
– Planning – Policy Synergy
– Institution – Legislation and Regulation
– Cooperation – Partnership and Involvement
– Cooperation – Key Individuals</td><td>SURVEY</td></tr>
<tr><th colspan="2">Section III - Results</th><th>Source</th></tr>
<tr><td>Environment</td><td>– CO2: negligible
– NOx: - 1.48%
– PM10: - 1.1%
– PM2.5: - 1.5%
– In 2003, the University of Westminster feasibility study examines the freight companies strategies in response to the introduction of LEZ and the impacts. According to the Study, the London EZ would result in a 15% reduction in PM10 emissions by 2012 and similar reductions in NOx.</td><td>Low Emission Zone – Impacts Monitoring (TfL - 2008) - 2007

BESTUFS II, 2008, D 1.4 BESTUFS Policy and Research Recommendations IV</td></tr>
<tr><td>Network</td><td>–</td><td></td></tr>
<tr><td>Economy</td><td>– Investment costs (mil. €): c. €65m (at 2008 exchange rate)

– Operational costs (mil. € per year): c. €11.9m (at 2010 exchange rate)

– Revenues from charges (€ per year): €5.5 – 7.8m (estimated)

– Forecast monetized health benefits from the scheme, present value to 2015/16:

<table><tr><td></td><td>IGCB/Defra</td><td>EU Cafe</td></tr><tr><td>London benefits</td><td>£80m–£110m</td><td>£160m-£420m</td></tr><tr><td>Outside London benefits</td><td>£70m–£100m</td><td>£90m–£250m</td></tr><tr><td>Total Benefits</td><td>£140m–£210m</td><td>£250m–£660m</td></tr></table>
– Urban economy increase/decrease:

o Indicator: Indicator: Pre-implementation estimates

Data: The business and economy impacts assessment, conducted during the design stage for the scheme, suggests the overall loss to the economy from the direct and wider impacts of the scheme could lie in the range of £100m to £270m, with a potential net loss of 140 to 420 full time equivalent jobs.</td><td>Low Emission Zone – Impacts Monitoring (TfL - 2008) – 2007

Source: Proposed LEZ Economic and Business Impact Assessment (TfL) Date: Nov 2006</td></tr>
<tr><td>Acceptability</td><td>– Citizens have been consulted by means of:
o Survey
o Consultation

– Percentage of favorable people before the scheme implementation: 75%</td><td>LEZ Mayor’s Statement (TfL)

May 2007</td></tr>
<tr><td>Equity</td><td>– Scheme winners:
o Residents in the restricted zone
o Residents out of the restricted zone
– Scheme losers:</td><td>SURVEY</td></tr>
</table>

LONDON LEZ – CITY LEVEL		
	o Shop keepers/Retailers o Freight distributors	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Alternative options o Charges and sanctions o Scheme results – To whom: o Shop keepers/Retailers o Freight distributors o Central government, local authorities and politicians o Business representative groups o Organisations representing groups such as voluntary and community organisations, disabled people, Black, Asian and Ethnic Minority people and walking and cycling o Freight and haulage representative organisations o Bus and coach representative organisations o Organisations representing vehicle manufacturers and pollution abatement equipment manufacturers o Health organisations, NHS trusts and emergency service providers – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o Internet (e.g. Transport for London website on LEZ www.tfl.gov.uk/roadusers/lez/default.aspx) o Posting o Posters o Leafleting (e.g. www.tfl.gov.uk/roadusers/lez/about/2027.aspx)	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[163]	– Air quality legislation – Road code prescription – Level of access restriction scheme legal basis:	SURVEY

[163] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

LONDON LEZ – CITY LEVEL		
	o urban	
Relationships with Existing EU legislation/regulation	– Council Directive 2008/50/EC on Ambient Air Quality& Cleaner Air for Europe drove the scheme because it imposed minimum air quality standards to meet. The scheme aims to address those standards directly.	SURVEY

Lund

LUND – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 80 (1000 inhabit.) - Urban Area: 50 km2 - Population Density: 1,600 inhabit./km2 - Cars per inhabitants: 375 (cars/1000 inhabit.) - Car density: 600 (cars/km2) - Number of private cars: 30,000	SURVEY
Context Description	– Modal Split: o Walking: 23% o Cycling: 42% o Bus: 9% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car: 26% o Motorcycle/scooter: N/A – Overall traffic volume (vehicle km/year): 500 mil – Proportion of traffic represented by freight: 6% – Total number of motorised trips in the city per day: 96,000 – ... of which external (commuting) 38,000 – Average motorised trip travel time: 20 min – Average motorised trip length (km): 26 – Total number of non-motorised trips (walking/cycling) in the city per day: 120,000 – Average non-motorised (walking/cycling) trip travel time: 15min – Average non-motorised (walking/cycling) trip length (km): 3	SURVEY
Scheme Objectives	– CO2 emissions reduction – Road safety improvement – Liveability – Future generations	SURVEY
Targeted Traffic	– Private cars – Euro 4 vehicles and under	SURVEY
Scheme Design	– Cordon based – Time based – Environmental zones	SURVEY
Technology Used	– signs, parking guidance system – Paper licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Technical service department., office of road and traffic. – Citizens representatives, PT company, Service providers, Retailers and Freight distributors have been involved during the scheme implementation. – On 1st January 1972 was formally decided to adopt the access restriction scheme which came into operation on 1st July 1972. – The scheme works 24/7. – No charge is foreseen. – Type of enforcement adopted: o Manual – Exempted categories: o PT vehicles	SURVEY

LUND – CITY LEVEL		
	o Taxi o Emergency vehicles – Future plans foresee more restrictions on private car use, re-routing of PT, improving walking and biking facilities, Mobility management (behavior)	
Encountered Barriers	– Cultural and Lifestyle	SURVEY
Encountered Drivers	– Politics and Strategy – Coalition – Cooperation – Partnership and Involvement – Citizens Participation	SURVEY
Section III - Results		**Source**
Environment	–	
Network	– Decrease in n° of vehicles entering the zone (% vehicles/day or): 80%	SURVEY
Economy	– Investment costs (mil. €): 1,000 €	SURVEY
Acceptability	– Citizens have been consulted by means of: o Dialogue	SURVEY
Equity	– Scheme winners: o PT users o Shop keepers/Retailers o Residents in the restricted zone – Scheme losers: o Private motorized users o Residents out of the restricted zone o Freight distributors	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o N/A – To whom: o Private motorized users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press	SURVEY
Section V – Scheme Legal Aspects		**Source**

LUND – CITY LEVEL		
Scheme Legal Framework[164]	– Road code prescription – Level of access restriction scheme legal basis: o urban	SURVEY
Relationships with Existing EU legislation/regulation	–	

[164] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Manchester

MANCHESTER – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Population density: 1,983.7 inhab./km2 - Cars per inhabitants: 265.7 - - - Manchester has a population of approximately 452,000 and is situated within the wider Greater Manchester Urban Area, which has a population of about 2,240,230. It is the United - Kingdom's third largest conurbation. Greater Manchester consists of ten metropolitan boroughs: Bolton, Bury, Oldham, Rochdale, Stockport, Tameside, Trafford, Wigan, and the cities of Salford and Manchester.	EUROSTAT 2006 CURACAO
Context Description	– It is Manchester's economic success that has become its 'Achilles' heel' in that the prosperity of business and economic growth in the area is the main cause of one of its greatest problems and future challenges: congestion. – It is argued that if left unchecked, congestion in Greater Manchester will not only result in greater pollution, poor air quality and higher carbon emissions but will also damage the local economy. – It is estimated that congestion could cause the loss of around 30,000 jobs in the next 15 years. – Public Transport It is considered that the numbers using public transport to commute into Manchester have risen by approximately a third since 2000. Overcrowding is a recognised problem on the local rail and Metrolink networks. – Improvements and extensions to the public transport system included the further development of Metrolink (the light rail / tram system) and were part of the planned £2.7 billion (€3.2 billion) public transport investment package. It should be noted that in the case of Metrolink this was in addition to a £0.6 billion (€0.7 billion) funding package that was confirmed during 2008. – Car ownership has increased by about 25% over the last decade in the Greater Manchester conurbation. – Building more roads is not considered to be financially possible or environmentally acceptable. – Local transport officials agree that if left unchecked, congestion in Greater Manchester will not only result in greater pollution and air quality and higher carbon emissions, but will also damage the local economy. This is also the view supported by United City – a group representing transport/property consultants and a number of developers. – It is claimed that less congestion would create 10,000 new jobs in Greater Manchester and provide a major boost for the local economy. – Modal split (proportion of journeys to work by car), 2004: o Car 71% o Motor cycle 0.9% o Bicycle 1.1% o Walking 1.5% o Public transport (rail, metro, bus, tram) 26.8%	CURACAO http://www.urbanaudit.org/DataAccessed.aspx
Scheme Objectives	– Congestion reduction – Traffic flows improvement – Improve bus services	CURACAO

MANCHESTER – CITY LEVEL		
Targeted Traffic	–	
Scheme Design	– Cordon based	CURACAO
Technology Used	– The technology proposed included both "tag and beacon" and Automatic Number Plate Recognition (APNR) for vehicles without tags. Where possible, vehicles would be fitted with a special tag which would be read automatically as the vehicle passed into and out of the charging zone. – Regular users would register to a franchised agent and payment would be debited as the car passed the active charging point. – The toll reader would be placed inside the car's windscreen and would have a slot for a smart card (much like London's Oyster card). – For occasional users, drivers would be able to pre-pay before passing active charging points.	CURACAO
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– The UK Department for Transport (DfT) approved "programme entry" for the package of measures associated with the introduction of a proposed Congestion Charge on 9th June 2008. The aim was to draw on resources from the Government-backed Transport Innovation Fund (TIF). – A 2-ring scheme was planned to become operational from 2013, with a maximum daily charge of £5 (€6) helping to fund a £2.7 billion (€3.2 billion) package25 of public transport measures. However, the scheme was overwhelmingly rejected26 in a referendum on 12th December 2008, leading to the proposals being abandoned by the Passenger Transport Authority. On Friday 19th December 2008 the Association of Greater Manchester Authorities (AGMA) officially agreed to stop proceeding with the TIF proposals. – The proposal for the Manchester Congestion Charging Scheme was to charge motorists to enter the city during the morning (0700 to 0930) and leave in the afternoon (1600 to 1830) peak period. – Motorists would only be charged if their journey took them across one of the charging points. If you crossed a charging point outside the pricing times, you would not be charged. – The TIF proposal did not include any exemptions; all motor vehicles were to be subject to a charge under the scheme. However, 100% discounts would apply to; o Blue Badge holders; o All emergency vehicles; o Motorcycles; o Buses, coaches and registered community transport services; o All Taxis – Licensed Hackney Carriages and private hire vehicles; and o Patients who attend hospitals or specialist health facilities within the M60 for regular treatment – Following the summer 2008 consultation, AGMA also agreed: o A 100% discount for registered vehicle recovery services; and o All charges for HGVs (3.5t and over) would be deferred for 12 months pending the outcome of a study on journey time savings and other benefits in relation to costs.	CURACAO

MANCHESTER – CITY LEVEL		
	– It was also proposed that vehicles would only pay once to cross a ring in each charging period regardless of how many times they had crossed that ring. This meant that the maximum daily – charge would be £5 (€6) per day (at 2007 prices). – AGMA also proposed that, until public transport improvements could be put in place (expected to be 2016) workers based at the Trafford Park industrial area would receive a 100% discount for any outer ring charges. – Charges would vary dependent on: o Time of day; and o Where the journey started and finished. – The following describes the various charges in outline: 1. Morning peak period inbound (between the hours of 0700 and 0930, Monday to Friday) - £2 (€2.40) to cross the outer ring (M60 orbital motorway) and £1 (€1.20) to cross the inner ring (Manchester city centre); 2. Evening peak period outbound (between the hours of 1600 and 1830, Monday to Friday) - £1 (€1.20) to cross the inner ring (Manchester city centre) and £1 (€1.20) to cross the outer ring (M60 orbital motorway); 3. Morning peak outbound (between the hours of 0700 and 0930, Monday to Friday) – no charge; 4. Evening peak inbound (between the hours of 1600 and 1830, Monday to Friday) – no charge; 5. Off-peak times - no charge; 6. Weekends and Public (Bank) Holidays - no charge; and 7. Travel within the inner ring or outer ring boundaries – no charge at any time, peak or off-peak.	
Encountered Barriers	– The ten Metropolitan Boroughs of Greater Manchester were divided in their opinion about the introduction of the scheme from its initial stages; – Anti congestion charging lobby groups such as the Greater Manchester Momentum Group and Manchester Against Road Tolls gained support amongst the business community; – UK / national media coverage of the announcement to introduce the scheme was mixed; – Public polls asking whether or not the people of Manchester wanted the charging scheme were used by anti-charging lobby groups to further their argument. However, in many cases the poll questions did not ask about the package of measures, including the public transport investment, but simply asked if the public wanted a congestion charge. The danger was that public opinion would be influenced by 'results' from these polls. *(SEE ALSO ACCEPTABILITY)*	CURACAO
Encountered Drivers	– The scheme would have been part of an investment package of £2.8 billion (€3.4 billion) in public transport schemes and improvements in the Greater Manchester conurbation; – Despite anti congestion charging lobby groups emerging, a business lobby group "United City" established itself in support of the investment package that included road pricing; – Some media coverage, including local newspaper the Manchester Evening News, presented a positive message about the 'package' of public transport measures that were to accompany the proposed congestion charging scheme in Manchester.	CURACAO
Section III - Results		**Source**

MANCHESTER – CITY LEVEL		
Environment	–	
Network	–	
Economy	– One of the conditions for funding any proposed scheme was that any revenue raised would be re-invested into public transport schemes. – The TIF investment package would have been made up of £1.5 billion (€1.8 billion) grant from the Government's TIF together with £1.2 billion (€1.4 billion) borrowings which would have been paid back over 30 years from congestion charging and public transport revenues. In addition, the Department for Transport would fund additional train carriages and there would be a further £100 million (€120 million) from other sources. – Part of the funding conditions prior to the scheme being rejected by referendum in December 2008 was that money would be re-invested in public transport schemes and used to pay for operating costs.	CURACAO
Acceptability	– The AGMA always maintained that it would not go ahead with Congestion Charging unless it had the support of the public and business community. – Before the public referendum three out of the ten local Metropolitan Borough Councils (Trafford, Stockport and Bury) had made clear statements that they opposed the planned scheme. – It is difficult to categorically state the reasons for the negative referendum result in December 2008 at this stage but some practitioners and commentators29 have offered the following as possible reasons: 1. The public misunderstood the proposals and thought that the congestion charge would apply anytime, anywhere. 2. The debate never focused on public transport improvements, just on the congestion charge. 3. The public did not believe that public transport would get better after Government Minister Alistair Darling withdrew Government funding from the Metrolink 'Big Bang' project in 2004. People therefore thought they would get the tax but not see the benefits. 4. The current economic climate means that people are less likely to vote for something that is perceived as another tax. 5. Greater Manchester's governance structures did not assist with the prospect of delivering an ambitious transport project as a number of councils would have to agree on the proposals before they were accepted. 6. Assurances to the business community were not given as fully as they should have been and thus many were against the charge. 7. Campaigners for the congestion charge did not fully focus on the health benefits of the congestion charge. 8. It appears that campaigning was not at a local level and therefore did not touch on the issues that really mattered to the public. Benefits/costs should be defined on a community by community basis.	
Equity	– Proposals to support low income workers with a discount, including public transport, were considered in public consultation. – Following the consultation AGMA proposed that low-paid workers (based on statutory minimum wage) would receive a 20% discount on the congestion charge for a minimum period of	CURACAO

MANCHESTER – CITY LEVEL		
	2 years when the impact of these proposals would be evaluated. Low-paid workers would also receive a 20% discount on public transport fares at peak times.	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– A leaflet including details of the proposed Congestion Charging plan was sent to every property in Greater Manchester during the consultation period which ran for 14 weeks from 7th July to 10th October 2008.	CURACAO
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[165]	–	
Relationships with Existing EU legislation/regulation	–	

[165] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Milan

MILAN – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- 1.3 mil inhabitants in the municipality - 2,243.1 inhabitants/km^2 - 839 cars per 1,000 inhabitants	ISTAT / ACI
Context Description	– Milan has the third-highest concentration of particle matter (PM10) among large European cities, both in terms of average annual level and days of breaching a European Union limit of 50 micrograms per cubic meter, according to a 2007 study of 26 European cities by the environmental group Legambiente and the research institute Ambiente Italia, and sponsored by Dexia SA. Particle matter pollution mainly originates from traffic, heating, and industry. – In Lombardy each day 5.7 millions of people are going to move towards urban areas, 95% inside the region itself. 75% of daily transits are made by private vehicles, 14% by public transport system. About 54% of daily transits are for work, and among these roughly 48% are directed to Milan urban area. – Geomorphology and climate of the valley (Pianura Padana) of – Lombardy, with the Milan urban area placed in the centre of it. Northern Alps range is a sort of barrier that makes difficult to clear the air from pollutant emissions. – Modal split (modal split of journeys by prevailing in the urban area of Milan): o Train 7.9% o Metro 13.2% o Tram, bus 13.7% o Other 1.0% o Taxi 0.4% o Cars 33.5% o Motorcycles 4.4.% o Bicycles 3.0% o Auto pax 7.3% o Walking 15.7%	CURACAO / ECOPASS REPORT JAN.-DEC. 2009 Valutazione ambientale strategica www.comune.milano.it/dseserver/WebCity/documenti.nsf/0/c54f2196adf9678cc12575ca003a5b4c/$FILE/All_Valutazioni_trasportistiche.pdf
Scheme Objectives	– to reduce the environmental impacts of travel; – to improve city comfort and cleanliness; – to support the local economy; – to reduce the health impacts from local transport emissions. – To improve air quality by reducing PM emissions in the Cerchia dei Bastioni (approximately the city centre of Milan) by 30%, with a positive effect on the surrounding areas of the city as well; – To relieve congestion by reducing the number of incoming cars by 10% and thereby speeding up public transport in the area; – To boost public transport by reinvesting all EcoPass charges in sustainable traffic and a sustainable environment.	CURACAO / ECOPASS REPORT JAN.-DEC. 2009 www.konsult.leeds.ac.uk/private/level2/instruments/instrument001/l2_001c.htm#milan

MILAN – CITY LEVEL		
Targeted Traffic	The Ecopass ticket is required for: – private and commercial petrol cars Euro 0, Euro 1 and Euro 2 – Diesel cars Euro 0, Euro 1, Euro 2 and Euro 3 – Diesel commercial vehicles Euro 0, Euro 1, Euro 2 and Euro 3 – Diesel buses Euro 0, Euro 1, Euro 2, Euro 3, Euro 4 and Euro 5 Exempted categories are: – the inhabitants of properties situated within the Ecopass Area who are either owners of such properties or tenants with duly registered rental contracts and with domestic utility contracts in their name; – the inhabitants of properties situated outside the Ecopass Area who have garages or parking spaces within the Ecopass Area; – mopeds, scooters and motorbikes – vehicles carrying disabled passengers and/or bearing a disabled passenger badge.	CURACAO / ECOPASS REPORT JAN.-DEC. 2009
Scheme Design	– Ecopass consists of a charge applied to vehicles circulating within the city centre area during working days (Monday to Friday) from 7.30 a.m. to 7.30 p.m. (7.00 a.m. to 7.00 p.m. from 15th April 2008). – The Limited Traffic Zone includes the area within the city walls. This zone has been chosen because within it are 12% of daily car trips of the whole municipality; secondly, it is the area most served by public transport; and thirdly, it is easily managed due to the low number of possible access points (43 in total).	CURACAO / ECOPASS REPORT JAN.-DEC. 2009
Technology Used	– The Ecopass Area has 43 entrance points, each equipped with CCTV (Closed-Circuit Television) cameras designed to record vehicles entering and exiting the zone. Cameras can record license plate numbers and pollution class with a 90% accuracy rate through automatic number plate recognition (ANPR) technology. – Each Ecopass gate has 2 built-in cameras: the first one takes pictures of all incoming vehicles, while the second identifies car plates through an OCR (Optical Character Recognition) system, for vehicle classification.	CURACAO / ECOPASS REPORT JAN.-DEC. 2009
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Ecopass started on 2nd January 2008 – Each vehicle has its registration book for the European Directive and with the information inside this document it is possible to identify the Euro Category and the corresponding pollution class. After having recognised the pollution class of the vehicle, the user will pay the charge (from 2€ to 10€ for daily entrance) corresponding to a certain level of PM10 emissions his vehicle is characterised by. – With a daily Ecopass the user can enter the Ecopass Area all day as many times as he/she pleases. The charge can be paid on the first day of entry or until midnight on the following day. – There is also a multiple Ecopass, worth €20, €50 or €100, which entitles the holder to enter on different days, without having to pay a daily Ecopass charge. The multiple entry Ecopass allows the holder to enter the Ecopass area on 50 – not necessarily consecutive – days, with a 50% reduction on the daily Ecopass charge and for a further 50 days with a 40% reduction. There are no multiple entry reductions from the 101st day onwards. Moreover reductions only apply to passenger vehicles, while buses, multi-purpose vehicles and goods vehicles are excluded.	CURACAO / ECOPASS REPORT JAN.-DEC. 2009
Encountered Barriers	–	

MILAN – CITY LEVEL		
Encountered Drivers	–	
Section III - Results		**Source**
Environment	– Reduction of total PM10 emissions from road traffic equal to 16%, 18% of NOx, 11% of CO2 and 38% of NH3 (ammonia).	CURACAO / ECOPASS REPORT JAN.-DEC. 2009
Network	– The decrease in vehicles accessing the Ecopass Area was of 67% of Euro 0, Euro 1 and Euro 2 vehicles, while the number of Euro 3, Euro 4 and electric/hybrid vehicles increased by 16% – The traffic reduction, both private and commercial, within Ecopass area during the enforcement was 17.1% and 8.4% outside the zone. – Effects on the commercial speed of PT: the analysis on all the lines passing through the Ecopass Area between 7.30 a.m. and 7.30 p.m. of working days has shown that, in respect to a mean reference value metered before Ecopass implementation, the speed of public transport has increased by 8.1%. – the increase of passengers using the metro for travelling towards and within Ecopass area has been 6.2% during the first year of implementation, while during the second year has been only 3% (both percentages calculeted in respect of 2007 data – pre-Ecopass)	CURACAO / ECOPASS REPORT JAN.-DEC. 2009
Economy	– During the period between January 2008 and September 2009 the revenues from Ecopass tickets have been 19.5 mil €, of which 68.7% comes from the paper tickets sold by authorized shops. That's because of the high percentage of occasionally users with a consequent relevant percentage of daily tickets sold (95% of the total). Also the tickets bought on the internet are quite significant (17.4% of total tickets sold), while 13.9% of users employs the current account payment system.	CURACAO / ECOPASS REPORT JAN.-DEC. 2009
Acceptability	– A survey[166] carried out by SWG Group after one year of scheme implementation has shown that 74% of interviewees considers Ecopass totally useless in reducing air pollution; moreover the 60% would be in favor of a referendum about the real benefit of a city access charge. – The 77% of residents interviewed thinks that alternative measures should be considered for air pollution abatement. – 68% of respondents approves the proposal of the President of Milan province (Mr. Filippo Penati) to increase of 0.20 € the highways tolls for drivers heading toward Milan and using the incomes for PT improvements (mainly metro and trains).	www.postpoll.it
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	–	
Section IV – Information Dissemination		**Source**

[166] The survey has been carried out by request of the Milan province with a sample of 600 residents.

MILAN – CITY LEVEL		
Information dissemination on the scheme performed at city level	– In the first week of the Ecopass drivers had difficulty finding and/or paying for the necessary ticket, which can be purchased in various denominations at dispensers throughout the city, at some banks and over the internet. After almost two years it seems that citizens have got acquainted with Ecopass.	CURACAO / ECOPASS REPORT JAN.-DEC. 2009
	– Type of media used: o Internet (e.g. city level in Italian language)	www.comune.milano.it/portale/wps/portal/CDM?WCM_GLOBAL_CONTEXT=/wps/wcm/connect/contentlibrary/Milano/Milano/Mobilit+e+Ambiente/Trasporti+in+citt/ www.comune.milano.it/dseserver/ecopass/abbonam_residenti.html
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[167]	–	
Relationships with Existing EU legislation/regulation	–	

[167] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects.

Modena

MODENA – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 175.502 (1000 inhabit.) - Urban Area: 183.63 km2 - Population Density: 980 inhabit./km2 - Cars per inhabitants: 663 (cars/1000 inhabit.) - Car density: 634 (cars/km2) - Number of private cars: 116,428	Statistic Yearbook 2007
Context Description	– Modal Split: o Walking: N/A o Cycling: N/A o Bus: 9.5% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car : 79.9% o Motorcycle/scooter: 2.7%	Urban Mobility Plan (PUM) 2002
Scheme Objectives	– Historical inner city preservation – Congestion reduction – Air quality improvement – CO2 emissions reduction – Increasing urban economy – Liveability – Equity – Future generations	SURVEY
Targeted Traffic	– Private cars – LDV	SURVEY
Scheme Design	– Cordon based	SURVEY
Technology Used	– Paper licenses – Automatic Number Plate Recognition (ANPR) / Virtual licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design has been in charge of Traffic Department while implementation of City police department and license offices. – Citizens representatives, PT company, Service providers, Retailers and Freight distributors have been involved during the scheme implementation. – On 31st December 1973 was formally decided to adopt the access restriction scheme which came into operation the same date. – The scheme works 24/7. – The charge is 4€/license (60 minutes) – Type of enforcement adopted: o Technology based - OCR-automatic number plate recognition/white list (virtual licenses) – Exempted categories: o PT vehicles o Taxi o Two-wheelers o Foreign vehicles o Emergency vehicles o Electric vehicles	SURVEY

MODENA – CITY LEVEL		
	– At the beginning the restriction of circulation in the historical inner city (ZTL-Limited Traffic Zone)was controlled just by City Police Department. – In order to improve the scheme, from 2008 we have installed 12 video-controlled access point to recognize the authorized vehicles, and to fine the others.	
Encountered Barriers	– Politics and Strategy – Conflict – Planning – User Assessment – Institution – Legislation and Regulation – Technology – Cultural and Lifestyle	SURVEY
Encountered Drivers	– Politics and Strategy – Commitment – Politics and Strategy – Coalition – Planning – Technical – Planning – Economic – Planning – Policy Synergy – Planning – User Assessment – Institution – Administrative Structures and Practices – Cooperation – Key Individuals – Citizens Participation – Information and Public Relation – Technology – Public Funds and Subsidy – Exchange and Mutual Learning – Cultural and Lifestyle	SURVEY
Section III - Results		**Source**
Environment	–	
Network	– Decrease in n° of vehicles entering the zone (% vehicles/day or): -21% (2007)	SURVEY
Economy	– Investment costs (mil. €): 370,000 € (Dec. 2008) – Operational costs (mil. € per year): 147,000 € (Dec. 2008) – Revenues from charges (€ per year): 150,000 € (Dec. 2008) – Revenues from fines (€ per year): 3,700,000 € (Dec. 2008)	SURVEY
Acceptability	– Citizens have been consulted by means of: o Survey o Polls – Percentage of favorable people before the scheme implementation: 70% (2007)	SURVEY
Equity	– Scheme winners: o Shop keepers/Retailers o Residents in the restricted zone o pedestrian, bikers, tourists – Scheme losers: o Private motorized users o Residents out of the restricted zone o Freight distributors	SURVEY
Liveability	–	

MODENA – CITY LEVEL		
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Alternative options o Charges and sanctions o Scheme results – To whom: o Private motorized users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors o representative of inhabitants, trade unions and professional organizations – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o Internet (e.g. city level in Italian language www.comune.modena.it/poliziamunicipale/viabilita.shtml; http://www.comune.modena.it/citypass) o Leafleting	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[168]	– Road code prescription – Local law – Level of access restriction scheme legal basis: o urban o national – The municipality provided a specific local law in order to avoid congestion of inner city, and to preserve storical sites	SURVEY
Relationships with Existing EU legislation/regulation	–	

[168] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Monza

MONZA – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 121.28 (1000 inhabit.) - Urban Area: 33.03 km2 - Population Density: 4,770 inhabit./km2 - Cars per inhabitants: 327.7 (cars/1000 inhabit.) - Car density: 610 (cars/km2) - Number of private cars: 74,343	Registry office ACI
Context Description	– Modal Split: o Walking + Cycling: 8.9% o Bus: 2.4% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car: 76.4% o Motorcycle/scooter: 5.8% – Total number of motorised trips in the city per day: 63,936 – ... of which external (commuting) 31,646	PGTU 2003
Scheme Objectives	– Liveability – Protection of historical centre	SURVEY
Targeted Traffic	– Private cars	SURVEY
Scheme Design	– Area licensed based	SURVEY
Technology Used	– Manual	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Monza Municipality. – In 1993 was formally decided to adopt the access restriction scheme which came into operation in 1995. – The scheme works 24/7 and a special time window for freight deliveries works between 06.00 – 10.00 and 14.00 – 16.00. – no charge is foreseen but special permits for more than a day cost 15€. – Type of enforcement adopted: o Manual based – Exempted categories: o Taxi o Emergency vehicles o Residents o Bicycles o LDV (only during goods delivery windows) – At this moment in Monza there is a limited access zone in the Historical Centre where only residents and authorized vehicles (taxis, Police, freight operators for goods delivery in certain hours of the day) are allowed. The scheme was implemented in 1993 and has been extended to other areas of the Historical centre in the following years. – The Historical centre has been divided into three areas, and	SURVEY

MONZA – CITY LEVEL		
	residents are allowed to circulate only in the area where they live, in order to avoid having cars in the centre. – There was a deep information campaign and residents were invited to go to the municipality offices in order to get their permission to circulated in the area they live in. – Residents who are not owners of a private parking place are allowed to park their car in limited time stalls with no limits.	
Encountered Barriers	–	
Encountered Drivers	–	
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	–	
Acceptability	–	
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules – To whom: o Private motorized users o Shop keepers/Retailers o Residents in the restricted zone o Freight distributors – When the information has been disseminated: o During the scheme implementation – Type of media used: o The press o Radio - TV o Internet o Posting o Leafleting	SURVEY
Section V – Scheme Legal Aspects		**Source**

MONZA – CITY LEVEL		
Scheme Legal Framework[169]	– Road code prescription – Level of access restriction scheme legal basis: o urban	SURVEY
Relationships with Existing EU legislation/regulation	–	

[169] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Munich

MUNICH – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 1,370 (1000 inhabit.) - Urban Area: 310 km2 - Population Density: 4,410 inhabit./km2 - Cars per inhabitants: 0.6 (cars/1000 inhabit.) - Car density: 2,200 (cars/km2) - Number of private cars: 594,000	Municipality of Munich (2009)
Context Description	– Modal Split: o Walking: 23% o Cycling: 14% o Bus+ Light rail + Commuting rail + metro: 23% o Car + Motorcycle/scooter: 40% – Overall traffic volume (vehicle km/year): 5.111 bn – Total number of motorized trips in the city per day: N/A – ... of which external (commuting) 500,000	Municipality of Munich (2008)
Scheme Objectives	– Air quality improvement	SURVEY
Targeted Traffic	– Private cars – LDV	SURVEY
Scheme Design	– Environmental zones	SURVEY
Technology Used	– Paper licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design has been in charge of Municipality of Munich in cooperation with Free State of Bavaria (legally responsible authority) while implementation of Municipality of Munich. – Citizens representatives, PT company, Service providers, Retailers and Freight distributors have been involved during the scheme implementation. – On 21st August 2008 it was formally decided to adopt the access restriction scheme which came into operation on 1st October 2008. – The scheme works 24/7. – The charge is 5 Euro for paper license, exception fees according case. – Type of enforcement adopted: o Manual – Exempted categories: o Two-wheelers o Emergency vehicles o Electric vehicles o Classis cars (minimum 30 y old), exception permits for a range of cases	SURVEY
Encountered Barriers	– Politics and Strategy – Opposition – Politics and Strategy – Conflict – Planning – Policy Conflict – Planning – User Assessment – Institution – Administrative Structures and Practices – Cooperation – Key Individuals – Citizens Participation	SURVEY

MUNICH – CITY LEVEL		
Encountered Drivers	– Politics and Strategy – Commitment – Institution – Legislation and Regulation – Cooperation – Key Individuals – Citizens Participation	SURVEY
Section III - Results		**Source**
Environment	– NOx: - 23% – PM10: - 6%	Municipality of Munich (2008)
Network	– Decrease in n° of vehicles entering the zone (% vehicles/day): none – Change in average vehicle speed in the zone (km/h: none	SURVEY
Economy	– Investment costs (mil. €): none – Operational costs (mil. € per year): currently not available – Revenues from charges (€ per year): currently not available	SURVEY
Acceptability	– Citizens have been consulted by means of: o Survey o Public participation according national law	SURVEY
Equity	– Scheme winners: o Residents in the restricted zone – Scheme losers: o Private motorized users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Charges and sanctions o Scheme results – To whom: o Private motorized users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors o Citizens of Munich and surroundings – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o Internet: ▪ Feinstaubplakette (environmental badge) –	SURVEY

MUNICH – CITY LEVEL		
	national level website in German language http://www.feinstaubplakette.de) ▪ Federal Ministry for the Environment, Natural Conservation and Nuclear Safety – national level website http://www.bmu.de/english/air_pollution_control/general_information/doc/40740.php ▪ City level website www.muenchen.de/Rathaus/rgu/vorsorge_schutz/luft/luftqualitaet/188711/index.html#22" o Posters o Leafleting	
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[170]	– Air quality legislation – Legally responsible: Free State of Bavaria – Responsible for implementation: Municipality of Munich, Legally responsible: Free State of Bavaria – Responsible for implementation: Municipality of Munich – Level of access restriction scheme legal basis: o national	SURVEY
Relationships with Existing EU legislation/regulation	–	SURVEY

[170] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Nord-Jæren

NORD-JÆREN – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	– Nord-Jæren region is located on the western coast of Norway. Stavanger is the regional capital for about 250'000 inhabitants, including adjacent municipalities. The city of Stavanger is Norway's fourth largest city by population with 119'000 inhabitants.	CURACAO
Context Description	–	
Scheme Objectives	– The goal of the Nord-Jæren package was to prepare a coordinated development of the transport system in the region with regard to all modes. The toll system was set up to co-finance this package with as low burden as possible for the inhabitants.	CURACAO
Targeted Traffic	–	
Scheme Design	– Toll ring	CURACAO
Technology Used	– All toll plazas are fully automated with the use of the Auto-PASS system. Initially fares were differentiated, but since 2005 toll must be paid 24 hours a day all year round including weekends and holidays. Drivers are only charged for one trip per hour and there is a maximum payment of 75 trips per month for users of the Auto-Pass system. – The toll ring offers electronic toll collection with the use of on-board units, the Auto-Pass system. – Subscribers with on-board units can achieve up to a 50 per cent discount depending on the amount prepaid. – In 2004 electronic toll collection was harmonized throughout Norway. Most toll roads now use the Auto-Pass system. The system will gradually be expanded further in to provide for payment on ferries, for parking, etc. – The Auto-PASS concept is owned and managed by the Norwegian Public Roads Administration (NPRA). The concept covers all Auto-PASS tags and Auto-PASS equipment at the charging points (Auto-PASS roadside equipment). The concept also covers all the specifications for the tags, roadside equipment, central systems, interfaces between the system elements, Auto-PASS logo and trademark, Auto-PASS contractual framework and the Auto-PASS security architecture. – The Auto-PASS Service includes both a transport and a payment service (EFC). Examples on transport services include the use of infrastructure like bridges, tunnels, motorways, road networks, road user charging schemes and ferry transport. The payment service consists of a dedicated payment system based on a user holding an Auto-PASS tag, installations at the charging points, e.g. a toll station, and a central account held and managed by the company being responsible for the payment means and contract with the user.	CURACAO
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– The Nord-Jæren toll ring started its operation in April 2001, a decade after the other main toll rings in Norway. However, local discussions of a toll ring had been going on since mid 80s, but never gained the necessary political support. The Nord-Jæren package was established despite the lack of political support from two of the municipalities in the region. The other three municipalities, including the city of Stavanger, and the county council supported the package. – The plans for the toll ring passed Parliament. The toll period was set at 10 years, with an option to increase the period to 15 years if necessary. – The toll system of the Nord-Jæren package has a regional profile in the sense that the toll plazas are dispersed over the entire region. The initially 17 plazas were placed on the major roads in the region on the borders of the municipalities. One goal was that within all municipalities no one should pay to get to the centre of the municipality. The location of the toll plazas was not watertight. In some places it was possible to make detours to avoid the toll. To cope with this, some new plazas were established. Currently, 21 toll plazas are in	CURACAO

operation.

- Initially, fares were differentiated over the day. In weekends and on weekdays from 6PM-6AM no fee applied. The maximum fee of 10NOK (1.2€) for small vehicles applied from 7AM-9AM and from 2PM-5PM. At other times, half the fee applied. The most frequent users could get a maximum 50% discount of the fares above. Drivers were only charged for one trip per hour and there was a maximum payment of 75 trips per month for users of the Auto-Pass system.
- Furthermore, trips from home to the centre of ones own municipality were free of charge.
- The revenue from the initial toll system was lower than expected due to the low average fee level. As a result the charging scheme was significantly changed in 2005, following a political process. Currently no fee differentiation applies and the toll must be paid 24 hours a day all year round including weekends and holidays.
- The public owned company, Nord-Jæren Bompengeselskap AS is legally responsible for the toll ring. They have outsourced (after tendering) the operation of the toll ring to Bro Tunnelselskapet AS. The current fees are given in the table below. The fee is collected through 21 toll plazas.

	Vehicle registered for total weight			
	Less than 3 500 kg		From 3 500	
	NOK	Approx EURO	NOK	Approx EURO
Without AutoPass agreement				
	13	1.6	26	3.2
Discounts with AutoPass				
30% discount, 25 trips prepaid	9.1	1.1	18.2	2.3
40% discount 175 trips prepaid	7.8	1	15.6	2
50% discount 350 trips prepaid	6.5	0.8	13	1.6

- The fee is collected from all vehicles with the following exceptions:
  - buses in regular routes
  - emergency vehicles
  - motorcycles and mopeds
  - electric operated vehicles
  - people with a disability parking permit (must apply)
  - Tractors and farm vehicles
  - Trips from own house to municipality centre

Encountered Barriers	– The main barrier in the process of the Nord-Jæren Package seems to be the political reluctance by two of the municipalities to accept the scheme.	CURACAO
Encountered Drivers	– The main driver behind the Nord-Jæren package as well as the other Norwegian urban toll packages has been the lack of public funds to finance infrastructure, both road and public transport. This has been facilitated by the long tradition of using tolls as an alternative source of revenue. Local acceptance has been a guiding principle. One of the important drivers for the package was the opportunity to finance improvements in local rail by the toll revenue.	CURACAO
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	– The cost of operating the system has been far above expected. Initially, an estimate of NOK 11.5 mill (1.44 M€) was made for the first year of operation. The actually cost of operation has been more than twice this and increasing every year.	CURACAO

NORD-JÆREN – CITY LEVEL		
	– The revenue raised by the Nord Jæren package will be used for both road, rail and cycling/walking. In addition some revenue will also be used to improve the local environment and liveability of the area.	
Acceptability	–	
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Smarter	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	–	
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[171]	–	
Relationships with Existing EU legislation/regulation	–	

[171] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Nuremberg

NUREMBERG – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 495 (1000 inhabit.) - Urban Area: 186 km^2 - Population Density: 2,658 inhabit./km^2 - Cars per inhabitants: 0.4 (cars/1000 inhabit.) - Car density: 1,182 (cars/km^2) - Number of private cars: 191,867	City of Nuremberg (2008)
Context Description	– Modal Split: o Walking: 23% o Cycling: 11% o Bus: 21% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car: 45% o Motorcycle/scooter: N/A	City of Nuremberg (2007)
– Measures in the past Since the early 1970s, the historic city centre has been gradually pedestrianised, in particular in an attempt to address the issue of worsening air quality. Traffic volumes on the other streets grew by only 20–29 % of the traffic originally on the then closed roads. Forecasts predicted that the pedestrianisation of Rathausplatz/Theresienstrasse Square (thereby closing a road which carried on average 25 000 cars/16 hours) would result in traffic chaos in surrounding streets. This chaos did not materialise. After one year, traffic monitoring revealed that overall traffic flow in the historic city was reduced by up to 25 %, and the increase in traffic in adjacent streets proved very limited, ranging between 4 and 19 %, well below experts' forecasts. Significant improvements in air quality have been achieved. The following measures are described in detail in the annotations of the City of Nuremberg's Clean Air Plan and its update: 1. Topic Environmental Network o optimising local public transport (ÖPNV) o priority for local public transport over private car transport – adapted traffic signalling, additional bus lanes o further extension of designated cycle lanes and of the footpath network o establishing "urban railways" for extensive development of local public transport o further extension of suburban railway network for commuters travelling into Nuremberg 2. Topic Traffic Guidance o increased car park space management o further extension of dynamic traffic and parking guidance systems o reduction of goods traffic due to shift of the main customs office and establishing the container railway terminal at Nuremberg State Harbour o guidance of HGV traffic o developing strategies for establishing intelligent logistics concepts o planning and building measures at special "traffic hot spots" Planned Measures In order to safeguard sustainable mobility, which is indispensable for guaranteeing a city's basic functions, the City Council adopted a catalogue of traffic political objectives and related measures. The basic aim is to shift as much car travel as possible to the so-called "Umweltverbund" (Environmental Network), comprising travel by local public transport, bicycle and on foot. For this purpose, a variety of traffic planning measures need to be implemented, most of them long-term. Examples of measures required include development of the local public transport network, car park space management, extension of the network of cycle paths, and the traffic guidance system of Messe/Stadion/ARENA, as well as measures implemented in the historic centre of the Old Town. All in all, Nuremberg is well placed, and for some measures, such as traffic guidance systems, the extension of the pedestrian precincts and residents' parking policies, is already in the top tier of major German cities. Against the backdrop of accelerated climate change and stricter legal limits on various emissions in cities, Nuremberg's main objective of shifting as much individual to the Environmental Network has become more topical than ever. Short to medium term measures for bicycle travel: More and more Nuremberg citizens use their bicycle for daily travel to work or to school, to go shopping or in their leisure time. Thus the share of cycle traffic as a proportion of overall traffic doubled between 1985 and 2005. For journeys to work and educational institutions, and for shopping, the share increased to 13%, and for leisure travel to 23%. It is known that 29% of all households in Nuremberg do not own a car, which means that the share of bicycle traffic could be increased further. Traffic planning takes this into account by consistently promoting cycle travel as a permanent transport policy. The City of Nuremberg has the objective of achieving a bicycle		SURVEY

share of 20% within the city. By purposefully extending the network of cycle paths and footpaths, as well as establishing the corresponding infrastructure, the City intends to promote the use of an intelligent transport mix. Developing the cycle-friendly infrastructure (bike parking facilities, signposting etc.), will make new bicycle links to the surrounding villages and towns increasingly attractive. A comprehensive cycling campaign ("Nürnberg steigt auf" – Nuremberg gets on its bike) is intended to help achieve the objectives and comprises the following measures: Signposting Strategy Currently, there are about 135 kilometres of signposted main cycle routes within the Nuremberg city area. The signposting strategy adopted by the City Council provides for signposting a further 150 kilometres of cycle routes linking city districts. Cyclists' City Map: In June 2008, the fifth amended edition of the Cyclists' City Map was published. The number of copies printed was increased from 6,000 to 20,000 copies. The new Cyclists' Map is intended to give strong support to the trend towards more and more citizens using their bicycle for everyday journeys. After all, apart from walking, cycling is the mode of transport which is most conducive to protecting the environment and the city. In addition, about half of all car journeys are shorter than 5 kilometres. Bike parking facilities Currently, in the Old Town alone, there are about 1,300 publicly accessible bike parking racks. In early 2008, a bike parking strategy was adopted which provides for around 330 additional roofed bike stands in the Old Town. Bike parking facilities, roofed if possible (Bike&Ride) are provided at all major public transport stops, and will also be provided in further extension plans for the public transport network. Long-Distance Links Between Green Spaces Attractive cycle paths and footpaths, linking a whole network of green spaces, lead through the inner city and towards leisure areas in the vicinity of the city. The concept of "übergeordnete Freiraumverbindungen" (long-distance links between green spaces) was adopted in the land utilisation plan and integrated landscape plan for the City of Nuremberg. In 2008, the north-south axis was introduced, further routes are being planned. Extension of cycle path network The budget allocated to measures for extending cycle travel were significantly increased to 4.5 million Euros in the medium term investment plan for 2009-2014 (compared to 1.09 million Euros for 2003-2006). Public bicycle hire system The City of Nuremberg was chosen in a competition for a pilot project "Innovative Public Bicycle Hire Systems – New Mobility in the Cities". The competition was organised by the Federal Ministry of Transport, Building and Urban Affairs. Public bicycle hire systems are intended to promote cycle travel and at the same time attract new public transport users. PR work In order to promote an intelligent transport mix, the image of cycling has been addressed by numerous activities and projects, such as "Mobile Citizens' Meetings", "City Council Cycling", "Nuremberg – Intelligent Mobility", "One into Three in Bicycle Path Construction", "Bike to Work and "VIPs on Bikes“. Medium to long-term public transport measures The hierarchy of the various modes of transport (bus, tram, urban railway, underground and suburban railway) will be determined by the public transport development plan with forecasts which run until 2025. The central task of the public transport development plan is to devise a public transport network which will be able to cope with future traffic volumes, and achieve the most favourable modal shift towards public transport, whilst taking into account economic considerations. In April 2008, engineering consultants were commissioned to produce the public transport development plan. An expert working group has been appointed to help prepare the plan, as well as a project advisory council comprising representatives from the City Council, from advocacy groups and associations and other stakeholders. The public transport development is to be finalised in 2010.

Örebro

ÖREBRO – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 100 (1000 inhabit.) - Urban Area: N/A km2 - Population Density: 92 inhabit./km2 - Cars per inhabitants: 414 (cars/1000 inhabit.) - Car density (cars/km2): N/A - Number of private cars: N/A – Population 134,006 – Residents per km^2, 2004: 92 – Cars per 1000 inhabitants: 414 – Modal split (proportion of journeys to work by car), 2004: o Car 60% o Motor cycle 0% o Bicycle 20% o Walking 14% o Public transport (rail, metro, bus, tram) 5%	SCB 2009 www.scb.se/Pages/TableAndChart____287610.aspx www.urbanaudit.org/DownloadPDF.ashx?CityCode=SE008C" www.carbonaware.eu/fileadmin/user_upload/News_item/6_OrebroCCPlan_PerElvingson.pdf http://www.urbanaudit.org/DataAccessed.aspx
	– We will probably investigate effects of environmental zones within the coming year. We foresee new national legislation making it possible to regulate access not only for HDV (as today) but also for light vehicles. A primilinary analysis shows it to be a powerful intrument to reach goals for air quality and noise. Sorry for incomplete data in section 2 of questionnaire. I do not have access to requested data for the moment, but can check out if neccessary.	SURVEY

Oslo

OSLO – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- The Oslo metropolitan region is the smallest of the Scandinavian metropolitan regions. Just over 1 million people currently live in the two counties of Oslo and Akershus, which cover a total of 5,400 square kilometers. The region is the national centre of administration and distribution, and the hub of Eastern Norway. - Eastern Norway has two million inhabitants, almost half of Norway's total population, and geographically makes up one quarter of the country. Population densities vary within the region, the highest densities found along the four railway lines out of Oslo. - Population (2010): 586,860 - Area: 4269 km^2 - Population density: 159.6 inhab./km2 - Cars per inhabitants: 368.6 – Proportion of households with the use of a car (2001): 51% – Modal split[172]: o Cars 48.7% o Motorcycles 30.5% o Public transport NA o Bicycles 1.0% o Walking 19.8%	CURACAO http://www.ssb.no/english/municipalities/0301 ISFORT, Indicatori Comuni Europei www.isfort.it/sito/ricerca/opmus/Studi/Indicatori%20Comuni%20Europei.pdf
Context Description	– From 1970 and towards the end of the 80's the number of cars increased significantly in Oslo. – The investments in new road capacity did not reflect the increase in traffic and the results were deteriorating conditions on the roads and for the environment.	CURACAO
Scheme Objectives	– The objective of Oslo package 1 is to finance investments in infrastructure. This includes both road infrastructure and, to an increasing extent, PT infrastructure investments. Future use as a means for traffic restraint is also an open possibility, but congestion relief was not an objective per se. – Oslo package 2 is a plan for new and upgraded infrastructure and rolling stock for public transport in Oslo and Akershus. It is financed by an increase in tolls and a fare increase in public transport. Thus, the objectives are still the same – to raise revenue to be used for infrastructure investments. – The objective to raise revenue for investments is reflected in several ways. First of all the toll plazas were located with this as a purpose. As a result they are placed on the main roads into Oslo and located so that they form a "water tight" ring, catching most traffic with the least adverse effects and operational costs. With this location, only a few local roads had to be closed with as few toll plazas as possible. Furthermore, the toll is only collected on the inbound traffic. – This significantly reduces the operating costs. – The pricing objective is also reflected in the fee structure. There is no differentiation between peak and off-peak. Furthermore, the fee is also collected at weekends and nights. To make the toll ring	CURACAO

[172] Public transport includes taxis, public transport and combined transport.

Data refers to the winter season; for bicycles figure, the annual average is 4%, while from April to October is up to 7%.

OSLO – CITY LEVEL		
	more acceptable, heavy users may purchase monthly or yearly passes limiting the total fee they must pay. The pricing system is far from what would have been if congestion charging was the objective.	
Targeted Traffic	–	
Scheme Design	– The Oslo toll ring is located 5-8 km from the city centre. It has been in operation since 1990, with only minor changes. There are 19 toll plazas. Some of them are placed on the main roads into Oslo, whereas some smaller plazas are placed on smaller roads to create a water-tight toll ring. – The toll ring offers electronic toll collection with the use of on-board units, the Auto-Pass system. – Until July 2008 the toll ring offered both manual payment and electronic payment.	CURACAO
Technology Used	– The Auto-PASS concept is owned and managed by the Norwegian Public Roads Administration (NPRA). The concept covers all Auto PASS tags and Auto-PASS equipment at the charging points (Auto-PASS roadside equipment). The concept also covers all the specifications for the tags, roadside equipment, central systems, interfaces between the system elements, Auto- PASS logo and trademark, Auto-PASS contractual framework and the Auto-PASS security architecture. – The Auto-PASS Service includes both a transport and a payment service (EFC). Examples on transport services include the use of infrastructure like bridges, tunnels, motorways, road networks, road user charging schemes and ferry transport. The payment service consists of a dedicated payment system based on a user holding an Auto-PASS tag, installations at the charging points, e.g. a toll station, and a central account held and managed by the company being responsible for the payment means and contract with the user.	CURACAO
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– The general lack of public funds for road investment in Oslo forced the politicians to consider other options. A new initiative was required to raise money for investments, the Oslo toll ring (Oslo package 1 - 1990). – A few years after the toll ring introduced, and following extensive road investments in the region, there was a growing concern about car traffic increasing more rapidly than expected, as well as a lack of infrastructure investments in the public transport infrastructure system. In 1996, the Norwegian parliament invited the local authorities in the Oslo region to develop an enforced public transport plan based on national and local co-financing, to meet this challenge. This plan (Oslo package 2) was launched in 1998 and approved by Parliament and the local authorities in 2001. – Oslo package 2 is a supplement to the existing Oslo package 1 and consists of an increase in the toll of approximately €0.25 per trip making the single fare NOK 15 (approx €1.9). The increase is earmarked for public transport infrastructure investments. In addition, the package includes an increase in the public transport fare of approximately €0.10 per trip, earmarked for rolling- stock investments. The planning of Oslo package 2 involved two counties and several different authorities and organizations. Investment in public transport was expected to double as a result. The main elements in the first four-year period (2002-2005) were railway investments (60% per cent of expenditures), a new metro ring	CURACAO

	(20% per cent), terminals/stations (11% per cent), and priority measures (9% per cent). The co-financing plan for Oslo package 2 also involved extraordinary national funding and public-private partnership funds from the redevelopment of the old Oslo airport. – The Oslo toll ring was due to end in 2007. As the end of the toll ring came closer, two alternatives were examined. Either the toll ring could be removed, as happened in Trondheim at the end of 2005, or a new toll scheme, "Oslo package 3" could be introduced. The politicians opted for the latter. Because the planning started late, it was decided to continue the original toll – ring ("Oslo package 1") until a new scheme was in place. The plans for Oslo package 3 were presented by a working group in May 2006. Most political parties accepted the general concept of the package after long negotiations. The final scheme will be presented to the Parliament in two steps. The first step focused on increased fares, new toll plazas and the possibility to use some of the revenue for public transport operation. The new system for urban road user charging passed Parliament in March 2008 and collection started in two steps in July and October the same year. The second part will be presented to the Parliament in march/April 2009 and will focus on the organization of the package and the plans for investment. Oslo package 3 will run until 2027 making 20 more years of urban tolling in Oslo. – All car drivers must pass the toll ring when they drive in the direction of the city centre. The toll must be paid 24 hours a day all year round including weekends and holidays. There is no extra peak surcharge. – In March 2008 a new road user charging system, step 1 of Oslo package 3, passed Parliament. Fares were increased in the existing toll ring, and some new toll plazas were put up west of the existing ring. The new toll plazas started operation in October 2008. Following Oslo package 3, all toll plazas have been made fully automated. – The share of manual and coin box collection in Oslo decreased from 40 percent in 1991 to approx. 20 percent in 2008. Subscribers with on-board units could either have a seasonal pass (month or year) or a number of prepaid transits (25-350) with discounts depending on the number of tickets bought. About 50 % of seasonal passes are paid by employers. With the introduction of Oslo package 3 in July 2008 all monthly and yearly passes have been removed and the maximum discount has been set to 20% per trip. In addition, the fare has been increased by 25 per cent for passenger cars (now NOK 25/ 2.75€) and by almost 90 per cent for larger vehicles (now NOK 75/ 8.20€).	

OSLO – CITY LEVEL		
	<table><tr><th></th><th>Light vehicles Less than 3 500 kg</th><th>Heavy v</th></tr><tr><td>Oslo package 3 (Automated lanes only) Single trip "old" ring Single trip new plazas Single trip old+new</td><td>25 (€3.1) 12.5 (€1.6) 37.50 (€4.7)</td><td>Three ti fare f veh</td></tr><tr><td>Discount AUTOpass tags</td><td>20%</td><td>20</td></tr><tr><td>Oslo package 2 Manual operated lanes Discount card 25 trips 100 trips 175 trips 350 trips Dynamic lanes Monthly pass 6-month pass Yearly pass</td><td>20,- (€2.5) 340,- (€42.5) 1 300,- (€162.5) 2 200,- (€275) 4 000,- (€500) 400,- (€50) 2 250,- (€281) 4 100,- (€512)</td><td>Twice for light</td></tr></table> – The fee is collected from all vehicles with the following exceptions: o buses in regular service o emergency vehicles o motorcycles and mopeds o electric vehicles o people with a disability parking permit (must apply)	
Encountered Barriers	– The main focus of the implementation process in Oslo has been to find a compromise that is political acceptable to a broad group of political parties, rather than to select policy packages that are economically efficient. The result has been both increased investments in both public transport and road infrastructure. Furthermore, some high-profile investments (such as the metro ring) have been included to sweeten the pill. Yet surveys of the	CURACAO

OSLO – CITY LEVEL		
	general public indicate that the Oslo packages would be turned down in a referendum. A preference survey of decision makers also supports this view. These findings highlight the challenges of implementing urban road-pricing schemes in democracies.	
Encountered Drivers	– The main driver behind the Oslo packages was the lack of public funds to finance infrastructure, both road and public transport. This was facilitated by the long tradition for toll financing in Norway.	CURACAO
Section III - Results		**Source**
Environment	– One of the main reasons for the Oslo package was the local environmental problems caused by traffic and congestion in the late 80's. On this aspect, Lian (2004) concludes that "Air pollution levels do not seem to be negatively affected by road investments. Noise nuisance is reduced where new roads are built as tunnels. Measures to improve local environment, like traffic management, reinforce environmental effects." Overall, the effects of the Oslo packages on the local environment have been positive. This is not due to traffic reduction effects from the toll ring, but through the investments in road infrastructure. The investments have made the increase in traffic occur on the main roads rather than local roads. – Concerning global emissions, there has been a discussion to what degree improved road infrastructure induces more traffic. This may have adverse effects on the global emissions. Lian (2004) find no strong support for induced traffic from the packages.	CURACAO
Network	– A fully connected metro system and road lanes reserved for buses have been important and effective measures for public transport. – During the period 1990-2002 traffic growth has been slightly lower than the national average, in spite of strong growth in traditional drivers of mobility like population, employment and income. Thus, it is hard to claim that major road investments have induced new traffic in general in the region. – There is a slight reduction in travel times during morning rush hours, but no significant change in the afternoon. Increased road capacity has thus counterbalanced the growth in traffic with a small positive margin. – Delays vary by corridor, western and southern corridor being the worst. Road sections 10-15 km from the city centre have the largest delays. Freighters regard road accessibility to be improved. – Oslo Packages 1 and 2 are generally considered to be success stories (see "bullets" above), but many important transport projects will not be financed by 2008. Furthermore dismantling the Oslo Toll Ring is in the short term calculated to increase road traffic by 8-10%. Expected traffic growth from 2001 to 2025 without the toll ring is around 30 %. Critical parts of the trunk road system (mainly some tunnels) may be overloaded by 2015. The Inner city is already considered to receive traffic flows near its capacity, in terms of road space and environmental conditions. This development may undermine the benefits of Oslo Package 1 and 2 resulting in increased and more unpredictable travel times and more traffic in residential areas and shopping streets.	CURACAO
Economy	– Since 1990, the Oslo Packages have financed parts of the road and public transport investments in the Oslo region. Oslo Package 2 has been dedicated to investments in public transport. The Government was to finance 45 per cent of the investments in Oslo Package 1. – About 40 per cent of the revenue from road user charging should be spent on public transport investments. From 1990-2001 Oslo	CURACAO

OSLO – CITY LEVEL		
	Package 1 (funding from user charging and the state budget) financed investments for a total of 11 billion NOK (about 1.4 billion Euro). – The total operating income of the Oslo toll ring was 1,248 mill NOK (156 M€). The operating cost of the Oslo toll ring was 134 mill NOK (16.8 M€). The operating costs have stayed at 10-11% of the operating income for the last 10 years. Having close to 93 million registered trips through the ring in 2006, this makes the operating cost per trip to be 1.4NOK (0.2€). – Toll revenue can only be used for infrastructure investments. The revenue can be used for public transport infrastructure investments if this alternative use, from an economic point of view, is better than direct road infrastructure investments. – By the end of 2007, the toll ring of Oslo package 1 has contributed 13,235.4 mill NOK (2007 value) (1,654 M€) to infrastructure investments in the Oslo region. In addition the toll ring has covered all operational costs and interest. At the same time, the State has provided 7,248.5 mill NOK (2007 value) (€906 mill) in state funds to investments within in Oslo package 1. This makes the entire Oslo package 1 an investment package of 22,232 mill NOK (2,779 M€). In addition investments in the tolling system – amounts to 286 mill NOK (35.8 M€). – The fare hike in the toll ring from Oslo package 2 will provide another 1,169 mill NOK (2007) in infrastructure investments by the end of 2007. – In Oslo package 1, 20% of the investments were allocated to public transport infrastructure. All the extra revenue raised by Oslo package 2 has been earmarked for public transport infrastructure.	
Acceptability	– The toll ring in Oslo commenced operation in February 1990. Each year since 1989 a survey of attitudes towards the toll ring has been carried out among the citizens in Oslo and Akershus. The sample is randomly selected among the population, with roughly 1000 interviews carried out each time by telephone. The aim has been to track changes in attitudes over time. The result is a time series of attitudes covering a period of 18 years. Respondents were asked whether they were positive, indifferent or negative to this way of collecting revenue. Results show that there is no overwhelming public support for the packages. Even though this survey cannot be compared with the result from a potential referendum, it is fair to say that the schemes would have a hard time being accepted in a general referendum. Acceptance has, however, increased over time since each scheme was introduced. – The introduction of Oslo package 2 in 2001, and the corresponding fee increase, reduced acceptability. However, after a few years acceptability was back to the pre-Oslo package 2 levels. – In 1989, more than 60% of the people in favour of the toll ring explained their reason as reduced car traffic, and 25% explained it as providing increased funds for road investments. In 2006 this had reversed, with more than 50% being in favour due to more funds for road investments and 25% due to reduced car traffic, this situation had been quite stable since 1994, indicating that the change occurred from 1989 to 1994. – The reasons why people are negative to the toll ring has much to do with the overall tax level of car usage. Most people explain their negative attitude towards the toll ring by this being unfair as they pay enough in taxes already. – Since 2001, the survey has included a question on attitudes towards Oslo package 2. About two thirds express a positive attitude towards Oslo package 2 after being informed about the	CURACAO

OSLO – CITY LEVEL		
	contents of the package. There are no significant geographical differences. The youngest are more positive, whereas the ones with more cars per household are more negative. Close to one third agree on a question that half the revenue should be used for public transport investments (the PT share of Oslo package 1 is 20 per cent). Respondents are split equally on whether tolling should be continued regardless of how the funds are spent. However, the increased use of revenues for public transport and road investments is the main reason why the public accepts a prolongation of the toll ring	
Equity	– Equity discussions for the Oslo toll ring are primarily related to the high number of road users which no not pay. All trips within the toll ring and outside the toll ring avoid the fee. Less than 30% of the trips in the area pay toll. The rest benefit without contributing.	CURACAO
Liveability	– Traffic accident risks are reduced in the period of the toll ring, but to a smaller extent than on national level. However, the county of Oslo has experienced a larger reduction in deaths and severe injuries due to traffic accidents than the national average. – Traffic growth has occurred on major roads, while local roads have experienced unchanged traffic volumes. This is in line with the aims of the investment package. The toll ring itself led only to a small reduction in car travel crossing the toll cordon (3-5 %). The liveability in urban areas has benefited from having the increase in traffic on the main roads rather than on local roads. This was also one of the aims of the investment package.	
Achievement of Green Paper Five Pillars Targets	– More fluid – Safer – Smarter	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of media used: o Internet (e.g. Luftkvalitet – national level website in Norwegian language)	www.luftkvalitet.info/Default.aspx?pageid=1097
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[173]	–	
Relationships with Existing EU legislation/regulation	–	

[173] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Parma

PARMA – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 178.718 (1000 inhabit.) - Urban Area: 260.55 km2 - Population Density: 685.92 inhabit./km2 - Cars per inhabitants: 604 (cars/1000 inhabit.) - Car density: 461.2 (cars/km2) - Number of private cars: 107,954 - Number of Light Duty Vehicles (LDV) (less than 3.5 tons) circulating in urban area: 3,000 veh./day	ISTAT 2009 ACI 2007 Parma Municipality 2009
Context Description	– Modal Split: o Walking: 1.4% o Cycling: 9.6% o Bus: 13% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car (incl passengers): 76% o Motorcycle/scooter: N/A – Overall traffic volume (vehicle km/year): 812,204 – Proportion of traffic represented by freight: 18% – Total number of motorised trips in the city per day: 153,000 – ... of which external (commuting) 35,000 – Average motorised trip travel time: 19.8min – Average motorised trip length (km): 10.6 – Total number of non-motorised trips (walking/cycling) in the city per day: 21,400 – Average non-motorised (walking/cycling) trip travel time: 25min – Average non-motorised (walking/cycling) trip length (km): 2	Urban Mobility Plan 2005 - 2006
Scheme Objectives	– Congestion reduction – Traffic flows improvement – Air quality improvement – CO2 emissions reduction – Liveability – Equity – Future generations	SURVEY
Targeted Traffic	– Private cars – LDV – Euro 4 vehicles and under – Natural Gas (CNG) and electric vehicles	SURVEY
Scheme Design	– Area licensed based – Time based – Environmental zones	SURVEY
Technology Used	– Manual – GPRS	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– The scheme works 24/7. – Type of enforcement adopted: o Technology based – Exempted categories: o PT vehicles o Taxi	SURVEY

PARMA – CITY LEVEL		
	o Emergency vehicles	
Encountered Barriers	–	
Encountered Drivers	–	
Section III - Results		**Source**
Environment	–	
Network	–	
Economy		
Acceptability	–	
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of media used: o Internet (e.g. city level website in Italian language www.provincia.parma.it/page.asp?IDCategoria=519&IDSezione=2424&ID=43815; www.poliziamunicipale.comune.parma.it/pm/listPageDetail.asp?ID=70&nMenu=2&IDMENU=101) o Leafleting o Meetings with interested parties	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[174]	–	
Relationships with Existing EU legislation/regulation	–	

[174] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Perugia

PERUGIA – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 149 (1000 inhabit.) - Urban Area: 449 km2 - Population Density: 331 inhabit./km2 - Cars per inhabitants: 0.721 (cars/1000 inhabit.) - Car density: 252 (cars/km2) - Number of private cars: 113,325 - Number of Light Duty Vehicles (LDV) (less than 3.5 tons) circulating in urban area: 575,835 veh/yr	ISTAT 2001 Perugia Municipality (2009) ACI (2008)
Context Description	– Modal Split: o Walking: 0.8% o Cycling: N/A o Bus: 6.7% o Light rail: N/A o Metro: 2.2% o Commuter rail: 0.3% o Car (incl passengers): 90% o Motorcycle/scooter: N/A – Overall traffic volume (vehicle km/year): 657 mil – Proportion of traffic represented by freight: 1.187 mil – Average motorised trip travel time: 16min – Average motorised trip length (km): 4.5	ISTAT 2001 Minimetro SpA (2009) PUM Perugia 2006
Scheme Objectives	– Liveability	SURVEY
Targeted Traffic	– Private cars – LDV – Euro 4 vehicles and under	SURVEY
Scheme Design	– Zonal based – Time based	SURVEY
Technology Used	– Electronic gates	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design has been in charge of Perugia Municipality while implementation of service provider company. – Service providers have been involved during the scheme implementation. – On 10th January 2001 was formally decided to adopt the access restriction scheme which came into operation on 1st August 2002. – The scheme works from Monday – Saturday 22.00 – 13.00 and on Sundays and holidays 22.00 - 07.00. – Type of enforcement adopted: o Technology based: electronic gates – Exempted categories: o PT vehicles o Taxi o Two-wheelers o Emergency vehicles o Electric vehicles	SURVEY
Encountered Barriers	– Citizens Participation – Technology – Cultural and Lifestyle	SURVEY

PERUGIA – CITY LEVEL		
Encountered Drivers	– Politics and Strategy – Commitment – Planning – Economic – Citizens Participation	SURVEY
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	– Investment costs (mil. €): 0.45.€ (2002) – Operational costs (mil. € per year): 0.16 € (2008) – Revenues from charges (€ per year): 0.24 € (2009) – Revenues from fines (€ per year): 1.8 € (2009)	Perugia Mobility Department
Acceptability	–	
Equity	– Scheme winners: o PT users o Residents in the restricted zone o pedestrians and tourists – Scheme losers: o Private motorized users o Shop keepers/Retailers o Residents out of the restricted zone	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Alternative options o Charges and sanctions – To whom: o Private motorized users o PT users o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation – Type of media used: o The press o Radio - TV o Internet (e.g. city level website in Italian language http://www.perugia.com/ztl_a_perugia.htm; www.perugiaonline.it/easy/perugia_tfintpgus.html) o VMS (Variable Message Signs)	SURVEY

PERUGIA – CITY LEVEL		
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[175]	– Level of access restriction scheme legal basis: o national	SURVEY
Relationships with Existing EU legislation/regulation	–	

[175] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Poitiers

POITIERS – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 133,755 (1000 inhabit.) - Urban Area: 256,33 km2 - Population Density: 533 inhabit./km2 - Cars per inhabitants: 500.4 (cars/1000 inhab.)	INSEE (2006) INSEE (2009)
Context Description	– Modal Split: o Walking: 22% o Cycling: 1% o Bus: 10% o Car: 65% o Motorcycle/scooter: 2% – Total number of motorised trips in the city per day: 271,500 – Average motorised trip travel time: 18 min – Total number of non-motorised trips (walking/cycling) in the city per day: 93,986 – Average non-motorised (walking/cycling) trip travel time: 13 min	Enquête déplacement 2007
Scheme Objectives	– Congestion reduction – Traffic flows improvement – Increasing urban economy – Liveability	SURVEY
Targeted Traffic	– Private cars	SURVEY
Scheme Design	– Area licensed based	SURVEY
Technology Used	– Bollards	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation will be in charge of Cabinet d'architecte Yves Lion suivi par le service espace public de la Ville de Poitiers. – PT company, Service providers, Retailers and Freight distributors will be involved during the scheme implementation. – On 30th June 2008 was formally decided to adopt the access restriction scheme which will come into operation on 1st January 2012. – Type of enforcement to be adopted: o Manual – Exempted categories: o PT vehicles o Taxi o Emergency vehicles o Electric vehicles o Residents in the zone	SURVEY
Encountered Barriers	– Politics and Strategy – Conflict	SURVEY
Encountered Drivers	– Politics and Strategy – Commitment – Planning – Technical – Cooperation – Partnership and Involvement – Citizens Participation – Information and Public Relation	SURVEY

POITIERS – CITY LEVEL		
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	– Investment costs (mil. €): 27	SURVEY
Acceptability	– Citizens have been consulted by means of: o Consultation meetings	SURVEY
Equity	– Scheme winners: o PT users o Shop keepers/Retailers o Freight distributors o Cyclists and pedestrians – Scheme losers: o Private motorized users	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – Safer – More accessible – Smarter	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Scheme results – To whom: o Private motorized users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation – Type of media used: o The press o Radio - TV o Internet o VMS (Variable Message Signs) o Posters o Leafleting	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[176]	– Road code prescription – Level of access restriction scheme legal basis:	SURVEY

[176] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

POITIERS – CITY LEVEL		
	o national	
Relationships with Existing EU legislation/regulation	–	

Potenza

POTENZA – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 68,594 (1000 inhabit.) - Urban Area: 173 km2 - Population Density: 398.1 inhabit./km2 - Cars per inhabitants: 659	ISTAT 2009 PUM 2007
Context Description	– Modal Split: o Walking: 18.09% o Cycling: N/A o Bus: 9.62% o Light rail: 0.91% o Metro: N/A o Commuter rail: N/A o Car (incl passengers): 69.14% o Motorcycle/scooter: 2.25% – Total number of motorised trips in the city per day: 100,000 – ... of which external (commuting) 30,650	SURVEY
Scheme Objectives	– Congestion reduction – Traffic flows improvement – Air quality improvement – CO2 emissions reduction – Road safety improvement – Increasing urban economy – Liveability	SURVEY
Targeted Traffic	– Private cars	SURVEY
Scheme Design	– Time based	SURVEY
Technology Used	– Paper licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Potenza Municipality. – Citizens representatives, PT company, Service providers, Retailers and Freight distributors have been involved during the scheme implementation. – On 4th July 2006 was formally decided to adopt the access restriction scheme which came into operation on 1st September 2006. – The scheme works 0600a.m. – 1000a.m. every day. – The charge has been defined according national Road Code prescriptions. – Type of enforcement adopted: o Manual – Exempted categories: o PT vehicles o Taxi o Emergency vehicles – The city of Potenza entered in 2005 into the CIVITAS network with the project named SMILE. The experience gained from the best practices exchange between the network cities allowed a better planning of the LTZ.	SURVEY

POTENZA – CITY LEVEL		
	– The city is working to the improvement of the actual access restriction scheme. – The LTZ will be extended to the whole day and will be implemented with ANPR Technology System (to be placed in 4 LTZ accesses). The product purchased is T-ID by KRIA, an automatic license plate reading system, certified by the Italian Ministry of Transportation.	
Encountered Barriers	– Cultural and Lifestyle	SURVEY
Encountered Drivers	– Politics and Strategy - Commitment – Planning - Technical – Planning - Policy Synergy	SURVEY
Section III - Results		**Source**
	–	
Network	–	
Economy	–	
Acceptability	–	
Equity	– Scheme winners: o PT users – Scheme losers: o Private motorized users	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener – Safer – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules – To whom: o Private motorised users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation – Type of media used: o The press o Radio - TV o Internet (e.g. city level in Italian language www.comune.potenza.it/Zona_Traffico_Limitato/) o Leafleting	SURVEY
Section V – Scheme Legal Aspects		**Source**

POTENZA – CITY LEVEL		
Scheme Legal Framework[177]	– Level of access restriction scheme legal basis: o urban	SURVEY
Relationships with Existing EU legislation/regulation	–	

[177] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Poznan

POZNAN – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 555.7 (1000 inhabit.) - Urban Area: 261.8 km2 - Population Density: 2,122 inhabit./km2 - Cars per inhabitants: 504 (cars/1000 inhabit.) - Car density (cars/km2): 1,379 - Number of private cars: 280.8 - Number of Light Duty Vehicles (LDV) (less than 3.5 tons) circulating in urban area: 50.9	Statistical Office 2009
	– Poznań didn't implement access restriction scheme in the City because in Poland we don't have any appropriate regulations. Of course, there are some actions tending to reduce road traffic. For example we have attended car parks (on Roosevelt Street, Pułaski Street, Głogowska Street, Chwaliszewo, Maratońska Street, Dolna Wilda Street and Droga Dębińska Street) which should stop cars on the outskirts. – Moreover, we should notice that our city works on some infrastructural projects including investments in building huge car parks on the outskirts called Park&Ride car parks – making in the frame of public-private partnership. On 16th March 2010 City Council passed a resolution LXIX/954/V/2010. It releases car drivers from charges for using public transport when their cars are on P&R car park. – Nowadays, the City of Poznań is looking for investors for implementation of three car park projects: on the corner of Poznańska Street and Roosevelt Street, near „Szymanowskiego" tram station and on Osiedle Sobieskiego station. We also plan building another car parks for example on Plac Bernardyński, on Starołęka traffic circle and near city station „Górczyn" on south side of track. This localisations result from „Poznań Parking Policy". We should underline that creation P&R car parks will cause limitations in regard to parking space on streets. It derives from our parking policy. – We also prepare reduction of truck traffic in the city centre through supplying some goods to stores using ecological methods of transport. It is connected with European project SUGAR (INTERREG IVC programme). We also plan exclusion of car traffic around Old Market. Thanks to these changes, there will be an increasing availability of city space for pedestrians and cyclists. Moreover, it will reduce problems with all car vehicles in the Old Market. – The main traffic's engineering instrument is Paid Parking Zone. It is a very popular solution that is used in Poland and in other countries in the EU. It is a way to improve city traffic – Paid Parking Zones have been functioning in Poznań since 1992. This regulation was confirmed in Transport Policy that was passed on 18th November 1999. The main aim of this policy is to satisfy the need of parking spaces regarding to economics, environment and spatial area of our city. – In the centre of city, only a specific amount of car could park. More cars may occupy sidewalks, hinder city traffic and operation of public transport and may destroy ecological and cultural areas in Poznań.	SURVEY

POZNAN – CITY LEVEL		
	– In 2009 there were approximately 5.898 parking spaces, besides there were 259 parking meters. The main cause of parking fees is to ensure 15-20% of free parking spaces. For this reason in the city centre fee is the highest and it causes or stimulates rational using of parking spaces. – Paid Parking Zone in the area of Jeżyce will be extended in 2011. Opinion poll and other researches show the requirement of changes in this district. It will put in order parking rules, protect lawns and sidewalks and increase pedestrians safety, who have problems with moving among vehicles.	

Ravenna

RAVENNA – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- The city of Ravenna has an historical centre of 1,75 Km2. - The city of Ravenna has 95.53 private cars, and 0,64 car per inhabitant, the highest index in the Emilia-Romagna Region. - Population density: 207.55 inhab./km2	START PROJECT
Context Description	– Modal split: o Walking+cycling: 10% o PT: 7% o Private vehicles: 83%	
Scheme Objectives	– General objective of the Municipality of Ravenna consist in reduction of vans/trucks during the time windows most preferred by tourists, the reduction of illegality in parking by loading/unloading vehicles and stimulate a more efficient urban delivery system by increasing load factors and using cleaner vehicles.	START PROJECT
Targeted Traffic	– Private cars – LDV	START PROJECT
Scheme Design	– restriction to the city centre according to EURO emission levels – differentiation of the access time windows – regulation of the delivery of goods is related to different types of operators.	START PROJECT
Technology Used	– To maintain the respect of the access rule the Municipality has recently start with an ITS system, SIRIO, an access remote-monitoring system. SIRIO consists in an installed monitory point in every city centre access with a digital camera and a local processing unit, equipped with an OCR (optical character recognition) software able to recognise the plate number of vehicles, and sanctioning the vehicle without access permission. – SIRIO is part of the Control centre, an integrated system where all the transport-related ITS system installed in the city, that will be used together for the traffic supervision and impacts, permitting the monitoring and enforcement of the access restrictions. The Control centre will become fully operative from the middle of 2008. – The technology that will be together operative from 2008 are: o 8 external traffic flow detectors (6 with variable message panels). o 3 dynamic traffic light plants with flow detectors (3 more soon). o Urban bus localization system. o Park addressing system with 12 variable message panels and traffic flow detectors. o 17 more flow detectors. o SIRIO with 5 detecting points (one more soon). – The control centre is the heart of all traffic technologies owned by the municipality.	START PROJECT
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– The political orientation toward urban goods delivery complies with the broader vision of a city that strives to control, and if possible reduce, air pollution and energy consumption. From 2002 urban goods delivery became an important point on the local	START PROJECT

agenda.

- The city centre of Ravenna has a Limited Traffic Zone – LTZ that includes most of the historical city centre. ZTL access restriction is composed of two parts:
  - in one there are restrictions to vehicular traffic from 0:00 to 24:00, all days, including Sundays;
  - in the other part the restrictions apply from 7:30 to 20:30 every day, including Sundays.
- The access to the LTZ is not subject to any tariff. Loading and unloading operations are allowed as follows: 8:30-10:30, 14:30 16:00 and 0:00-7:00
- In loading/un-loading area, vehicles are allowed to stop for a maximum of 30 minutes with the obligation to show the parking disk.
- The Municipality of Ravenna has launched at the middle of 2007 the new "General Urban Traffic Plan", which include the Access and park in City Centre" regulations, with new rules to differentiate entry hours of truck on the base of type of engine and combustible.
- Its development will be done in three phases:
  1. Operating connection of existing technologies and detailed definition of next phases.
  2. Remote control of load/unload parking places, first implementation of a general traffic supervisor, car-sharing management, registered operators management.
  3. Final implementation of the system and extension to the whole city.
- The first phase of implementation of the Control centre is started. At the moment Ravenna is reorganizing the operating centre of the Municipal Police in order to accommodate the terminal of all the transport-related and mobility ITS systems.
- Next step will be the operating connection (physical and logical) of that systems in order to make them available for the injection activities of the second phase related to the car sharing management and registered operators management.
- The access restrictions is controlled through a Control Centre which has been implemented outside of the START project. In parallel to START, the Municipality of Ravenna has implemented an ITS transport related system called "Traffic controller and management system-TCMS".
- One of the main functions of the TCMS is to monitor and enforce the access restrictions and an automatic number plate recognition system has been fully installed.
- In every monitoring-point there is a digital camera and a local processing unit, equipped with OCR (optical character recognition) software. The software reads the number plate and compares it with the list of authorized vehicles (white list). If a match is found, the image is discharged, if not the image is sent to the control centre for a fine.
- The system will be adapted so it will be able to control and support the agreements reached with the private operators regarding consolidation schemes and incentives. The adoption of the system will ensure better future data on freight traffic flows that can be used for further policy development by the Local freight network.
- At the present time the technologies are installed in the operation centre of the Municipal Police office of Ravenna and in the future there will be the possibility of the remote control and supervision of the system from every office of the Municipality that has competence in this field.

RAVENNA – CITY LEVEL		
Encountered Barriers	–	
Encountered Drivers	–	
Section III - Results		**Source**
Environment	– Enlargement of the "clean" commercial fleet in Ravenna by promotion of the renewal of vehicles of every company operating in Ravenna and by setting up of appropriate incentive programmes. The number of clean vehicles has increased by 3.925 (3761 private, 24 taxis, 40 artisans, 100 commercial vehicles).	START PROJECT
Network	– number of LDV trips in the restricted area has been reduced by 4%.	START PROJECT
Economy	–	
Acceptability	– Ravenna established the so called Logistic Concertation Table - LCT in 2002. The aim of the LCT is to involve local stakeholders in the decision making process on city logistics measures and tools identified during the various phases of analysis/identification of solutions/implementation. – The components of the LCT are all the associations representing the local stakeholders as well as public and private operators. There are also representatives of the economic activities of Ravenna (retailers, transport operators, logistics companies, etc.) with the aims to investigate the city logistics problems and to identify the most suitable solutions.	START PROJECT
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – Smarter	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	–	
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[178]	–	
Relationships with Existing EU	–	

[178] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

RAVENNA – CITY LEVEL		
legislation/regulation		

Reading

READING – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 144 (1000 inhabit.) - Urban Area: 55.35 km2 - Population density: 3,592 inhab./km2 - Cars per inhabitants: 430	ONS 2001
Context Description	– Modal Split: o Walking: 31.5% o Cycling: 2.6% o Bus: 20.7% o Light rail: N/A o Metro: N/A o Commuter rail: 17.1% o Car (incl passengers): 28.1% o Motorcycle/scooter: N/A – Total number of motorized trips in the city per day: 31,014 car trips were recorded in the 12- hour period measured for the 2007/08 cordon counts, as reported in our Annual Progress Report for that year – Average motorized trip travel time: 4 minutes 20 seconds (National Indicator 167) – Total number of non-motorised trips (walking/cycling) in the city per day: 34,773 walk trips and 2,872 cycle trips were recorded in our 12-hour cordon counts 2007/08	RBC Cordon survey 2007/08 the mode split figures provided are based on access to city central area (all data is from annual cordon count surveys for 2007/08)
Scheme Objectives	– Air quality improvement	SURVEY
Targeted Traffic	– LDV (greater than 3.5t and under Euro 5)	SURVEY
Scheme Design	– Cordon based	SURVEY
Technology Used	– Automatic Number Plate Recognition (ANPR) / Virtual licences	SURVEY
Section II - Implementation		**Source**

READING – CITY LEVEL		
Implementation Process, Enforcement, Monitoring	– The scheme foresees to be in operation 24 hours-7 days a week. – Estimated charge is £50 for HGVs over 3.5t, and £5 for passenger carrying vehicles – Scheme design and implementation will be in charge of Reading Borough Council. – Citizens representatives, PT company, Service providers, Retailers and Freight distributors will be involved during the scheme implementation. – Reading's LEZ proposal formed the basis of a business case submission for ' Programme Entry' in February 2010, under the Department for Transport's Transport Innovation Fund (TIF). The proposed LEZ is primarily aimed at addressing the NOx issue that is identified within our Air Quality Management Areas. Reading's TIF proposal included a package of supporting transport improvement measures, such as additional Park & Rides, extended bus services and bus fare subsidies. On 2 March 2010 the DfT announced the launch of a new transport initiative called the Urban Challenge Fund (UCF), to replace TIF. At this stage it is unclear as to the process and timescales for accessing funds via the UCF. – It has been proposed the scheme to come into operation in 2012	SURVEY
Encountered Barriers	– We are in the early stages of planning and therefore it is too early to complete this question	SURVEY
Encountered Drivers	– Politics and Strategy – Commitment – Planning – Technical – Institution – Administrative Structures and Practices – Cooperation – Partnership and Involvement – Citizens Participation (not yet undertaken but will be a significant driver) – Information and Public Relation (as above) – Technology	SURVEY
Section III - Results		**Source**
Environment	– The LEZ with complementary measures is estimated to have a net air quality benefit of £8.3m across the Reading area, associated with reductions in NOx and PM10 emissions between 2011 and 2030	SURVEY
Network	– Based on fleet composition, it is estimated that only 12% of HGVs (560 vehicles) would be affected, of which 70% would pay (and others upgrade or switch vehicles to avoid the LEZ)	SURVEY
Economy	– Investment costs (mil. €): £1.99m for design and implementation of the LEZ component of Reading's TIF – Operational costs (mil. € per year): £0.54m pa – Revenues from charges: £1.15m pa	SURVEY
Acceptability	– Consultation stages are to be undertaken.	SURVEY
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – Safer – More accessible	

READING – CITY LEVEL		
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of media to be used: o Internet o Leafleting – Consultation stage is to be undertaken, however wide ranging information types will be used	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[179]	– Not yet decided but options include a TRO or through the Transport Act 2000	SURVEY
Relationships with Existing EU legislation/regulation	–	

[179] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Riga

RIGA – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 717,371 (1000 inhabit.) - Urban Area: 307 km2 - Population Density: 2,322 inhabit./km2 - Cars per inhabitants: 520 (cars/1000 inhabit.) - Car density: 1,213 (cars/km2) - Number of private cars: 291,753 - Number of Light Duty Vehicles (LDV) (less than 3.5 tons) circulating in urban area: 43,745	RCC 2008 CSDD 2009
Context Description	– Modal Split: o Walking: 29% o Cycling: 1% o Bus, trams, trolleybuses, trains: 35% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car : 35% o Motorcycle/scooter: N/A	RCC 2009
Scheme Objectives	– Congestion reduction – Liveability	SURVEY
Targeted Traffic	– Private cars – LDV	SURVEY
Scheme Design	– Area licensed based	SURVEY
Technology Used	– Automatic Number Plate Recognition (ANPR) / Virtual licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Traffic Department together with City Development Department. – Citizens representatives are involved during the scheme implementation. – On 1st February 2009 was formally decided to adopt the access restriction scheme. – The scheme works 24/7. – The charge is not yet been decided. – Type of enforcement adopted: o Technology based: There will be a video system that recognizes the number plate and turns on a green or red light at the access point – Exempted categories: o Two-wheelers o Emergency vehicles – The scheme does not have a specific date to be implemented since we are still discussing its design with the interested and involved organizations.	SURVEY
Encountered Barriers	– Planning – Economic – Institution – Legislation and Regulation	SURVEY
Encountered Drivers	– Planning – Technical – Planning – Economic	SURVEY

RIGA – CITY LEVEL		
	– Citizens Participation	
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	–	
Acceptability	–	
Equity	– Scheme winners: o Shop keepers/Retailers o Residents in the restricted zone – Scheme losers: o Private motorized users	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules – To whom: o Shop keepers/Retailers o Residents in the restricted zone o Freight distributors o The information will be available for all interested people – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Internet (e.g. city level website in Latvian language www.riga.lv/LV/Channels/Riga_today/Satiksmes_ierobezojumi/Vecrigas+satiksmes+shema.htm)	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[180]	– Local regulation about special status areas – Level of access restriction scheme legal basis: o urban	SURVEY

[180] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

RIGA – CITY LEVEL		
Relationships with Existing EU legislation/regulation	–	

Rome

ROME - CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 26800 (1000 inhabit.) - Urban Area: 1,283 km2 - Population Density: 2,182 inhabit./km2 - Cars per inhabitants: 0.86 (cars/1000 inhabit.) - Car density: 1,871 (cars/km2) - Number of private cars: 2.250m - Number of Light Duty Vehicles (LDV) (less than 3.5 tons) circulating in urban area: 150,000	SPQR 2008
Context Description	– Modal Split: o Walking & Cycling: 7.3% o Bus + Light rail + Metro + Commuter rail: 28% o Car (incl passengers): 37.9% o Motorcycle/scooter: 14.7% – Overall traffic volume (vehicle km/year): 14.4 bn – Proportion of traffic represented by freight: 12% inside the LTZ – Total number of motorised trips in the city per day: 6.1m – ... of which external (commuting) 350,000 – Average motorised trip travel time: 45.8mins/average day Average motorised trip length (km): 12.7 – Average non-motorised (walking/cycling) trip travel time: 14mins/average day – Average non-motorised (walking/cycling) trip length (km): 1 – Rome's General Traffic Master Plan includes a strategy to restrict or limit private car use in the city centre and gradually relax these restrictions outside – The scheme is accompanied by complementary restrictive measures on traffic regulation and management, such as the implementation of the Limited Traffic Zones, accompanied by – different parking fares depending on city areas, and innovation and improvement of local Public Transport systems.	SURVEY CURACAO
Scheme Objectives	– Congestion reduction – Traffic flows improvement – Air quality improvement – Cultural heritage	SURVEY CURACAO
Targeted Traffic	– Private cars – The scheme foresees that in principle people or residents working inside the LTZ areas can have access by car, upon specific request, registration and payment of a permit, through ATAC offices. – There are a number of exemptions: LPT (Local Public Transport), taxis and disabled people have free access; institutions, freight carriers, public utility vehicles, etc that are included in the "authorized" category have the right to a permit if they pay specific tariffs. – A "White List" of authorized users is defined and updated every day (in order to take into account any temporary permit for weddings, movies and a range of specified special cases), so that non-authorized vehicles that access the LTZ during the enforcement times are detected by the ANPR system and automatically receive a fine of 68 €.	SURVEY CURACAO
Scheme Design	– Zonal based – Rome has implemented a complex Access Control System. The first	SURVEY CURACAO

ROME - CITY LEVEL		
	scheme, supported by lectronic gates, was implemented in 2001, in order to safeguard the central area of the city – After two years since the implementation of the central LTZ scheme, once the automatic system had been tested and fine tuned, other "sensitive areas" and "sensitive time bands" have been identified and a decision to limit car traffic has been issued and implemented according to a daily and night scheme	
Technology Used	– Automatic Number Plate Recognition (ANPR) / Virtual licences – The historical city centre LTZ subsystem, operating from October 2001, includes the use of 23 gates implemented on access roads to the city centre that optically detect the plate of vehicles by APNR (Automatic Plate Number Recognition) techniques. – All the electronic gates installed within the city centre use short-range radio technologies (DSRC) for communication. In this case vehicles are identified through an information exchange via radio between the gate (RSU – Road Side Unit) and a device called OBU (On Board Unit) which is on the vehicle. This OBU was given to residents and disabled people, but was not utilized during the implementation of new LTZ areas (Trastevere and San Lorenzo) because of the new camera technologies together with the need to reduce system complexities for citizens. For that reason the OBUs are now reaching the point of exhaustion. – All the gates installed around Rome are integrated with cameras working twenty-four hours a day: as the camera on the e-gate detects a car, a picture of the plate is taken and sent to the control centre. The ANPR allows comparing each plate number to the "White List" database. If there is a mismatch a fine is automatically issued to that plate.	SURVEY CURACAO
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design have been in charge of STA (private mobility agency) while implementation have been in charge of STA/ATAC. – In 2000 was formally decided to adopt the access restriction scheme which came into operation on 1st October 2001. – The scheme works 6.30am – 6pm Monday to Friday; 2pm-6pm Saturday; 9pm- 3am weekends. – Disabled: 15€ – Freight: 550 € – Private taxi (NCC): 55 € – Residents: 55€/5 years= 1st car, 300€/year =2nd car, 550€/year =3rd car – Non residents (private): 550 €/year – Taxi: 55 € – Public Transport: free – Others: o public utilities: 550 € o coaches: daily charge, 30-150 € – Type of enforcement adopted: o Technology based – Exempted categories: o PT vehicles o Taxi o Two-wheelers o Emergency vehicles o Electric vehicles o Residents inside the cordon o Vehicles belonging to disabled persons o Shopkeepers inside the cordon	SURVEY CURACAO

	o Freight distributors – The history of access control in Rome began in 1989 when restrictions were placed on vehicle entrances for the historical centre. These restrictions were not enforced in a systematic way until 1994 when municipal police were used to block the entrances into the area. Permission to enter is given free of charge to residents within the LTZ. Other users may obtain permission to circulate and park in the LTZ area if they fall into certain categories (i.e. doctors with offices within the city centre, artisans). – In 1998 this authorization became more complicated, since allowed non-residents were required to pay yearly the equivalent of 12 months public transport passes in order to obtain a permit for the access control area. Furthermore, parking was free for residents (near their home or within their designated neighborhood) but destination parking is burdensome for both residents and authorized non-residents. – Because of difficulty in enforcing this restriction of vehicles by the municipal police, Rome, from October 2001 the electronic full scale Access Control System and flat-fare Road Pricing scheme (ACS+RP) called IRIDE was switched on with the use of 23 entrance gates and a complex control centre located in STA (local transport agency nowadays called ATAC). – The pricing policies in place in Rome include both payment for on-street parking and payment for accessing certain areas of the city. The main objective pursued since the beginning of the Access Policies in Rome, going back to the late 80's, has been the protection of the unique cultural heritage of the city from the dangerous effects of traffic pollution. The turning point was the implementation of the LTZ system with "electronic gates" in October 2001. – With the implementation of the system in Trastevere, called IRIDE2, the computer interface has been improved and optimized; besides a specific effort has been spent to improve the information on the service, by including the vertical signaling combined with the e-gate. This mini-VMS (Variable Message Signs) system, providing real-time information on the gate status (active or not), is now present in all the gates to support a better comprehension of city's rules from citizens and tourists. – These new LTZ schemes are further supported by some side-measures like the Trastevere LTZ situation. In that case, during the enforcement, a dedicated shuttle service operated by electric buses connects the LTZ area with 221 slots parking. – The charging scheme was modified in January 2007 by introducing more strict tariffs Rome decided to implement new clean zones with a complex series of actions, according to the guideline provided by the Urban General Traffic Plan (PGTU). Besides, there are in Rome serious reasons to apply "clean zones": congestion and environment as well as a strong need to preserve the historical and archaeological city.	
Encountered Barriers	– Institution – Administrative Structures and Practices – Information and Public Relation – Cultural and Lifestyle – The full-scale deployment of the automatic access control systems in Rome was a demanding process which had to overcome a number of issues, ranging from technical ones, to the management issues of such a system, and finally to a variety of bureaucratic and	SURVEY CURACAO

ROME - CITY LEVEL		
	institutional issues. – Rome issued the first request in Italy to implement an Access Control System (ACS) and a Recognition Plate (RP) scheme and the government Bodies examined it carefully, establishing the parameters for its operation. Due to the complexity of the procedures related to the use of such automatic equipment being made operational on large scale for the first time in Italy, the Decrees dictated a pre-implementation period, to be jointly operated with the Urban Police at each gate to endorse the violations.	
Encountered Drivers	– Politics and Strategy – Commitment – Technology – Public Funds and Subsidy – The London implementation gave support to Rome, which was previously alone within the largest European cities to apply an electronic enforcement system. Support comes also from new restrictive air quality Directives recently approved and obliging further restriction of private cars to comply with them. – An added value of access control schemes is the comprehensive requalification of urban areas obtained with the implementation of the e-gate system. They created the opportunity to limit the space for private cars, giving back areas to pedestrians. Besides, the integration of ACS, RP and clean zones in "Sustainable Mobility" policies can support the matching of the new limits on air quality. – Surveys and continuous contacts with all the stake-holders and definition of the needs of all the social categories are necessary and it is important to integrate this kind of measure in Sustainable Mobility policy with PT integration and introduction of pedestrian areas.	SURVEY CURACAO
Section III - Results		**Source**
Environment	– CO2: - 0.6% – CO: - 50% – NOx: - 35% – PM10: - 10% – – In terms of concentrations, between the annual mean values, recorded in 2001 and the mean values in 2004 showed a reduction of CO concentration of about 21%, PM10 of 11% and Benzene of 37%. In particular, results concerning benzene concentrations seem to be particularly relevant since, if just 2005 is considered, a 27% decrease was recorded at about 50 sites. – The number of polluting vehicles decreased e.g. non-catalysed mopeds reduced by about 45%, private cars by 37% and commercial vehicles by slightly less than 35%. However the main influence on this was a ban on diesel and gasoline fuelled vehicles not meeting Directive 91/441/CE requirements from circulating in the Rail Ring area, which came into force in January 2002. – Carbon monoxide (CO) values metered during last ten years show a constant decrease in all three stations considered. This is mainly due to cars engines technical improvements and also to mobility management activities introduced. – PM10 value metered during last ten years show a substantial difference between the readings of the city centre station with respect to the other two considered. While these last two had a constant trend during the period between 1998 and 2001, the Arenula station registered a decrease of more than 30% in PM10	SURVEY (2001 baseline – 2007) CURACAO

<table>
<tr><td></td><td>concentration between the same period. This is mainly due to the coming into force of the e-gates in 2001 and it is clearly reflected in the decrease of number of days in which the PM10 concentration overcomes the UE threshold value reached by the Arenula readings with a decrease of more than 50%.
– NO2 concentration values do not evidence any definitive behavior.</td><td></td></tr>
<tr><td>Network</td><td>– Decrease in n° of vehicles entering the zone (% vehicles/day): -18%
– Change in average vehicle speed in the zone (km/h) :
o + 4% private cars
o + 5% PT

– Before and after data show that, in 2002, modal split in the central area was 30% public transport, 27% private cars, 23% motorbikes/mopeds and 20% pedestrians. The 2005 data revealed that these proportions had switched to 31%, 22%, 24% and 23%, respectively.
<table>
<tr><th colspan="5">Modal share</th></tr>
<tr><td></td><td>Public Transport</td><td>Private Cars</td><td>Motorbikes/ Mopeds</td><td>Pedestrians</td></tr>
<tr><td>Before</td><td>30%</td><td>27%</td><td>23%</td><td>20%</td></tr>
<tr><td>After</td><td>31%</td><td>22%</td><td>24%</td><td>23%</td></tr>
</table>
– traffic flows decreased by 20% during the restriction periods and by 15% in the morning peak hour (8.30-9.30).
– The proportion of illegal accesses decreased from 18% to less
– than 10% of the total traffic flows, during the four years of the gates implementation (even though, currently, still about 20.000 vehicles/week illegally access the area).
– during the period between 2006 and 2008 confirmed this trend and the number of accesses during the same period is resulted quite stable (around 70,000 vehicles/day), except during Christmas time (10th – 20th December) when different ZTL rules have changed the access rate.
– Increase of average vehicle speed inside LTZ: 4%
– Increase of average PT speed inside LTZ: 5%
– Increase in PT users inside LTZ: 5%
– Increase of two-wheelers inside LTZ: 10-15%</td><td>SURVEY

CURACAO</td></tr>
<tr><td>Economy</td><td>– Investment costs (mil. €): 1.9 M€
– Operational costs (mil. € per year): 1.5 M€
– Revenues from charges (€ per year): 15 M€
– Revenues from fines (€ per year): 74.8 M€ (Includes costs and revenues for the entire LTZ system in Rome)

– The city of Rome in 2007 had 15M€ of revenues from charges and 74.8 M€ from fees.
– The ACS+RP schemes are a success in economic terms. The better liveability inside the zones has increased the value of all the buildings and commercial activities. At the beginning of implementation, residents tend to be in favor and retailers/shopkeepers are against. After some months of application of the measure, normally an equilibrium point is found, with common satisfaction.</td><td>SURVEY

CURACAO</td></tr>
<tr><td>Acceptability</td><td>– Within PROGRESS project, in fact, the city of Rome performed two surveys: the first addressed to a fixed panel of users to be interviewed in two steps on traffic-related problems and attitudes towards road pricing (Oct- Nov 2000 and Oct-Nov 2003) and the second oriented to car users currently authorized to access the Limited Traffic Zone to be interviewed on road pricing acceptance</td><td>CURACAO</td></tr>
</table>

ROME - CITY LEVEL		
	(Oct- Nov 2003). – Another interesting indicator was the acceptability of a full road-pricing policy (without access control). Neither residents nor shop owners are in favor of the removal of the access control and its replacement with a full road-pricing policy. However, the percentage of residents who think that a full road-pricing scheme is not a good idea is greater than that of shop owners. Moreover, this percentage increased from 44% to 51.2% for residents, while it decreased from 44.5% to 38.0% for the shop owners.	
Equity	– Scheme winners: o PT users o Residents in the restricted zone – Scheme losers: o Private motorized users – The equity problem was solved in Rome by the City Council which decided, with a Council Act, who is permitted to access the zone and what is the right tariff for the allowed category. In Rome such discussion isn't easy, due to the aim of reducing the access in the central area to an increasingly fewer number of private cars. As a consequence, the equity issue has been in a way outweighed by the will to increase the cost of the "year permit" for the allowed categories, excluding the public transport and the disabled people.	SURVEY CURACAO
Liveability	– in the San Lorenzo district, regarding noise pollution, after the implementation of the measure, in zones without commercial activities a reduction of noise pollution of 8-9 dB(A) was observed. In zones with commercial activities such as restaurant or pubs, the reduction of noise pollution was slight and was about 3-4 dB(A). – A number of pedestrian areas have been established in the city centre, with the large TRIDENTE zone closed from 10 am to 8 pm. – road safety problem is increasing. Motorcycles circulating in Rome are 360,000 (55,000 pre-Euro) and mopeds 155,000 (70,000 pre-Euro). Within the city centre it can be estimated a volume of circulating two-wheelers equal to 250,000. Results in terms of road safety show that the ratio between the number of powered two wheels accidents (PTW) and total accidents has increased during the last years.	CURACAO
Achievement of Green Paper Five Pillars Targets	– greener – more fluid – more accessible – smarter	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Charges and sanctions – To whom: o Private motorized users o PT users o Shop keepers/Retailers o Residents in the restricted zone – When the information has been disseminated: o Before the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o VMS (Variable Message Signs)	SURVEY

ROME - CITY LEVEL		
	o Posters o Leafleting o Internet (e.g. city level website in Italian language www.comune.roma.it/was/wps/portal/!ut/p/_s.7_0_A/7_0_21L?menuPage=/Area_di_navigazione/Sezioni_del_portale/Dipartimenti_e_altri_uffici/Dipartimento_VII/Z-9-T-9-L-9-/; http://agenziamobilita.roma.it/ztl – Another interesting feature implemented by ATAC is the ATAC Mobile Infomobility application on mobile devices. The smart phones, in fact, become a direct communication channel between ATAC and citizens completely free of charge (only the service provided by the TLC operator should be paid). – The service called "Traffic Restrictions in ZTL" gives information on timetables of the different LTZ in Rome. The information on timetables is grouped according to the day of the week or to LTZ different areas, providing real-time information on the status of each individual gate (whether or not in the moment of query it is active).	CURACAO
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[181]	– Air quality legislation – Level of access restriction scheme legal basis: o urban – The road pricing scheme in Rome was not introduced under specific legislation but rather evolved from access control zones originally implemented in historical urban center.	SURVEY CURACAO
Relationships with Existing EU legislation/regulation	–	

[181] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects.

Rotterdam

ROTTERDAM – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 600 (1000 inhabit.) - Urban Area: 204 km2 - Population Density: 2,874 inhabit./km2 - Cars per inhabitants: 0.32 (cars/1000 inhabit.)	SURVEY
Context Description	– Modal Split: o Walking: 24% o Cycling: 18% o Bus: 12% o Light rail: N/A o Metro: N/A o Commuter rail: 3% o Car: 42% o Motorcycle/scooter: 1% – Overall traffic volume (vehicle km/year): 16,400 – Proportion of traffic represented by freight: 7% – Total number of motorised trips in the city per day: 1,2 m	SURVEY
Scheme Objectives	– Air quality improvement	SURVEY
Targeted Traffic	– Euro 4 vehicles and under	SURVEY
Scheme Design	– Environmental zones	SURVEY
Technology Used	– Paper licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Municipality of Rotterdam. – Freight distributors have been involved during the scheme implementation. – On 15th May 2007 was formally decided to adopt the access restriction scheme which came into operation on 19th September 2007. – The scheme works 24/7. – The charge is 160 €. – Type of enforcement adopted: o Manual – Exempted categories: o PT vehicles o Foreign vehicles o Emergency vehicles o Electric vehicles (?)	SURVEY
Encountered Barriers	– Politics and Strategy – Opposition	SURVEY
Encountered Drivers	– Institution – Legislation and Regulation	SURVEY
Section III - Results		**Source**

ROTTERDAM – CITY LEVEL		
Environment	– CO levels decrease [concentration] (%): 5% – NOx levels decrease [concentration] (%): 5%	SURVEY
Network	–	
Economy	– Investment costs (mil. €): 0.5 M€ – Operational costs (mil. € per year): 0.1 M€ – Revenues from charges (€ per year): 5,000€	SURVEY
Acceptability	–	
Equity	– Scheme winners: o Residents in the restricted zone o Visitors – Scheme losers: o Freight distributors	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Alternative options o Charges and sanctions – To whom: o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o Internet	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[182]	– Air quality legislation – Level of access restriction scheme legal basis: o urban o national o European	SURVEY

[182] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

ROTTERDAM – CITY LEVEL		
Relationships with Existing EU legislation/regulation	–	

Stockholm

STOCKHOLM – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 2,019 (1000 inhabit.) - Urban Area: 6,488 km2 - Population Density: 311 inhabit./km2 - Cars per inhabitants: 403 (cars/1000 inhabit.) - Car density: 121 (cars/km2) - Number of private cars: 783,417	NATIONAL STATISTICS (2007 – 2009) (Stockholm County)
Context Description	– Modal Split: o Walking: 29% o Cycling: 3% o Bus: 24% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car: N/A o Motorcycle/scooter: N/A – Overall traffic volume (vehicle km/year): 28.3 bn – Average motorised trip travel time: 20 min (car)/45 min (PT) – Average motorised trip length (km): 12.3 (car)/ 14.8 (PT) – About 500'000 vehicles pass in/out of Stockholm's inner city every weekday – A full-scale congestion charging trial took place between January 3rd and July 31st 2006, while the permanent scheme started in August 2007 – The trial was accompanied by a package of public improvements (e.g. new bus lines from suburbs to city centre)	Trafikkontoret 2007 CURACAO
Scheme Objectives	– Congestion reduction – Traffic flows improvement – Air quality improvement – CO2 emissions reduction – Liveability – Raising revenue	SURVEY
Targeted Traffic	– Private car – LDV	SURVEY
Scheme Design	– Cordon based	SURVEY
Technology Used	– Automatic Number Plate Recognition (ANPR) / Virtual licences – roadside equipment to collect passage information (DSRC based); pre-processors, to process the information from the control points and generate tax decisions; a business process platform, to book tax decisions, handle payments, reminders and reports; a web portal – with both a public website and an Intranet for the benefit of Customer Services and the National Tax Board.	SURVEY CURACAO
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of City of Stockholm and the Swedish Road Administration. – Citizens representatives, PT company, Service providers and Retailers have been involved during the scheme implementation.	SURVEY

STOCKHOLM – CITY LEVEL		
	– On 2nd June 2003 was formally decided to adopt the access restriction scheme which came into operation on 2nd January 2006. – The scheme works from Monday - Friday 06:30-18:30 (except public holidays). – The charge is 10 - 20 SEK per passage, with a maximum daily charge of 60 SEK. – Type of enforcement adopted: o Technology based: ANPR – Exempted categories: o PT vehicles o Two-wheelers o Foreign vehicles o Emergency vehicles o Alternative fuel vehicles registered before 2009 – Tax is levied when entering or leaving the zone – 18 control points are set up at city entrance and exit roads – Vehicles that only by-pass Stockholm via road E4 Essingelink are not subject to the congestion tax. When driving to or from Lidingö island, anyone who cross by any of the three control points at the Lidingö bridge as well as an additional control point in the city within 30 minutes is also exempted from the congestion tax. The reason for this is that the only connection from Lidingö municipality to the national road network runs through the city – The congestion tax is levied between 6.30 a.m. and 6.29 p.m. – The tax per passage is SEK 10, 15 or 20 (€1-2) depending on the time of day. The maximum amount per vehicle and day is SEK 60 (€6) – Payment can only be made retroactively, and there is no opportunity to pay at the control points – During the trial, payment was to be registered in the SRA congestion tax account no later than five days after the passage of a control point – During the permanent scheme monthly payments by invoice have been introduced, which is a good customer-oriented improvement as well as necessary to reduce transaction costs – The technical equipment at a control point is installed on three gantries above the carriageway and in a control cabinet at the side of the road – Columns are used instead of gantries at some control points – The first gantry is equipped with a ”Control Point” sign as well as a digital display indicating the tax charged at that particular time. Cameras installed on this gantry are used to photograph the rear number plates – The cameras used to photograph the front plates are mounted on the third gantry – Laser detectors and transceiver aerials for vehicle identification via the onboard unit are mounted on the middle gantry	CURACAO
Encountered Barriers	– Politics and Strategy – Opposition – Politics and Strategy – Conflict – Planning – Technical – Planning – Economic – Planning – Policy Conflict – Planning – User Assessment – Institution – Administrative Structures and Practices – Institution – Legislation and Regulation – *Constitutional Framework*: in Sweden, congestion charges are	SURVEY CURACAO

STOCKHOLM – CITY LEVEL		
	classified as ”tax” rather than ”fee”. Therefore in the initial process, the division of roles and responsibilities was not formally established and consequently neither the functional requirements of the system depending on whether the charge was a state tax or a local fee – *Local interests vs. regional*: the Stockholm congestion charging trial was clearly defined as an issue for the municipality of Stockholm even though the whole region was very much concerned – *Low initial public acceptance*: When the political decision was taken to conduct a trial, public opinion was predominantly negative to the introduction of charges	
Encountered Drivers	– Politics and Strategy – Commitment – Politics and Strategy – Coalition – Planning – Technical – Planning – Economic – Planning – Policy Synergy – Planning – User Assessment – Information and Public Relation – Technology – Public Funds and Subsidy – Cultural and Lifestyle – Problem Pressure – *Trial and post-referendum approach*: the trial approach in combination with a post referendum was an important political strategy in trying to turn public opposition into support and avoid conflict – *Extensive communication efforts*: the SRA strategy was to communicate intensively while at the same time keeping a low neutral profile. They did not engage in a debate on *why* congestion tax was introduced but rather on *how* the system would work and how to pay – *Balanced and measurable goals*: The city of Stockholm was responsible for the extensive evaluation programme during the trial. Inspired by London, the strategy was to present traffic data initially at a press conferences (go-live for 10 days) as well as presenting a full evaluation report at the end of the trial. According to polls in Stockholm, people became more positive throughout the trial as they experienced the obvious effects.	SURVEY CURACAO
Section III - Results		**Source**
Environment	– CO2: - 13% (Inner city) – CO: - 14% (Inner city) – NOx: - 8.5% (Inner city) – PM10: - 13% (Inner city) – – 8.5% NOx emissions reduction (inner city) – 2.7% NOx emissions reduction (Stockholm municipality) – 1.3% NOx emissions reduction (Greater Stockholm) – 13% total PM10 reduction (inner city) – 3.4% total PM10 reduction (Stockholm municipality) – 1.5% total PM10 reduction (Greater Stockholm) – 13% road surface PM10 reduction (inner city) – 3.3% road surface PM10 reduction (Stockholm municipality) – 1.5% road surface PM10 reduction (Greater Stockholm) – 12% fuel and combustion PM10 reduction (inner city) – 4.4% fuel and combustion PM10 reduction (Stockholm	SURVEY

STOCKHOLM – CITY LEVEL		
	municipality) – 2.4% fuel and combustion PM10 reduction (Greater Stockholm) – 14% VOC reduction (inner city) – 5.2% VOC reduction (Stockholm municipality) – 2.9% VOC reduction (Greater Stockholm) – 14% Benzene reduction (inner city) – 5.3% Benzene reduction (Stockholm municipality) – 3.0% Benzene reduction (Greater Stockholm) – 13% CO_2 reduction (inner city) – 5.4% CO_2 reduction (Stockholm municipality) – 2.7% CO_2 reduction (Greater Stockholm)	CURACAO
Network	– Decrease in n° of vehicles entering the zone (% vehicles/day): 22% – Reduction in queuing: 3 – 50% – 22% overall reduction in traffic crossing the congestion-charge cordon during the congestion-charge period (06.30–18.29 weekdays – 16% during the morning peak period – 24% during the afternoon/evening peak period – During the trial approximately half of the disappearing motorists changed to public transport which increased by 6 %, and the other half changed in less traceable ways like fewer trips, trip chaining and other destinations – Travel times significantly reduced – Travel time variability significantly reduced in both AM and PM peaks	SURVEY CURACAO
Economy	Investment costs (mil. €): ca. 200 M€ Operational costs (mil. € per year): ca. 25 M€ – Revenues from charges + revenues (€ per year): ca. 85 M€ – Urban economy increase/decrease: o Indicator: turnover before and after the implementation of the congestion tax for three statistical sectors: retail, wholesale and sales of motor vehicles and fuel. Data: The results show that the congestion tax has not had any negative impact on the overall turnover in the inner city when compared to the rest of Stockholm county. Both the retail and wholesale sectors show a more positive development of turnover in the inner city than in the rest of the county. – The budget for the entire Stockholm trial package was SEK 3.8 billion (€380 million), or approximately SEK 2.7 billion (€270 million) after deductions for various residual values – The SRA has estimated that the tested system can be run on an operating cost of around SEK 220 million (€22 million) p.a. including re-investments – if congestion charging were to be made permanent, corresponding calculations suggested that the system would generate a substantial annual surplus in CBA terms of some SEK 760 million (€76 million) after deductions for operating costs – The investment cost sustained by society would then be “repaid” in the form of socioeconomic benefits within four years	SUREVEY CURACAO
Acceptability	– Citizens have been consulted by means of: o Survey o Referendum	SURVEY

STOCKHOLM – CITY LEVEL		
	– Percentage of favorable people before the scheme implementation: 35 – 37% (Autumn 2005) – Politicians were ahead of their voters in their attitudes to congestion charging – When the political decision was taken to conduct a trial, public opinion was predominantly negative to the introduction of charges – There was a significant change in the public opinion when the system was introduced – The larger part of the attitudinal change occurred within the first two months of the trial – The result of the real referendum showed that 51.3% of city inhabitants voted in favour of a permanent solution with congestion tax	CURACAO
Equity	– Scheme winners: o Private motorized users o PT users o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors o pedestrians, cyclists – Scheme losers: o This is too simplistic - many individuals probably consider themselves scheme losers, but no evidence on a global scale – a large percentage of drivers in the county paid the congestion tax at least occasionally – Examining the level of loss for different groups on average, it was concluded that o Residents of the inner city and Lidingö lost about twice as much as residents of other areas o Households with high discretionary income paid nearly three times as much as households with low discretionary income o Employed people paid about three times as much congestion tax as non-employed o Men lost nearly twice as much as women o Households with children paid more congestion tax and households with two adults pay more congestion tax (per person)	SURVEY CURACAO
Liveability	– The official evaluation of the Stockholm trial comprised a questionnaire study relating to the perception of environmental qualities in different parts of the city. The results indicate that Significant positive changes were observed for three types of environmental quality: *better pace in traffic*, *improved air quality* and *improved accessibility by car* – The same tendencies appear in interviews made with cyclists in the inner city and with children who live in the inner city	CURACAO
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – Safer – More accessible – Smarter	

STOCKHOLM – CITY LEVEL		
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Alternative options o Charges and sanctions o Scheme results – To whom: o Private motorized users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors o Researchers, international – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o Internet (e.g. city level website in Swedish language www.stockholm.se/-/Naringsliv/For-foretagare/Trafik/Miljozon-) o Posters o Leafleting (e.g. Brochure in Swedish language www.stockholm.se/-/Naringsliv/For-foretagare/Trafik/Miljozon-/)	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[183]	– Specific legislation – Level of access restriction scheme legal basis: o national – The scheme is considered a tax under the Swedish constitution and so must be decided by parliament – On June 16, 2004 the Swedish Parliament, the Riksdag, adopted the Congestion Charges Law, with an annex relating to the Stockholm Trial – The trial is being fi nanced by state funding – The National Road Administration, Vägverket, was given responsibility for the technical design – The City of Stockholm was tasked by the government with responsibility for evaluating the trial and providing information about it	SURVEY CURACAO
Relationships with Existing EU legislation/regulation	–	

[183] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Stuttgart

STUTTGART – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 590.07 (1000 inhabit.) - Urban Area: 207 km2 - Population Density: 2,851 inhabit./km2 - Cars per inhabitants: 594 (cars/1000 inhabit.) - Car density: 1,698 (cars/km2) - Number of private cars: 222,844 - Number of Light Duty Vehicles (LDV) (less than 3.5 tons) circulating in urban area: 63,256	Office for Statistics 2008
Context Description	– Modal Split: o Walking: 19% o Cycling: 7% o Bus: 9% o Light rail: 5% o Metro: 5% o Commuter rail: 8% o Car : 46% o Motorcycle/scooter: 1%	Office for Statistics 2007
Scheme Objectives	– Air quality improvement – CO2 emissions reduction – Noise reduction	SURVEY
Targeted Traffic	– Euro 4 vehicles and under	SURVEY
Scheme Design	– Environmental zones	SURVEY
Technology Used	– Paper licenses – Labeling of cars	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Local Government. – Citizens representatives, PT company and Freight distributors have been involved during the scheme implementation. – On 1st January 2006 was formally decided to adopt the access restriction scheme which came into operation on 1st July 2007. – The scheme works 24/7. – £No charge has been envisaged. – £10 per day if paid by midnight on the following charging day. – Type of enforcement adopted: o Manual – Exempted categories: o PT vehicles o Two-wheelers o Emergency vehicles o Electric vehicles o Hardship provisions – intensification of the conditions for driving in environmental zone is foreseen.	SURVEY
Encountered Barriers	– Politics and Strategy – Opposition – Planning – Economic – Institution – Administrative Structures and Practices – Institution – Legislation and Regulation	SURVEY

STUTTGART – CITY LEVEL		
	– Citizens Participation	
Encountered Drivers	– Politics and Strategy – Commitment – Planning – Economic – Planning – Policy Synergy – Planning – User Assessment – Cooperation – Partnership and Involvement – Citizens Participation – Information and Public Relation	SURVEY
Section III - Results		**Source**
Environment	– CO2: 0% (forecast 2005) – CO: 0% – NOx: - 7% – PM10: - 5% – CO levels: 0% (measurement 2009) – NOx levels: 0% (measurement 2009)	SURVEY
Network	– Decrease in n° of vehicles entering the zone (% vehicles/day or): 10% HGV (forecast 2005) – There has been a change towards cleaner vehicles	SURVEY
Economy	– Investment costs (mil. €): 0.2 M€ (only signage) – Operational costs (mil. € per year): 0€ (only surveillance) – Revenues from charges (€ per year): 0€	SURVEY
Acceptability	– Citizens have been consulted by means of: o Public hearing	SURVEY
Equity	– Scheme winners: o PT users o Residents in the restricted zone – Scheme losers: o Private motorized users o Residents out of the restricted zone	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Alternative options o Scheme results – To whom: o Private motorised users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation	SURVEY

STUTTGART – CITY LEVEL		
	– Type of media used: o The press o Radio - TV o Internet ▪ National level website in German language www.feinstaubplakette.de) ▪ Federal Ministry for the Environment, Natural Conservation and Nuclear Safety – national level website www.bmu.de/english/air_pollution_control/general_information/doc/40740.php ▪ City level website www.stuttgart.de/feinstaub-plaketten	
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[184]	– Air quality legislation – Road code prescription – Level of access restriction scheme legal basis: o urban o national	SURVEY
Relationships with Existing EU legislation/regulation	–	

[184] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Szczecinek

SZCZECINEK – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 40.226 (1000 inhabit.) - Urban Area: 48,63 km2 - Population Density: 827.19 inhabit./km2 - Cars per inhabitants: 0,9584 (cars/1000 inhabit.) - Car density: 792.74 (cars/km2) - Number of private cars: 38,551	Statistics January 2010
Context Description	– Modal Split: o Walking: 24.8% o Cycling: 4.4% o Bus: 21.4% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car (incl passengers): 46.2% o Motorcycle/scooter: 1.9%	Survey 2009
Scheme Objectives	– Traffic flows improvement – Air quality improvement – CO2 emissions reduction – Road safety improvement – Liveability	SURVEY
Targeted Traffic	– Private cars	SURVEY
Scheme Design	– Area licensed based	SURVEY
Technology Used	– Manual	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Municipality of Szczecinek. – Retailers and Freight distributors have been involved during the scheme implementation. – On 1st January 1995 was formally decided to adopt the access restriction scheme which came into operation on 1st January 1997. – The scheme works 24/7. – The scheme is free of charge. – Type of enforcement adopted: o Manual – Exempted categories: o PT vehicles o Shop freights – In Szczecinek in 1995-1997 there was an idea to enlarge the pedestrian zone. It was finally implemented in 1997. It is 1 km long pedestrian zone dedicated to the pedestrians and cyclists covering the historic city centre. Only freight distributors are free to access this zone but they are obliged to obtain special permission at the Municipality of Szczecinek (free of charge). Unfortunately we do not posses any special reports concerning this investment.	SURVEY
Encountered Barriers	– Citizens Participation – Cultural and Lifestyle	SURVEY

SZCZECINEK – CITY LEVEL		
Encountered Drivers	– Politics and Strategy – Commitment – Public Funds and Subsidy	SURVEY
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	–	
Acceptability	–	
Equity	– Scheme winners: o Residents in the restricted zone o Residents out of the restricted zone – Scheme losers: o Private motorised users o Shop keepers/Retailers o Freight distributors	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules – To whom: o Private motorised users o PT users o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[185]	– Road code prescription	SURVEY
Relationships with Existing EU	–	

[185] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

SZCZECINEK – CITY LEVEL		
legislation/regulation		

The Hague

THE HAGUE – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	– Land area in km^2: 82.43 – Population: 482,510 - Population density per km^2 land: 5,854 - Cars per inhabitants: 390	Amsterdam in cijfers 2009 http://www.os.amsterdam.nl/tabel/11013/
Context Description	– The word "Spitsmijden" is a Dutch idiom stating the intention to avoid peak traffic. The Spitsmijden experiment in The Netherlands is not about a regular road pricing scheme, but about rewarding car drivers for avoiding to drive during peak hours. During the 50 working days experiment, 340 frequent drivers looked at alternatives for driving during morning peak hours over the stretch of the Dutch A12 motorway from Zoetermeer towards The Hague. – On weekday mornings, this segment of motorway is heavily congested with vehicles being heading for The Hague, which constitutes the centre of a daily urban system, with Zoetermeer as one of its suburbs. There are few alternative routes or ramps along this stretch of motorway, which made the trial relatively easy to control. The trial was launched on 2 October 2006 and ended on 24 January 2007. – Modal split (proportion of journeys to work by car), 2004: o Car 40% o Motor cycle 3% o Bicycle 22% o Walking 5% o Public transport (rail, metro, bus, tram) 30%	CURACAO http://www.urbanaudit.org/DataAccessed.aspx
Scheme Objectives	– On the A12, and in The Netherlands in general, traffic congestion is a growing problem not only with respect to accessibility, but with increasingly with respect to air quality and climate change. – In the reference period prior the experiment, the average reported free-flow time on this motorway segment was 20 minutes, the average congestion delay 16 minutes. – The purpose of the experiment was to study whether reward stimulus could be a possible control instrument to influence mobility behavior. In this way, congestion could be reduced at – relatively low cost and in quite short time. – As a secondary outcome, the negative effects of new infrastructure could be prevented. – The experiment provides scientifically based insight into the effects of positive stimuli on the participating drivers. Until now, researchers could have only made predictions based on surveys and models. Now they have their first practical experience, where different techniques and rewards have been combined into a unique experiment.	CURACAO
Targeted Traffic	–	
Scheme Design	– Cordon based	CURACAO
Technology Used	– A number plate recognition camera was installed at every EVI location to record the number plate of each vehicle passing by. The camera compensated for any unsuccessful EVI registrations and thereby reduced the chance of missed registrations to nearly zero. Moreover: o The cameras detected all vehicles passing along	CURACAO

THE HAGUE – CITY LEVEL		
	the road. In order to avoid participants to use family second car and thus collect a reward while travelling during rush-hours, also the number plate of all the others family cars were registered. o The cameras detected all traffic and thus also measured the volumes of total traffic, which, as an additional analysis, could be used to calibrate the participants' behavioural changes.	
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Instead of a congestion charge, the Spitsmijden project aimed at measuring the effect of positive stimuli on commuters' behaviour. In total, 340 drivers accepted the challenge to try to avoid driving during peak hours (7.30 a.m. – 9.30 a.m.). 98% of them lived in Zoetermeer and 56% of them worked in The Hague. – After subscribing and filling out several forms about personal characteristics and preferences, the participants were able to choose from two variants: a monetary reward varying from €3 to €7, or the right to become the Yeti smart phone owner after the experiment. – EVI beacons were positioned along the main exit roads of Zoetermeer (see map) together with camera systems for number plate registration. If a participant had passed under one of these check points between 7:30 AM and 9:30 AM on working days, the period with the highest traffic densities, no reward would have assigned. – The main rules of the trial were the following: 1. The participants had to commute at least three times a week from Zoetermeer towards The Hague. 2. They should have had an Internet access for checking e-mails. 3. They were asked to complete questionnaires and travel logs periodically. 4. Their participation had to be voluntary (although they were required to sign a contract listing the rights and duties of both parties). 5. They would have received a reward only for the times they avoided the morning rush-hour by travelling outside the rush hour period, using another mode of transport or working at home. The frequency of rush hour avoidance would be determined in relation to each participant's usual commuting behaviour during the reference period. 6. The participants of the so-called Yeti variant had to switch on the Yeti smart phone during each car trip. 7. The participants should have used the car in which an On Board Unit (OBU) had been installed. – In order to measure the participants' normal behaviour, short reference periods before and after the test were inconspicuously added to the experiment. – Because the EVI registration covered only four possible routes, it was necessary to identify other alternative routes from Zoetermeer towards The Hague. One of the solutions was to place additional number plate recognition camera systems on these routes and to identify participants trying to evade the EVI detection system. – The Spitsmijden website was used for both the internal and the external communications and was therefore an essential part of the trial. On this website, each participant had to fill in a logbook	CURACAO

THE HAGUE – CITY LEVEL		
	daily. The logbooks were used for analysis and compared with the detected movements. – Participants with a Yeti smart phone disposed of a website that had been customized for the trial. In this way, they were able to see the actual travel times in minutes between Zoetermeer and Prins Clausplein in The Hague. The idea was that they would have to use this information for their travel decisions. – The maximum number of rewards per week derived from the comparison with the rush-our travel frequency during the reference situation. – In the monetary variant, the participant was rewarded with a daily amount of €3 or €7 for not being registered between 07.30 and 09.30h. Also a varying scheme was conducted: o not registered between 07.30 and 09.30h > 7 Euros o registered between 07.30 and 08.00h > 3 Euros o registered between 09.00 and 09.30h > 3 Euros – In the Yeti variant, the participant was rewarded with the right to keep the smart phone Yeti, which was put at his/her disposal during the experiment. In this case the participant needed to avoid rush-hours for a certain given number of times. Also a so-called Yeti-variant was conducted; in this case the participant received only traffic-information on his smart phone. – In November 2008 the organisation started a new pilot 'Spitsmijden' which will run until December 2009. The difference between the two pilots is a longer route and the use of cameras and partly of GPS technology (some of the participants will receive a Rabo Mobile). The EVItechnique is currently not part of the pilot. They may approach participants during the pilot to participate in additional investigations, for which a different technique, such as EVI, will be used. – Of course, the participation in an additional investigation will be entirely on a voluntary basis. Another difference is that incentives are setup to promote the use of the train as an alternative way of mobility. To make the shift to train mode as easy as possible, NS-Business Cards will be offered via internet and a trip could be booked by phone.	
Encountered Barriers	– Politicians may ask themselves: why pay for good behavior? "We do not reward people that do not steel." – Also, congestion charging can include fundraising for new infrastructures. – Finally, the recommendation to only reward a selected group can face practical equity problems.	CURACAO
Encountered Drivers	– Drivers participated on a voluntary basis. It is not clear to what extent this fact should influence expectations of a larger rewarding scheme. The first volunteers may be easily able to (or interested in) adjust(ing) their behavior. – Implementing a rewarding scheme seems the best solution to be pushed and led by private parties, funded by government, and evaluated by universities.	CURACAO
Section III - Results		**Source**
Environment	–	
Network	– A reduction of rush-hours car trips by about 50% was observed. This reduction was obtained mainly by rescheduling trips to earlier or later points in time. A shift to public transport occurred, but	CURACAO

THE HAGUE – CITY LEVEL		
	with a moderate percentage. – One special circumstance was the delay of public transport project RandstadRail. The original reason to schedule the trial during Autumn 2006 was the redesign of the local rail network between The Hague and Zoetermeer during Summer 2006. The plan was to convert the local heavy-rail loop into a light rail operation and to link it to the existing light rail system of The Hague. As the start of the trial approached, however, it became clear that construction planning had gone off track and that the trial would have to start with reduced rail operations (mainline rail only). A roughly scheduled bus replacement service continued to operate after the summer. However, this bus service was not sufficient to substitute the traditional local rail service: during rush-hours, in fact, there were always delays.	
Economy		
Acceptability	– 43% of the participants had some troubles in changing their behaviour. The same number found relatively easy to do it. Some causes of difficulty in adjusting mobility behaviour frequently mentioned were work- and family-related requirements. Lack of alternative transport means was mentioned by 5% of the participants, while 7% mentioned the delay in RandstadRail service as the reason for their difficulty in adjusting their behaviour. – But after all, 86% per cent of the participants indicated that they would participate in a similar trial if they had the chance. – Only 5% said that they would not participate.	CURACAO
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Smarter	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of media used: o Internet: ▪ Central Milieuzones – national level website in Dutch language www.milieuzones.nl) ▪ City level website in Dutch language www.denhaag.nl/home/bedrijven-en-instellingen/verkeer-en-vervoer/to/Milieuzone-Den-Haag.htm)	
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[186]	–	

[186] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

THE HAGUE – CITY LEVEL		
Relationships with Existing EU legislation/regulation	–	

Toulouse

TOULOUSE – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 935 (1000 inhabit.) - Cars per inhabitants: 610 (cars/1000 inhabit.) - Number of private cars: 570,000 – 3,299 hab / km²	Enquete Ménage 2004 www.linternaute.com/ville/ville/donnee/356/toulouse.shtml
Context Description	– Modal Split: o Walking: 23% o Cycling: 3% o Bus: 8% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car : 62% o Motorcycle/scooter: 2% – Total number of motorised trips in the city per day: 2.755 mil – Average motorised trip travel time: 21min – Average motorised trip length (km): 8 – Total number of non-motorised trips (walking/cycling) in the city per day: 880,000 – Average non-motorised (walking/cycling) trip travel time: 13min – Average non-motorised (walking/cycling) trip length (km): 1.5	Enquete Ménage 2004
Scheme Objectives	– Congestion reduction – Traffic flows improvement – Liveability	SURVEY
Targeted Traffic	– Private cars	SURVEY
Scheme Design	– Point based	SURVEY
Technology Used	– personal cards for residents and deliveries	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Toulouse Municipality. – Citizens representatives, PT company, Service providers, Retailers and Freight distributors have been involved during the scheme implementation. – On 2nd January 2004 was formally decided to adopt the access restriction scheme which came into operation on 1st July 2005. – The scheme works 24h/7 (some streets are open from 9h to 11h30 for deliveries). – The scheme is free of charge. – Type of enforcement adopted: o Manual – Exempted categories: o PT vehicles o Taxi o Emergency vehicles – The municipality have planned to extend the access restriction from several points of restricted streets to an area scheme.	SURVEY

TOULOUSE – CITY LEVEL		
Encountered Barriers	– Politics and Strategy – Opposition – Planning – User Assessment – Information and Public Relation – Technology	SURVEY
Encountered Drivers	– Politics and Strategy – Coalition – Citizens Participation	SURVEY
Section III - Results		**Source**
Environment	–	
Network	– Decrease in n° of vehicles entering the zone (% vehicles/day): 60%	Mairie de Toulouse
Economy	– Investment costs (mil. €): 0.5 M€ – Operational costs (mil. € per year): 0.15 M€ – Revenues from charges (€ per year): – Revenues from fines (€ per year):	Mairie de Toulouse
Acceptability	– Citizens have been consulted by means of: o Public meetings	SURVEY
Equity	– Scheme winners: o Shop keepers/Retailers o Residents in the restricted zone – Scheme losers: o Private motorized users o private services to residents	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules – To whom: o Shop keepers/Retailers o Residents in the restricted zone o Freight distributors – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o Posting o Meetings	SURVEY
Section V – Scheme Legal Aspects		**Source**

TOULOUSE – CITY LEVEL		
Scheme Legal Framework[187]	– Road code prescription – Level of access restriction scheme legal basis: o urban	SURVEY
Relationships with Existing EU legislation/regulation	–	

[187] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Trondheim

TRONDHEIM – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Population: 230,111 - Area: 324.2 km^2 - Population per km^2: 36.5 Inhab./km2 - Cars per inhabitants: 397 - Proportion of households with the use of a car (2001): 66.5%	www.ssb.no/english/municipalities/1601 EUROSTAT
Context Description	– During the 70's and early 80's, Trondheim experienced significant increases in traffic, accompanied by congestion and environmental problems. In particular, adverse effects resulting from through traffic in the city centre attracted much attention. The proper solution was envisaged to be a network of main roads that would move traffic away from the city centre and dwelling areas. The policy initiative concerning the toll ring originated in 1985, during the last stage of preparing a new transportation plan for Trondheim. The first milestone was a unanimous declaration in the City Council, asking for a feasibility study of a local financial contribution to road construction, provided the State would allocate additional funds. – Modal split, 1998 (distribution of journeys on transport mode in different areas, as % of total journeys): o Walking/cycling 27% o Car (driver and passenger) 62% o Public transport 10%	CURACAO OECD, Implementing sustainable urban travel policies www.internationaltransportforum.org/europe/ecmt/pubpdf/03UrbNatRev.pdf
Scheme Objectives	– The objective of pricing was to raise private sector revenue to feed an urban transport investment package, initially intended to be financed 60 % by user fees and 40 % by government funds. However, the differentiated charges and the absence of seasonal passes had a secondary demand management objective. Motorists had to pay per trip (with limits) and they paid more during peak periods. Still, the pricing system was not intended to manage congestion, since the peak toll was set low, and the peak/off-peak differential was small.	CURACAO
Targeted Traffic	–	
Scheme Design	– 1991 toll ring – 1998 zone based – 2004 extended zone based	CURACAO
Technology Used	– The toll ring offered electronic toll collection with the use of on-board units and DSRC technology. Passive tags are activated by a roadside transmitter, which sends a signal to the tag that responds with its identity. This response is read by an associated receiver at the roadside, enabling a charge to be added to or deducted from a centrally held credit or debit account. – Since 2004 electronic toll collection has been harmonized throughout Norway and is owned and managed by the Norwegian Public Roads Administration (the Auto-PASS system).	CURACAO
Section II - Implementation		Source
Implementation Process, Enforcement, Monitoring	– The original Trondheim toll ring system, implemented in 1991, went through two major revisions. Firstly, in 1998 some charging points were relocated and 6 more were added, making it into a multi zone system comprising 18 stations. A second revision of the scheme layout was made in November 2003 by adding an inner CBD (city centre) ring. This increased the number of	CURACAO

stations to 24.

- On 30 December 2005 the urban tolling system in Trondheim was turned off, nine months before the legal concession period of 15 years had elapsed. The local decision makers chose to stick to this date, even if implementation was delayed from January to October 1991.
- Trondheim was the third city in Norway to introduce a toll ring, following the examples of Bergen from 1986 and Oslo from 1990. So, while Bergen and Oslo have decided to continue their charging systems to finance new transport projects, Trondheim became the first Norwegian city to discontinue charging and dismantle their charging equipment.
- The Trondheim scheme was unique in three aspects when it was introduced in 1991, (i) it was fully electronic with non-stop toll lanes from the start, (ii) it had time-differentiated charges, and (iii) only a payment per each trip option was available.
- 11 new automatic toll stations were built, of which only one had additional manned operation. In addition, one existing manned motorway toll station to the east at Ranheim completed the ring. 21 of the 35 lanes leading in to the toll stations were non-stop lanes for tag holders.
- In June 1996, the City Council in Trondheim decided on a revised toll charging scheme. This zone-like system was fully implemented during the first months of 1998. Two main
- objectives motivated the revision of the single cordon scheme: Firstly, more revenue was needed to fulfill the transport investment plans. Secondly, a more "equitable" scheme was called for (interpreted as a system charging a higher portion of the motorists). To some extent, the revised system was designed to provide daily service facilities inside each zone. The revised fee structure included a raise in the basic charge from 10 to 12 NOK47 (1.25€ to 1.5€), extended opening hours from 5 to 6 pm, and a lowering of the maximum number of charged crossings per month from 75 to 60.
- A second and final extension involving six additional stations closer to the city centre came into operation 1 November 2003. The basic charge level had already been raised from NOK 12 (1.5€) to NOK 15 (1.9€) on 26 February 2001. With a typical discount of 30-40 % for tag holders, this implied a price per passage of around 1.2€. The layout of the scheme now consists of 24 stations (or strictly speaking 26 if stations located very close together to the south are counted separately) and 59 payment lanes.

Charges (NOK) depending on payment options	Monday – Friday	
	06:00-10:00	10:00-18:00
Manual payment (basic charge)	15.00 (1.9€)	15.00 (1.9€)
Prepayment of NOK 1000 (125€)	12.00 (1.5€)	9.00 (1.1€)
Prepayment of NOK 3000 (375€)	10.50 (1.3€)	7.50 (0.9€)
Prepayment of NOK 6000 (750€)	9.00 (1.1€)	6.00 (0.75€)
Post-payment by bank giro:		
5 or less passages/week	15.00 (1.9€)	12.00 (1.5€)
10 or less passages/week	13.50 (1.7€)	10.50 (1.3€)
More than 10 passages/week	12.00 (1.5€)	9.00 (1.1€)

Encountered Barriers

- As a payment device, the ring strikes unjustly and arbitrarily.
- Motorists pay enough already; public roads are the responsibility of the State.
- The toll ring is not well designed. Various arguments criticizing, e.g., too high, low, or biased regulation effects, and the possibilities for avoiding payment by crossing residential areas.
- The road projects are not needed; the money should be used for other purposes.

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Encountered Drivers

- The ring pays for an improved network of main roads.
- Funds are built for investment in traffic safety, public transport, and environmental improvement.

CURACAO

TRONDHEIM – CITY LEVEL		
	– The toll ring regulates the traffic. – The toll ring is a technically advanced and efficient charging measure.	
Section III - Results		**Source**
Environment	– There has been no comprehensive study to evaluate the environmental effects of the Trondheim tolling schemes. A measuring station collecting data on PM10 dust particles was in operation in one of the heavily trafficked main approach roads to the city centre since 1993 for the extended winter season (Oct/Nov – May/June). Due to the widespread use of studded tires and the weather conditions in the winter time, this period is the most interesting period to look at for air pollution effects. Dry and cold weather tends to bring the concentrations up to high levels. – Based on observations of PM10 levels, it is not possible to conclude that the toll ring had an effect on air quality. The variation in concentration is most likely a result of changing weather conditions.	CURACAO
Network	– Looking at time periods, inbound car traffic through the toll cordon decreased by 10% during both the high and low charged periods, and this decrease was almost offset by an 8-9 % increase in inbound car traffic during uncharged periods at evenings and at weekends. Thus, the toll ring caused a general shift in timing for car trips away from the charged hours, but the percentage reduction was not affected by the differentiation between peak and off-peak charges. – Whilst traffic in the formerly charged periods increased by 11.5 %, traffic for the whole week increased by only 3.8 %, and traffic at working day evenings and at weekends decreased. The total increase for working days constituted 7.5 %. – Looking at percentage of traffic within charged hours for working days, this increased to 76.5 % in 2006 from 73.9 % in 2005. This shows that motorists that were priced out during charging periods have returned back to the more preferred periods for making trips. – Traffic in 2006 between 05:00 and 06:00 decreased by 11 % whilst traffic between 06:00 and 07:00 increased by 11 %. In the afternoon, shifts in departure times to avoid being charged are even more evident; the last of the charged hours, between 17:00 and 18:00, has a 20 % increase in 2006, and an 8 % decrease in the following hour. – When the municipal charging stations were demolished, motorists in 2006 were able to make detours using routes that were now free of charge, to avoid passing through Ranheim. The result was considerable increases between 2005 and 2006 at places like Skovgård (48 % for charged periods and 25 % for average daily traffic) and Tunga (20 % for charged periods and 16 % for average daily traffic), and corresponding decreases at Ranheim (-17 % for charged periods and – 11 % for average daily traffic).	CURACAO
Economy	– Some interesting findings on longer-term effects appear, when looking at the period 1992-97, during which the payment scheme was unchanged. During this 5-year period there was a slower average annual growth in total traffic crossing the toll cordon (1.8 %), compared to the general growth in the Trondheim area (2.8 %) or the County of Sør-Trøndelag (2.6 %). Most of the growth in traffic crossing the cordon occurred during the charged hours, indeed 2.9 % compared to only 0.8% during the uncharged hours. Paid crossings constituted 48.6% in 1992, but grew to 51.3% in 1997. – Firstly, this indicates that the Trondheim charging scheme is associated with a slower growth in total in-bound traffic crossing the cordon, than what would otherwise have been expected. – Secondly, a gradual return of traffic that initially was “priced out” of the more preferred charged time periods is evident. – The 1998 revision of the scheme led to a major increase in traffic crossing the toll cordons, and also in the percentage of vehicles being charged. Compared	CURACAO

	to the previous year, the total number of vehicles crossing toll stations increased by 39 % and charged traffic increased by 53%. The main reason for the large increase in charged traffic was the one hour extension of the charging period. – The final extension of the scheme with six additional toll stations on 1 November 2003 is already evident in the traffic data for 2003, but the full effect came in 2004 and 2005. Compared to 2002, the total number of vehicle crossings in 2005 is up by 37% and charged crossings are up by 40%. – The increase in 1998 is due to the introduction of the zone scheme. A second large increase came in 2001 after a 25 % raise in the basic toll level and a third large increase in 2004 is attributable to the final extension of the scheme. In total the charging scheme brought in 1,818 million NOK (227.25€) in gross revenues. – Annual operation costs for the Trondheim charging scheme have been 10-11% of gross revenues throughout its period of operation. – The Trondheim Package amounts to approximately NOK 2,100 mill for the period 1989-2005 (NOK 100 is about 12.5€). The package is financed with a combination of revenues raised from the Trondheim toll ring, and governmental funding. According to the original plans for the Trondheim package, national funding (governmental) was to amount to 40% of the funding of the Trondheim Package, and the local funding (toll revenues) had to raise the last 60% over the total 15-year concession period. Loans were taken up in advance of the toll charging, to allow road construction to start before the toll ring was established. The loans amounted to approximately NOK 440 million (55€), and are covered by toll revenues. – A study of retail sales data for the period 1987 to 1997 shows that the CBD did loose trade in real terms in the period 1987 to 1990. Then, starting in the same year as the introduction of the toll ring, city centre trade has in real terms been on a general trend line of modest but steady growth. The loss in market share to other sectors in the municipality is simply a result of these sectors having a faster growth. It can be concluded that in spite of the toll ring, the city centre has had a modest growth in trade. – The long term trend of decreasing market shares has continued, even though the net sales volumes have grown modestly. However, the market share did not drop during 2005, and the drop during 2006 was smaller than in previous years. Still, the annulment of road user charging did not lead to an upswing in city centre trade during 2006.	
Acceptability	– Prior to implementation, there was a lot of concern about negative effects on the attractiveness of the CBD for business activity, and great uncertainty prevailed about the possible effects on shopping trips. For instance, a shopping survey in 1990 concluded that 25% of respondents in Trondheim and surrounding areas were likely to change their shopping behaviour because of the toll ring, by moving their shopping to other destinations or times. The follow-up study in 1992 revealed that respondents had changed their shopping behaviour only modestly (10% rather than 25%). – Trondheim Chamber of Commerce carried out a special sample survey of trade turnover in Trondheim starting September 1991 (one month before the opening of the toll ring) and ending September 1992. A sample of 40 firms representing about 25% of total turnover in Trondheim took part. The firms were located throughout the municipality (both inside and outside the toll ring) and covered the major business sectors. The conclusions from the study was that a long lasting trend of growth in areas outside and decline in areas inside of the toll cordon, leveled out during the study period. During the first months of 1992 there was evidence of some businesses located inside the toll ring losing trade. From the summer of 1992 no distortion of competition due to the toll ring could be read out of the statistics. Businesspeople located in the CBD had prior to the toll ring predicted major negative swings in trade once the toll ring came into operation. The Chamber of Commerce in its own study concluded that there was hardly any effect of the toll ring on trade at	CURACAO

	all. – Opinion polls on the attitudes to the Trondheim toll ring indicated decreased opposition after implementation. In April 1991, six months prior to the implementation date, about 70% of the respondents objected to the toll ring. In December 1991, two months after implementation, the negative share had dropped to below 50%. During the summer of 1992 the mood was such that slightly more people were positive (37 %) than negative (35 %). However, as time went by, the negative share increased and the positive share decreased until a peak in October 2003, when four times more were negative than positive. The very low support in 2003 is related to negative publicity and discussions at that time about the immediate introduction of five new charge stations close to the city centre. – The November 2005 measurement can be interpreted as a continuation of the long term trend of increasing tiredness and frustration about the charging. The single group being most negative to urban tolling was daily car drivers. The most typical supporters were men living inside the original cordon and driving a car less frequently than on a daily basis. One possible explanation for the diminishing support is the lack of sufficient information and publicity about the purpose of charging, as time went on. Public relations work was taken much more seriously by the authorities prior to implementation and during the first year of operation. – A strong indication of the importance of information is that when respondents were reminded about what type of projects the revenues from charging were financing, the support increased considerably. When respondents in 2005 were asked about their attitudes to urban tolling, taking into account the use of revenues, the negative share decreased from 47% to 38%, and the positive share increased from 19% to 30%. The most – typical supporters now were men in the 18-29 years age group. – What is perhaps more surprising, is the delight with which respondents in 2006 responded to the same question, when asked about their attitude to having had urban tolling in Trondheim. – The negative share now dwindled to 27% and the positive share increased to 48%. Subgroups having high shares being positive or very positive to having had urban tolling were men, people living inside the old cordon and the 45-59 years old age group. Additionally, support increased with increasing income, increasing education level and decreasing car ownership.	
Equity	– Disabled drivers are allowed free crossings. – A charging system with free passage after 5 pm and in the weekends. The "equity argument" was to avoid charging "social travel", e.g., visits or accompanying children to activities. – The most difficult equity issue has been where to locate the toll stations in a "fair" way. The 1991 ring was a compromise between fairness arguments, practical considerations and revenue maximization. The fairness aspect indicated that motorists benefiting from the new infrastructure should have to pay. – The development of a revised tolling scheme (implemented in 1998) was propagated as more fair, by charging a higher proportion of the motorists. (Raising more revenue for infrastructure was the other main argument). The zone system implied that the number of total households in Trondheim that paid toll charges during one ordinary (randomly chosen) working day increased from 28% to 42%. After this revision, there was still much public debate on how to improve the "fairness" of the system.	CURACAO
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – Safer – More accessible	

TRONDHEIM – CITY LEVEL		
	– Smarter	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of media used: o Internet (e.g. Luftkvalitet – National level website in Norwegian language)	www.luftkvalitet.info/Default.aspx?pageid=1097
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[188]	–	
Relationships with Existing EU legislation/regulation	–	

[188] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Turnhout

TURNHOUT – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 40,765 (1000 inhabit.) - Urban Area: 56.05 km2 - Population Density: 727 inhabit./km2 - Cars per inhabitants: 570 (cars/1000 inhabit.) - Number of private cars: 22,800	Statistics 2009
Context Description	– Modal Split: o Walking: 11% o Cycling: 34% o Bus: 12% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car : 41% o Motorcycle/scooter: 2%	Statistics 2008
Scheme Objectives	– Increasing urban economy – Liveability – Car free area	SURVEY
Targeted Traffic	– Private cars – LDV	SURVEY
Scheme Design	– Zonal based – Time based	SURVEY
Technology Used	– Automatic Number Plate Recognition (ANPR) / Virtual licenses	SURVEY
Section II – Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of City Government. – Citizens representatives, PT company, Retailers and Freight distributors have been involved during the scheme implementation. – On 1st January 2003 was formally decided to adopt the access restriction scheme which came into operation on 1st January 2004. – The scheme works from Monday – Friday 8.30am-11.30am 6.00pm-8.30pm for deliveries. – charge is 50 €. – Type of enforcement adopted: o Technology based – Exempted categories: o PT vehicles o Emergency vehicles – The City of Turnhout has the intention to make the car free area bigger. The scheme will be monitored with a camera network that recognizes number plates.	SURVEY
Encountered Barriers	– Institution – Administrative Structures and Practices – Cooperation – Partnership and Involvement – Technology	SURVEY
Encountered Drivers	– Politics and Strategy – Commitment – Planning – Policy Synergy – Cooperation – Partnership and Involvement – Information and Public Relation	SURVEY

TURNHOUT – CITY LEVEL		
	– Cultural and Lifestyle – Problem Pressure	
Section III - Results		**Source**
Environment	–	
Network	– Decrease in n° of vehicles entering the zone (% vehicles/day or): 100%	SURVEY
Economy	–	
Acceptability	–	
Equity	– Scheme winners: o PT users o Shop keepers/Retailers – Scheme losers: o Private motorized users	SURVEY
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules o Charges and sanctions o Scheme results – To whom: o Shop keepers/Retailers o Residents in the restricted zone o Residents out of the restricted zone – When the information has been disseminated: o Before the scheme implementation o After the scheme implementation – Type of media used: o The press o Radio - TV o Internet o Leafleting	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[189]	– Road code prescription – Implementing a car free area in a shopping zone. – Level of access restriction scheme legal basis: o urban	SURVEY
Relationships with Existing EU	–	

[189] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

TURNHOUT – CITY LEVEL		
legislation/regulation		

Utrecht

UTRECHT – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 300 (1000 inhabit.) - Urban Area: 99 km2 - Population Density: 3,030 inhabit./km2 - Cars per inhabitants: 420 (cars/1000 inhabit.) - Car density: 1,304 (cars/km2) - Number of private cars: 124,000	CBS 2009
Context Description	– Modal Split: o Walking: 16% o Cycling: 23% o Bus: 6% o Light rail: N/A o Metro: N/A o Commuter rail: 13% o Car: 41% o Motorcycle/scooter: 1% – Proportion of traffic represented by freight: 5%	TIL Report (TfL - 2009)
Scheme Objectives	– Air quality improvement	SURVEY
Targeted Traffic	– LDV – HGV	SURVEY
Scheme Design	– Area licensed based	SURVEY
Technology Used	– Automatic Number Plate Recognition (ANPR) / Virtual licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Municipality of Utrecht. – Retailers and Freight distributors have been involved during the scheme implementation. – On 14th March 2007 was formally decided to adopt the access restriction scheme which came into operation on 1st July 2007. – The scheme works 24/7. – The charge is € 25 for a day permit. – Type of enforcement adopted: o Manual / ANPR – Exempted categories: o All non-HGV's; and some specified HGV-groups	SURVEY
Encountered Barriers	– Institution – Legislation and Regulation – Technology	SURVEY
Encountered Drivers	– Politics and Strategy – Commitment – Institution – Legislation and Regulation – Cooperation – Partnership and Involvement – Information and Public Relation – Public Funds and Subsidy	SURVEY
Section III - Results		**Source**

UTRECHT – CITY LEVEL		
Environment	–	
Network	–	
Economy	–	
Acceptability	–	
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– Greener	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of information disseminated: o Scheme and its rules – When the information has been disseminated: o Before the scheme implementation o During the scheme implementation – Type of media used: o Internet (Central Milieuzones – national level website in Dutch language www.milieuzones.nl, city level website in Dutch language www.utrecht.nl/smartsite.dws?id=203566) o Leafleting o Meetings with interested parties	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[190]	–	
Relationships with Existing EU legislation/regulation	–	

[190] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Verona

VERONA – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 265 (1000 inhabit.) - Urban Area: 206 km2 - Population Density: 1,284 inhabit./km2 - Cars per inhabitants: 660.7	Statistics 2008
Context Description	– Modal Split: o Walking: 20% o Cycling: 8% o Bus: 7% o Light rail: N/A o Metro: N/A o Commuter rail: N/A o Car (incl passengers): 51% o Motorcycle/scooter: 10%	SURVEY
Scheme Objectives	– Congestion reduction – Traffic flows improvement – Air quality improvement – CO2 emissions reduction – Liveability	SURVEY
Targeted Traffic	– Private cars	SURVEY
Scheme Design	– Point based – Time based	SURVEY
Technology Used	– Automatic Number Plate Recognition (ANPR) / Virtual licenses	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design and implementation have been in charge of Local Mobility Agency. – In 2001 was formally decided to adopt the access restriction scheme which came into operation in 1997 (from 2005 electronic gates). – The scheme works from Monday – Friday 0.00-10.00, 13.30-16,00, 18.00-20.00, -0.00; Weekends 0.00-10.00, 13.30-0.00. – Type of enforcement adopted: o Technology based – Exempted categories: o PT vehicles o Taxi o Two-wheelers o Foreign vehicles o Emergency vehicles o Electric vehicles	SURVEY

VERONA – CITY LEVEL		
		
Encountered Barriers	–	SURVEY
Encountered Drivers	–	SURVEY
Section III - Results		**Source**
Environment	–	
Network	–	
Economy	–	
Acceptability	–	
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener	
Section IV – Information Dissemination		**Source**

VERONA – CITY LEVEL		
Information dissemination on the scheme performed at city level	–	
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[191]	–	
Relationships with Existing EU legislation/regulation	–	

[191] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Verviers

VERVIERS – CITY LEVEL		
Section I – General Description		**Source**
City Dimension	- Urban area population 54.15 (1000 inhab) - Urban Area: 33.07 km2 - Population Density: 1,637 inhabit./km2 - Cars per inhabitants: 327.7 (cars/1000 inhabit.) - Car density: 1538.5 (cars/km2) - Number of private cars: 2.497m -	INS 2009
Context Description	– Modal Split : o Cars : 70% o PT : 28/ o Walking and cycling : 2%	
Scheme Objectives	– Congestion reduction – Traffic flows improvement – Road safety improvement – Increasing urban economy – Liveability	SURVEY
Targeted Traffic	– Private cars – LDV	SURVEY
Scheme Design	– Cordon based	SURVEY
Technology Used	– Automatic Number Plate Recognition (ANPR) / Virtual licences	SURVEY
Section II - Implementation		**Source**
Implementation Process, Enforcement, Monitoring	– Scheme design is in charge of Transitec S.A. while the implementation will be in charge of Ville de Verviers. – Citizens representatives have been involved during the scheme implementation. – On 25th January 2009 was formally decided to adopt the access restriction scheme. – The scheme will work from Monday – Friday 9h-12h; 13h30-17h30 and Saturday 9h-12h. – The charge is not yet defined. – Type of enforcement adopted: o Manual – Exempted categories: o Taxi o Two-wheelers o Emergency vehicles	SURVEY
Encountered Barriers	– Politics and Strategy – Opposition – Planning – User Assessment – Public Funds and Subsidy	SURVEY
Encountered Drivers	– Politics and Strategy – Commitment – Politics and Strategy – Commitment – Politics and Strategy – Coalition – Institution – Administrative Structures and Practices – Institution – Legislation and Regulation – Public Funds and Subsidy	SURVEY
Section III - Results		**Source**

VERVIERS – CITY LEVEL		
Environment	–	
Network	–	
Economy	–	
Acceptability	–	
Equity	–	
Liveability	–	
Achievement of Green Paper Five Pillars Targets	– More fluid – Greener – Safer – More accessible	
Section IV – Information Dissemination		**Source**
Information dissemination on the scheme performed at city level	– Type of media used: o Internet o Meeting with retailers and schools	SURVEY
Section V – Scheme Legal Aspects		**Source**
Scheme Legal Framework[192]	–	
Relationships with Existing EU legislation/regulation	–	

[192] Type (air quality legislation, road codes prescriptions, etc.) and level of the legal basis (urban, regional, national); Enforcement authorities; Enforcement approach description (pricing, total traffic bans, traffic bans on specific vehicles, etc.); Existence of differentiation by type of vehicle, and related criteria; Critical aspects

Annex 10 – Consultation Phase Questionnaire Template

The following represents the questionnaire template the stakeholders have been asked to fill. It consists of two main sections: firstly 6 closed questions and then 4 open queries to elicit stakeholder's opinion and advice with regard to any access restriction schemes he/she may know or have experienced, either already in operation or only planned.

1) Overall, do you think that measures that aim at restricting traffic in urban areas are useful tools:

a. to reduce the environmental impact of transport

YES NO

b. to make transport more efficient?

YES NO

2) Would you be supportive of the implementation of an ARS in your city?

YES NO

Please, explain briefly why

.....
.....
.....
.....

3) With regard to private and public transport of passengers and goods, which are the main problems to be tackled in order to ensure liveability (quality of life) of European cities and towns? (Please, assign a score from 1= marginal to 5= crucial)

Key issues affecting liveability in town	1	2	3	4	5
1. Congestion					
2. Scarce use of public transport					
3. Greenhouse gases emissions due to fuel consumption					
4. Local emission of pollutants (combustion gases, dusts, heavy metals…)					
5. Air quality impacts on human health					

Key issues affecting liveability in town	1	2	3	4	5
6. Monuments, historical buildings, cultural heritages, infrastructures and urban green areas preservation					
7. Scarce sense of the common ownership of the city					
8. Scarce consideration of walking and cycling					
9. Road safety					
10. Scarce economic resources to be used by Municipality for transport and safety enhancement					
11. Other, please specify: …….					

4) Among the above issues, which are the ones that an Access Restriction Scheme can contribute to solve? (Please, list max 5 of them assigning a score from 1= weak or partial contribution to 5=major contribution).

Number of the issue	1	2	3	4	5
(e.g. 1 – Congestion)					

5) Assuming that an Access Restriction Scheme can contribute to improving urban quality-of-life, among the measures listed below, which ones do you think are the most effective? (Please, assign a score from 1=less effective to 5=most effective)

Access Restriction measures	1	2	3	4	5
Low Emission Zones based upon permit release (according to Euro standards)					
Access zone restricted to all vehicles with the exception of residents					

Access Restriction measures	1	2	3	4	5
Charged access based upon tariffs proportional to emissions levels (Euro standards)					
Congestion charging without any Euro standard differentiations (motorized private vehicles allowed to access the zone upon payment of a fee including goods delivering)					
Congestion charging according to Euro standard differentiation for all motorised private vehicles including lorries					
Extension of measures to include motorised two-wheelers					
Low Emission Zones for heavy duty vehicles					
Other, please specify: ……					

6) Among the social categories that are likely to be affected by an access restricted zone, which ones do you think will gain and which ones will lose? (Please, assign a score from 1= winner to 5= loser)

Social categories	1	2	3	4	5
All citizens also living far from the restricted zone					
Citizens living in peripheral rings					
Citizens living in the restricted traffic zone					
Business and economic activities inside the zone					
Economically disadvantaged people					
Elderly/disabled people					
Daily commuters of any job					
Other, please specify: ……					

In this section we would like to elicit your opinion and advice with regard to any access restriction schemes you may know or have experienced, either already in operation or only planned.

7) Do you have in mind any example of successful actions undertaken by a city with regard to an access restriction scheme? (You may refer to e.g. technicalities, informative aspects , consultations undertaken, marketing actions, legal aspects, etc.)

8) Do you have in mind any example of unsatisfactory actions undertaken by a city with regard to an access restriction scheme? (You may refer to e.g. technicalities, informative aspects , consultations undertaken, marketing actions, legal aspects, etc.)

9) Do you think there are some aspects of the successful example you mentioned that could be divulged in order to turn into a best practice to be replicated elsewhere? If yes, please specify which ones and explain why. If not, please explain why.

10) Beside the promotion of best practices, which interventions do you think it could be useful to implement at EU level while complying with the subsidiarity principle?

Annex 11 – Opinions of the different groups of stakeholders

Member State Institutions

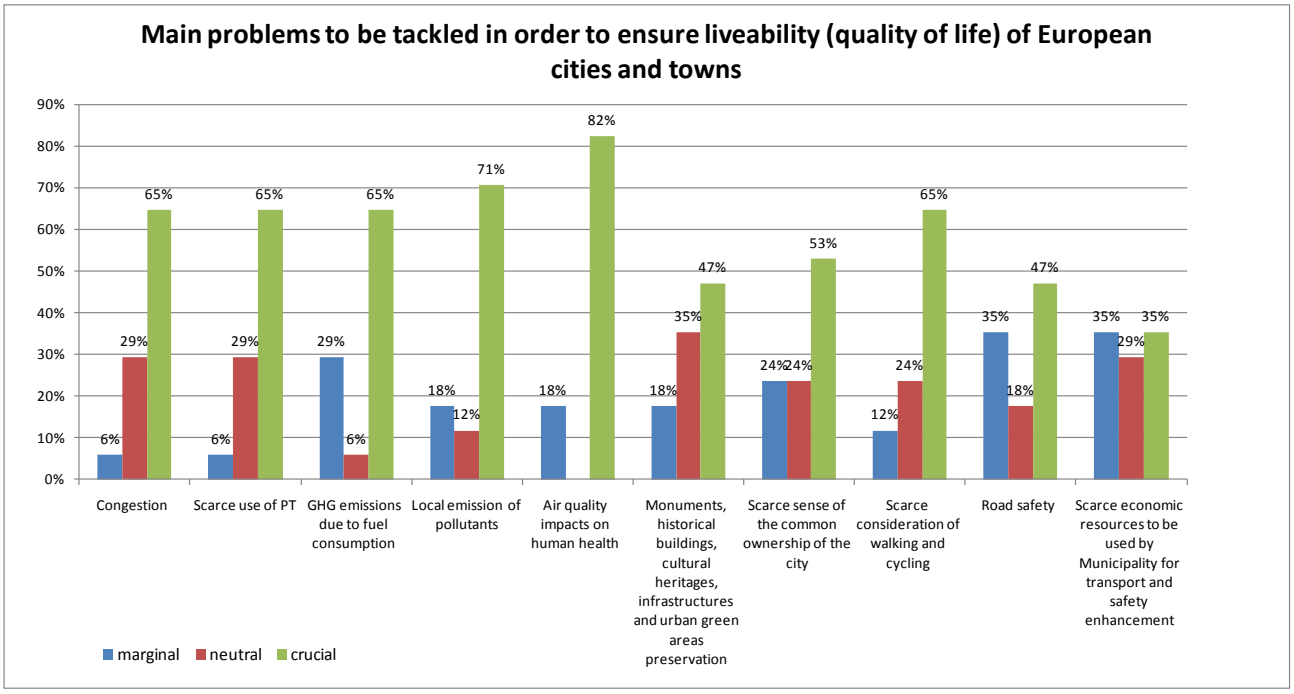

Figure 90 – Crucial problems to be tackled in cities: member state institution opinions

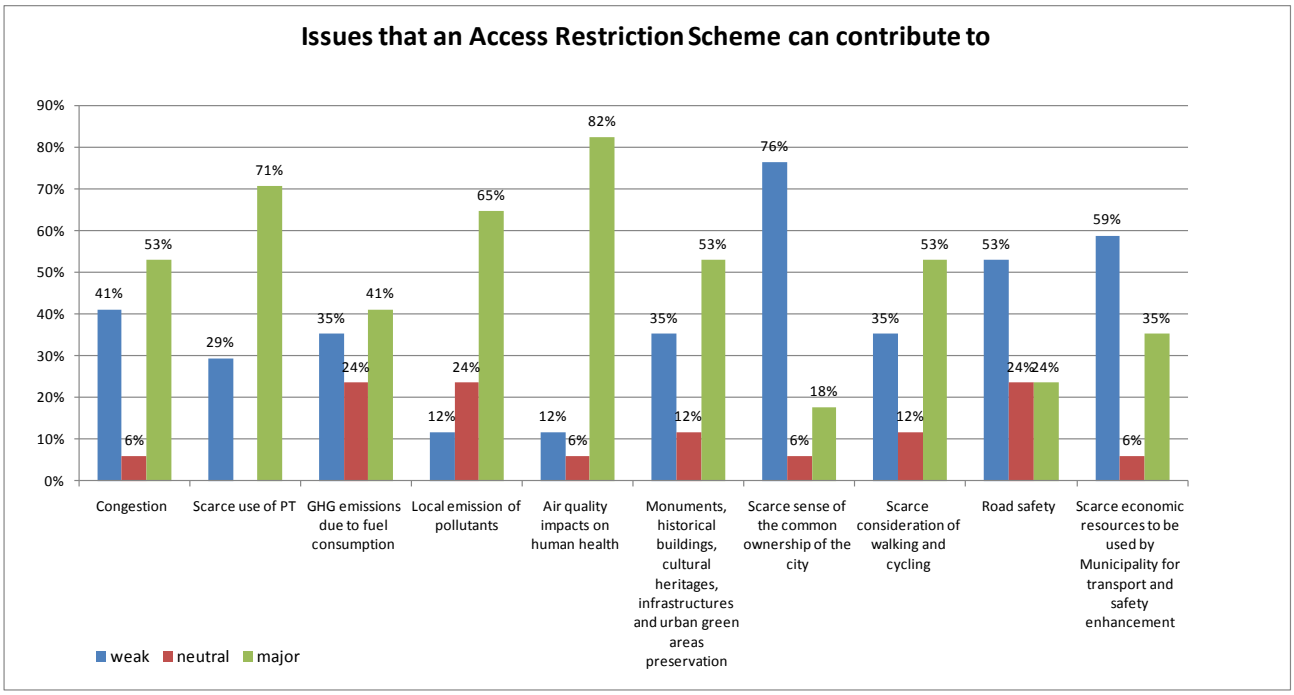

Figure 91 – Possible contributions of an Access Restriction Scheme: member state institution opinions

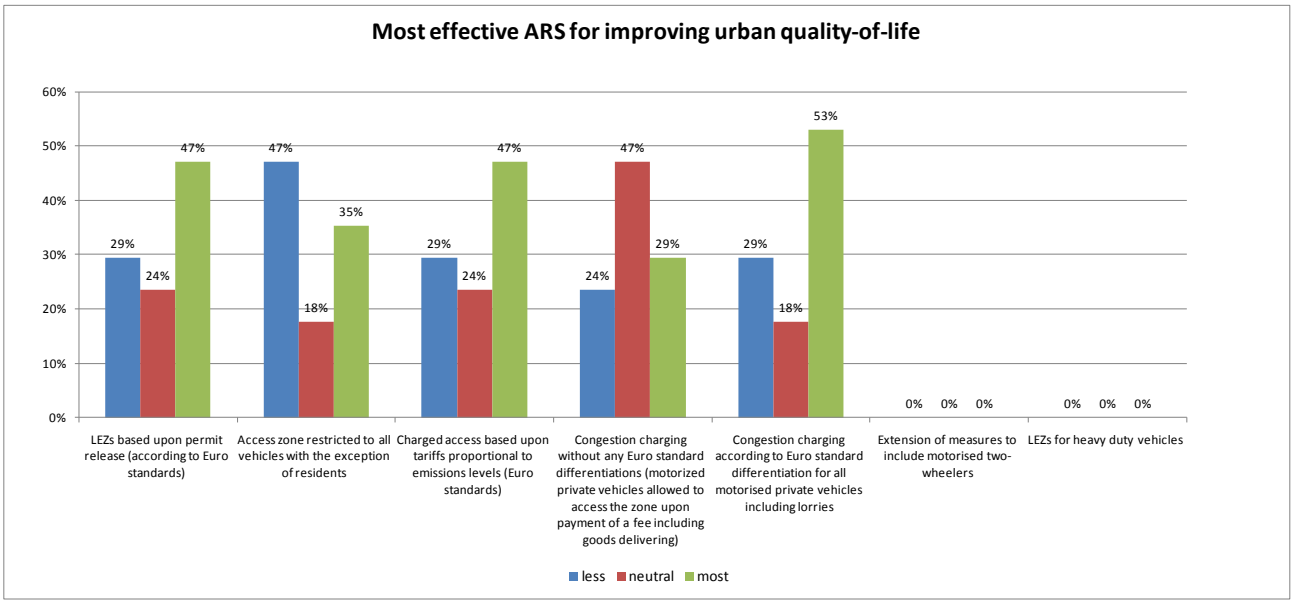

Figure 92 – Most effective Access Restriction Schemes: member state institution opinions

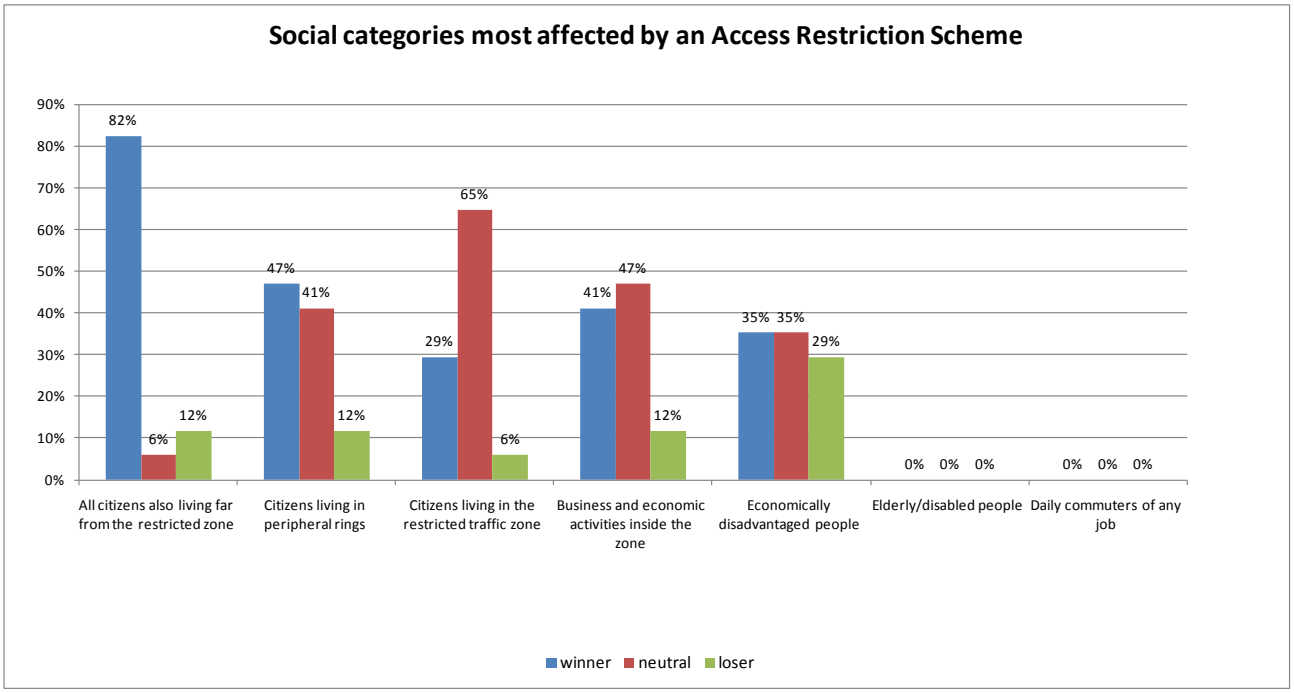

Figure 93 – Social categories most affected by an Access Restriction Scheme: member state institution opinions

Governmental Agencies

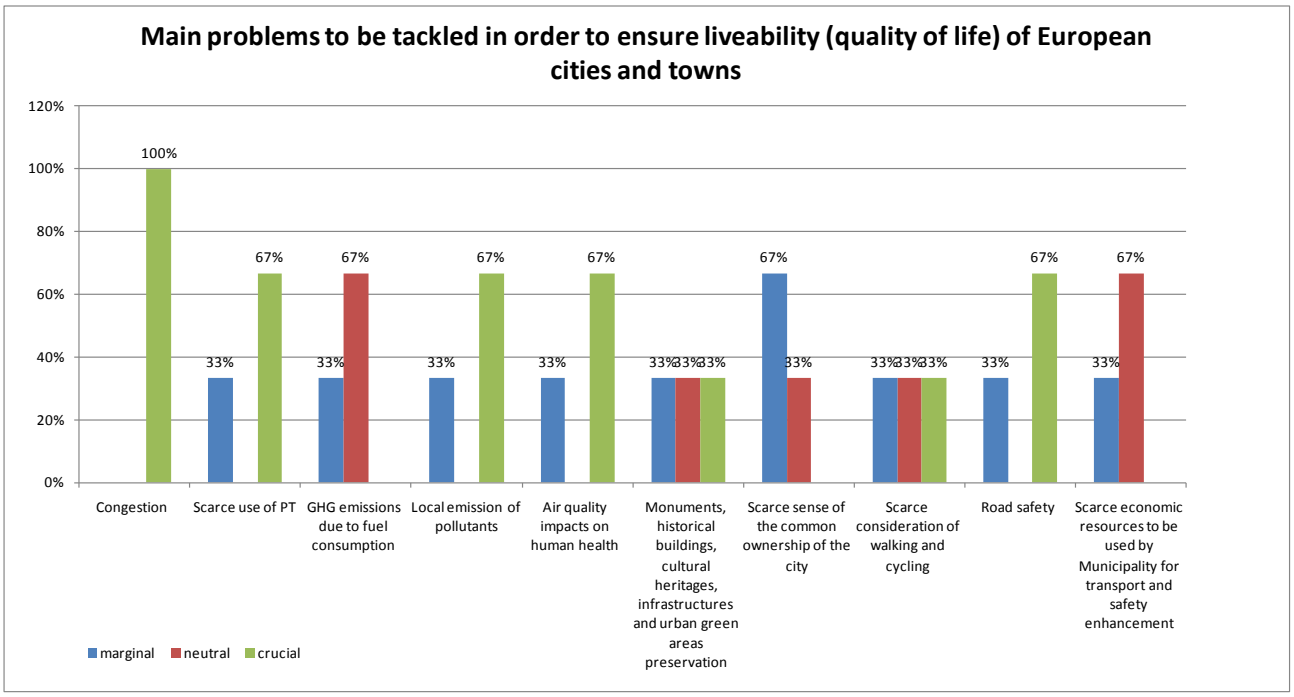

Figure 94 – Crucial problems to be tackled in cities: governmental agencies opinions

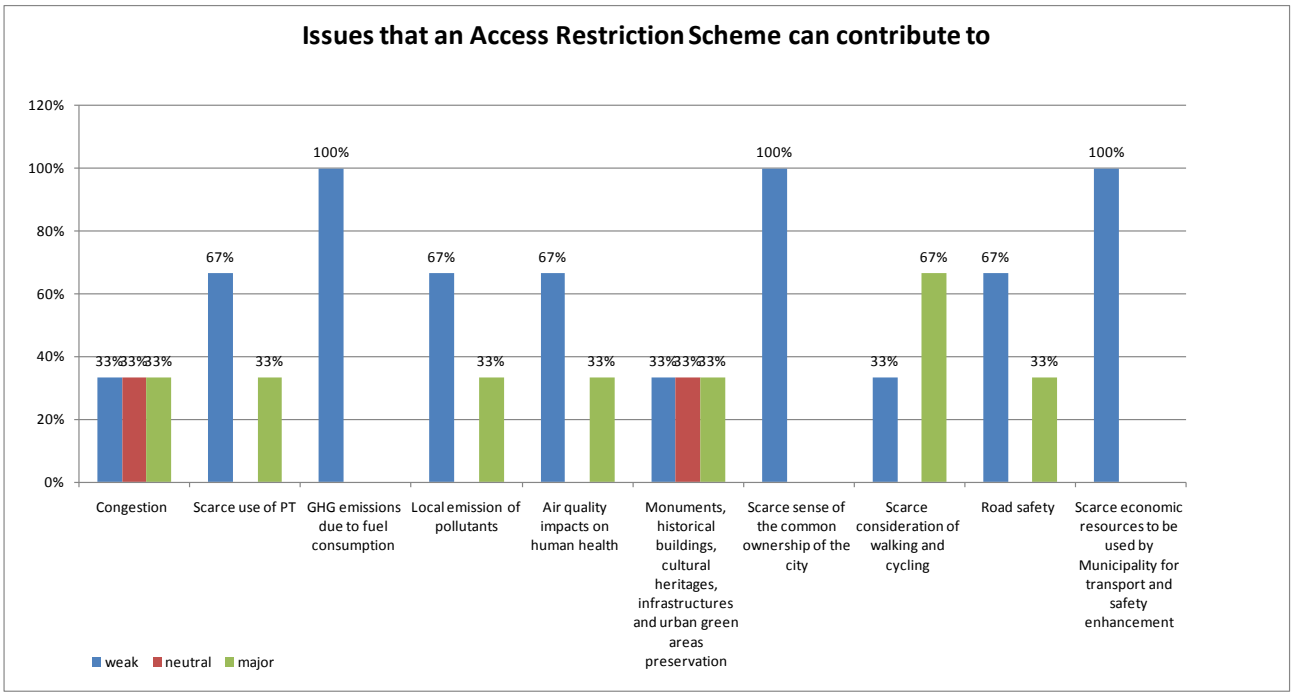

Figure 95 – Possible contributions of an Access Restriction Scheme: governmental agencies opinions

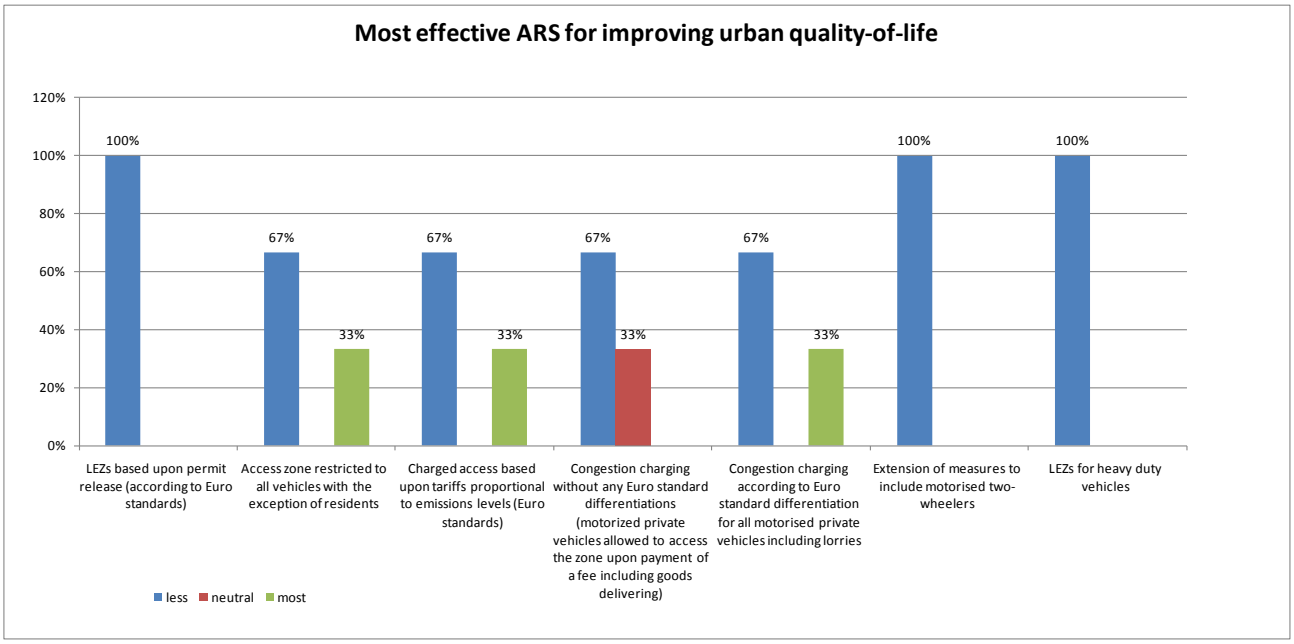

Figure 96 – Most effective Access Restriction Schemes: governmental agencies opinions

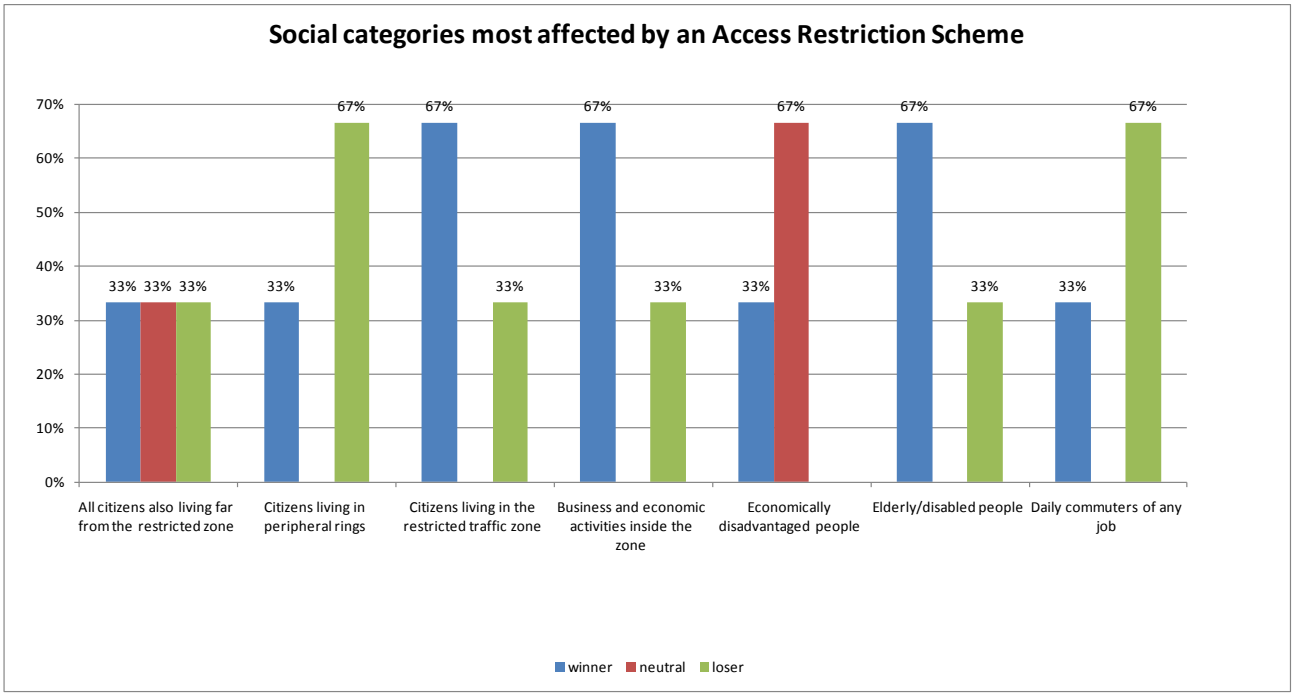

Figure 97 – Social categories most affected by an Access Restriction Scheme: governmental agencies opinions

Economic Players

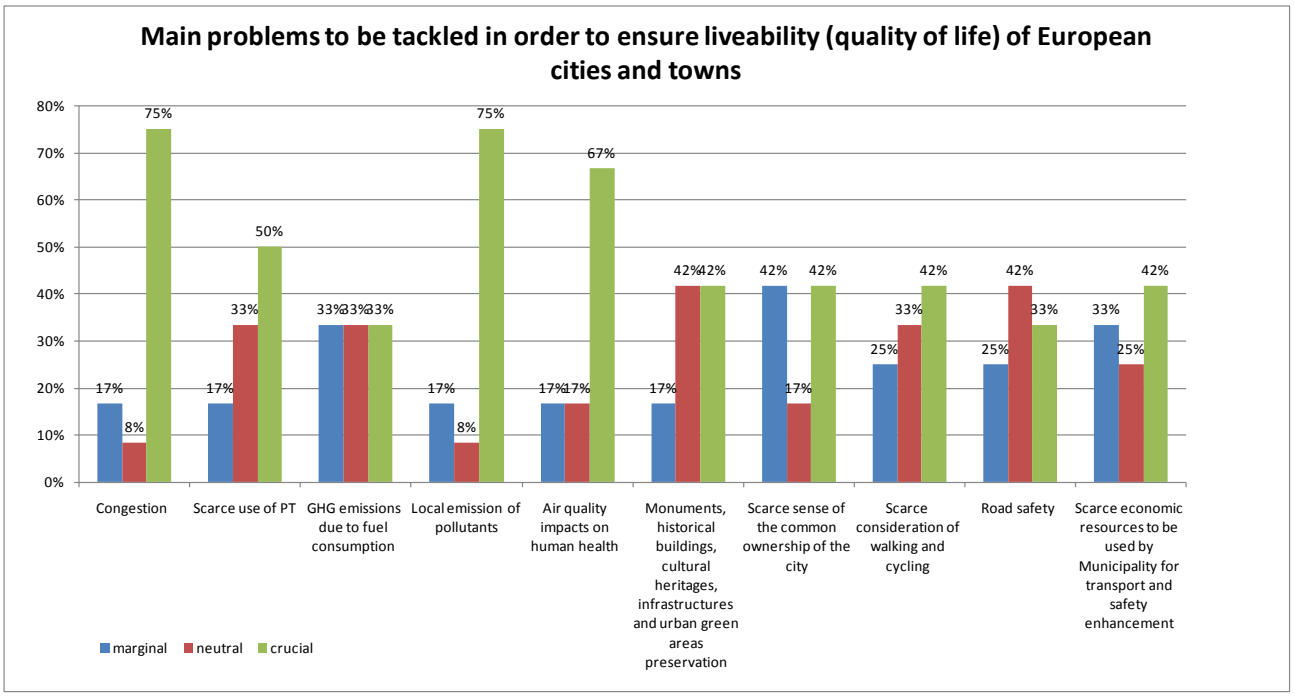

Figure 98 – Crucial problems to be tackled in cities: economic players opinions

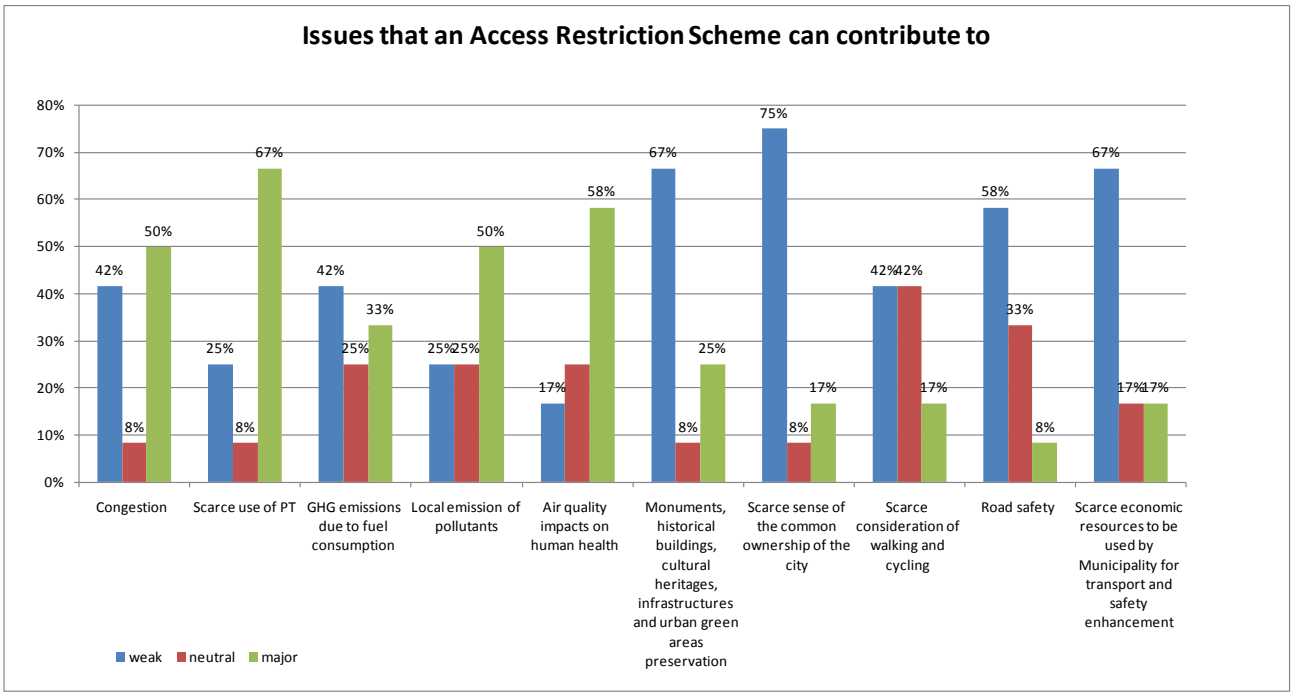

Figure 99 – Possible contributions of an Access Restriction Scheme: economic players opinions

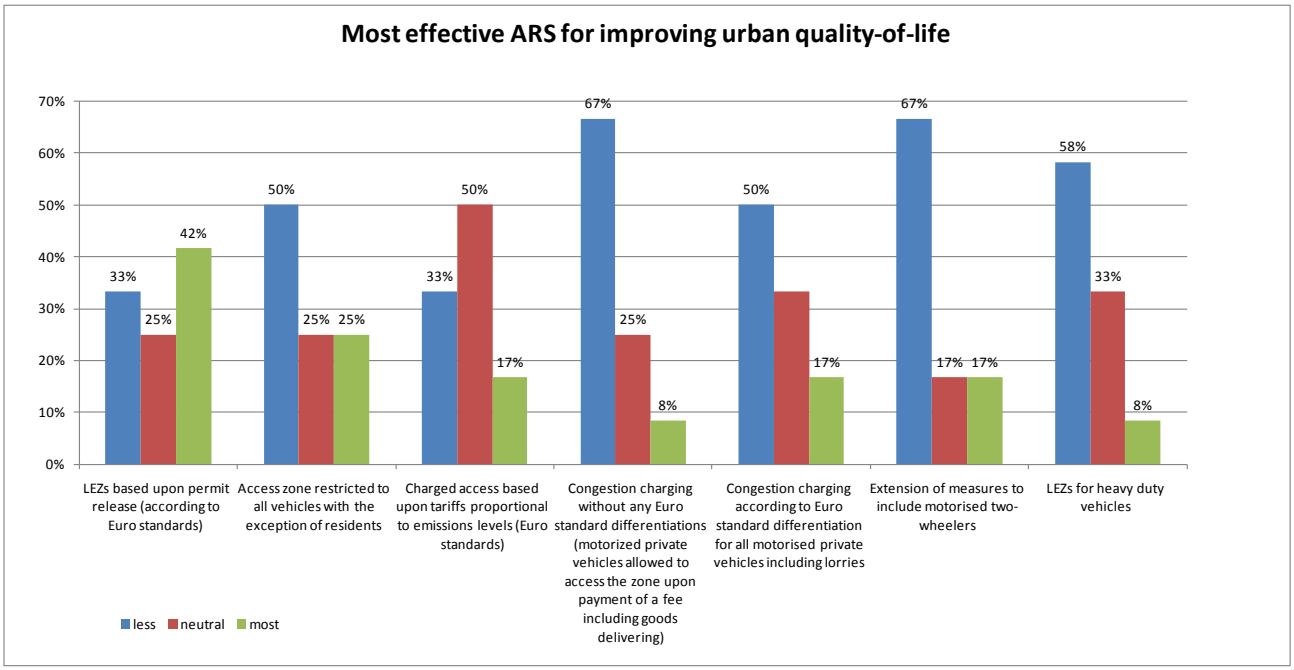

Figure 100 – Most effective Access Restriction Schemes: economic players opinions

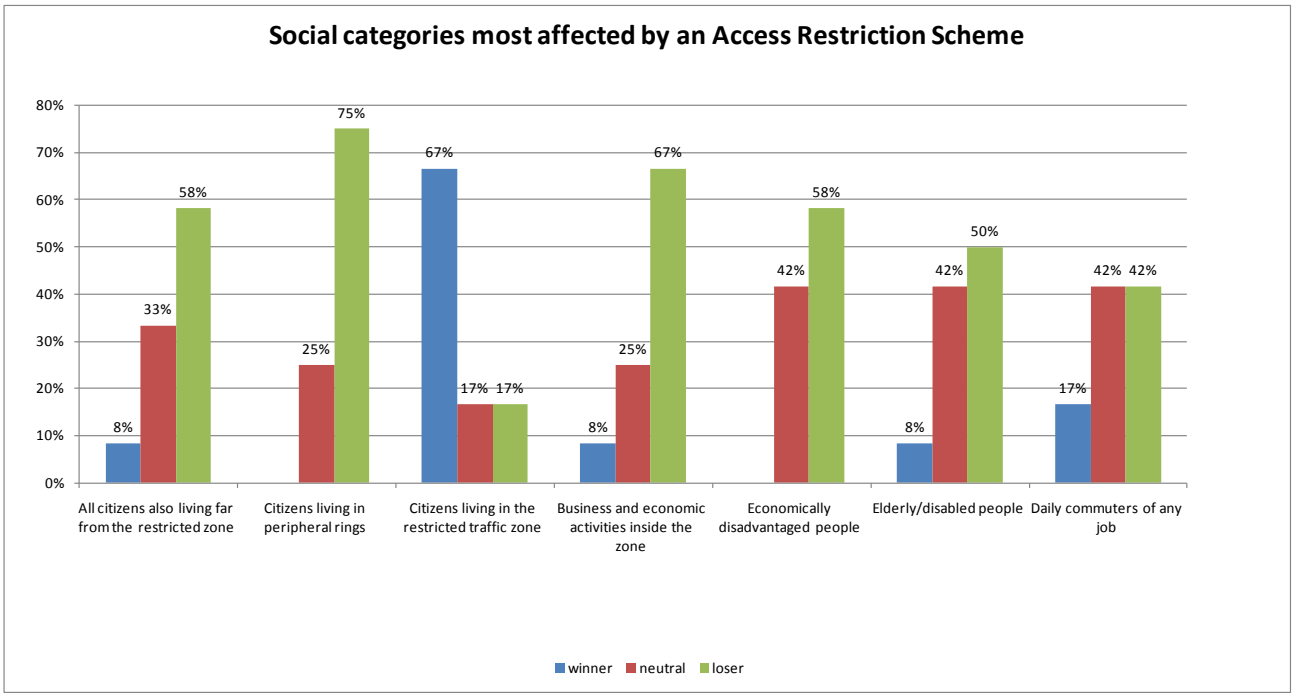

Figure 101 – Social categories most affected by an Access Restriction Scheme: economic players opinions

Citizens

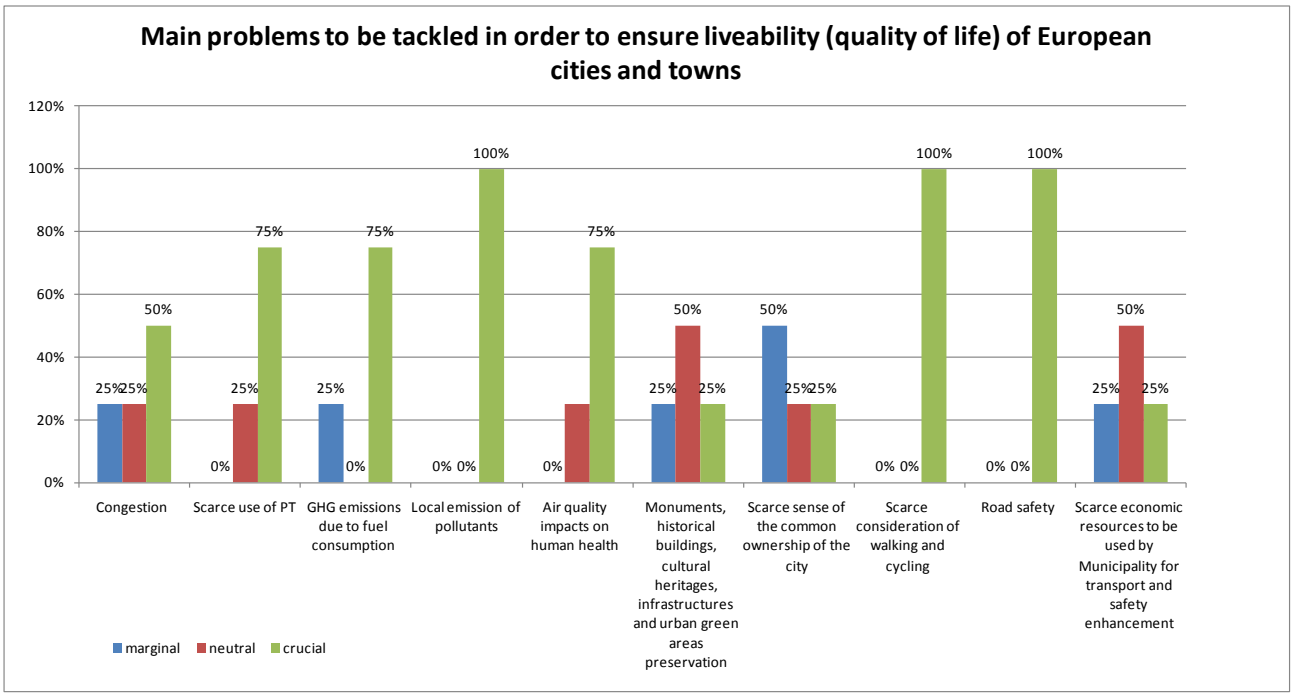

Figure 102 – Crucial problems to be tackled in cities: citizens opinions

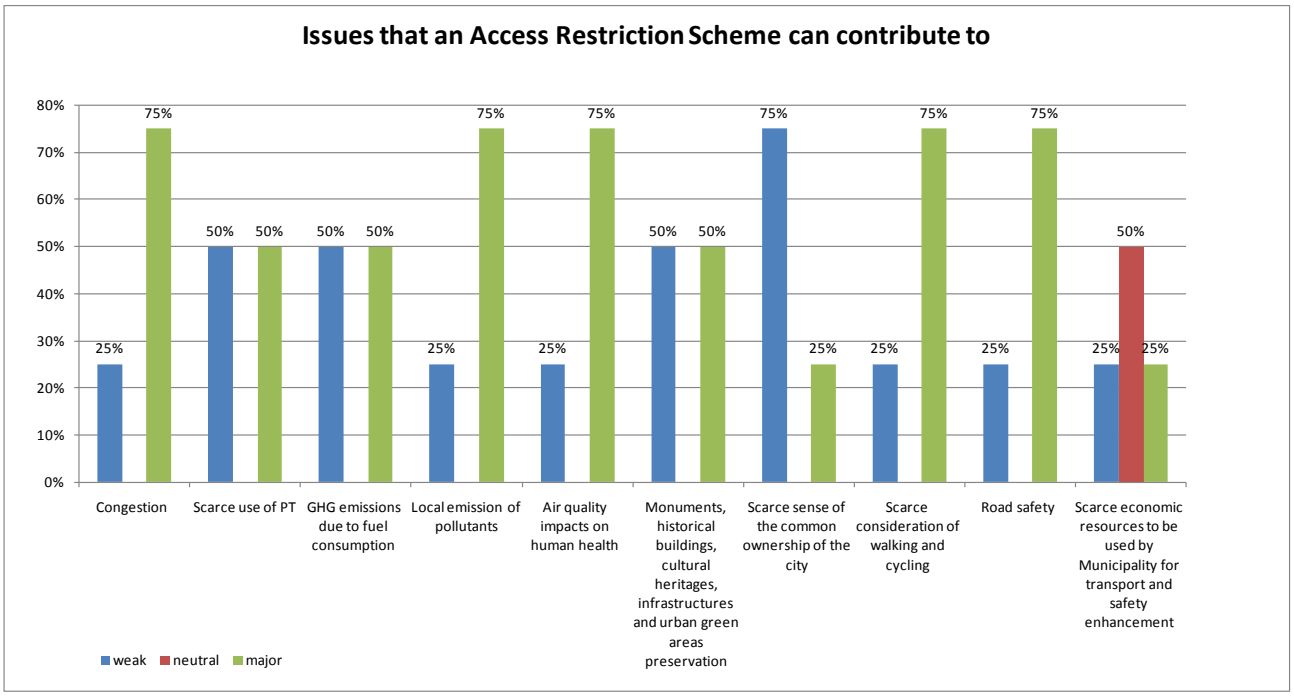

Figure 103 – Possible contributions of an Access Restriction Scheme: citizens opinions

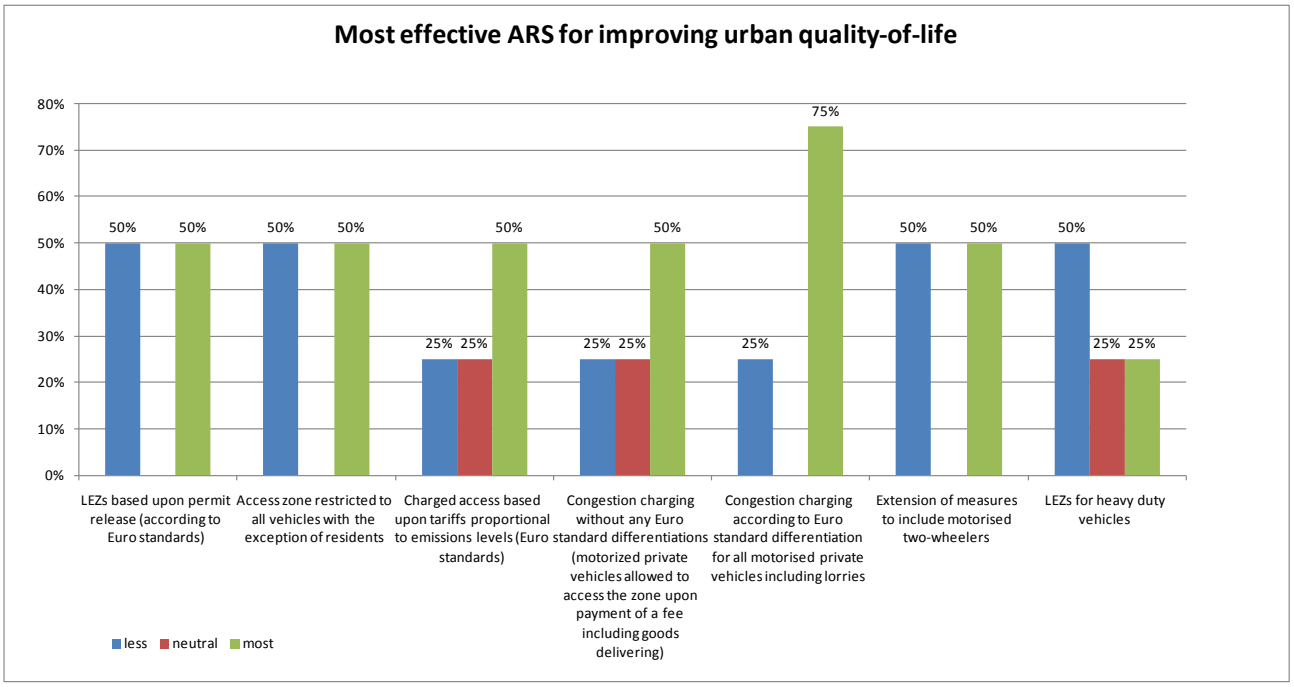

Figure 104 – Most effective Access Restriction Schemes: citizens opinions

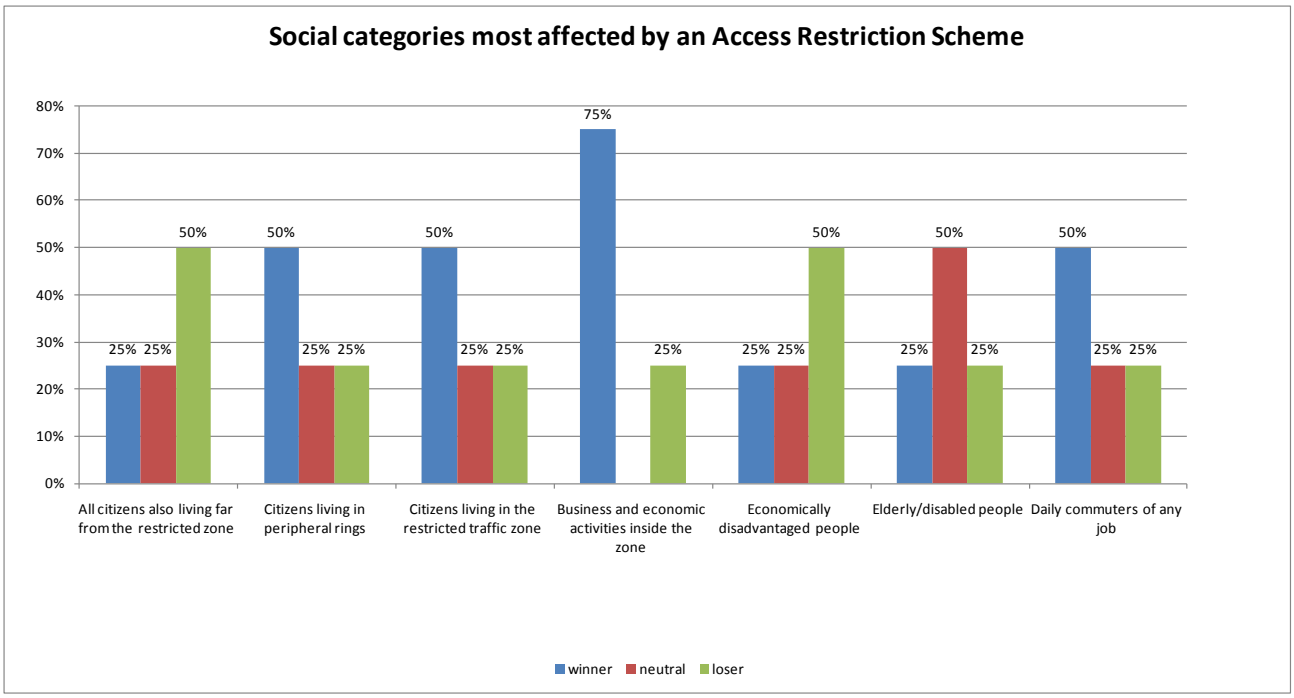

Figure 105 – Social categories most affected by an Access Restriction Scheme: citizens opinions

Academia and Research Organisations

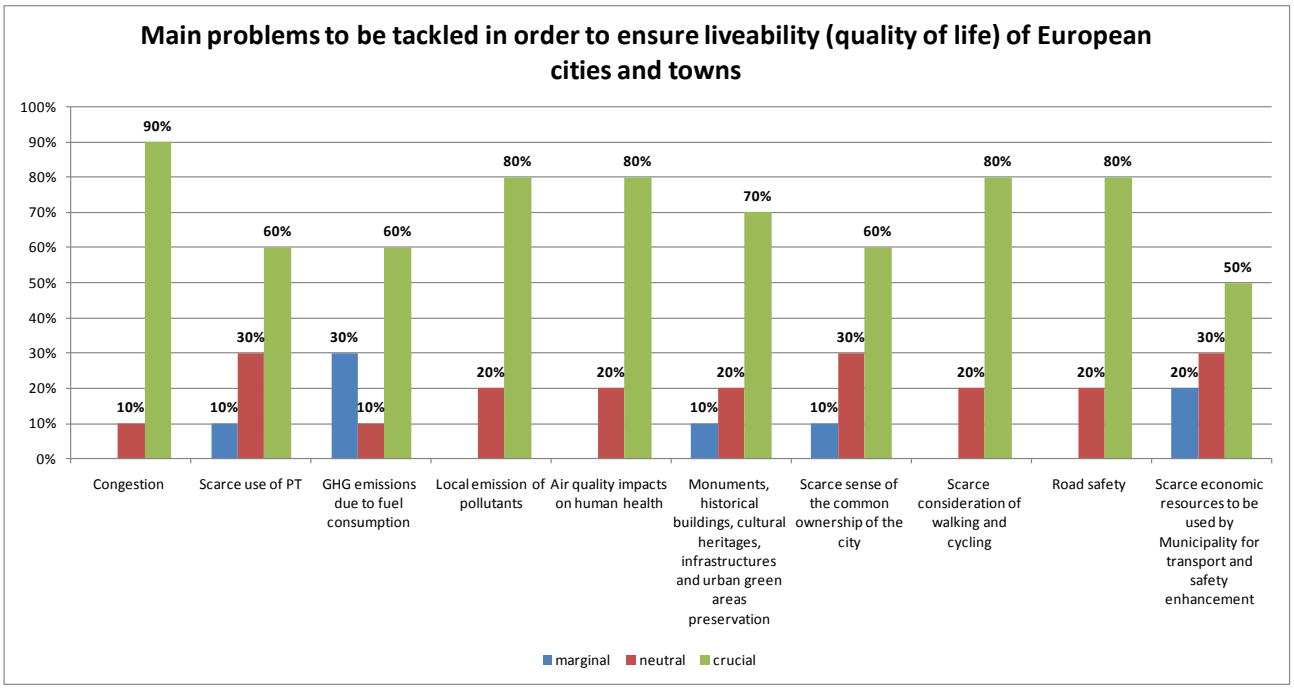

Figure 106 – Crucial problems to be tackled in cities: academia and research organisations opinions

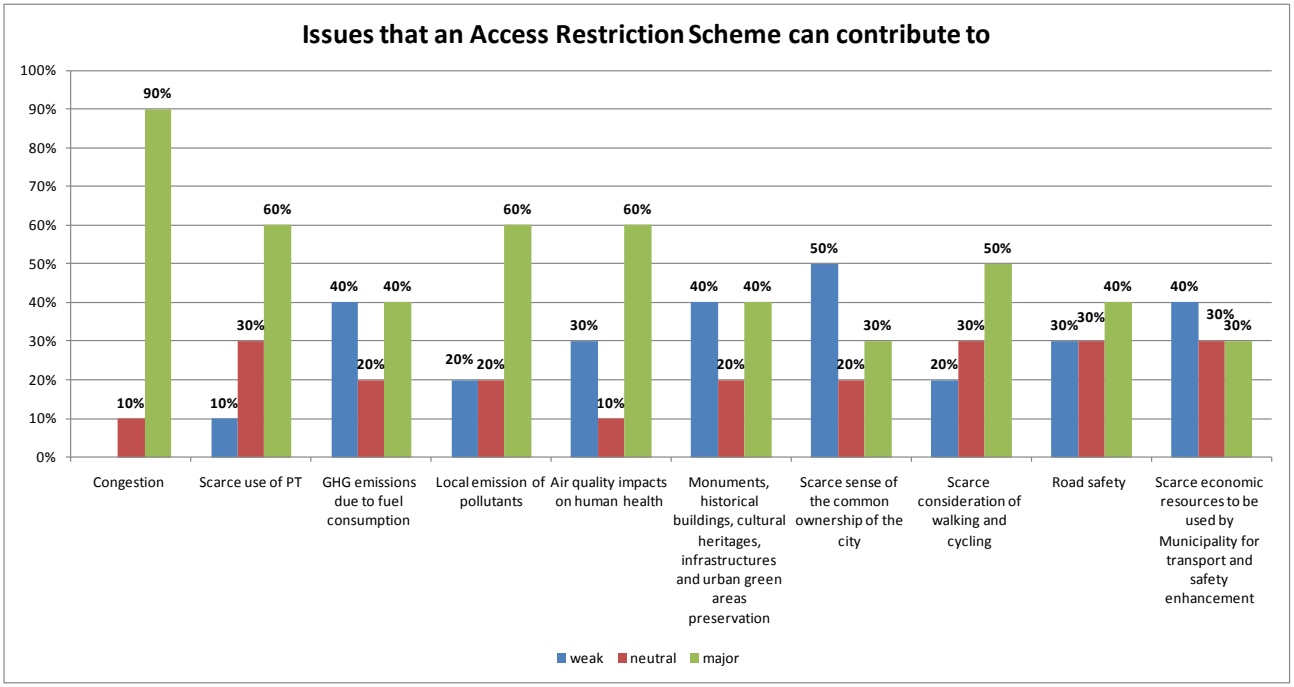

Figure 107 – Possible contributions of an Access Restriction Scheme: academia and research organisations opinions

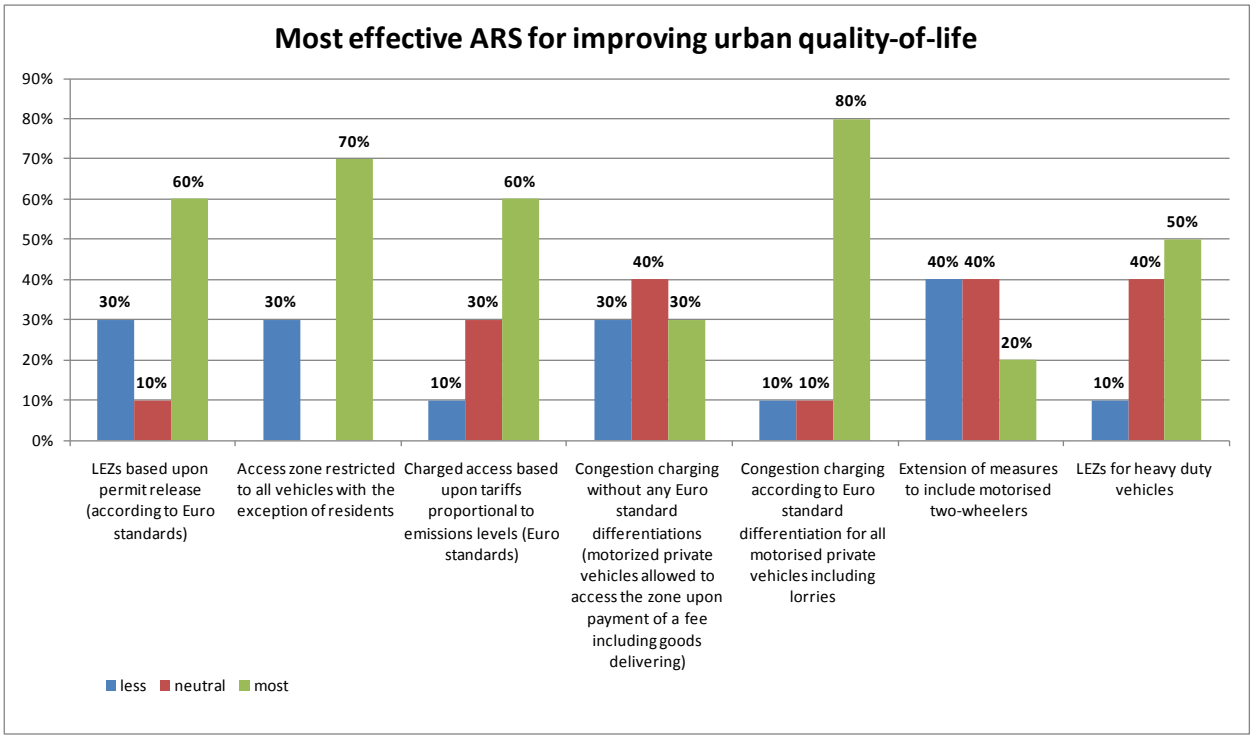

Figure 108 – Most effective Access Restriction Schemes: academia and research organisations opinions

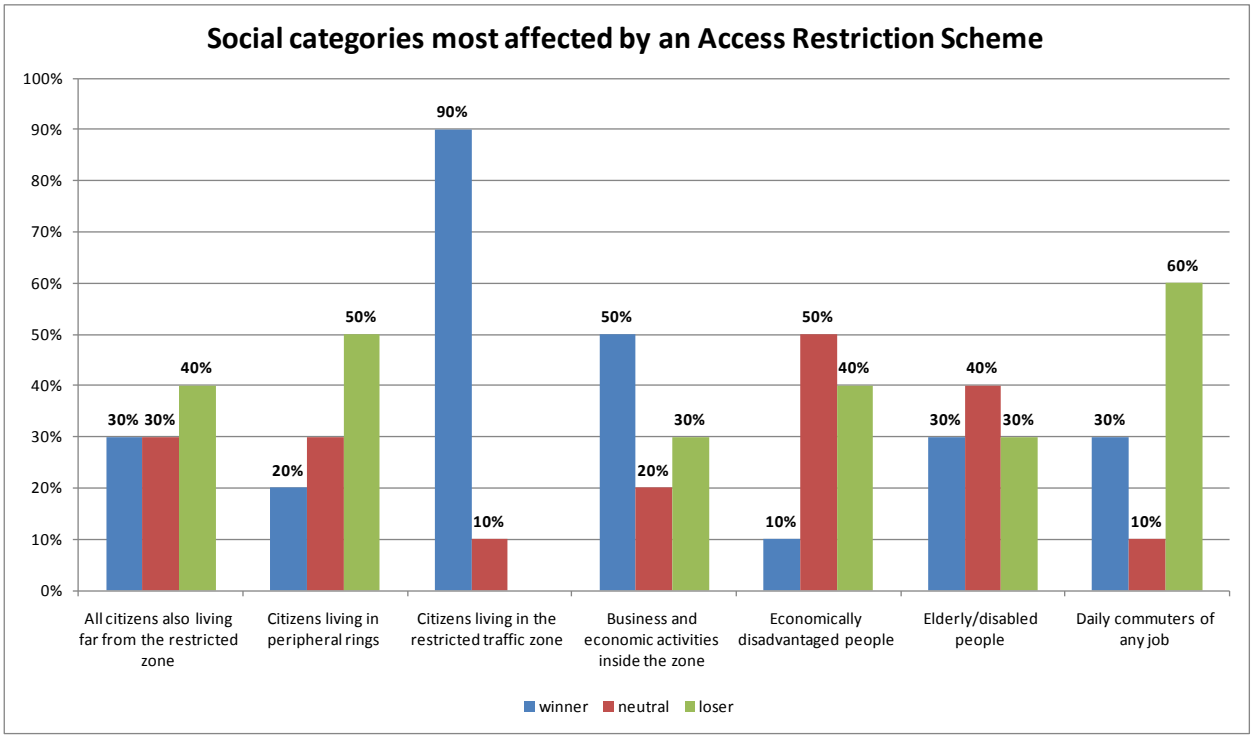

Figure 109 – Social categories most affected by an Access Restriction Scheme: academia and research organisations opinions

Private Consultancy Companies

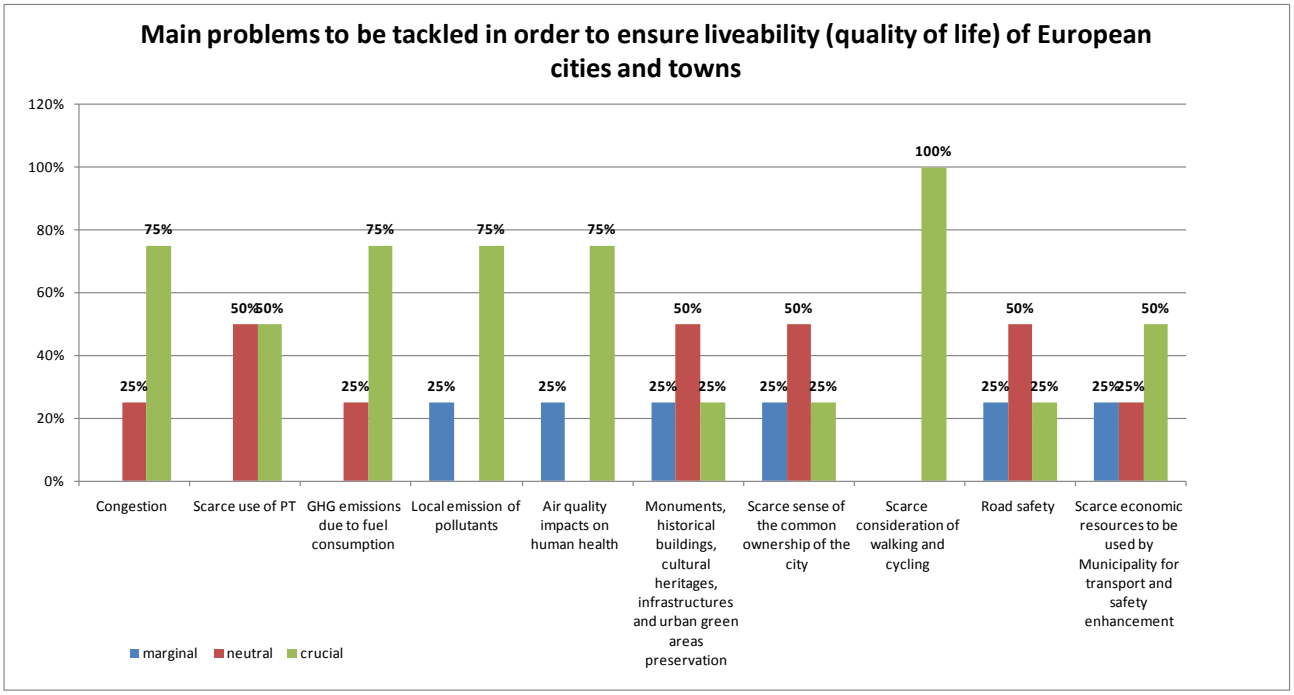

Figure 110 – Crucial problems to be tackled in cities: private consultancy companies opinions

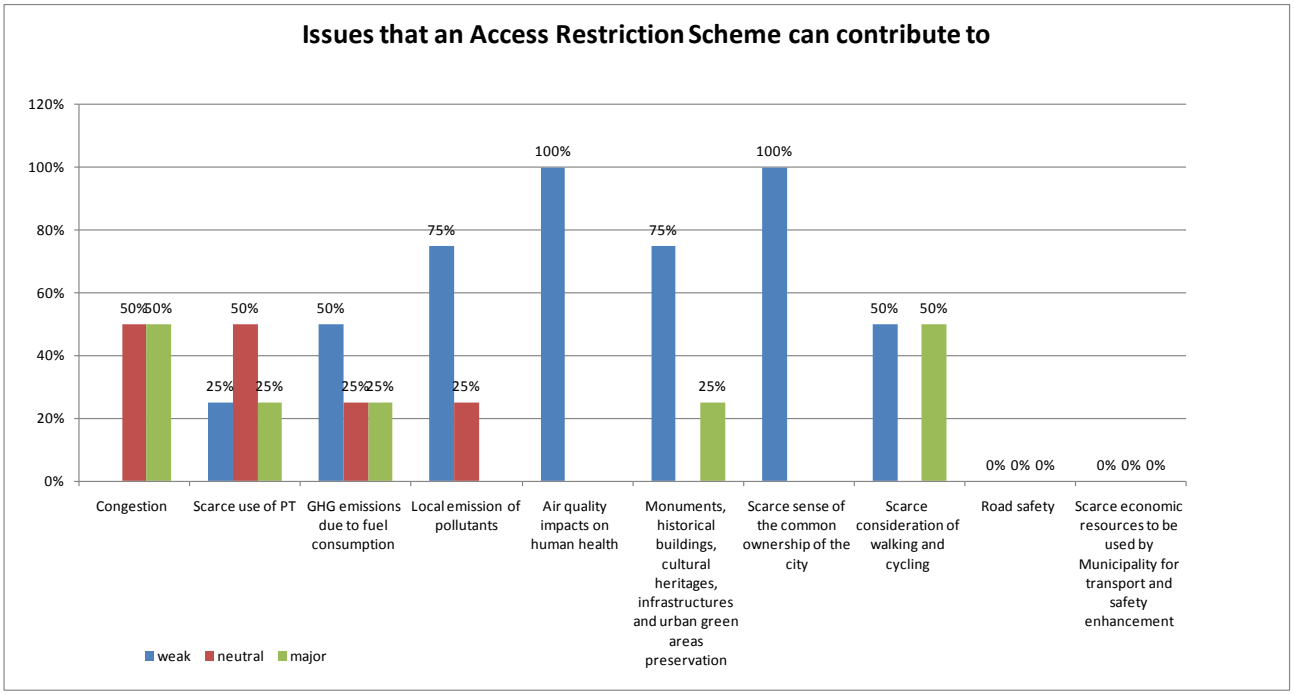

Figure 111 – Possible contributions of an Access Restriction Scheme: private consultancy companies opinions

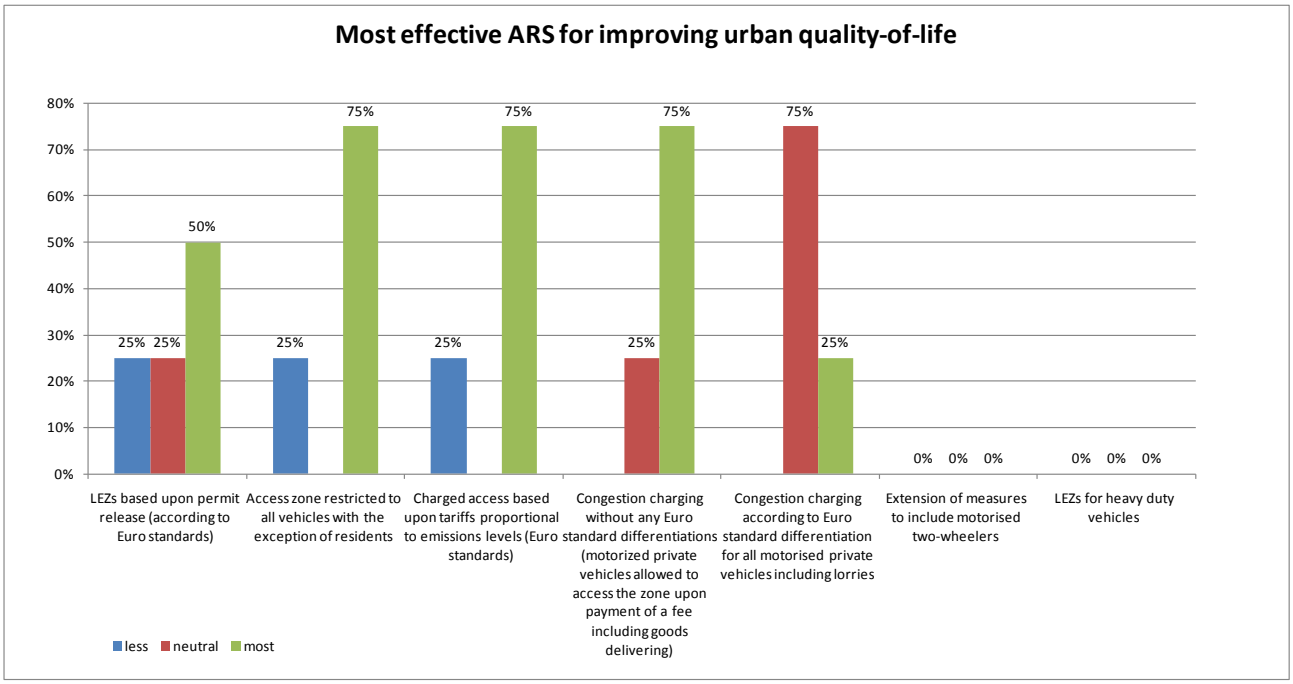

Figure 112 – Most effective Access Restriction Schemes: private consultancy companies opinions

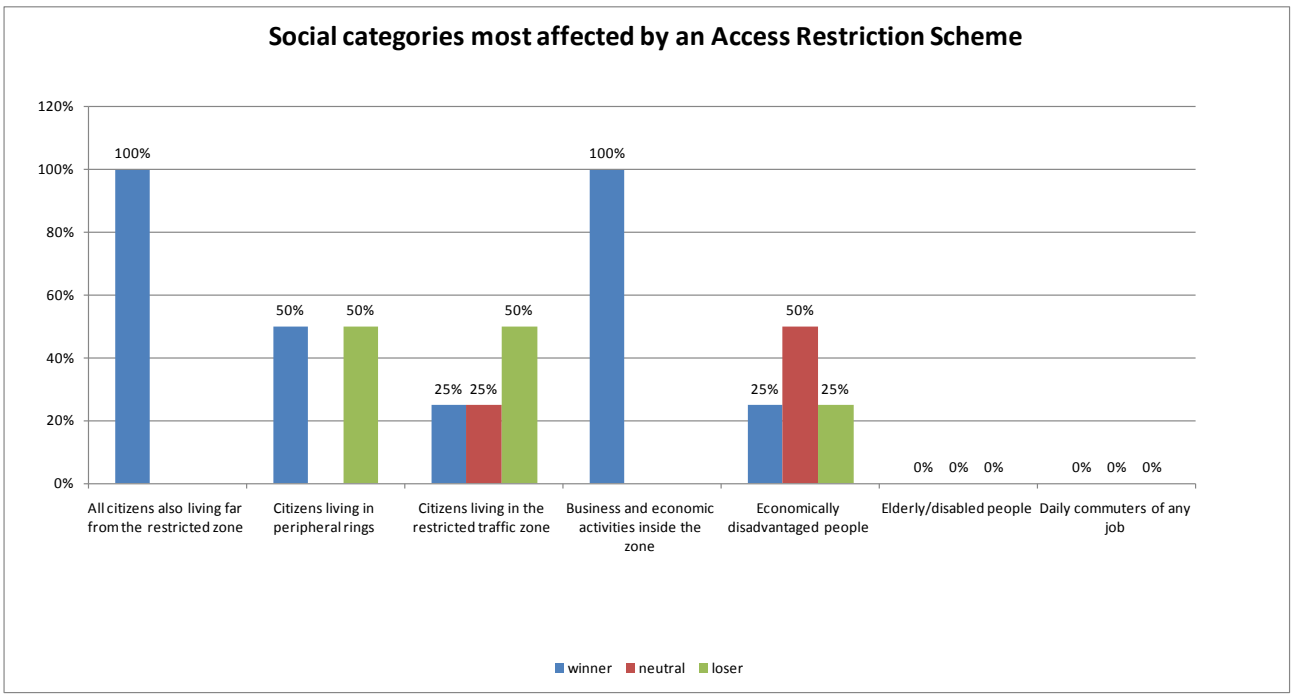

Figure 113 – Social categories most affected by an Access Restriction Scheme: private consultancy companies opinions

Annex 12 – Reference documents and sources of information

Table N – Studies providing data on existing ARS in specific cities

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
Deliverable D2.1 Best Practice Handbook Year 1 (2000)	BESTUFS I	2001	Best practices	Best practices on city access, parking regulations and access time regulations and enforcement support with respect to urban freight transport.	Case studies on: Barcelona, Paris, Copenhagen, Stockholm, Amsterdam, Haarlem, Tilburg, Groningen, Bremen, Genoa, Cordoba and Sevilla.	http://www.bestufs.net	The aims of BESTUFS I are to facilitate the establishment of personal connections and the widening of contact networks in the field of urban freight transport for all interested persons - without imposing any commitments or formal structures. BESTUFS is active since 2000 and currently maintained by EC funding.
The London Low Emission Zone Feasibility Study A Summary of the Phase 2 Report to the	AEA Technology Environment	2003	Feasibility Study	The study investigates the feasibility of an LEZ in London	London	www.tfl.gov.uk	

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
London Low Emission Zone Steering Group							
"Saddler Street Road User Charge Scheme Monitoring Report"	D. Harland, Durham City Council	2003	Report	Durham road user charging scheme	Durham		
Norwegian urban tolls	Farideh Ramjerdi, Harald Minken and Knut Østmoe	2004	Abstract	Norwegian urban tolls	Bergen, Oslo, Trondheim, Stavanger, Kristiansand		
Report from the Working Group on Environmental Zones Exploring the issue of environmentally -related road traffic restrictions	Joint Expert Group on Transport and Environment	2005	Final Report	Environmental problems and legislative framework Overview of implemented and planned schemes introducing environmental zones affecting road transport Discussion of the key issues/elements/distinctions motivating the introduction of road traffic restrictions The need and scope for action at community level Conclusions and recommendations	Overview of implemented and planned schemes: Sweden - Stockholm, Göteborg, Malmö and Lund; Denmark - Copenhagen; UK - London; Norway; Italy - Region of Lombardia and Rome.	http://circa.europa.eu	

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
"Piano Generale del Traffico Urbano" (General Urban Traffic Plan)	Comune di Bologna	2006	PGTU	LTZ scheme	Bologna	Piano Generale del Traffico Urbano Bologna	
Review of Transport for London's Assessment of Business and Economic Impacts of the Congestion Charge in Chapter 6 of Impacts Monitoring – Third Annual Report 2005	TfL	2006	Report	Business and economic impacts of London congestion charge	London	TfL Impacts of Congestion Charging	
Good Practice Guide	URBAN TRANSPORT BENCHMARKING INITIATIVE	2006	Good practices guide	Congestion Charging Scheme in London Access Restriction in Rome	London and Rome	www.eltis.org/docs	The aim URBAN TRANSPORT BENCHMARKING INITIATIVE is to raise awareness of the potential for performance benchmarking to encourage

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
							transport stakeholders in cities to adopt best practices which could improve their urban transport networks.
The Stockholm Trial. Effects on air quality and health. City of Stockholm Environment and Health Administration	City of Stockholm	2006	Report	Stockholm congestion charge scheme impacts on environment and health	Stockholm	Stockholm Trial Effects	
Equity effects of the Stockholm trial	TRANSEK	2006	Report	Equity effects of the Stockholm trial	Stockholm	Equity Effects of the Stockholm Trial	
Deliverable D 2.2 Best Practice Handbook (Year 2006)	BESTUFS II	2006	Best practices	The Best Practice Handbooks aims at: Giving information and hints about innovative ongoing strategies, concepts and activities in European countries; Providing knowledge and experiences of completed and running projects and	Case studies on: Access restrictions Enschede (Netherlands); New regulation of city access in Montpellier (France); Lorry guiding	http://www.bestufs.net	BESTUFS II is a follow-up initiative of the BESTUFS project and aims to maintain and expand an open European network between urban freight transport experts, user

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
				actions; Providing contacts for further information. In particular, topics of interest are the city access restriction schemes consisting of an overview on national situations and relevant projects, case studies (Best Practices) and experience, conclusions and recommendations.	network in Bremen (Germany); Truck total-weight restriction zone Budapest (Hungary); London Low Emission Zone (UK); Namur Pedestrian Zone Deliveries (Belgium).		groups/associations, ongoing projects, the relevant European Commission Directorates and representatives of national, regional and local transport administrations and transport operators in order to identify, describe and disseminate best practices, success criteria and bottlenecks with respect to City Logistics Solutions (CLS).
Environmental Zones in European Cities: impacts and opportunities for urban freight	BESTUFS II	2008	Workshop	The workshop aims to assess planning, policy-making, decision-making and implementation related to environmental zones in European cities and what these mean to urban freight focusing on: Framework legislation; Success and failure factors in the processes (planning, policy-making and decision-making); Restrictions and incentives used in different cities; Roles of and	Presentations for the following areas: Spain - Madrid. The Netherlands, Germany - Cologne;UK - London; Italy - Bologna; Romania - Suceava; France - Montpellier; Sweden - Göteborg.	http://www.bestufs.net	

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
				cooperation between operators (or associations), retailers, shop-keepers and citizens;Impacts on traffic and transport.			
Proposed London Low Emission Zone Greater London Low Emission Zone Charging Order 2006 Report to the mayor following consultation with stakeholders, businesses, other organisations and the public	TfL	2007	Report to Mayor	Low Emission Zone Scheme Order	London	www.tfl.gov.uk	
Business case guidance for the road pricing element of the TIF Package	TfL	2007	Report	This guidance is to help local authorities in England in developing the road pricing element of their business cases for TIF Programme Entry.	UK	Business Cases for TIF Programme Entry	
Transport	TfL	2007	Report	This report provides	UK	TAG Modelling Road Pricing	

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
Analysis Guidance (TAG) – Modelling Road Pricing				guidance on modelling requirements when projects include road pricing schemes.			
Appraisal of Road Pricing Options	TfL	2007	Report	The report draws heavily on the existing guidance in outlining the approach that should be followed in appraising road pricing options.	UK	Appraisal of Road Pricing Options	
Measuring the Social and Distributional Impacts of Road pricing Schemes	TfL	2007	Report	The report provides guidance on requirements for measuring social and distributional impacts using social research methods when projects include road pricing schemes.	UK	Social and Distributional Impacts of Road Pricing	
Stockholm Congestion Charges – Forecasts and Reality	Eliasson J., Brundell-Freij K. – WSP Analysis&Strategy	2007	PPT presentation	Stockholm congestion charge case study	Stockholm	Stockholm Congestion Charge Forecasts and Reality	
Berlin´s Environmental Zone from 2008 What drivers need to know	Berlin's Senate Department for Health, Environment and Consumer	2007	Report	Environmental zone	Berlin	www.berlin.de	

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
	Protection						
Public Acceptability of Road User Charging: The Case of Edinburgh and the 2005 Referendum	University of Edinburgh	2007	Transport Reviews article	Principal factors responsible for the public's overwhelming opposition to the Edinburgh's scheme.	Edinburgh	Edinburgh Referendum 2005	
Rapporto sulla Sostenibilità urbana	Comune di Bologna	2008	PPT presentation	LTZ scheme	Bologna		
Reducing of emissions by environmental zone in Prague, Czech Republic	downloaded from ELTIS website	2008	Fact sheets	Environmental zone	Prague (Czech Republic)	www.eltis.org	
Central London Congestion Charging Impacts monitoring Sixth Annual Report, July 2008	TfL	2008	Monitoring report	Impact of congestion charging scheme	London	www.tfl.gov.uk	
Cleaner air for Greater London "The Low	TfL	2008	Leaflet	Low Emission Zone	London	www.tfl.gov.uk	

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
Emission Zone is now in operation"							
How TfL determine whether your vehicle meets the emissions standards for the London Low Emission Zone (LEZ)	TfL	2008	Guidelines	How TfL determines the compliance status of the vehicles	London	www.tfl.gov.uk	
Future solutions for goods distributions START final report	START project	2008	Final Report	The aims of the Access restriction work package have been: Definition of the restriction of vehicle access into specific areas; Recommendations for changes of load-factor-restriction to be implemented in national and local legal frameworks; Acceptance from the freight business for regulation of specific areas; The assessment of user reactions, barriers and	Bristol (UK), Göteborg (Sweden), Ljubljana (Slovenia), Ravenna (Italy) and Riga (Latvia)	www.start-project.org	The START project started off as a joint initiative by the five partner cities Göteborg, Bristol, Ljubljana, Ravenna and Riga. The aim of START is to develop and implement sustainable city logistics and urban freight solutions.

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
				drivers; The transfer of knowledge between project partners and externally.			
Deliverable D3: Case Study Results Report	CURACAO	2009	Case Study	Collection of case studies from real life in the leading cities in the field of urban road user charging. The initial phase of pre-screening of the CURACAO case studies aimed at gathering an inventory of: Priority objectives of the local Urban Road User Charging schemes; Readily available data, to be used for the establishment of a baseline; Already planned rounds of data collection, as part of regular monitoring by the local authorities.	CURACAO case studies: British case Studies - Bristol, London, Durham, Cambridge, Manchester, Edinburgh; Dutch Case Studies - The Hague/Spitsmijden, Dutch National Case Study, more pilots in preparation of the national kilometre-charging scheme; Italian Case - Rome, Milan, Bologna; Norwegian Case Studies - Oslo, Trondheim,	http://www.curacaoproject.eu	The aim of CURACAO has been to support the implementation of urban road user charging as a demand management tool in urban areas.

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
					Bergen, Nord-Jæren; Swedish Case Studies - Stockholm.		
Fact sheets: case studies	CURACAO	2009	Fact sheets	Case studies fact sheets on road user charging	Bergen, Bologna, Bristol, Cambridge, Durham, Dutch National Scheme, Edinburgh, London, Manchester, Milan, Nord J-ren, Oslo, Rome, Stockholm, The Hague and Trondheim.	http://www.curacaoproject.eu	
"Monitoraggio Ecopass: Gennaio-Dicembre 2008"	Comune di Milano	2009	Report	Ecopass scheme results	Milan	Ecopass 2008 Report	
"Monitoraggio Ecopass: Primo Semestre 2009"	Comune di Milano	2009	Report	Ecopass scheme results	Milan	Ecopass 2009 Report	
Extended environmental	CIVITAS	2009	Fact sheets	Environmental zone	Malmö (Sweden)	www.civitas-initiative.org	

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
zone for heavy vehicle and enforcement - Malmö/Sweden							
Introduction of a Low Emission Zone (LEZ)	CIVITAS	2009	Website	Low Emission Zone	Norwich (UK)	www.civitas-initiative.org	
Implementation of the Umweltzone (Environmental Zone) in the city centre of Berlin	downloaded from ELTIS website	2009	Fact sheets	Environmental zone	Berlin (Germany)	www.eltis.org	
Bremen Environmental zone: emission allowance for voluntary vehicle fleet upgrades of enterprises	downloaded from ELTIS website	2009	Fact sheets	Environmental zone	Bremen	www.eltis.org	
Enforcement of access restrictions in Krakow/Poland	downloaded from ELTIS website		Fact sheets	Access restrictions	Krakow (Poland)	www.eltis.org	
Internet portal on Low Emission	Sadler Consultants		Website	Low Emission Zone (LEZ) schemes in Europe giving an	Details at local level for the	www.lowemissionzones.eu	

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
Zones in Europe				overview of the schemes in the different countries, with the scheme information and number of LEZs in operation or planning in the country.	following countries: Austria, Czech Republic, Denmark, Germany, Hungary, Italy, The Netherlands, Norway, Sweden and UK.		
Emissions standards	TfL		Website	LEZ emissions standards	London	www.tfl.gov.uk	
LEZ Map	TfL		Interactive map	Low Emission Zone	London	www.tfl.gov.uk	
Papers produced as evidence for the Edinburgh Congestion Charging Public Inquiry	Edinburgh City Council		Website	Edinburgh Congestion Charging Public Inquiry	Edinburgh	www.ititime.com	
Edinburgh's Transport Choices Consultation Results	Edinburgh City Council		Website	The website shows some of the main results of the public consultation on Edinburgh's transport strategy	Edinburgh	Edinburgh Consultation Results	

Table O – Other relevant studies

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
Road Pricing in Urban Areas	Swedish National Road Administration and T&E	2002	Report	Accessible and independent review of relevant knowledge on road charging in urban areas	Global	Road Pricing in Urban Areas	The report was originally produced in Swedish by the Swedish National Road Administration, for a Swedish audience. Still, the content is of general interest and certainly fills a gap in the international debate. It has been designed to present the information in an unbiased way.
International Perspectives on Road Pricing		2003	Report	Committee for the International Symposium on Road Pricing proceedings	Global	International Perspectives on road Pricing	
Deliverable D1.4 Recommendations for further activities (IV)	BESTUFS I	2004	Recommendations	Recommendations on access regulations with respect to urban freight transport.	European cities (no details at local level)	www.bestufs.net	BESTUFS I aims to facilitate the establishment of personal connections and the

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
							widening of contact networks in the field of urban freight transport for all interested persons - without imposing any commitments or formal structures. BESTUFS is active since 2000 and currently maintained by EC funding.
PROPOLIS EU project Final Report	K. Lautso, K. Spiekermann, M. Wegener, I. Sheppard, P. Steadman, A. Martino, R. Domingo, S. Gayda	2004	Report	Planning and Research of Policies for Land Use and Transport for Increasing Urban Sustainability		PROPOLIS Final Report	
Determining factors in traffic growth - Developments, causes and possible future directions	Umweltbundesamt (UBA)	2005	Report	Possible courses of action through which meaningful traffic reduction strategies can play a part in the achieving of political goals.	Germany	www.umweltdaten.de	

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
Fine particulates caused by urban traffic	Umweltbundesamt (UBA)	2006	Workshop	Experts of the Centre for Environmental Research (UFZ) at Leipzig-Halle, the Leibniz-Institute for Tropospheric Research (IfT) and the Federal Environment Agency (UBA) met in February 2005 in Leipzig for the workshop "Verkehrsbedingte Feinstäube in der Stadt" (Fine particulates caused by urban traffic). The experts discussed the impact of fine particles on human health as well as different measuring and modelling methods. Furthermore traffic-related measures to reduce levels of fine particulate matter in ambient air were presented.		www.umweltdaten.de	German document
Reduction of Energy Use in Transport	Joint Expert Group on Transport and Environment	2006	Final Report	Suggestions on the reductions of energy use in transport as an input to the discussions on the Green Paper on energy efficiency presented by the European Commission in June 2005. Measure of interest: Enabling EU-wide city tolls or	European Union	http://circa.europa.eu	

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
				access restriction zones.			
Road Charging Systems: Technology Choice and Cost Effectiveness		2006	Conference proceedings	The conference was organized in order to share experience in the design and implementation of electronic road charging systems. One of the objectives was to make this experience available to governments considering introducing new charging systems.	Austria, Germany, Russia, Sweden, Switzerland, The Netherlands, UK	Road Charging systems Technology and Costs	
BESTUFS WP 3.1 Report on urban freight data collection	BESTUFS II	2006	National reports	The national reports contain an overview of urban freight data collection.	Belgium, Switzerland, Germany, Spain, France, Hungary, Italy, Netherlands, Portugal, Sweden and UK.	www.bestufs.net	
Good Practice Guide on Urban Freight Transport	BESTUFS II	2007	Good practices guide	Guidance on the movement of freight in urban areas considering measures which may be implemented to improve the flows of products in urban areas and reduce the environmental impact of the operation. Subject of interest is the goods vehicle access and loading approaches in urban	European cities (no details at local level)	www.bestufs.net	BESTUFS II is a follow-up initiative of the BESTUFS project and aims to maintain and expand an open European network between urban freight transport experts, user

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
				areas.			groups/associations, ongoing projects, the relevant European Commission Directorates and representatives of national, regional and local transport administrations and transport operators in order to identify, describe and disseminate best practices, success criteria and bottlenecks with respect to City Logistics Solutions (CLS).
Workshop on "Climate Change and Environmental Issues in Transportation"	Umweltbundesamt (UBA)	2007	Workshop	The report summarises the workshop's results on "Climate Change and Environmental Issues in Transportation" on May 24th, 2007, which was organised by the Federal Environment Agency of	Global	www.umweltdaten.de	

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
				Germany, ten speakers presented ideas on how the responsibility of the transportation sector can be defined and quantified. Participants from the European member countries representing governments, parliaments, NGOs and universities discussed these ideas and suggested policy measures.			
Only cars with a sticker to pass through the environmental zone	Umweltbundesamt (UBA)	2007	Press release	Ordinance on marking of vehicles with low emissions (Kennzeichnungsverordnung für Kraftfahrzeuge)	Germany	www.umweltbundesamt.de	
Paying for Roads in the 21st Century With TDP Pricing	Bern Grush, Gabriel Roth	2007	Paper	On the basis of arrangements currently used in telecommunications systems, this paper describes a TDP (Time-Distance-Place) low-cost system to be used in road charging schemes.		Paying for Roads in 21th Century	
D 1.4 BESTUFS Policy and Research Recommendations IV	BESTUFS II	2008	Recommendations	Environmental Zones in European towns and cities; The European Commission and national legal frameworks for Environmental Zones;	Environmental Zones in European towns and cities for Sweden, Italy, Germany, UK, The	www.bestufs.net	

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
				Operator behaviour and costs as a result of Environmental Zones; Benefits of Environmental Zones; Recommendations on Environmental Zones.	Netherlands, Denmark and Norway.		
Low emission zones planned in Germany	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety	2008	Website	Low Emission Zone	Germany	www.bmu.bund.de	German language
Fact sheets: themes	CURACAO	2009	Fact sheets	Themes fact sheets on road user charging	Acceptability, Appraisal, Business Systems, Economy, Environment, Equity, Evaluation and Monitoring, Implementation, Objectives, Policy Recommendations, Predictions, Scheme Design, Technology, Traffic Effects and Transferability.	www.curacaoproject.eu	The aim of CURACAO has been to support the implementation of urban road user charging as a demand management tool in urban areas.

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
Low Emission Zones (Miljözon) in Sweden	downloaded from ELTIS website		Fact sheets	Low Emission Zone	Sweden	www.eltis.org	
Low Emission Zones (Miljøzone) in Denmark	downloaded from ELTIS website		Fact sheets	Low Emission Zone	Denmark	www.eltis.org	
Low Emission Zones (Milieuzone) in the Netherlands	downloaded from ELTIS website		Fact sheets	Low Emission Zone	The Netherlands	www.eltis.org	
Action Plan on Urban Mobility	COMMISSION OF THE EUROPEAN COMMUNITIES	2009	Action plan	The Commission will launch a study on the different access rules for the different types of green zones across the EU in order to improve knowledge on how the different systems work in practice. On the basis of the study results, the Commission will facilitate the exchange of good practices.	European Union	Action Plan on Urban Mobility	
Good Practice in the Exploitation of Innovative Strategies in Sustainable Urban Transport: City Interview Synthesis	UCTC - University of California Transportation Center	2009	Research paper	The review identified a series of key aspects of policy transfer which the literature suggests might be important in understanding the process of, advantages and barriers to transferring innovative transport policies.	Northern Europe (Leeds, Edinburgh, Stockholm, Copenhagen, Bremen and Lyon, Nancy) and North America (Vancouver, Dallas,		

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
					San Francisco and Seattle)		
Overview of low emission zones in Germany	Umweltbundesamt (UBA)		Interactive map	Low emission zones	Germany	LEZ in Germany	German language
Low emission zone / emissions-control windscreen sticker	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety	2009	Website	Low Emission Zone	Germany	www.bmu.bund.de	
Urban Transport Pricing in Europe			Website	The European Commission has funded a number of projects in the area of transport pricing, in order explore the technical, financial, operational, political and social issues associated with implementing road pricing projects. This website brings together links and information for a number of projects under the Fifth and Sixth Frameworks.	European Union	http://www.transport-pricing.net/	
KonSULT, the Knowledgebase on Sustainable Urban Land use and	Institute for Transport Studies, University of	2006	website	The website contains two sections, namely: a Decision-Makers' Guidebook designed to help all those involved in	European Union	Konsult Knowledgebase	

Title	Author/s	Year of publication	Type	Topics of interest	Area	Website	Notes
Transport	Leeds			decisions on land use and transport, whether as politicians, professional advisers, stakeholders or individual citizens; and a Policy Guidebook providing fuller information on the policy instruments outlined in the previous section.			
Online TDM Encyclopedia	Victoria Transport Policy Institute		website	The Online Transportation Demand Management (TDM) Encyclopedia is a comprehensive information resource concerning innovative transportation management strategies including access restriction policies.		Online TDM Encyclopaedia	