

Measure title: **Integrated Access Restriction Strategy in Burgos**

City: **Burgos**

Project: **Civitas Caravel**

Measure number: **06.02**

A Introduction

A1 Objectives

The general objective is to establish a large, clean, traffic-free zone in the historical centre and to reorganize traffic management.

In particular:

- **Objective 1:** To establish a “clean zone” for traffic in the historical and monumental centre
- **Objective 2:** To increase levels of protection for pedestrians, improve living conditions (reduction of noise and pollution) in the clean zone and promote an active policy of access
- **Objective 3:** To reduce air pollution produced by vehicles in the historic centre
- **Objective 4:** To reorganise traffic management in the historic area
- **Objective 5:** To reduce traffic congestion in the historic centre
- **Objective 6:** To design alternative routes and itineraries paying special attention to N-S/E-W travel

A2 Description

The objective was to develop integrated actions within the city centre and its surrounding areas that relieved the pressure produced by social and economic demands, with special emphasis placed on clean and sustainable urban transport.

The activities were developed within demo area number 1: “Historical city centre” in the city of Burgos.

Within the city centre, the conservation of monuments of great artistic and patrimonial value and their protection from all forms of pollution was a highly important issue. In this area, air pollution due to unclean vehicles will be reduced by means of mechanical controls to restrict access and 30% of its surface area was limited to pedestrian traffic.

In addition, a policy on information and management was developed (i.e. electronic access systems, identification cards) with residents in the area, which allowed them access to their homes. The system was monitored from a control centre.

At the same time, pedestrian traffic was encouraged around the city centre by providing its streets with comfortable and safe areas for walking, resting and enjoying to achieve this, the priority areas for pedestrians was analysed and will continue to be developed until pedestrian zones constitute 25% of the city centre.

As a consequence of the restricted access policy, greater pressure will be exerted on traffic in surrounding areas and transit to and from different zones were complicated by increasing traffic congestion. The procedure to soften such consequences were to identify and analyse the problems and seek alternative traffic management strategies by modifying traffic systems, regulating traffic lights and engaging citizens in other active consultative policies, in keeping with public awareness plans and the diffusion of information on mobility to citizens by distributing new itineraries that respond to their mobility needs.

Furthermore, one of the tasks within the CIVITAS programme were to work in coordination with sectors involved in heavy vehicle transport, city transport agencies and external companies whose vehicles frequently use the main trunk roads through our city. In addition to

the construction of by-passes and outer ring roads, activities were developed together with relevant businesses in order to ensure adequate acceptance of the measures before limited access in the city leads to excessive traffic congestion and strong opposition. Once the ring roads were in use, the restriction of heavy vehicles in the urban centre and in sensitive areas will be effective. In order to assure as much, traffic controls were intensified in these areas.

To accompany these measures, the traffic department drew up new itineraries for heavy vehicles, design traffic signs for the outer ring roads including electronic message signs (in accordance with WP12) and prepared various training sessions for relevant sectors throughout the project.

Demonstration activities were established and the following actions will be developed in the historical city centre and surrounding areas:

- Development of infrastructure required for different levels of pedestrian zones
- Enhancement of pedestrian walkways
- Development of access to pedestrian zones for residents
- Introduction of mechanical systems to restrict access
- Implementation of access and parking measures for residents (actively involving neighbour-hood associations in drawing up procedures for stakeholders, permits, secure methods etc)
- Design of access schedules for delivery vehicles and communication of such measures to relevant organisations and collectives
- Promotion of restricted access for heavy vehicles in the city centre
- Modifications to traffic directions around the inner city to reduce congestion

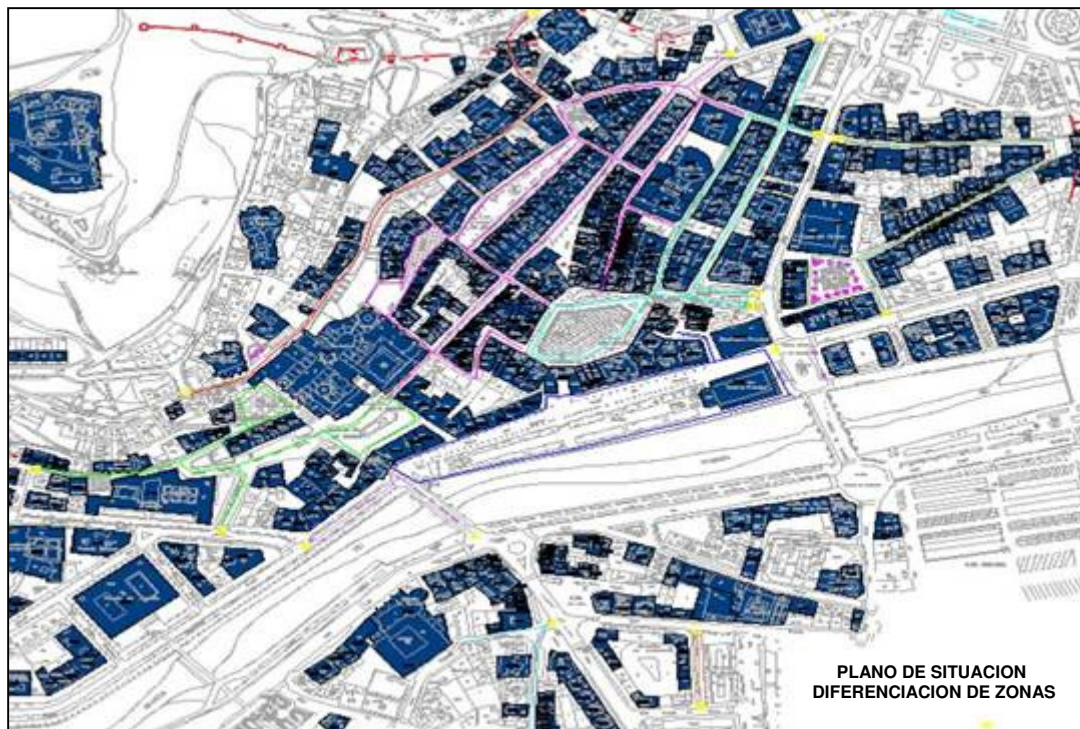


Image 1: Situation map of the access restriction strategy

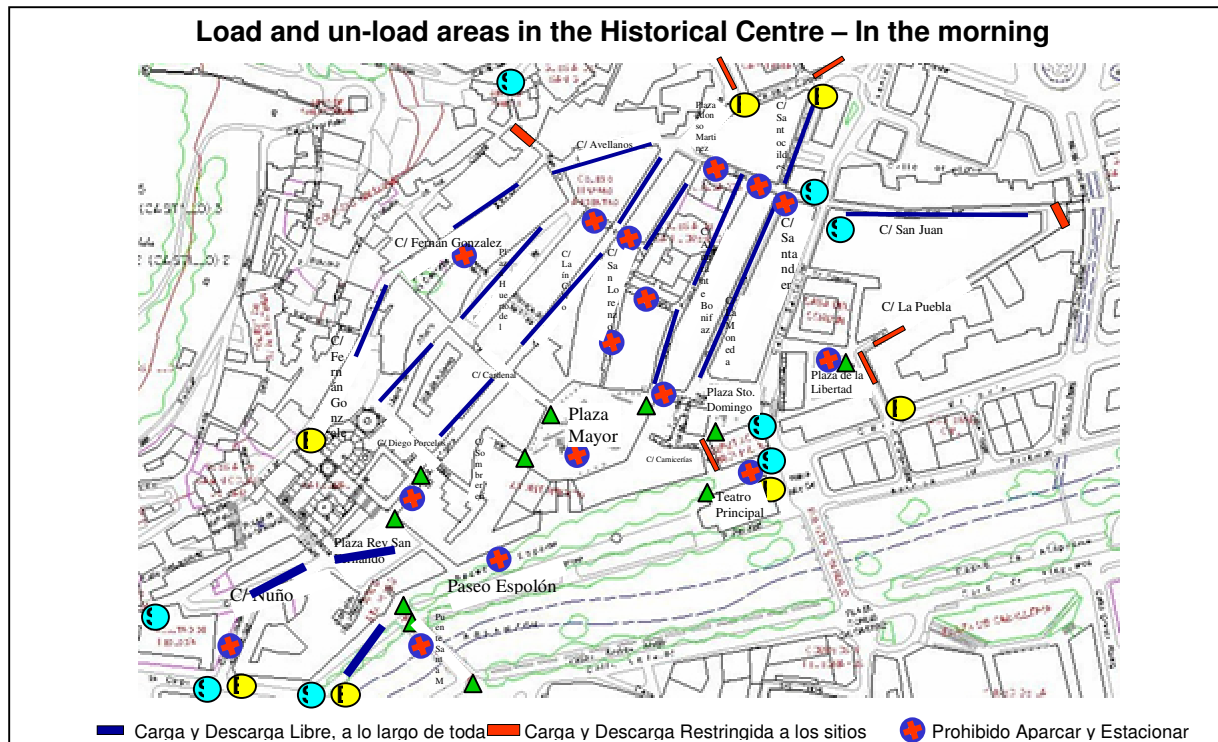


Image 2: Identification the gates of the access restriction strategy and load and un-load zones (S – Exit gate, E – Entry gate)

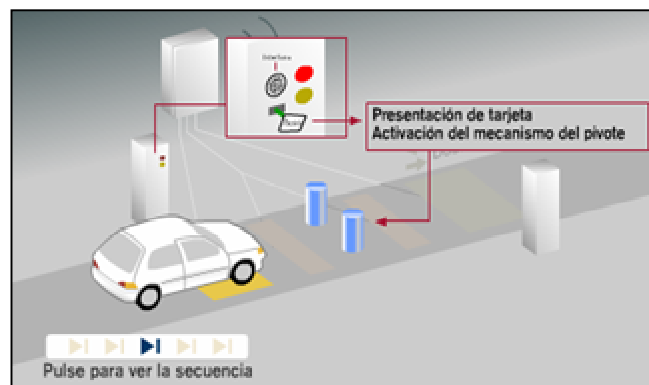


Image 3: Scheme of the access restriction technology



Image 4: Photos of different inaugural events (new pedestrian areas and access restriction)

B Measure implementation

B1 Innovative aspects

In general the measure represents a new conceptual approach of mobility, as the integration of an active policy on access in conjunction with many stakeholders in sensitive areas, optimisation of traffic around the historical and monumental centres and facilitation of movement and accessibility in pedestrian zones for people with limited mobility.

In particular the innovative aspects of the measure are:

- **New conceptual approach:** Prohibited access to the historic centre and protection of the sensitive monumental area
- **Use of new technology/ITS:** Acquisition of new equipment for launching the access restriction strategy in the town through a system which connected the gates with the control traffic room via optical channels.
- **Targeting specific user groups:** Integration of an active policy of access in conjunction with residents, haulage industry and people with limited mobility.
- **New policy instruments:** Access restriction strategy changed the regulation of the Historical Area and new policy (hourly for load and unload, weight of vehicles, resident card, use of private parking...) were introduced in the influence zone.
- **New physical infrastructure solutions:**
 - Optimisation of traffic flows around the historic and monumental centres by offering alternative routes.
 - Provision of information to transport companies and heavy vehicles on alternative routes to avoid sensitive areas in the city centre and on arrangements for the new ring roads under construction around the city.
 - Accessibility in pedestrian zones for the disabled and people with limited mobility

B2 Situation before CIVITAS

Burgos is a Spanish city of great historical and cultural interest. Among its noteworthy buildings figure the Cathedral, the Casa del Cordón, the churches of San Esteban, San Gil, Santa Águeda and San Nicolás among others, the walls of the medieval city, the arch and bridge of Santa María, etc. Its historic centre extends over 320,000 m² and houses 14,041 residents. In recent years, a great effort has been made to conserve and restore many of the buildings whose stone facades have suffered damage due to air pollution produced in part by heating systems and traffic.

With a view to reducing pressure in the urban zone arising from various economic and social factors, different activities have been carried out over time and in an orderly manner: traffic has been limited to certain streets, pedestrian areas established over 3% of the surface area, energy substitution introduced in buildings, parking areas built for 8% of the residents, etc. Nevertheless, delivery trucks and vehicles using conventional fuels continue to circulate through the centre due to the inefficient access restrictions that are currently in use.

Moreover, Burgos is a city that has been steadily growing around its historic centre and along the Arlanzon River. The area of the old city occupies 32 km², measuring 8,500 m by 4,000 m. If the outskirts of the city are taken into consideration, the area could be said to be 12.5 km long and 8.5 km wide, which represents a surface area of 104 km². There are 6 bridges within the city for the circulation of automobiles and pedestrians, concentrated principally in the oldest part of the city. N-S traffic has to pass over one of these bridges, 3 of which are situated in the historic centre. Currently, travel through the city involves driving as close as 300 metres to the historic centre and traffic jams are frequent during rush hours.

Furthermore, heavy vehicles circulate around the principal thoroughfares of the city no less than 300 metres from the sensitive historic zone of the city. This high volume of traffic is principally due to the position of the city that lies at a crossroads between the North and South of Europe, for traffic passing through Madrid and, in addition, is crossed by traffic travelling from the East to the West of Spain. The high volume of heavy vehicles obstructs the flow of traffic and considerably increases air pollution in specific areas of the city. Moreover, their parking in the city is a contentious issue as there is no specific parking zone for heavy vehicles, which are left with little or no choice other than to park in the main roads and streets of the city.

Ring roads around the city are still incomplete and some phases are currently under study or being drafted, principally by the Ministry of Development and the Development Council of Castilla and León. The progressive completion of these construction projects, scheduled over the next 10 years, is expected to culminate in a strategy that will mitigate many of the negative effects of traffic and pollution currently experienced in the city, principally due to the passage of heavy vehicles.

In conclusion, the movement of people in the historical centre is very high because the number of tourists visiting the area has increased by 20% over the last 5 years, added to which there are numerous small businesses and administrative offices located in its streets, as well as a large number of hotels, restaurants and bars surrounding each tourist attraction. Traffic in the historic centre is dense and continuous, resulting in frequent traffic jams during rush hours. Heavy vehicles en-route from one motorway to another pass by the historic centre at a distance of 300 metres, collapsing traffic and intensifying pollution in this area. This flow of traffic produces widespread parking problems and parking violations within the urban centre. In short, demand within the historic centre has increased considerably in recent years while the area has yet to adapt to its changing circumstances.

B3 Actual implementation of the measure

The measure was implemented in the following stages:

Stage 1: Scheme design (*from February 1st, 2005 – to September 1st, 2006*) – The stage included the definition of the pedestrian areas, the definition of the target population, the common access criteria for the different vehicles, the permission of neighbourhoods, the distribution of good scheme, the definition of the requirements of the system, the definition of the control points and the legal aspects. Within this first part, many meetings with different stakeholders were organized, and some of the actions began, as the implementation of the first pedestrian controlled areas.

Stage 2: Implementation of the system (*from September 1st, 2006 – to March 1st, 2007*) - The stage included the implementation of the system with the bollards, the implementation of the cameras and the connections at the same time with the new traffic centre, the beginning of the control, the answer and feed back from neighbourhood, shop owner, distribution of goods companies...Many meetings were held again to try to improve the system, as well as the implementation was done step by step, in different areas of the city. Within the period of the implementation several public events took place to celebrate the new pedestrian areas. In this way not only the participation stakeholders was high, but at the same time the level of acceptance of the project grew. .

Stage 3: Day by Day working scheme (*from March 1st, 2007 – to December 31st, 2007*) – The stage included the complete set up of the measure with all the pedestrian areas developed and the (close to) complete system developed (only there is a little area yet to implement due to the many buildings in progress, the bollard system is implemented and ready to work, but it is not currently working. All the organisational and managing issues are solved, as well as the complete consensus with the

neighbourhoods and the shop owners and companies in charge of the distribution of good.

Stage 4: Personnel training (from March 1st, 2006 – to December 31st, 2007) -, different courses) - The stage included training activities to employers who have to manage the system. It is not very complicated to manage but it is more important to know the different permissions and access, the legal issues and the collaboration with the police department.

Stage 5: Promotion of the system (from April 1st, 2007 – to December 31st, 2007, different actions and campaigns) – Educational campaigns and marketing to promote the system and to change citizens behaviour, and at the same time focus on the enjoyment of the city centre free of cars.



Image 5: Specific campaign developed to promotion the access restriction strategy in the target area affected

Stage 6: Evaluation of the activities (from February 1st, 2005 – to December 31st, 2008) - All the evaluation activities have been performed according to the evaluation plan.

B4 Deviations from the original plan

No problems have arisen during the implementation. The last part of the implementation has suffered a bit delay due to the many buildings around the area, but the system is implemented and ready to work.

B5 Inter-relationships with other measures

The measure is related to other measures as follows:

- **6.5.- Parking strategy and management in Burgos** - Electronic information panels for parking and special access restriction. Promotion of the underground parking that allows to reduce the impact of the vehicles in the parking surface.
- **10.2.- New goods distribution scheme in Burgos** - Delivery of goods in pedestrian areas, close to the inner area of study where numerous good distribution stakeholders participated in the regulation of the access restriction and pedestrian areas. The new good distribution scheme will favour new strategies to promote the use rational of delivery in the inner area. After the restriction strategy already performed and finished within the CiViTAS CARAVEL Project, the next step will be the implementation of a distribution of goods centre provided with clean vehicle to definitely ensure that only silent, slow and non polluting (no exhaust emissions) vehicles will circulate in the protected zones. The theoretic plan for this measure has been developed in the project. The final implementation will be located in a disused train sheds close by the train station at least temporally and through electric vehicles. On this way, the new goods distribution centre will introduce greater flexibility into delivery patterns, reduce traffic in the area around the city centre and save on parking time as the freight companies will leave the van or truck in the centre facilities.

- **11.2.- Sustainable mobility marketing in Burgos** - Promote clean transport in urban areas. Moreover, to promote the access restriction strategy, the campaigns had consisted on promoting the pedestrian areas and quality of life of these areas.



Image 6: Campaign for promotion the quality of life in the inner area

- **Not Caravel, Municipal pedestrian plan**, Some pedestrian areas will be integrated in the urban strategy and access restriction area
 - **Not Caravel, New urban development with sustainable criteria**, Design of new urban areas including sustainable mobility and other concepts
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C Evaluation – methodology and results

C1 Measurement methodology

C1.1 Impacts and Indicators

The evaluation of this measure consists in the monitoring, all over the duration of the project, of the development of the level of the service and of its use. Many quantitative and qualitative parameters (derived from direct market analysis, customer satisfaction reports and surveys) have been used to give an exhaustive view of the success of the actions

The evaluation has been taken place with a strong interrelation with similar activities under development at a national and international level by Instituto Tecnológico de Castilla y León (ITCL) partner.

Table of Indicators and detailed description of the indicator methodologies:

6.2 INTEGRATED ACCESS RESTRICTION STRATEGY IN BURGOS						
Evaluation Category	N°	Indicator	Units	Source of data	Methodology for indicator construction (survey, modeling, etc)	Baseline date
Environment	5	CO levels	Tn/Hab	Monitoring station	Measured, monthly	2004
Environment	6	NOx levels	∞g/m3	Monitoring station Junta Castilla y León	Measured, monthly	2004
Environment	7	Particulate levels	µg/m3	Monitoring station Junta Castilla y León	Measured, monthly	2004
Transport	23&24	Average vehicle speed peak/off peak	km/hr	Traffic equipment	Measured, monthly	-
Society	14	Acceptance level	%	Questionnaires	Measured/ Calculated	July 2007
Society	13	Awareness level	%	Questionnaires	Measured/ Calculated	July 2007
Transport	NM	Car reduction in restriction area	%	Study of parking	Survey Directly	2004
Transport	GI	Pedestrian/cyclists counts in restricted area	Pedestrian and cyclists	Visual inspection	Measured, monthly	-
Transport	GI	Traffic flows in surrounding roads	%	Visual inspection	Measured, monthly	-
Transport	GI	Modal split change for people traveling	%	Visual inspection and others	Measured/ Calculated	May 2003

Indicator	Methodology for indicator construction	
	Definition	Methods of Measurement
5. CO ₂ level	CO ₂ level is defined as the average annual (CO ₂ concentration over a full year) Unit : tn/hb	Method of data collection: <ul style="list-style-type: none"> For data collection through monitoring stations, the measurement points should be the PT vehicles. Source Local Agency 21 Report Frequency: According to Local Agency 21 Report
6. NOx level	NOx level is defined as the average hourly (or peak/off peak) NOx concentration over a full year. Unit : ppm or ∞g/m3	Method of data collection: <ul style="list-style-type: none"> For data collection through monitoring stations of the Castilla and Leon Region. Data obtained of Annual Report of Air Quality of Castilla and Leon

Indicator	Methodology for indicator construction	
	Definition	Methods of Measurement
		Frequency: Annual
7. Particulate levels	Particulate level is defined as the average hourly (or peak/off peak) PM ₁₀ and PM _{2.5} (if possible) concentration over a full year.	Method of data collection: <ul style="list-style-type: none"> ○ For data collection through monitoring stations, of the Castilla and Leon Region. Data obtained of Annual Report of Air Quality of Castilla and Leon Frequency: Annual
13. Awareness level	Awareness level is defined as the percentage of the population with knowledge of a measure on account of provided information. Unit: %	Method: Data could be collected by means of surveys (e.g. questionnaires by mail or by face-to-face interviews). Awareness can be at a variety of levels, it depends on the measure. Frequency: Measurements should be made 2 twice during the project Target group: general public (including residents and visitors), operators, PT, customers...
14. Acceptance level	Acceptance level is defined as the percentage of the population who favourably receives or approve of the measure. Unit: %	Method: User acceptance can be assessed through surveys (e.g. questionnaires by mail or by face-to-face interviews). Frequency: Measurements should be made 2 twice during the project Target group: general public (including residents and visitors), operators, PT, customers...
23&24. Average vehicle speed (peak/off peak)	Average vehicle speed is defined as the average network or route speed by vehicle type. Unit: km/hr	Method: Speed radars and Police statistics Frequency: At least one time during the project. Target group: general traffic
NM. Car reduction in restriction area/town	The car reduction in restriction area is defined as Internal trips inside the restriction area. Unit: %	Method: The data needed can be provided by service operators or derived from study of parking. Frequency: Once a year until end of the project Target group: general traffic
GI. Number of Pedestrian /cyclist in restricted area	This indicator is defined as the number of pedestrian and cyclist that there are in restricted area Unit: Number of pedestrian and number of cyclist	Method: These dates will be obtained in visual inspection, in a concrete part of the city where cyclist and pedestrian are frequents. Frequency: The counts will be realized by counted during eight hours one day. Target group: Cyclist and pedestrian
GI. Traffic flows in surrounding roads	Traffic flows in surrounding roads is defined as the number of vehicles that uses this kind of roads. Unit: Number vehicles / %	Method: These dates will be obtained in points of traffic capacity which measured the intensity of traffic flow. It was selected a capacity point more representative for surrounding areas. Frequency: Data will be collected in 2004 and 2007. Data obtained will be the number of vehicles for one day Target group: Traffic department
GI. Modal split change for people travelling	The indicator is defined as how many people use different forms of transportation. Frequently used to describe the percentage of people using private automobiles as opposed to the percentage using public Unit: %	Method: These data will be obtained with visual inspection and other methods Frequency: Data will be collected on an annual basis. Target group: drivers, user pt, people on foot

C1.2 Establishing a baseline

Various tools were used to evaluate the 10 performance indicators for this measure. Further information was gathered from data sources of the Regional and Municipality Services. The frequency of measurement and the exact source data are defined in the section C1.1. and C2. of this document.

Survey work took place between July of 2007 to establish the Baseline Scenario which included the awareness and acceptance of public to initiative and the evaluation of access restriction strategy.

Acceptance/awareness questionnaire surveys – A questionnaire was carried out to general public in different areas of the city, included Historical Area for understanding and awareness of access restriction and pedestrian strategies and any influence.

The results are shown in section C2.

C1.3 Building the business-as-usual scenario

The level of protection of historic areas and places with significant movement of people is an open debate in the city of Burgos. Citizens want a friendlier and safer environment so they can enjoy their streets. Many voices are seeking to protect these environments. They want a City centre free of cars in order to walk and enjoy the city centre in a safe and secure way.

At the same time, the most important historic monuments of the City suffer because of the vehicles and their pollution.

The quality of life and a more rational mobility in cities are prerequisites in programs to improve the environment of the Council of Burgos.

The setting chosen in the project, with significant historical value and established a monumental landmark in the level of protection and quality of life of citizens. The planning, management structure and adjusting the streets for pedestrians has been a model and example for developing new levels of protection in other settings of the city, also characterized as historical or on main roads in neighbourhoods the city with a large influx of residents, seeking more friendly environment for walks, enjoy walking in his neighbourhood, and incidentally reduce the level of pollution and noise impact on its streets.

The citizens now have a complete vision of the city centre and they want to stay there to do the shopping or to go to bars or restaurants, as they know their children can play safely.

The process of the implementation hasn't been easy at all. More than 50 meetings with stakeholders were needed in order to build the strategy, get the consensus, explain the implementation steps and finally inform of the agreements.

The results at economic level have been good and helped the stakeholder's acceptance:

- Residents and neighbourhood associations were more likely to accept or agree with the idea: clean, quiet, lively streets and **higher property values** (more than 1,500 €/m² more expensive than the non restricted areas)
- Local traders and hotels they eventually accepted the idea (more people and business in the area). **Rents are among the most expensive in the city** (more than 10 €/m² month)

More than 40,000 people take pleasure in going in the weekends to enjoy the city centre, do shopping or just walking around, when, before this implementation, they were afraid of the cars, and people with children didn't wanted to go because of the afraid of injures and accidents.

Citizens and specially neighbourhoods in the restricted area saved more than 2,000 cars crossing the restricted area per day, with the noise and the pollution and the bad impact on the monuments and more than 4,000 in the weekends with the same bad consequences.

C2 Measure results

The performance indicators for the evaluation of Measure 6.2. are broken into 3 sections: environment, transport and society. Many of these indicators were evaluated using both quantitative and qualitative data collection methods. A full explanation of the indicators and how they were quantified is available in the section C1.1 and C1.2. of this document.

C2.1 Economy

N/A

C2.2 Energy

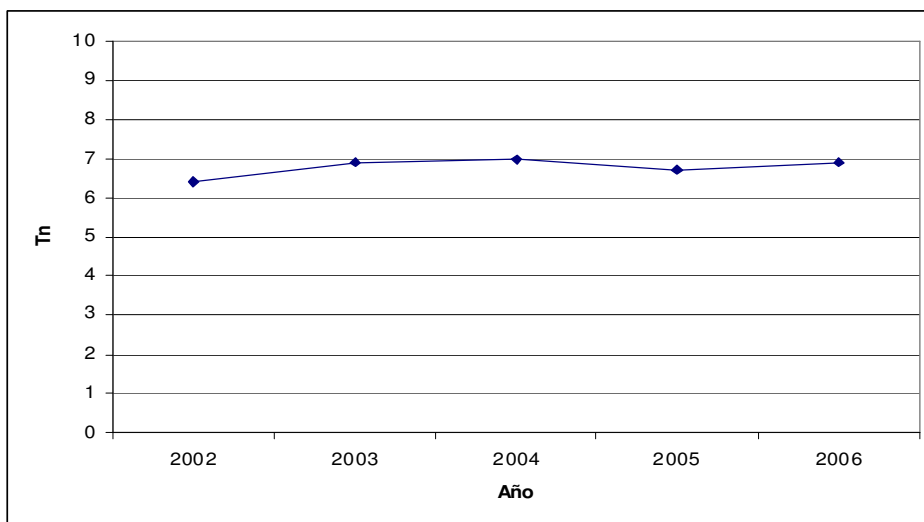
N/A

C2.3 Environment

Indicator - CO₂ Emission

Indicator	Baseline Data 2004	Data Result 2005	Data Result 2006
(5) CO ₂ emission - Annual CO ₂ emissions	7,00 tn/Hab	6,90 tn/Hab	6,99 tn/Hab

As it is observed in the table 1 and Graphic 1, the evolution of CO₂ emission in the city has been similar in the last three years, with a short reduction of the emission (6,90 tn/hab/6,99 tn/hab in 2005 and 2006) has been obtained in comparison with the baseline period (7,00 tn/hab) in 2004.



Graphic 1: Comparison of the evolution of CO₂ emissions per habitant (Source: Local Agenda 21 Study)

It is shown that the city has maintained constantly the level of CO₂, with short reduction in the baseline conditions, due to the emission of the traffic, houses and industrials.

The data results (6,99 tn/hab) are less than the Spanish average (9,6 tn/hab), which is indicated that Burgos is a city with a moderate influence in the emissions of CO₂ to national

level. It is due to the level of traffic and density of population is considerably bottom than other cities in Spain.

Note: Spanish average – Source: www.sostenibilidad-es.org

The indicator, nevertheless, is taken in the industrial area among others, so in principle the CO2 from the traffic only affects a little bit in the indicator.

The emissions have maintained the level despite the increase of the industrial activity and the heating of the houses of the new development areas within the last six years, so it means the emissions are mainly from other sources and the transport part has decreased or maintained at the same level despite the grown of the city (in 2003 Burgos accounted with 170,000 and Burgos has currently got in our days 180,000 inhabitants).

Moreover, Burgos allows to the national network “Red Española de Ciudades por el Clima” www.redciudadesclima.es which realized a continuous monitoring for controlling the CO2 emissions in the Spanish cities. Burgos has included several proposal for reducing the CO2 emission related to transport, housing and industrial emission. Many of these activities were focused in the Civitas Project and thanks to the project; the city has obtained hopeful results to follow to work in the reduction of emissions.

Indicator - NOx emission

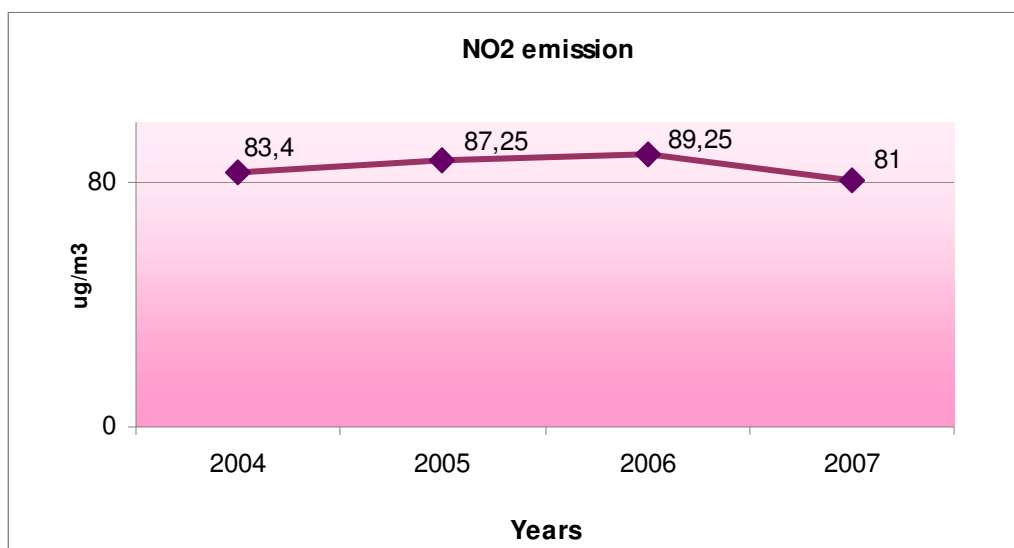
Table 2: Results of Environment indicators				
Indicator	Baseline Data 2004	Data Result 2005	Data Result 2006	Data Result 2007
(6) NOx emission - Annual NOx average emissions per vkm	83,4 μ g/m3	87,25 μ g/m3	89,25 μ g/m3	81 μ g/m3

The data for NOx emissions was obtained from the Annual Air Quality Report of the Castilla and Leon Region. There are four official monitoring stations in Burgos city to obtain the data results concerning the pollution. The data for each year correspond to an average result of the four stations. The NO2 emission is based on values of 98 percentil and annual limit value 200 μ g/m3.

The result obtained in 2007 (81 μ g/m3) is a slight reduction in comparison to the baseline results (83,4 μ g/m3) in 2004, after an important increment in 2005 (87,25 μ g/m3) and 2006 (89,25 μ g/m3).

The reasons for this result could be explained due to the intense traffic in some areas of the city where the ring roads were not operative and some urban development in concrete points of the city (for example, close to the monitoring stations) caused traffic jams in peak hours which affected directly the air quality of the monitoring zone.

After improving the infrastructure with the finalization of the external ring road, saving traffic from the City, the situation improved substantially in comparison to 2004.



Graphic 2: Comparison of the evolution of NO2 emissions in the city (Source: Annual Air Quality Reports of the Castilla and Leon Region)

Indicator - Small particulate emission

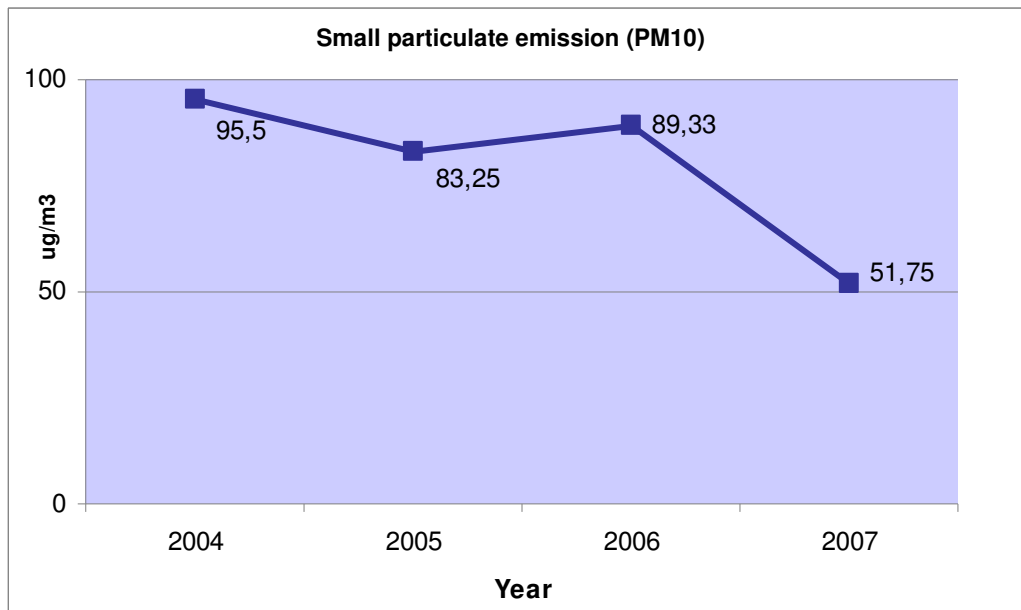
Indicator	Baseline Data 2004	Data Result 2005	Data Result 2006	Data Result 2007
(7) Small particulate emissions - Annual particular matter (PM10) average emissions	95,5 μ g /m3	83,25 μ g/m3	89,33 μ g/m3	51,75 μ g/m3

The data for small particulate emissions was obtained from the Annual Air Quality Report of the Castilla and Leon Region. There are four official monitoring stations in Burgos. The data for every year corresponds to an average of these four stations. The small particulate emission is based on values of 98 percentil. The methods for obtaining results were based on the legal procedures for the air emissions control.

The result obtained in 2007 (51,75 ug/m3) represents a great reduction in comparison to the data obtained as baseline (95,5 ug/m3) in 2004, that lead to an important reduction in 2005 (83,25 ug/m3) and 2006 (89,33 ug/m3).

The reasons for this improvement can be the results of the continuous renovation of the most pollutant vehicles of the city, which reduce as a consequence the level of emissions. Moreover, since 2007, at least two ring roads were opened and many vehicles used these roads instead of crossing the city. As a consequence of the introduction of this infrastructure the small particulate emissions were reduced drastically.

The expertises say that it is important to think that in this point one of the principal source is the emissions from buildings (civil engineering buildings, houses buildings), and for the last year and a half it can be observed that many of the big infrastructures have been finished, so it means another explanation concerning the reduction of the small particles.



Graphic 3: Comparison of the evolution of small particular emissions in the city (Source: Annual Air Quality Reports of the Castilla and Leon Region)

C2.4 Transport

Indicator - Average vehicle speed peak/off peak

Indicator	Baseline Data 2000/2004	Data Result 2006/2007	Data Result 2008
(23&24) Average vehicle speed peak/off peak	65 km/h	61 km/h	56 km/h

The vehicle speed was measured through **speed radars** which were located next to the Historical Area, in streets often used by cars to reach the centre. The data is an average of the data obtained during one day using the speed radars.

The results obtained were 65 km/h in 2004 (obtained from Police statistics) and 61 km/h in 2007 and 56 km/h in 2008 with the speed radars. A short reduction of the velocity was observed in the period of the project; however it is 6 km/h beyond what the law stipulates in urban environments (50 Km/h).

It indicates that the speed in the some part of the urban areas were superior to the legal limit (50 km/h), however, it has a important reduction from baseline period which is confirmed that the control of the speed in some areas of the city has began to obtain the first positive results.

Some of the reasons can be found in a stricter policy of fining as well as vigilance through radars. The information and aware policy has been improved and also the citizens are now more conscious of the necessity of the respect of the speed.

Finally, the traffic calming policy has adapted the infrastructures of the neighborhoods in order to limit the speed of the private vehicles.

Indicator - Car reduction in restricted area

Table 5: Results of transport indicators (III)

Indicator	Baseline Data 2000/2004	Data Result 2006/2007	Data Result 2008
(NM) Car reduction in restricted area	20%	87%	97%

The data reflected as the number of vehicles were reduced in the internal trips inside the restricted area. The baseline data (2004) shows that the reduction of internal trips by vehicle was very low (20%) in comparison to the results obtained in 2007 (97%). It is due to the actions of access restriction and pedestrian areas which forced to reduce the impact of the particular vehicle and loading and unloading at the centre.

Thanks to the restricted strategy in the town, the life conditions of the residents have been improved. The down town zones are now for the pedestrians, not for the vehicles. The situation of the vehicles some years ago with a wide occupation in the streets, even very narrow streets, made difficult for the pedestrians to walk or enjoy the streets in safe conditions.

Now the configuration of the town has changed completely. Numerous citizens use the pedestrian areas to walk, shopping or for their leisure. The free spaces were dedicated for the pedestrian and the role of the vehicles was secondary, only for delivery goods or neighbourhoods parking in their private parking places.

Indicator - Pedestrian/cyclists counts in restricted area

Table 6: Results of transport indicators (III)

Indicator	Baseline Data 2000/2004	Data Result 2006/2007	Data Result 2008
(GI) Pedestrian/cyclists counts in restricted area	Pedestrians: 8.810 Cyclists: 30	Pedestrians: 14.230 Cyclists: 110	Pedestrians: 18.970 Cyclists: 248

The data were obtained through the counts in concrete streets, close to the town, where the bicycles and pedestrian used to arrive to the town. The counts were realized during eight hours in a labor day. The data obtained for the baseline were obtained through a study made by the Council. The results were the following:

- The number of cyclists counted in 2004 was 30 respects to 110 in 2007 and 248 in 2008. The difference between 2004 and 2008 values was 218 cyclists more in the town.
- The number of pedestrian counted in 2004 was 8.810 respect to 14.230 in 2007 and 18.970 in 2008. The difference between 2004 and 2008 values was 10.110 pedestrians more in the town.

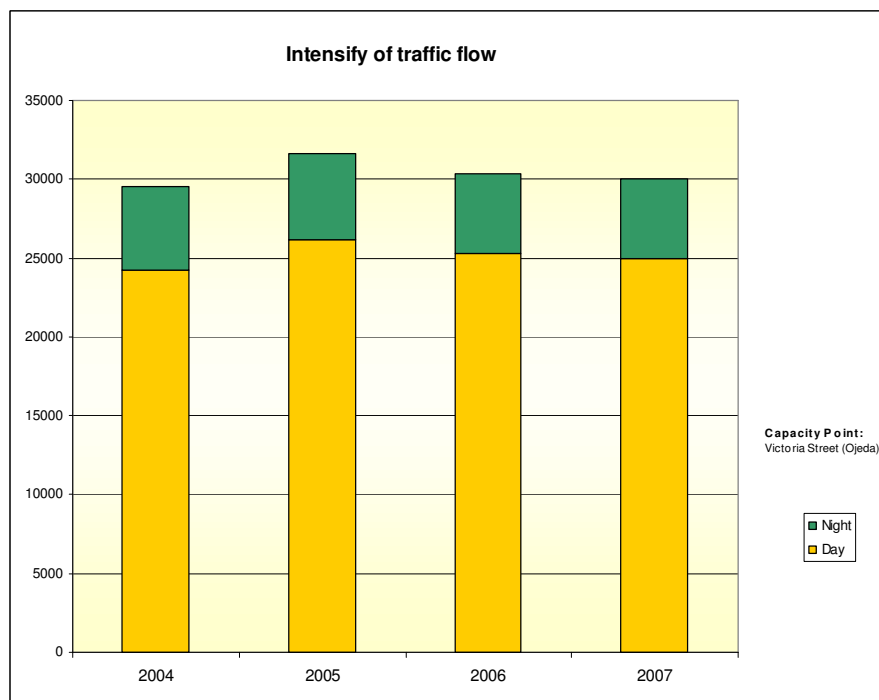
Followed to the consequences of the restricted strategy, the number of pedestrian and cyclist has increased. It is due to the safe conditions of the pedestrian areas and more friendly

environment for the spare time. The changes have provoked that the citizens see the down town an adequate space to walk, to enjoy the spare time and to shopping. The habits of the citizens have changes as consequence of these favourable life conditions.

Indicator -Traffic flows in surrounding roads

Table 7: Results of transport indicators <u>(IV)</u>		
Indicator	Baseline Data	Data Result
	2000/2004	2006/2007
(GI) Traffic flows in surrounding roads	24.206,5 vehicles	24.928,8 vehicles

The data was obtained through the traffic capacity in specific points in surrounding roads. The intensity of vehicles during the day was constant in all the period of study. Emphasize that intensity in the period 2000/2004 was about 24.000 vehicles per day and there was a slight increase in 2005. The traffic flows increased in 722,8 vehicles comparing 2004 to 2007,



Graphic 4: Evolution of traffic flow Intensity in surrounding roads to the City Centre

Despite the traffic flows has maintained more or less the same tendency, it has got sense as far as some of the points are located in some surrounding streets affected by the traffic restriction. Now the cars are not allowed to cross the streets in the city centre, they use these streets.

The normal increase of the population (10,000 inhabitants more in the last four years) did not affected so much in the total number of the traffic flow, so it means the citizens have started to use other modal splits to move in the city.

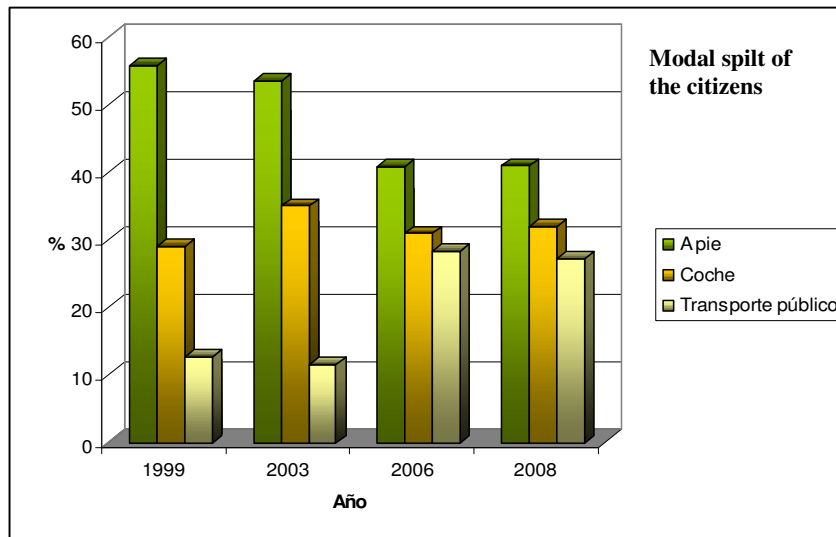
The increase of the year 2005 can be explained due to the numerous buildings in the city provoking traffic jams in some of the streets with accounting points.

Indicator - Modal split change for people traveling in Burgos

Table 8: Results of transport indicators (V)			
Indicator	Baseline Data 2000/2004	Data Result 2006/2007	Data Result 2008
(GI) Modal split change for people traveling in Burgos	On foot: 51,5% By PT: 11,9% By car: 36,6%	On foot: 40,8% By PT: 28,3% By car: 30,9%	On foot: 40,9% By PT: 27,2% By car: 31,9%

In the Graphic 5 and Table 8, it can be observed that there was a moderate change in the modal split for the people of Burgos, towards traveling by foot and by Public Transport. In the case of modal split on foot it was reduced from 11% in 2003 (51%) to 40% in 2008. It can be explained as the new developments in the city, far from the city centre, and the older average age of the citizens (difficult for them to walk). On the other hand, the modal split by PT and other alternative ways of transport has increased by 15,3% witching from (11,9%) in 2004 to 27.2% in 2008. The modal split by car was also reduced about 5% from 2004 (36,6%) to 2008 (31,9%). The reduction of the modal split on foot and by car was absorbed by the Public Transport as well as other ways of transport such as bicycle or private collective transport (private day by day buses to go to work).

It means a city which has grown and got older, and they prefer to use the PT for the day by day displacements, and the success of the policies concerning the lower use of the private car, with an enormous increase of the use of the bicycle and other collective means (private collective buses or car pooling).



Graphic 5: Comparison of modal split in Burgos. Source- Agenda Local 21 – Ayuntamiento de Burgos

Notes (A pie/On foot, Coche/By car, Transporte Público/Public Transport, bicycle and other modes of transport)

C2.5 Society

For the society indicators, the same methodology was used in 2007 and 2008, according to the rules defining in the C1 section.

Survey work took place in July of 2007 to establish the Baseline Scenario which included the **awareness and acceptance** of citizens to initiative and the evaluation of access restriction strategy.

The survey for **awareness and acceptance level** to establish the data results of **citizens** to initiative and the evaluation of access restriction strategy took place between June/July of 2008. In these surveys, same questionnaires of 2007 surveys were presented to the **citizens** in different areas of the city. The principal aim was understanding and awareness if the access restriction had any influence in the mobility issues of the citizens.

Name of target group	Date of survey	Sample size	Purpose	Relevant question to assess
Citizens	July 2007	250	Awareness and acceptance of specific measure	Awareness level - Do you know the access restriction system in Burgos?
Citizens	June/July 2008	250		Acceptance level - What is your position regarding the access in the restricted area?

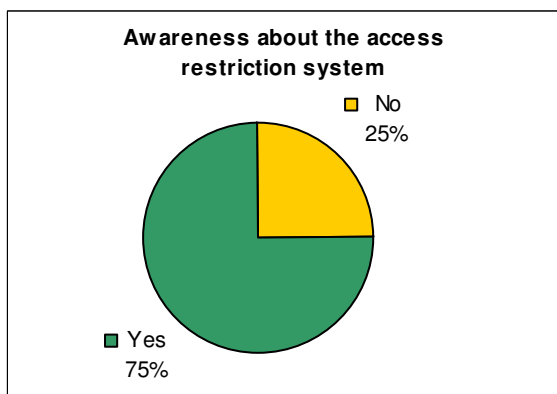
2007 Data results: 250 citizens completed the survey regarding the society aspect of the access restriction system in Burgos. 36,4% of the respondents were male and 63,6% female. The age ranges of the respondents were distributed as 4,8% (<20), 27,6% (20-30), 19,2% (31-40), 38,0% (41-65) and 10,4% (>65).

2008 Data results: In the same way, 250 citizens completed the survey. In this case, 53,2% of the respondents were male and 46,8% female. The age ranges of the respondents were distributed as 6,3% (<20), 21,6% (20-30), 27,1% (31-40), 27,9% (41-65) and 17,1% (>65).

Indicator - Awareness level

Indicator	Relevant Question	Data Result 2007	Data Result 2008
(13) Awareness level	Do you know the access restriction system in Burgos?	NO – 25% YES – 75%	NO – 19% YES – 81%

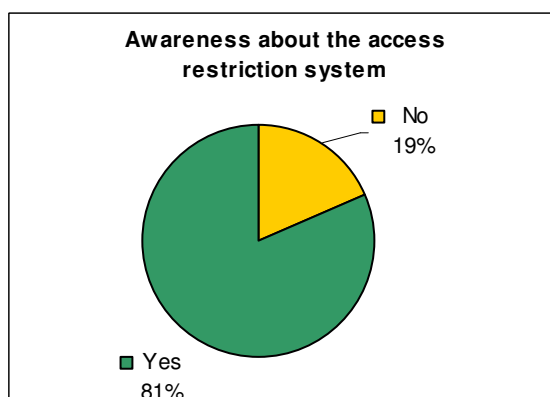
In 2007, the respondents were asked if they were aware the access restriction system in Burgos, 75% stated that they were aware of the access restriction system, but 25% stated didn't have any information about the access restriction system.



Graphic 6: Awareness level about access restriction in Burgos in 2007

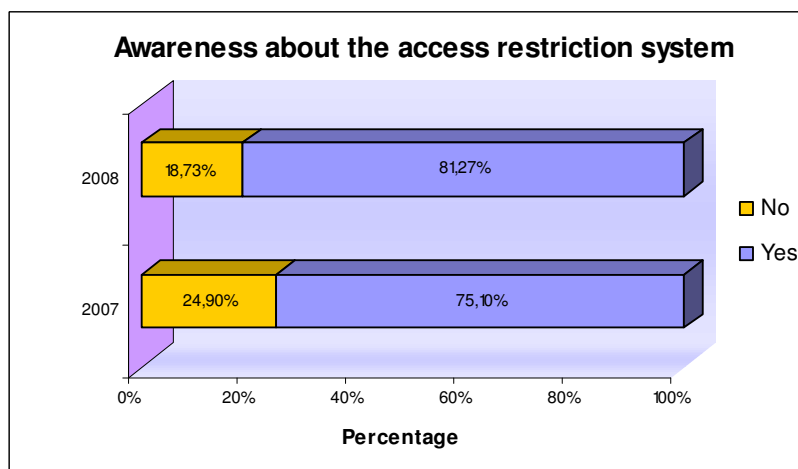
In 2008, 81% stated that they were aware of the access restriction system, but 19% stated didn't have any information about the access restriction system.

Graphic 7: Awareness level about access restriction in Burgos in 2008



In conclusion, the awareness about the access restriction system increased 6% in one year, according to the access restriction activities which were expanded to other areas and the citizens assumed the access as habitual in their movements to the town. The explanation can be related with the people using the car to go to the city centre. Very probably the people the said “no” is because they never used the car in the past to go to the city centre and they realized the streets are closed but they don't know the system, or the people don't go to the city centre in any time, because they live far.

In the next graphic shows the comparatives of the data between 2007 and 2008:



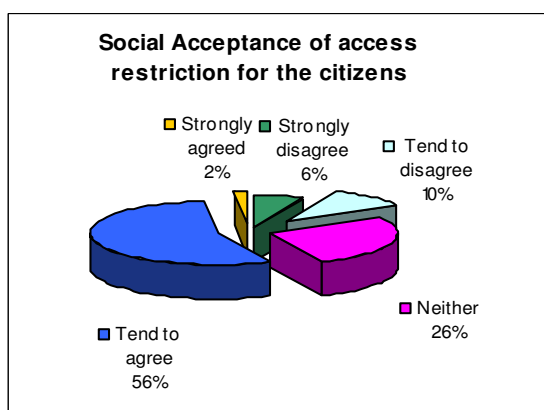
Graphic 8: Comparatives of Awareness level about access restriction in Burgos in 2007 and 2008

Indicator: Acceptance level:

Table 11: Results of society indicators			
Indicator	Relevant Question	Data Result 2007	Data Result 2008
(14) Acceptance level	What is your position regarding the access in the restricted area?	Strongly agree: 2% Tend to agree: 56% Neither: 26% Tend to disagree: 10% Strongly disagree: 6%	Strongly agree: 1% Tend to agree: 20% Neither: 65% Tend to disagree: 12% Strongly disagree: 2%

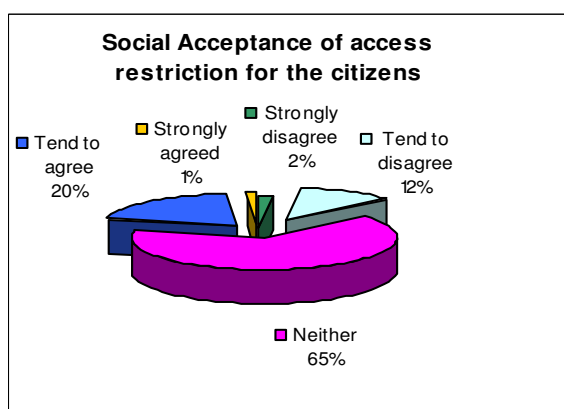
In 2007, the respondents were asked on their level of acceptance asking concerning the position or opinion regarding the access restriction strategy: 2% stated strongly agree, 56% tend to agree, 26% stated they don't have an opinion about the access restriction system, while 10% tend to disagree and 6% stated strongly disagree.

Graphic 9: Acceptance level about access restriction in Burgos in 2007



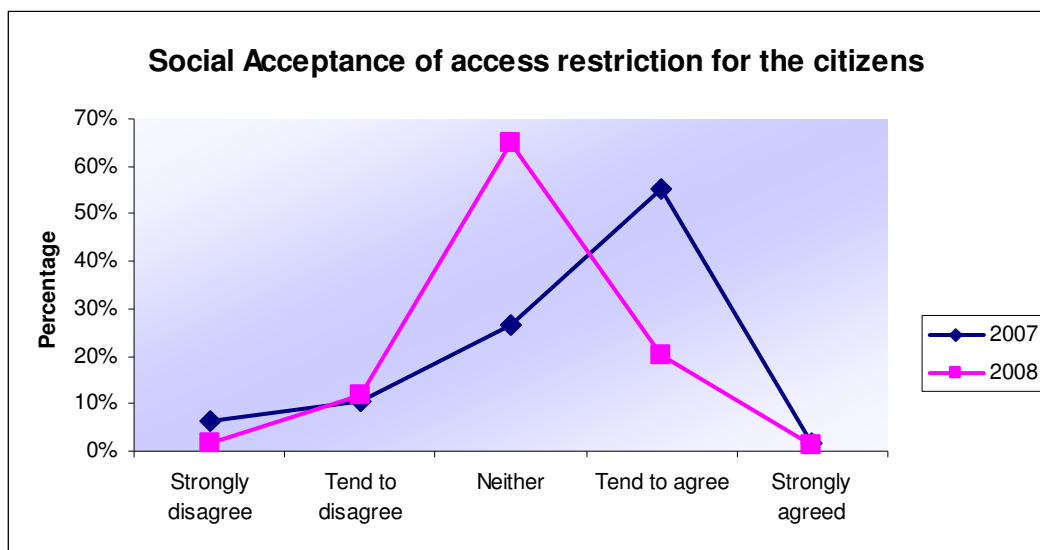
In 2008, 1% stated that they strongly agree about the access restriction system, 20% tend to agree, 65% stated they don't have an opinion about the access restriction system while 12% tend to disagree and 2% stated that they were strongly disagree about the public transport service.

Graphic 10: Acceptance level about access restriction in Burgos in 2008



The perception in 2008 respect to 2007 is that the citizens observed the access restriction as normal and habitual in the mobility regulation, and that is the reason why the opinion not positive neither negative has appeared often in the last survey. The system was just implemented in 2007 so people were very enthusiastic with the idea, and it explained the extremely good opinion concerning the access restriction. In 2008 with the system working for more than two years ago, the citizens have the view as a very normal thing and the opinion "normal" has increased from 26% to 65%, which it means that 2/3 of the citizens have accepted this action and included them in their normal life, despite the levels of happiness have decreased concerning the action.

The bad opinion or view concerning the system has decreased, from 16% of the people with a bad or very bad opinion to 14% in 2008. It means that some people with a bad view have changed their mind into an opinion "normal" of the system, accepting it.



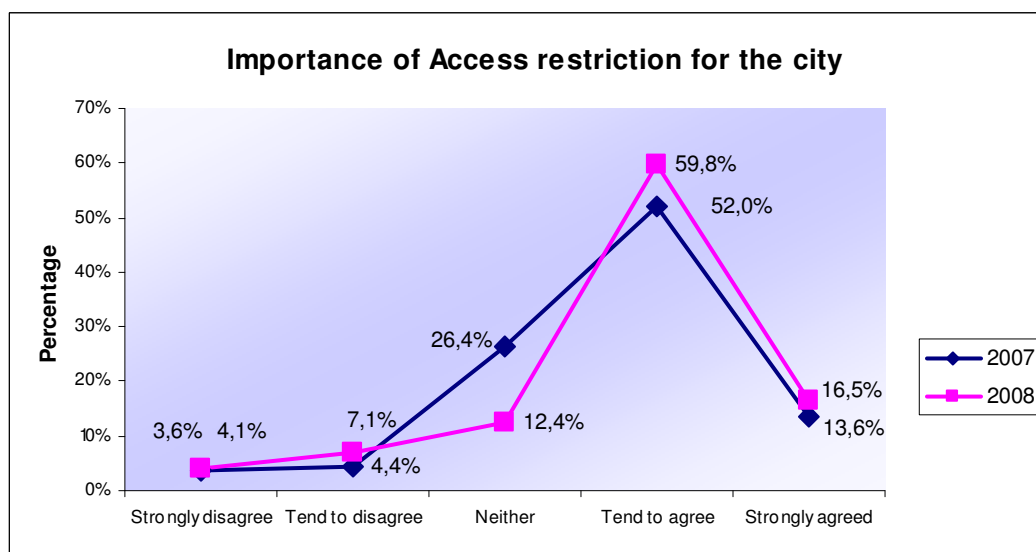
Graphic 11: Comparatives of Acceptance level about access restriction in Burgos in 2007 and 2008

Additionally, the citizens were asked about the importance of the access restriction strategy for the city. The respondents considered that they agreed at least by 60% in 2007 and 2008. The situation in 2008 improved in all stages respect to 2007, in some cases with differences of about 14%.

Only a 8% of the citizens in 2008 think that the access restriction is a bad action performed for the city against the 76% with a favourable opinion, and a 12,4% which really think there is no a big difference.

It means that some of the people do not have a positive view of the system or they have a normal view do really think it is important to have a place to join without cars. One of the main reasons can be that despite they are still not very happy with the idea of to leave the car far from the area or in an off street parking, they eventually enjoy the area or think it is important for the whole city in many aspects: business, tourism, a more lively city...

In the next graphic shows the results obtained with this question:



Graphic 12: Importance of access restriction strategy for general public

C3 Achievement of quantifiable targets

No.	Target	Rating
1	Reduction of the air pollution produced by vehicles in the historic centre	***
2	Reduction of the traffic congestion in the historical centre	***
NA = Not Assessed * = Not achieved ** = Achieved in full *** = Exceeded		

C4 Up-scaling of results

Up-scaling of this measure is possible due to its continued success. There are other populous areas, with small commercial or historical area which could be protected of the private car impact by the access restriction strategy.

A desktop study was carried out to investigate the potential and additional car reductions of up-scaling the measure. So that, some areas and with determinate level of protection, would be eligible for the future access restriction scheme.

A number of assumptions were made in this up-scaling. These were:

- The effect of the measure on encouraging residents is high because they had habitually problems to park the car when foreign drivers occupied the places in the study area.
- The measure will be adopted when the adequate policy of parking regulation and new resident parking will be built.

The same work of analysis in the potential areas were done in the up-scaling period, for example: estimate the cars in the area, the traffic congestions around the study area, level of protection of area, number of car per resident, etc....

The results of desktop study had the following conclusions:

- Important deficit of parking places for residents, it will imply that other areas round access restriction strategy area will be affected in parking demand and traffic flow. Additional flexible regulations schemes should be integrated in the up-scaling activities.
- Protection level to include bollards, cameras... will depend the number of resident with parking in each building. Flexible technological system could be selected to reduce the effects for the residents.
- The car reduction in the area will be high and these spaces could be recuperated for the pedestrians.
- The commercial impact in the up-scaling area will be positive although an important phase of commitment with stakeholders will be necessary.
- New organizational and arrangements will be launched to regulate the access restriction in the area for to enter the vehicles as horary for good distribution, the weight of vehicles and the velocity in the area.
- Awareness campaign should be defined to inform and promote the level of protection and the area affected by the access restriction scheme.

C5 Appraisal of evaluation approach

After the evaluation of the measure, some considerations were done aiming at improving the evaluations of similar actions in the city. Some appraisals are the following:

- Better coordination among Traffic department and operators (subcontracting company) about the data obtained to realize evaluation before and after of the implementation and obtain right data for the progress of the traffic results.
- The surveys could realize to other targets groups with the aim to evaluate other information related to the access restriction strategy.
- Evaluation of quality of the access restriction service should be carried out periodically, with the aim to assure that the service offered to information and management is adequate and it can reach the target groups or citizens in general.

C6 Summary of evaluation results

The key results are as follows:

- **High level of acceptance and awareness among citizens** – The new strategy was accepted and knew by the citizens, they considered that the impact for the city was very important and it solved many problems with the vehicles in the town.
 - **Favourable reduction of the emission and traffic impact in the area** – The data showed as the emissions were reduced in the city thanks to positive strategy to reduce the impact of the traffic in sensible areas of the city. The support of the ring roads and traffic restrictions for some vehicles favoured that these data were obtained.
 - **High Social acceptance to the pedestrian strategies** – The town changed when the pedestrian areas were available for the citizens. The number of pedestrians in these areas began to grow and a new habit appeared in the town, to walk and leisure time in the pedestrian areas because the citizens perceived that these restricted areas were friendlier and less polluted to spare time.
-

D Lessons learned

D1 Barriers and drivers

D1.1 Barriers

- **Barrier 1** – Politicisation and existing stakeholder resistance to measures which might lead to stronger political opposition to changes. - It was resolved through numerous meeting with different stakeholders to know the strategy and the political point of view..
- **Barrier 2** – Substantial cost increases for major components and budget modifications that might modify the project and any remaining measures – Substantial costs were analysed by the Council and valorated the capacity of the council to absorb the equipment.
- **Barrier 3** – Conflicting responsibilities between different local council departments for developing measures that might delay demonstration activities. - Since the first moment, a clear municipality team worked in the measure and the decision were resolved by the politicians.
- **Barrier 4** – Failure to keep to the implementation deadlines and to satisfy quality conditions in technological systems, which might delay the remaining measures related to the historic centre. – A timetable planning were defined by the team to introduce the access restriction scheme on time, some delays were resolved with internal meetings to clarify the technical implementation in a concrete phase.

D1.2 Drivers

- **Driver 1** – The residents of the target area were aware to improve the quality of life and reduce the impacts of the cars
- **Driver 2** – General public were to favour to resolve the problems of traffic and pollution in the historical area, and the pedestrian solutions were the ideal proposal for increasing the quality of life of this area.
- **Driver 3** – Freight sector collaborated actively in the implementation and operation phase. Through numerous meetings a clear position for working in the area was established.

D2 Participation of stakeholders

- **Stakeholder 1** - Local/regional politicians: Decision about the strategy to develop in the target area. Establish the planning of work and financial possibilities.
- **Stakeholder 2** - Local/regional administration: Definition the technical consideration of the pedestrian and access restriction projects. Develop of tender and administrative requirements.
- **Stakeholder 3** – General public: The project was destined to allow that everybody can enjoy the un-polluted spaces and offered new resources of free time with high quality of life
- **Stakeholder 4** – Local/regional businesses: The general businesses improved the environment for the visitors and clients, without cars and less level of pollution.
- **Stakeholder 5** – Media (radio, newspaper): The media people informed about the progress of the new pedestrian areas and access restriction strategy....

- **Stakeholder 6** - Residents of target area: The new equipment and pedestrian areas increased the quality of life in the area, reduced the number of vehicles which were parking continuously. The projects won areas for spare time and leisure and reduced the pollution.
- **Stakeholder 7** – Commuters (work/education): The commuters can walk easily without problems of accident for vehicles and enjoyed of the open spaces.
- **Stakeholder 8** - Visitors (shopping/leisure/tourism): The new open spaces allowed that the visitors could walk with security without vehicles.
- **Stakeholder 9** - Disabled/elderly people: The new open spaces were defined to satisfy the requirements of mobility, without elements which avoided free circulation of disabled/elderly people.
- **Stakeholder 10** - Car drivers: The projects reduced the number of spaces to parking and the free circulations. Other alternatives were offered outside the target area. The car drivers offered so resistance to modify the baseline conditions.
- **Stakeholder 11** – Haulage industry: The project modified the baseline conditions for operation, however, new rules were addressed for this stakeholder. A particular and intense participative process was open to discuss the relevant issues in the mechanism of load and unload in the access restriction area and Historical centre of Burgos. The participation of this stakeholder was very strong and all participants could inform the Council about their particular conditionants.

D3 Recommendations

- **Information and awareness rising** – It is essential to inform citizens on the results of the CIVITAS – CARAVEL project and as the access restriction strategy improved the live and the impact of the traffic in sensible areas.
- **Remain informed about the state-of-the-art** – It is necessary to analyze the state of art in the technological tools to introduce in the Access restriction technology. Many applications are available in the market. To pre-define in a technical project the aim and the capacities of each tool, application or software is indispensable for an adequate exploitation of the access restriction service and
- **Local Inter-department cooperation** – It is essential to define the model of operation for the Access control room. Burgos had a strong debate about how the system should be managed (bollards, software, cameras, cards).
- **Parallel development of the pedestrian and access restriction strategy** – For obtaining pedestrian areas free of car, it is necessary to include systems of restriction, through the electronic system, the results were more favorable for the city of Burgos respect the police control, for example. To realize this urban integration will be easier for the citizens if the pedestrian areas and access restriction were implanted together. Burgos realized some implementations of the access restriction strategy according to the implementation plan for the pedestrian areas which was very well received by the residents (less impact of the works) and the resources reduced.

D4 Future activities relating to the measure

Future activities of this measure can be foreseen due to its continued success, Burgos City Council is studying to provide a new complementary access restriction strategy in other special areas to protect against the traffic impact.

New pedestrian areas were launched and now in implementation. The quality of life for the citizens is the most important priority for the Council, and the pedestrian strategy is an important tool for obtaining it.

It is important to say that after this first implementation many other neighbourhoods associations from different parts of the city have asked the Council to implement the same rules (access restriction) as well as the same system (bollards) in their own areas.

Finally some other villages and cities around Burgos have asked concerning the process of implementation as well as technical aspects to copy or to implement even the same system in their cities or villages, the transference of the good results have started during the project timing.