Environmental Zones in Europe

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Summary

This report looks at Environmental Zones, i.e. ways to restrict traffic for some types of vehicles in specific areas in Europe. In Sweden, we use the term Environmental Zone. Other European countries sometimes use Low Emission Zone (LEZ) or Clear Zone.

Part 1 deals with five different methods to increase compliance withregulations relating to environmental zones in five different cities. The methods were studied and discussed in the context of how suitable they would be for Stockholm.
The different types of environmental zones described in the study:

- Prohibited zone with demands on the age of the vehicle combined with a weight limit
- Prohibited zone with demands on utilization of loading capacity for vehicles with a weight over a special limit
- Prohibited zone for vehicles with a weight (or length) over a special limit
- Reduced accessibility for traffic
- Access control to defined area during a special time of the day

The purpose of Part2 of this study was to collect information and evaluate methods used in other European cities, to increase compliance with regulations relating to environmental zones. Special attention has been given to methods aiming at better information to users, and alternative penalty systems those breaking the regulations. The survey included around 30 cities, and 16 of those are included in the study: Copenhagen, Denmark, Aalborg, Denmark, Athens, Greece, London City, United Kingdom, London Camden, United Kingdom, Nottingham, United Kingdom, Naples, Italy, Bologna, Italy, Amsterdam, The Netherlands, Maastricht, The Netherlands, Utrecht, The Netherlands, Düsseldorf, Germany, Prague, The Czech Republic, Suceava, Rumania, Barcelona, Spain, and Ghent, Belgium

Some of the findings: information campaigns are essential to make environmental zones accepted and thus also respected. But fines are also necessary to ensure high compliance.

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Environmental Zones in Europe

- part one

Preface

The project TRENDSETTER is a collaborating effort between five European cities – Stockholm, Graz, Lille, Prague and Pecs. The main gaol is to show how cities can reduce environmental impact from heavy traffic. TRENDSETTER is co-funded by the European Commission DG TREN within the CIVITAS program (CIty VITality and Sustainability).

A Stockholm consortium comprising the Environment and Health Administration, the Road and Real Estate Administration, Stockholm Transport as well as the Swedish National Road Administration (Stockholm Region), is already actively working to improve the city's traffic situation. TRENDSETTER provides a marvellous opportunity to co-ordinate current projects, create synergies and together find new solutions to help reduce the environmental impact of transport systems.

Lorries and buses account for a large part of air pollution in Stockholm. TRENDSETTER aims to make heavy transport cleaner, using renewable fuels and more efficient transport management, among other aids such as access restrictions.

Nearly half of the nitric oxide emissions and airborne particles in Stockholm come from heavy transport i.e. buses and lorries. Even so, these vehicles make up only about 10 per cent of the city's traffic volume. Heavy traffic also causes much noise pollution. Despite its environmental disadvantages, heavy transport is essential for the city to function. The use of heavy vehicles for goods deliveries and passenger transport is basic for the transport system, economy and welfare of any city. It is thus vital to make heavy vehicles more energy-efficient and environmentally suitable.

Access restrictions such as the environmental zone for heavy vehicles in Stockholm plays an important part in reducing the environmental impact from heavy vehicles in the city. The zone was implemented in 1996 in the inner city area of Stockholm.

The purpose of this report is to find different ways to collect and evaluate methods to increase the adherence to the regulations of the environmental zones together with an evaluation of existing methods used in other cities in Europe today. Interesting methods we will be looking at are better information to drivers and companies and penalty system to those breaking the regulations.

Abstract

The purpose of this study is to collect information and evaluate methods, used in other European cities, to increase the adherence to the regulations of the environmental zone. The main issues this report focuses on are methods working towards better information users and on alternative penalty systems to those breaking the regulations.

The quality of the content in the collected information varies a lot. Sometimes very little information being available. Generally it has been difficult to find information about environmental zones in different cities.

Five different types of environmental zones are described in this report and for those methods where there exists information about information systems and penalty systems; it is described under each method. It is also a part where possible improvements are described for each method.

This are the different kinds of environmental zones described in the study:

- Prohibited zone with demands on the age of the vehicle combined with a weight limit
- Prohibited zone with demands on utilization of loading capacity for vehicles with a weight over a special limit
- Prohibited zone for vehicles with a weight (or length) over a special limit
- Reduced accessibility for traffic
- Access control to defined area during a special time of the day

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1 Introduction

1.1 Definition

The expression ”environmental zones” used in this project means a geographical zone within which special regulations and restrictions for car and heavy vehicle traffic apply aimed at reducing air pollution.

1.2 Background

Central city areas are attractive visiting zones, especially for non-motorized visitors and shoppers. The quality of living, shopping and strolling in the streets in and close to the pedestrian precincts are often negatively influenced by noise and exhaust emissions from road traffic. Improvements in the environmental conditions of such zones is necessary in order to safeguard both the built environment and the attractiveness of the inner city compared to shopping malls outside the cities.

Since July 1st 1996 an environmental zone for heavy goods vehicles and buses in the central area of Stockholm has been enforced. Within the zone diesel driven heavy trucks and buses are prohibited to drive if they do not meet specific environmental standards (Euro norm 3). There are some general and special dispensations given.

The environmental zone has significantly decreased exhaust emissions from heavy diesel driven vehicles. However, there are still problems with exhaust emissions from traffic in Stockholm, especially on some major streets and close to motorways. Another problem to be addressed is a more effective enforcement of the environmental zone. Approximately 10 % of heavy vehicles in the zone do not obey the existing rules.

1.3 Purpose of the study

The purpose of this study is to summarize and evaluate methods to increase the adherence to the regulations of the environmental zones together with an evaluation of existing methods used in other cities in Europe today. Methods to be evaluated:

- Better information to drivers and companies
- Penalty systems to those breaking the regulations

This will end in a recommendation of methods that can be tested in a part of the environmental zone in Stockholm.

1.4 The environmental zone in Stockholm

There are four cities in Sweden that have environmental zones; Stockholm, Gothenburg, Malmö and Lund. The main regulation for diesel engine-driven heavy vehicles driving in the environmental zone in the cities is that the vehicle must not be more than eight years old. The age of the vehicle is counted from the day that the vehicle is first registered. The environmental zone concern heavy vehicles and buses with a weight of more than 3 500 kilo. It is possible to get an exception, with the demands described below, to the regulation but an application is required. Necessary equipment for the exception has to be tested and approved.

These demands of reduction of air pollutants has to be fulfilled (from 2002-01-01):

Emissions	*Demand level B*	*Demand level C*
Particulates	- 80 %	- 80 %
Hydro-carbons	- 80 %	- 80 %
Oxides of Nitrogen	No increase	- 35 %
Noise	No increase	No increase

Demand level B = Subsequently installed catalytic converter with particle filter
Demand level C = Equipment for reducing oxides of nitrogen (NO_x)

To be allowed to drive in the environmental zone, a vehicle has to prove its authority by having a decal from the municipality on the vehicle. The decal can be obtained from the municipality in question and this has to be visibly attached on to the windscreen. The decal shows the period of validity, the first registered year of the vehicle (irrespective of in which land the vehicle was first registered) and the registration number of the vehicle.

Exceptions:

- **Vehicles with exceptionally low emissions.** Vehicles that have requirements to be certified according to the Euro IV or better can, after a special application, accord more than one-year allowance to drive in the environmental zone.
- **Vehicles provided with approved equipment for exhaust emission control.** Vehicles older than eight years will get an exception to be allowed to drive in the environmental zone some extra year/s if the vehicle has been equipped with exhaust emission control. The number of extra years of permission will depend on the registration year.
- **Vehicles that have special bodywork and are equipped with approved exhaust emission control.** Vehicles with special bodywork older than eight years equipped with exhaust emission control will get an exception to drive in the zone. The number of extra years of permission will depend on the registration year.
- **Change of motor.** If the vehicle has been equipped with a new motor with at least Euro 3, it can be allowed to drive in the environmental zone for some additional years.

Stockholm

The environmental zone in Stockholm includes the city centre; Södermalm, Kungsholmen, Vasastaden, Norrmalm, Östermalm and Ladugårdsgärdet. A few of the main streets through the city are excluded from the environmental zone. The zone has an area of 35 km^2, about 250 000 citizens live in the area and there are about 280 000 places of work. There are a large number of visitors in the area.

2 Method

Initially, J&W started searching on the Internet to find information about environmental zones, other definitions used in Europe are Low Emission Zone (LEZ) and Clear Zone. J&W has also been in contact with several persons in Stockholm who have been working with this issue, for example some persons at the Stockholm Environment and Health Protection Administration. The contact with persons in other cities has mainly been performed by e-mail. No research has been carried out outside Europe, although it is known that it exists some well-developed environmental zones in cities outside Europe. In the end of the survey a list of contacted persons and web sites visited in order to collect data will be presented.

3 Regulations

3.1 Method 1: Prohibited zone with demands on the age of the vehicle combined with a weight limit

3.1.1 Content and function

The method is used in Sweden and the content of the regulation is described in section 1-4. In practice is that the weight limit is restricted to 3 500 kilo, the vehicle must not be older then 8 years and the age counts from the first day the vehicle was registered. The regulation holds for foreign vehicles as well. There are some exceptions from the regulation and those are to be read in the Introduction. To be allowed to drive in the environmental zone, the vehicle has to prove its authority by having a decal from the municipality on the vehicle.

3.1.2 Adherence and control system

In Sweden the police perform the control and heavy vehicles without a certificate will get a fine. In Stockholm controls were uncommon earlier and the adherence approximately 90 %. In the last year the police have performed more controls and vehicles without a certificate have been towed out of the environmental zone and the haulers in question had to pay for the expense of the towing. A statistic of 93 % adherence to the regulations was recorded after this.

3.1.3 Information campaigns

The information in Sweden consists of a brochure and information on the Internet.

3.1.4 Possible improvements

It is possible to reach the owner of a vehicle via the motor-vehicle registration office; it could be a way of distributing information. Further possible improvements of the method are described in the Conclusion, since it is some of the purposes of this study.

3.2 Method 2: Prohibited zone with demands on utilization of loading capacity for vehicles with a weight over a special limit

3.2.1 Content and function

In Copenhagen all vehicles with a total weight over 2 500 kilos has to have a certificate to be able to stop in a city centre zone, called Middelalderbyen. Foreign vehicles are also included in the restriction. The certified vehicles from a registered carrier have to have a utilization of loading capacity that is more than 60 % in to or out of the zone. Transit goods are not included.

Almost the same system exists in Amsterdam. The difference between the systems is that the demands in Amsterdam are higher; they require a utilization of loading capacity of 80 %, on the other hand the limit of weight is higher, 7 500 kilos, in Amsterdam.

3.2.2 Adherence and control system

In Copenhagen vehicles over 2 500 kilos without a valid City Goods certificate are not allowed to stop on public road space within the certification zone, if they do they will be charged with a parking fine, 510 DKR.

Vehicles without valid green City Goods certification will be charged with a parking fine if they stop in a loading zone between 8 a.m. and noon, Monday to Friday.

The issued certificate will be withdrawn if the driver neglects to give, or gives wrong, information in the application. The certificate will also be withdrawn if there is mismanage in obligations. If the certificate gets withdrawn the vehicle are not able to get a new one during the rest of the trial period (until January 31st 2004).

The green certificate will also be withdrawn if the demand of utility of loading is not fulfilled. It is after that possible to apply for a yellow certificate, valid for 6 months, for the vehicle in question.

3.2.3 Information campaigns

The work with information has a major part of the project in Copenhagen.

- All 6 000 inhabitants in the concerned area have got information by post. This was sent in the beginning of the project in 2001. At the same time, a newsletter was sent to the members of the two largest transport associations (about 5 000 members) in Denmark.
- In the beginning of January 2002 the inhabitants in the concerned area got another letter about the project and another newsletter was sent to the transport associations.
- An article in a written magazine to all the companies having business in the municipality of Copenhagen about the start of the project, reaching about 33 000 companies.

- The project team have written various articles and participated in several interviews about the City Goods project during a period of 6 month before the start of the project.
- Member meetings have been hold in transport associations.
- A project web site is completed and provides information.
- From the middle of January to the middle of February 2002, they had six advertisements about the City Goods project in five of the leading daily newspapers. Parallel to this the organization left leaflets on the windscreen of cars parking in the city, telling about the start of the project.
- During the middle of January to the middle of February TV, radio and newspapers paid a lot of attention to the project. Running press releases were performed when something new was happening in the project.
- The municipality is sending out newsletters currently.
- In the middle of June the parking meters in the inner city will get a little plate with information for the drivers.

To mark the zone for road users there are signs telling when driving into the certification zone.

3.2.4 Possible improvements

The information campaign performed in Copenhagen is very well developed and is a good example how to inform different kind of concerned people, companies and organizations.

At the present situation, vehicles without a certificate will be punished with a fine, 510 DKR for loading or unloading in the zone. It should be possible to charge with a higher fine, the current fine is not that much for a large firm of haulage. Maybe that implies a change in the law, to make it possible to have differential fines to different weights of vehicles. It should also be a possibility to have a fine to those driving into the zone to load or unload without a certificate. The police, as a random inspection, could control that.

Further on, the method can be developed to include a restriction to pass through the zone as well. An additional idea is to raise the limit of the utility of the load.

3.3 Method 3: Prohibited zone for vehicles with a weight (or length) over a special limit

3.3.1 Content and function

Some cities have a zone in the central area where vehicles with a special weight cannot pass if a special permit is missing. The limited weight is different in different cities. Prague has two limited weights, 5 500 kilo and 3 500 kilo, where the heavier weight includes a larger area than the lower weight. In Copenhagen the limited weight is 2 500 kilo and there it is a demand of a utilization of more than 60 % as well.

3.3.2 Adherence and control systems

In Prague the enforcement of the restricted access into this zone by heavy vehicles is controlled and also fined by the police in accordance with traffic regulations. The adherence to the zone is randomly controlled by traffic police and infringement of the entry prohibit of lorries to the zone is penalized as other Highway Code infringements.

3.3.3 Information campaigns

There has been a massive information campaign in Copenhagen, see method 2.

In Prague residents and non-residents are informed about the zone by means of general city plans, Internet (www.udi-praha.cz) and of traffic signs at the streets before the crossroads where the zone begins. An information campaign was performed in press and other media, without any special contacts with the haulers.

3.3.4 Possible improvements of the method

The method can be combined with method 1, which means that a restriction according to the utilization of loading capacity can be combined with the weight limit. Another possible improvement is to involve more vehicles by lowering the approved weight. These improvements are to be made with an exception for vehicles with new engines or engines with a specific standard.

3.4 Method 4: Reduced accessibility for traffic

3.4.1 Content and function

In Suceava one street is closed for traffic, which makes the adjacent large green area more accessible for the citizens. The city has also started to improve the engines by installing catalytic converters in some of the buses running in the central area. In addition to the measures, air measurement equipment has been installed in the city centre. The devise makes it possible for the citizen in Suceava to observe the level of air pollution.

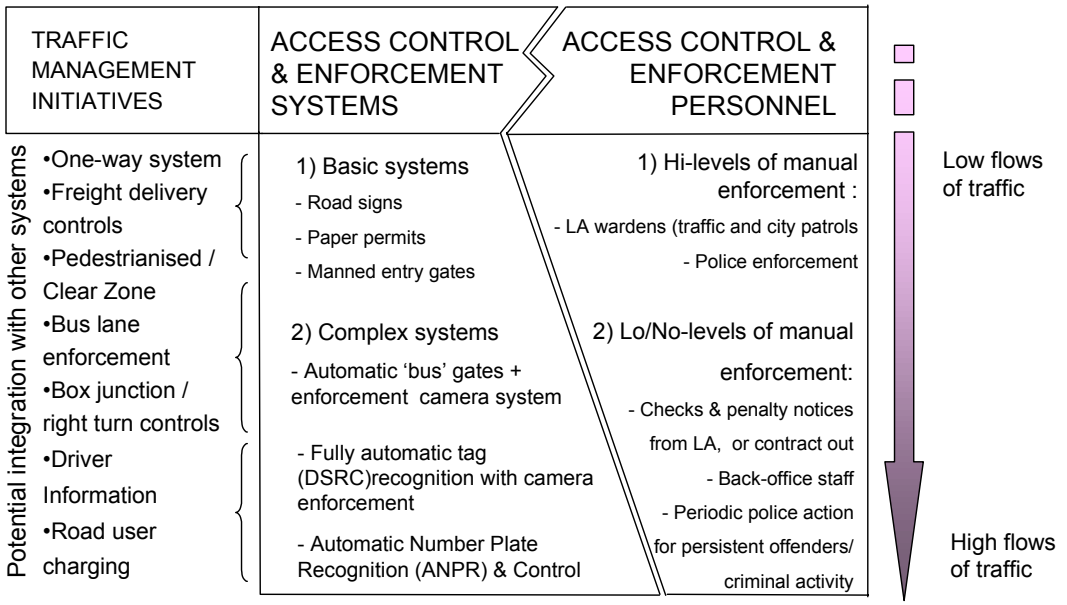
In the City of London a project is carried out where the access into the zone for general traffic has been restricted to eight entry points compared to the previous 33 entry points. This has been accomplished by means of 19 full street closures, 3 half closures, 7 new one-way streets, 2 banned turns and 2 streets with access restricted to certain classes of vehicles.

Aalborg has introduced pedestrian streets in the city centre. Delivery vehicles are permitted on the streets in the morning between 5 a.m. and 11 a.m. Special vehicles can get an exemption and will then be allowed to drive on the pedestrian streets other times on the day. The streets are one-way streets and there is a couple of passing places on the streets where two delivery vehicles are able to pass each other. These passing places serve also as extra loading and unloading places.

3.4.2 Adherence and control systems

In Suceava the local authorities are collaborating with local traffic police and soon they will initiate penalties for the drivers who enter the area.

The control system in the City of London consists of road signs and the use of digital image recognition technology has also assisted control at the zone's entry points. United Kingdom has assembled data of different access control systems in a graph shown below. The graph illustrates different kind of systems but also the relationship between human resources and infrastructure together with the links to other traffic management approaches.



Graph 1: Access control and enforcement – automatic systems, manual systems and other traffic management infrastructure (NSCA Low Emission Zones – Fact Sheet, Transport and Travel Research Ltr., United Kingdom 2002)

The choice of systems used for boundary control should be made according to the enforcement needs of the zone, which can be derived from the following factors:

- Volume, and likely speed of traffic
- Number of entry points – i.e. degree of complexity to the zone
- Security target level – i.e. how stringently will it be enforced, or conversely, how difficult will it be to comply with the regulations, and therefore what proportion of the people are likely to avoid doing so?

3.4.3 Information campaigns

To inform about the closed street the zone is marked with signs. The air measurement equipment will help to make the citizens informed and interested of the project. Radio and TV broadcasts, local press articles and local seminars were organized in Suceava to help people to understand how bad an impact traffic pollution can have on their own health. The next step is to convince citizens of Suceava that alternative traffic can improve their quality of life and that changing to the clean vehicles will be much easier to do.

A lesson that they have learned in Suceava from the on-going project is that the municipality and local authorities must work as an example to the community, the citizens and the private companies. For example by renewing their own old vehicles, to indicating that everything you can do is important.

They have made a brochure in Aalborg that has been sent out to shop owners, contractors of haulers and to those who gets exemption for driving in the pedestrian streets. The only thing that has been done except this, is that the pedestrian streets has been marked with signs.

3.4.4 Possible improvements

It is always important to inform about new projects that involve the citizens and companies in the city. In this special method it is easy because the regular road signs will show where the street is closed. However it should be completed with further information to make sure the measure is accepted by the people and also understood. It is probably not necessary to carry through such a large campaign as in method 1, but some of it should be done. Especially those living and working in the actual area should get special information, for example by post.

To reach a higher adherence it can be imposed with a fine for motorized vehicles to enter the pedestrian street. Citizens living in the houses around the pedestrian street should always be allowed to drive to their homes.

3.5 Method 5: Access control to defined area during a special time of the day

3.5.1 Content and function

In Barcelona, restrictions are applied during three-hour periods in the mornings and afternoons; this allows free access for delivery vehicles during the remaining hours of the day. The main objective is to promote and improve the quality of city areas as places to live a fulfilled life of varied activities. Enforcement problems can be minimised by using retractable bollards to provide a physical deterrent against access infringements.

3.5.2 Adherence and control systems

In Barcelona, systems configured using retractable bollards and contactless cards for validation of permits promote traffic calming since the vehicle driver has to position the vehicle at the validation point and await signal instruction of authorized entry.

The retractable bollard is an effective deterrent against illegal access, which minimises the need for post-entry enforcement; this approach is validated as being more practical than issuing fines based on video evidence. Authorities cannot expect authorised users to purchase or rent identification equipment. Since the authority has to assume this cost, the cheapest card system is preferable. Citizen information campaigns are an essential part of the implementation process.

3.5.3 Information campaigns

In Barcelona, lower- and higher-tier local authorities require partnerships when the responsibilities for street works and traffic regulation are not carried out by a single organisation. Partnerships with parking operators are also relevant.
Social acceptance of traffic restrictions is required and the authority has to sufficiently explain what is proposed, to gain consensus support for action, and to explain what citizens are expected to do to the system.

3.5.4 Possible improvements of the method

The method can be improved by better information campaigns, which leads to a better acceptance for the change. To improve the adherence for the system park-and-ride facilities can be developed. One possible outcome of this measure is that people drive to the city limit and utilize public transport from there to get to their destination.

Conclusions

Information has mainly been available over the Internet, brochures and sometimes by post. The adherence of the regulations in the cities is usually controlled by the police, traffic wardens and sometimes by the local authorities. To summarize the different kinds of control system it is possible to find these four different groups:

- Administrative permissions
- Restrictions marked by road signs
- Physical automatic systems
- Pay systems

All methods described in chapter 3 could be interesting for Stockholm to consider when widening the environmental zone. Method number 2, a prohibitive zone with emphasis on utilization of loading capacity for vehicles over a special limit, can be implemented directly to Stockholm's environmental zone. A goal could be to match Amsterdam's level with a utilization of loading capacity at approximately 80 %. However it is important to have a well developed and an easy report system, which also is easy to follow up. With too much administration the system will be too hard to manage.

Method 3, a prohibitive zone restricting vehicles with a weight (or length) over a specific limit, could also be implemented in Stockholm. A possible idea could be to approve a lower weight than today's 3 500 kilo. One idea is to have a limit where all normal private cars have access, but restrictions could be placed on minibuses, delivery vans, jeeps etc. Another idea is to have the same limit as in Copenhagen, 2 500 kilo. Vehicles over the specific weight must approve special demands of standards of engines. It is hard to reach everyone who is affected by this rule. Probably advertising in newspaper and maybe on local radio shows etc. could be required. It is also possible to reach the owner of a vehicle via the motor-vehicle registration office.

Method 4, reduced accessibility, is very interesting since it is a method that in a direct way can improve the environment for the pedestrian. The method is a measure where you can close one or many roads easily. The closed zone can be marked with road signs but it is also possible to have a physical obstruction like bollards or a gate, depending on the traffic flow. One possibility for Stockholm could be to have two environmental zones, an inner and an outer zone. The inner zone should be the pedestrian street closed for traffic and the outer zone should be the environmental zone of today, maybe with some further improvements.

It has been difficult to find information about the penalty and control systems in operation and how the work with information campaigns has been done in European cities. It might be because the cities have not documented their campaigns very well if at all. The same could be said for the penalty and control systems. In many cities the zone is under surveillance by the police but as this is a quite new issue it has a low priority in the policemen's work.

Finally, due to these difficulties a recommendation is to go for an educational visit to an established system in operation of interest to Stockholm, for example Copenhagen. That would make it possible to collect all information from important persons in the city and to come up with questions raised during the visit. It is always interesting and often fruitful to experience what has been done in other cities rather than just read about it.

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Environmental Zones in Europe

- part two

Preface

The project TRENDSETTER is a collaborating effort between five European cities – Stockholm, Graz, Lille, Prague and Pecs. The main gaol is to show how cities can reduce environmental impact from heavy traffic. TRENDSETTER is co-funded by the European Commission DG TREN within the CIVITAS program (CIty VITality and Sustainability).

A Stockholm consortium comprising the Environment and Health Administration, the Road and Real Estate Administration, Stockholm Transport as well as the Swedish National Road Administration (Stockholm Region), is already actively working to improve the city's traffic situation. TRENDSETTER provides a marvellous opportunity to co-ordinate current projects, create synergies and together find new solutions to help reduce the environmental impact of transport systems.

Trucks and buses account for a large part of air pollution in Stockholm. TRENDSETTER aims to make heavy transport cleaner, using renewable fuels and more efficient transport management, among other aids such as access restrictions.

Nearly half of the nitric oxide emissions and airborne particles in Stockholm come from heavy transport: buses and trucks. Even so, these vehicles make up only about 10 per cent of the city's traffic volume. As well, heavy traffic causes much noise pollution. Despite its environmental disadvantages, heavy transport is essential for the city to function. The use of heavy vehicles for goods deliveries and passenger transport is basic for the transport system, economy and welfare of any city. It is thus vital to make heavy vehicles more energy-efficient and environmentally suitable.

Access restrictions such as the environmental zone for heavy vehicles in Stockholm plays an important part in reducing the environmental impact from heavy vehicles in the city. The zone was implemented in 1996 in the inner city area of Stockholm.

The purpose of this report is to do a research about the environmental zones in Europe. Interested issues are type of restrictions, included districts, performance of the probation, adherence of the regulation and reward or penalty system.

Abstract

This report contains a survey of the environmental zones in Europe. Issues surveyed include type of restrictions, included districts, performance of the probation, adherence of the regulation and reward or penalty system. Countries and cities included in this survey are:

- Copenhagen, Denmark
- Aalborg, Denmark
- Athens, Greece
- London City, United Kingdom
- London Camden, United Kingdom
- Nottingham, United Kingdom
- Naples, Italy
- Bologna, Italy
- Amsterdam, The Netherlands
- Maastricht, The Netherlands
- Utrecht, The Netherlands
- Düsseldorf, Germany
- Prague, The Czech Republic
- Suceava, Romaninan
- Barcelona, Spain
- Ghent, Belgium

In this study approximately 30 European cities have been surveyed out of which 16 were deemed to have something of interest for this report. Among these 16 cities the quality of information varies considerably. Some cities have already achieved much in their environmental zones while others are only now beginning a process. It also appears that the cities have had different emphasis in with their zones even though the environment is important for all cities. This makes it difficult to carry out direct comparisons of the environmental zones in the different cities. In Sweden the term “environmental zone” is used, Low Emission Zone (LEZ) and Clear Zone are two other common words used in other countries of Europe.

The countries that have cities with the most developed and evaluated environmental zones are Denmark, United Kingdom and the Netherlands. Denmark’s City Goods restricts the weight of the vehicle and demands on the utilization of the loading capacity. A similar regulation exists in Amsterdam. In London they have reduced the accessibility for traffic in the city by reducing the number of entry points and by closing streets (or making one-way streets).

In some of the cities, Prague for example, the restriction in the zone holds for heavy vehicles with a specific weight limits. In Barcelona the city is closed for traffic during particular times of the day. In Naples they haven’t started their project yet, but they plan to close off parts of the city to traffic. They also plan to take measurements around the closed area, for example park & ride services to simplify the use of public transport in the closed area.

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1 Introduction

1.1 Definition

The expression ”environmental zones” used in this project means a geographical zone within which special regulations and restrictions for car and heavy vehicle traffic apply aimed at reducing air pollution.

1.2 Background

Central city areas are attractive visiting zones, especially for non-motorized visitors and shoppers. The quality of living, shopping and strolling in the streets in and close to the pedestrian precincts are often negatively influenced by noise and exhaust emissions from road traffic. Improvements in the environmental conditions of such zones is necessary in order to safeguard both the built environment and the attractiveness of the inner city compared to shopping malls outside the cities.

Since July 1st 1996 an environmental zone for heavy goods vehicles and buses in the central area of Stockholm has been enforced. Within the zone diesel driven heavy trucks and buses are prohibited to drive if they do not meet specific environmental standards (Euro norm 3). There are some general and special dispensations given.

The environmental zone has significantly decreased exhaust emissions from heavy diesel driven vehicles. However, there are still problems with exhaust emissions from traffic in Stockholm, especially on some major streets and close to motorways. Another problem to be addressed is a more effective enforcement of the environmental zone. Approximately 10 % of heavy vehicles in the zone do not obey the existing rules.

1.3 Purpose of the study

The purpose of this study is to carry out a survey of environmental zones in Europe:

- What do the restrictions look like?
- What kinds of districts are included?
- How is the probation performed?
- How is the adherence?
- Does a reward or penalty system exist for those who follow respectively break the regulations?

1.4 The environmental zone in Stockholm

There are four cities in Sweden that have environmental zones; Stockholm, Gothenburg, Malmö and Lund. The main regulation for diesel engine-driven heavy vehicles driving in the environmental zone in the cities is that the vehicle must not be more than eight years old. The age of the vehicle is counted from the day that the vehicle is first registered. The environmental zone concern heavy vehicles and buses with a weight of more than 3 500 kilo. It is possible to get an exception, with the demands described below, to the regulation but an application is required. Necessary equipment for the exception has to be tested and approved.

These demands of reduction of air pollutants has to be fulfilled (from 2002-01-01):

Emissions	*Demand level B*	*Demand level C*
Particulates	- 80 %	- 80 %
Hydro-carbons	- 80 %	- 80 %
Oxides of Nitrogen	No increase	- 35 %
Noise	No increase	No increase

Demand level B = Subsequently installed catalytic converter with particle filter
Demand level C = Equipment for reducing oxides of nitrogen (NO_x)

To be allowed to drive in the environmental zone, a vehicle has to prove its authority by having a decal from the municipality on the vehicle. The decal can be obtained from the municipality in question and this has to be visibly attached on to the windscreen. The decal shows the period of validity, the first registered year of the vehicle (irrespective of in which land the vehicle was first registered) and the registration number of the vehicle.

Exceptions:

- **Vehicles with exceptionally low emissions.** Vehicles that have requirements to be certified according to the Euro IV or better can, after a special application, accord more than one-year allowance to drive in the environmental zone.
- **Vehicles provided with approved equipment for exhaust emission control.** Vehicles older than eight years will get an exception to be allowed to drive in the environmental zone some extra year/s if the vehicle has been equipped with exhaust emission control. The number of extra years of permission will depend on the registration year.
- **Vehicles that have special bodywork and are equipped with approved exhaust emission control.** Vehicles with special bodywork older than eight years equipped with exhaust emission control will get an exception to drive in the zone. The number of extra years of permission will depend on the registration year.
- **Change of motor.** If the vehicle has been equipped with a new motor with at least Euro 3, it can be allowed to drive in the environmental zone for some additional years.

Stockholm

The environmental zone in Stockholm includes the city centre; Södermalm, Kungsholmen, Vasastaden, Norrmalm, Östermalm and Ladugårdsgärdet. A few of the main streets through the city are excluded from the environmental zone. The zone has an area of 35 km^2, about 250 000 citizens live in the area and there are about 280 000 places of work. There are a large number of visitors in the area.

2 Method

Initially, J&W started searching on the Internet to find information about environmental zones, other definitions used in Europe are Low Emission Zone (LEZ) and Clear Zone. J&W has also been in contact with several persons in Stockholm who have been working with this issue, for example some persons at the Stockholm Environment and Health Protection Administration. The contact with persons in other cities has mainly been performed by e-mail. No research has been carried out outside Europe, although it is known that it exists some well-developed environmental zones in cities outside Europe.

3 Experiences from existing environmental zones in Europe

3.1 Denmark

3.1.1 Copenhagen

Copenhagen is the capital of Denmark and has approximately 1,7 million inhabitants.

Regulations

"City Goods ordningen" is a compulsory two-year trial and the objective is to improve the environment in the city centre. This is being coordinated by better utilization of loading capacity, so that the necessary transports could be made with fewer or smaller vehicles. All vehicles with a total weight over 2 500 kilos has to have a certificate to be able to stop in the "Middelalderbyen". Vehicles with a total weight over 18 000 kilos must have an additional special permit to stop in "Middelalderbyen". The trial is also extended to foreign vehicles.

The certified vehicles from a registered carrier must have utilization of loading capacity that is, in average, more than 60 % in three months in to or out of the zone. Transit goods are not included. The utilization of the loading capacity is dependent on the characteristics of the goods. If it is palletised goods the utilization of capacity is in the amount of pallets. If it is weight goods, the utilization of capacity is according to the maximum goods weight etc.

All vehicles with a total weight above 2 500 kilos have to have certificate to stay in "Middelalderbyen" in the Copenhagen city centre. The certificate exist in three shapes:

- **The green certificate** sets up demand regarding the age of the engine and the utilization of loading capacity.
  - The utilization of loading capacity should in average be at least 60 % when delivering goods to (or from) Middelalderbyen. The 60 % is an average over a 3 months period; this means that one are allowed to have fewer than 60 % in one turn if it is more than 60 % in another.
  - The engine of the vehicle must be younger than eight years on point of the application. If there is a new engine in an older vehicle (and if this can be proved) the green certificate can be approved.
  - The vehicles total weight most be over 2 500 kilos.

- **The yellow certificate** is an exemption, which can be applied for if all the demands of the green certificate cannot be fulfilled. The exemption is only valid up to the 31st of July 2002. The purpose of the exemption is:
  - To allow time to adapt to the green certificate where necessary
  - To give the municipality time to evaluate, if there are any special conditions for businesses, which should be enough to give the vehicle a permanent exemption.
  - To allow for a period of adjustment in which alternative transport use must be organized for use within the Middelalderbyen.

If vehicles adapt to the demands of a green certificate, on or before the 1st of August, a green certificate is rewarded.

Where special conditions apply in a vehicle not being awarded a green certificate, an extension, of the yellow certificate may be awarded for a further 6 months. The certificate must be renewed every 6 months.

If the vehicle, by the 1st of August, can neither comply with the demands of the green certificate nor fulfil any special condition, a certificate can be awarded for a final 6 months, after which time it will be no further exemptions awarded.

- **The red certificate** is a one-day certificate for the vehicle visiting the city centre infrequently. There are no particular requirements to the red certificate. The red certificate can be bought at the City goods secretary or at petrol stations when approaching the capital and it cost 50 DKR per certificate.

Loading zones are specially marked areas with special signs, which can be used Monday – Friday from 8 am to noon. The loading zones are only available for vehicles with a green certificate. Out of this space of time the loading zones are for public use. The loading zones are supplements to existing possibilities of loading and unloading.

Included districts

Most of the "Middelalderbyen" in Copenhagen is included in the "City Goods" certification zone. The zone is approximately 1 km^2 and the certification zone is marked with signs both when entering and exiting the zone.

Control

To control that the loading capacity of 60 % is followed information must be given of the number of visits made to the zone and which amount of goods have been delivered. The owner/user of a vehicle with a green certificate has to show the utilization of loading capacity by the end of a 3-month period, and to send a form with the figures to the City Goods Secretary.

A report of the utilization of loading capacity for a vehicle is based upon a daily registration of the number of delivery routes in to the zone. This should be done for every single vehicle. The following facts should be registered for every vehicle:

- The number of routes
- The amount of delivered goods

Experiences

The first trial period of the environmental zone came out in February 2000. The experience of the trial has been positive, but the city hasn't been able to draw any conclusions of the demonstration project. The result was so good that a new two-year trial is running.

3.1.2 Aalborg

Aalborg is situated in northern Jutland and is the third biggest city in Denmark with approximately 150 000 inhabitants.

Regulations

In the city centre of Aalborg there are restrictions for vehicle traffic. Pedestrian precincts have been implemented in the centre of Aalborg. Deliveries are allowed in a time-window, between 5 a.m. and 11 a.m. It is possible to apply for an exemption to drive on the pedestrian precincts for example for building works etc. On the 1st of May 2002 the pedestrian precincts were redirected to one-way streets directed from west to east. At the same time a couple of loading- and unloading bays were introduced in the area. At these places two heavy vehicles can pass each other.

Included districts

Approximately ten streets in the centre of Aalborg are included, in an area of about 0,1 km^2.

3.2 Greece

3.2.1 Athens

Athens is the capital of Greece and has a population of 3 100 000 inhabitants and in an area of 427 km^2.

Regulations

The overall transport strategy for the city is inevitably focused on reducing air pollution levels by limiting the number of motor vehicles, particularly in the central areas of the city and by promoting other means of transport. A selective circulation policy for motor vehicles has operated in central areas of the city since 1984, cars only being allowed to enter the central city on alternate days. When pollution reaches high levels, all cars are banned from the central area for a few hours. All cars are required to meet pollution standards, which are expected to be strengthened in the near future.

Included districts

The zone covers the greater city centre area.

Control

The traffic police enforce driving restrictions at the centre of Athens city. A disregard for the regulation incurs high fines and penalties.

3.3 United Kingdom

3.3.1 London, City

London is has 12 millions inhabitants and covers an area of approximately 1 600 km^2. Corporation of London – City of London is located in the centre of London. Only 5 000 inhabitants live in the area but 300 000 work there.

Regulations

The City Traffic and Environmental Zone is an area with a traffic management scheme implemented in 1993. The core of the City's Square Mile is contained within the zone with 140 000 people employed in it, predominantly in the financial services sector and related businesses. This concentration of activity gives rise to a correspondingly intense generation of access traffic that, before the scheme was implemented, was overlain by a significant element of through traffic.

The essence of the project is that access into the zone for general traffic has been restricted to eight entry points compared to the previous 33 entry points. This has been accomplished by means of 19 full street closures, 3 half closures, 7 new one-way streets, 2 banned turns and 2 streets with access restricted to certain classes of vehicles.

The basic concept of the zone was to make existing through routes in the area less attractive or impossible. A significant amount of traffic capacity has been removed from the zone by reducing the number of access points, and by reducing their width to a single lane. Improving the efficiency of the surrounding street network and altering traffic signal timings has created provision of additional capacity for diverted traffic outside the zone.

Included districts

The core of the city square Mile.

Control

The control consists of road signs and the use of digital image recognition technology has also assisted control at the zone's entry points.

Experiences

The amount of traffic entering the zone each day has been reduced by 25 % to 114 000 vehicles with all displaced traffic still contained within the City by enhancing capacity of alternative routes.

Result

A SATURN traffic model of the City and the surrounding area, which had already been developed, was used to predict the effects of the scheme to highlight problems and to optimise traffic signals. The scheme was designed to reduce traffic within the central core of

the city, whilst maintaining overall traffic levels in the City as a whole, with no overspill into the wider area. The actual effect was almost exactly as predicted, with traffic flows decreasing on the central area network by approximately 30 % and displaced onto secondary roads outside the zone but still within the City.

The scheme has resulted in a considerable improvement to the environment for pedestrians by making streets significantly quieter and safer than previously. Pedestrian accidents within the Zone have been reduced by 39 %. It is also estimated that air pollution has been reduced by 15 %. The scheme has also brought significant benefits to local traffic circulation by reducing the through traffic that previously conflicted with access and the many bus routes.

3.3.2 London, Camden

London Borough of Camden is located in the centre of London, and has a population of approximately 200 000 inhabitants.

Regulations

The Camden clear zone has been developed in conjunction with the City of Westminster and the Corporation of London. It seeks to address the transport, air quality and congestion problems in these parts of London. The aims of the Clear Zone are:

- Develop traffic free areas and low emission zones
- Improve access through walking, cycling and public transport
- Develop car-free lifestyles
- Improve the quality of the public space
- Encourage sustainable development based on continuing economic vitality
- Improve environmental and enhance quality of life

Camden has developed a multi-faceted approach to the development of its Clear Zone, the primary focus of which has been of traffic reduction. The intention is that this will largely be achieved through the removal or reduction of through-traffic on an area-by-area basis across the Clear Zone.

In addition to traffic reduction, a range of proposals have been developed across the area. These include:

- Provision of an electric recharging station
- Development of a City car club
- Conversion of local taxis to Liquid petroleum Gas
- Local pedestrian improvements
- Development and introduction of interactive pedestrian direction signing

Included districts

The area of the Clear Zone is approximately 3 km^2 and is situated in the south part of Camden.

3.3.3 Nottingham

Nottingham is the regional capital of the East Midlands and has about 750 000 inhabitants.

Regulation

Nottingham introduced a Clear Zone in Autumn 2001. The Clear Zone in the city centre of Nottingham will initially exclude heavy goods vehicles, light goods vehicles and cars, preserving access for buses and taxis. The City has worked in partnership with bus operators and introduced a voluntary Bus Emissions Protocol that sets emission limits for vehicles entering the area. It has been agreed that by 2003 all buses entering the zone will be Euro 2 or better. Taxis are required to undertake six-monthly MOT standard tests as part of the licensing regulations. The proposal for the Nottingham zone includes expansion of the existing restricted access permit scheme for businesses within the area.

For future phases of the work there is interest in linking permits to automated systems, perhaps through camera recognition and the urban traffic control system. It is at this stage that further fine-tuning of access to the zone by cleaner vehicles might be enabled.

3.4 Italy

3.4.1 Naples, Pozzuli

Pozzuli is a city of 82 000 inhabitants in Naples metropolitan area.

Regulation

CTP, the transport authority for the province of Naples, has been collecting data on traffic pollution and conducting a sample survey of residents to define the criteria for the AlterEco project. The project is based on a Low Emission Zone (LEZ) in the historical centre where important archaeological sites are increasingly affected by heavy traffic. Nothing has been performed so far; the project is in an early phase. Around this LEZ there will be a larger area of intervention where Park and Ride sites will offer motorists an alternative to taking their cars into the heavily congested central area. Gates will deny access to all but residents and delivery vehicles in the LEZ, forcing motorists to use the Park and Ride service. Those who are allowed in the LEZ will be registered in a database and any vehicle entering illegally will be caught on camera and issued with a penalty notice in a similar manner to parking or speeding fine. However, the potential impact of the LEZ in Pazzuoli may be restricted by the need for vehicular access to the port, which lies within the project area.

Experiences

In September 2001 a sample survey was conducted to consult residents and non-residents within the LEZ area in the city. All categories of respondent said that of all the measures needed to implement the LEZ, the creation of Park & Ride was the most popular.

3.4.2 Bologna

Bologna is a city in the north of Italy with a population of 450 000.

Regulations

The entire historical centre of Bologna has been converted into a controlled access area. The traffic restrictions are enforced from 7.00 a.m. to 8.00 p.m. for all private cars, except for the following motor vehicles having access permits:

- Buses of the public transit operations
- Taxis and emergency service vehicles
- Cars belonging to residents (about 25 000)
- Vehicles belonging to trade business located in the inner city
- Delivery vehicles (only at set times)
- Vehicles belonging to shop owners (with limited length of stay)
- Hotel guests

Aside from the access restrictions in the historical centre the following measures were implemented:

- Reservation of the (former) public parking spaces for residents and businesses, the residents however are only allowed to park in their own quarter
- Reorganization of the municipal bus transit services
- Establishment of park and ride lots in the periphery
- Extension of the short term parking zones on the edge of the historical centre
- Strict surveillance of access through parking control

The first set of measures implemented in Bologna was almost completely achieved through organizational measures avoiding physical changes to streets or buildings. The entrances into the historical centre were only marked with signs showing restricted access, so that no large investments had to be made.

Included districts

The historical centre which covers almost 4,5 km^2 with a diameter of about two kilometres inside the medieval city wall.

Control

The only control system in Bologna is the strict surveillance of access through parking control.

Experiences

The number of cars driving daily into the city centre has been reduced from 152 000 to 58 000 in eight years. This equals a drop of 62 %.

3.5 The Netherlands

3.5.1 Amsterdam

Amsterdam is a city with approximately 700 000 inhabitants. Amsterdam is the second largest city in the Netherlands and has, as many other towns in the Netherlands, problems with air pollution and noise especially from heavy vehicles.

Regulations

The municipality of Amsterdam have decided to introduce a maximum weight for heavy vehicles at 7 500 kilo in the city centre (Binnenstadt) excluding some primary thoroughfares.

It is possible to be exempted though, if the following demands are fulfilled:

- Utilization of capacity should be at least 80 % (weight or volume) with goods to or from the city centre.
- The wheelbase should at the most be 5,50 metre, and a total length of approximately 9 metres or a total weight of 15-18 000 kilo.
- The engine of the vehicle should be at least of the EURO 2-norm.

Included districts

The included district is the city centre (Binnenstadt).

Control

Part of the control system is that utilization of capacity should be documented by freight letters and similar documents and should be send to the authority every 3 months.

Experiences

As off yet there are no statistical results, but the Ministry of traffic in the Netherlands believes that it is going to be a success because all parties are interested in reducing the negative effect the traffic has on the environment and because all parties has been a part of the process from the beginning.

Others

There are some haulage contractors who have specialized simply in transports in and out of the city centre. These firms' stand for a major part of the transport to the city centre in Amsterdam. Many haulage companies from other cities in the Netherlands now use these firms to deliver goods into the city centre.

3.5.2 Maastricht

Maastricht is a town with approximately 80 000 inhabitants and has a vulnerable but preservable city centre.

Regulations

In Maastricht there is a maximum length of 10 metres for vehicles. In order to reduce the amount of heavy vehicles in the city centre even further, the municipality has build terminals for transshipment of the goods outside the city centre.

Included districts

The included district is the city centre of Maastricht.

Control

The vehicles from the terminal have the advantage of being able to deliver goods in/towards the city centre between noon and 6 pm. During these hours mobile barriers, that only the terminal vehicles can manoeuvre, will lock the city centre. At other time vehicles less than 10 metres are free to drive in the city centre.

3.5.3 Utrecht

Utrecht is a city with approximately 135 000 inhabitants.

Regulations

In Utrecht there is a demand of a maximum axle pressure of 1 000 kilo and a maximum length of 7 metres and a width of 2,2 metre.

Included districts

The included district is the city centre area of Utrecht.

Experiences

There have been no studies into how successful the system has been.

In 1994 a couple of goods terminals were introduced specialized on goods to the city centre. Experience shows however that there where just a very small part of the goods which past the goods terminal and therefore the reduction of heavy vehicles due to the terminals has been low.

3.6 Germany

3.6.1 Düsseldorf

Düsseldorf is a city in the southeast of Germany and has 560 000 inhabitants.

Regulation

The City-Logistics Southern Düsseldorf has existed for four years and at the moment four large companies participate in this project. In the project the companies participate in a delivery-cooperation. The companies drive their heavy vehicles to a point and reload the goods to City-Logistics' vehicles. The advantages for the companies to participate in the project is that they do not have to drive through the inner city as their destination is now in the south of Düsseldorf not far away from a motorway exit. The consignments supplied by forwarders are delivered only once a day, at a time stipulated in advance. The trade business is only minimally disturbed; the City-Logistics reduces the delivery traffic in the inner city. Regarding the size and degree of emissions, the City-Logistics' vehicles are tailor-made for the special demands of the inner city.

Experiences

In the project the municipality has found out that city-logistics only can be achieved with external support, as the individual parties involved are not prepared to bear the development cost if their possible efforts achieve unsure results. The city knew that the idea to build up carrier co-operations was not new. The new thing was to do it under an economic point of view and not with the main intention to get environmental effects. The aim in this project was to achieve "double-win situations" under economic circumstances and to do it without public subsides in the long term.

This is not a kind of project where information to the citizens and the organizations is needed; they will get benefits of the project anyway. It is also unnecessary to have a control system since the project is built on voluntarily basis for the participating companies.

3.7 The Czech Republic

3.7.1 Prague

Prague is the capital of the Czech Republic and has a population of 1 200 000.

Regulations

The problem of pollution has been monitored and dealt with in Prague for a number of years. The first measure taken with environmental improvements in mind was regulating of traffic in the downtown area restricting the transit of heavy vehicles realized in the early 1960's by creating of area with prohibited entry for vehicles above 5 500 kilo. This measure was later changed to the no entry zone for vehicles with a weight above 6 000 kilo, due to changes in the structure of vehicle fleets.

Entry of heavy vehicle traffic into this zone for the purpose of goods delivery, building works etc., is possible with a special permit. Short-term or long-term permits are issued in necessary cases by the respective department of the municipal authority.

Another significant development was further restricted access for heavy vehicle traffic implemented in the early 1990's. Permission for transit along the northern border of the downtown area was halted.

In 1999 a regulatory measure was implemented for the restriction of growing traffic constraints on the inner city, by the implementation of a zone with restricted access for heavy vehicle traffic and buses with a weight above 3 500 kilo in the inner city centre.

Included districts

The first zone from the 1960's included approximately 6 km^2 of the downtown area. This coverage was gradually extended to other parts of the city centre and was also enforced on buses as well. Currently it covers approximately 17 km^2.

The zone for heavy vehicle traffic and buses with a weight above 3 500 kilo from 1999 has undergone several partial modifications; it covers an approximate area of 5 km^2 of the city centre. These two zones work together.

Control

Enforcement of the restricted access into this zone is controlled by police in accordance with traffic regulations (Czech Highway Law), this also includes fines.

Experiences

After the implementation of these regulatory measures, the volume of heavy vehicle traffic declined up to 85 % on the busiest routes under monitoring. This traffic was transferred to the more appropriate roads, namely to the parts of the city ring road on the southern border of central part of the city. At the same time the volume of heavy vehicle traffic on the ring road stretches increased approximately by 30 – 50 % after the implementation of regulatory measures.

3.8 Romania

3.8.1 Suceava

Suceava is a provincial city in Romania with a population of 118 000. Suceava is included in a project called AlterEco (A project tackling European city centre environmental issues) and that is how they came to start working with this kind of issue. Public transport vehicles in the city are equipped with old and non-EU standard engines, which produce high level of emissions.

Regulation

As a first step in the first year of the project, Suceava started with two equipment projects together with a Low Emission Zone (LEZ), this was in the spring 2001. The street is totally closed to traffic in the weekends, and a permanent pedestrian only zone is being considered. As funds are restricted the strategy is to replace engines instead of buying new vehicles. They have installed catalytic converters in five buses from the Local Transport Company, which will convert the non-euro standard buses to Euro II buses. The city have also invested in air measurement equipment and installed it in the middle of the pedestrian area (the LEZ).

The city decided to create the LEZ step by step. With the air measurement equipment the citizens in Suceava can observe (on the screen of the equipment) the level of pollution in the air on one hand during the workdays when the street so far is open for traffic and on the other hands during the weekend when the street is closed. The city has also decided to choose a supplier of the equipment needed for the project only from firms in Romania in order to create a local and national market and interest for environmental friendly vehicles, air measurement equipment and catalytic converters.

Included districts

The LEZ includes one street together with a large green area in the city centre (2,5 km^2).

Control

In the city they collaborate with local traffic police and soon they will initiate penalties for the drivers who enter in the area.

3.9 Spain

3.9.1 Barcelona

Barcelona is situated in northern Spain and is the Capital of Catalonia. Barcelona has approximately 2 millions inhabitants.

Regulations

By reducing car traffic levels in sensitive areas, access control can be used to improve the environment of the controlled zone. Through traffic and long-stay uncontrolled parking can be eliminated, and priorities can be established for space usage by important road-users such as pedestrians, delivery vehicles etc.

Access control utilises systems that limit vehicular access by road to specific, defined areas or zones. Electronic licences or permits are pre-issued to specific groups of authorised users (typically residents and those owning parking space inside the zone, but can also include delivery vehicle operators, etc). Vehicles have to pass control gates which allow access if the vehicle is recognise as having a valid permit. Enforcement problems can be minimised by using retractable bollards to provide a physical deterrent against access infringements.

In Barcelona, restrictions are applied during three-hour periods in the mornings and afternoons; this allows free access for delivery vehicles during the remaining hours of the day. The main objective is to promote and improve the quality of city areas as places to live a fulfilled life of varied activities.

Control

Systems configured using retractable bollards and contactless cards for validation of permits promote traffic calming since the vehicle driver has to position the vehicle at the validation point and await signal instruction of authorized entry.

Experiences

Daily car traffic entering the zone has been reduced by 78 % and shifted to earlier hours of the day. Road vehicles travel time has been reduced by 18 % inside the zone and there has been no change in the peripheral area. The occupancies of parking spaces has been reduced inside and increased outside the zone.

Conclusions

There have been positive results in terms of traffic reductions achieved and an overall social acceptance. The retractable bollard is an effective deterrent against illegal access, which minimises the need for post-entry enforcement; this approach is validated as being more practical than issuing fines based on video evidence.

3.10 Belgium

3.10.1 Ghent

Ghent is the third biggest city in Belgium with its 225 000 inhabitants.

Regulations

Ghent City Centre, the Mobility Plan has the ambition to radically improve the living conditions in the city centre of Ghent. This policy comprises a number of clear-cut and unambiguous measures; here are some of them:

- No through traffic in the city centre of Ghent
- A parking route ensures an optimal accessibility to all destinations
- Pedestrians, cyclists and public transport are given more space
- Streets and squares renovation aim at making the urban city centre more attractive to citizens and visitors

The city centre will only be accessible by car for people with a particular destination i.e. residents in the city centre, workers etc. The city centre is closed for through traffic and the parking route has to be used for visitors to the city centre.

A parking route in two directions surrounds the city centre. This parking route is clearly marked and permits reaching every possible destination within the city centre by following the signposts. This route has no traffic lights and only a few intersections.

The Mobility Plan Ghent Centre is plain and simple: inhabitants in the city centre will still be capable of parking their car in the neighbourhood by means of a residential parking system. Non-residents who are coming to work, to shop, etc. have to park their car safely and smoothly in an underground car park against payment of a fare. Aboveground parking facilities remain allowed but will gradually disappear, pending the completion of a chain of underground car parks. When the destination is reached, the driver will be directed to the car park in the immediate vicinity. A parking guidance system will direct the driver to the parking facilities by means of panels placed along the parking route, the city ring road and the approach routes.

Limiting car traffic and banning aboveground car parks does not necessarily ensue in more attractive streets and squares. Rendering the public road, which was mainly used for parking space and car traffic requirements, without making changes destined to the pedestrians and cyclists, would be useless. This new policy is exemplified by the completely Sint-Baafsplein, a former parking square which is now a meeting place both for youngsters and elderly people.

Included districts

The clear zone in Ghent covers an area of 0,3 km^2 of the city centre.

4 Conclusions

In this study about 30 cities have been surveyed but only 16 of them were estimated to have something of interest for this report. Among these 16 cities the quality of information varies a lot. Some cities have done a lot in their environmental zones while others just have started. It also appears in the study that the different cities have had different main emphasis even though the environment is important for all cities. In Sweden the term “environmental zone” is used, Low Emission Zone (LEZ) and Clear Zone are two other common words for the same thing.

The “City Goods ordningen” in Copenhagen with restrictions of the weight of the vehicle and demands on the utilization of the loading capacity is very well worked-out and they seems to have a good organization in the work with their zone. Amsterdam has a similar restriction as Copenhagen, however we don’t know how the administration works in Amsterdam. London has worked with reducing the accessibility for traffic in the city by reducing the number of entry points and by closing streets (or making one-way streets). This measure requires very little work for the authorities, since the restriction is based on physical measures as signs, bollards etc.

In some of the cities, Prague for example, the restriction in the zone holds for heavy vehicles with a weight over a special limit. In Barcelona the city is closed for traffic during a special time of the day. Some of the cities studied during this project have plans to introduce an environmental zone in their city, but they have not done anything so far. They have usually written a lot about the plans and the same thing holds for the cities that have introduced their environmental zones, a lot is written about the plans and less about the real project. That makes its difficult to know what worked out well and what did not.

It has been difficult to find information about environmental zones in European cities. One problem (if it can be called a problem) is that Stockholm has one of the most developed environmental zones. Many of the other cities have just started with their work with different kind approaches to different kinds of environmental zones. There should be some further measures performed somewhere with regard to environmental zones. One problem has been that it is very difficult to get in contact with the right persons and to get a useful answer even when the right person is found. . Another problem is the language, some people do not like to talk or write in English, and also a lot of the web sites on the Internet do only exist in the native language. Probably cities are doing more than the information found in this project shows. One possibility is that they have not documented the projects very well. It is also possible that after studies are infrequent. That leads to a lack of information about these things and it is an answer to why some of the methods in this study are to some extent incomplete.

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