6 CITY EVALUATION OUTPUTS: VITORIA-GASTEIZ

6.1 Introduction

In Vitoria-Gasteiz walking makes most of journeys, but most non-pedestrian journeys are made by car. Motorized traffic is the second largest source of greenhouse gas emissions and an issue that arguably has the most adverse impact on urban living.

The accelerated growth of the city during recent years altered the scale and structure of the city and the overall urban mobility trends were increasingly becoming less sustainable. Consequently the Municipality of Vitoria-Gasteiz defined a set of ambitions to reverse the undesired trend:

- To work on a Sustainable Mobility and Public Space Plan (SMPSP) aiming to reduce the impact from transport and increase the accessibility of public spaces;
- To encourage citizens’ engagement by involving them in a participatory scheme where to agree on a desired future vision for the mobility of the city and to sign a Pact for Sustainable Mobility in Vitoria-Gasteiz;
- To promote a sustainable mobility culture among citizens, stakeholders and transport operators;
- To design mobility management strategies to modify the affirming modal split also by improving efficiency and functionality of public transport system and public bicycle system.

Vitoria-Gasteiz is determined to double its efforts to turn public spaces into pleasant environments for people where to meet again while concurrently sensitizing and engaging the citizenship on the subject matters in order to facilitate an enduring cultural and behavioural change for the generations to come.

During Modern project, the urban bus network was radically reorganized (passing from 17 bus lines network to a network of 9 bus lines and 2 tram lines), pedestrian areas increased by more than 50 percent and bicycle lanes were extended from 38km to 148km. Educational campaigns sensitised citizens to safe and energy-efficient driving.

Nowadays, Vitoria-Gasteiz has a new mobility and traffic real time information webpage to help citizens make a good decision about how to move in a responsible way. A new traffic light system is currently giving priority to public transport, which reduces travel times. In the new electromobility centre, citizens can have first hand information about the latest electric vehicle models and aids available for its purchase, rent electric vehicles from a new ecar-sharing scheme or charge the electric vehicles in several points.

The data obtained from the mobility survey conducted in 2011 confirms that Vitoria-Gasteiz is meeting the objectives of the SM&PS Plan and CIVITAS Modern project. Pedestrian trips have increased by 40%, while there was a 50% increase in the number of daily trips by bus and tram. The new public transport network is safer, more punctual and the commercial speed faster. The private car has suffered a noticeable decrease in the modal split. It has gone from 36% recorded in 2006, down to 28% in 2011. Meanwhile, the share of cycling has doubled from 3.5 to 7% of all trips. In fact, Vitoria-Gasteiz is nowadays the Spanish city where bicycle is most used.

There has been a continuous effort to disseminate the goals and actions of the Sustainable Mobility Plan and measures developed within the scope of CIVITAS Project through several channels: web site of city council, web site of CIVITAS, press releases, press conferences, thematic conferences, publications, street marketing performances, etc. Accordingly, Vitoria-Gasteiz was recognised in 2010 with the CIVITAS Award in the Public Participation category and hosted the 2012 CIVITAS Forum.
All in all, Modern CIVITAS project, which has had a decisive influence on the early stages of Sustainable Mobility Plan of the city, has laid the foundation for a new model of mobility in the city and has demonstrated the viability of the organization of the city in superblocks.

6.2 Measures Summary and Evaluation Key Findings

In this paragraph each Vitoria-Gasteiz measure has been described in brief by illustrating the different implementation steps and also highlighting the achieved results.

**M01.12 – ELECTRIC VEHICLES USE AND E-CAR SHARING SCHEME**

A Car Sharing Service (CSS) is a scheme that provides collectively available vehicles that can be booked for exclusive use on a pay-as-you-drive basis. Such a scheme is based upon the principle that an individual does not necessarily need to own a car to be able to access one. CSSs are increasingly recognized as a mechanism for transferring from a model of owner-driver allocation of vehicle assets to one which decouples car ownership from car usage.

This measure has set up this new e-CSS in Vitoria, consisting of 6 EVs (4 smaller pure EVs 4-seater Peugeot IONs for short trips and 2 larger Plug-in Hybrid EV 5-seater BYD F3DM for longer trips with no limits on range) at 3 new locations. These new cars, Peugeot ION (pure electric) and BYD F3DM (plug-in hybrid), are available to businesses, public sector employers and residents throughout the IBILEK platform, a car-sharing company to introduce electric vehicles in the three Basque capitals.

This initiative is the starting point of a wider and growing e-CSS network in both the city of Vitoria-Gasteiz and the Autonomous Community of the Basque Country. The network of City Car Club (CCC) cars deployed across the City of Vitoria-Gasteiz is part of a growing initiative. This measure was part of this wider development.

The impacts of the demonstration have been evaluated during a short period of one month, just after this new measure was established, due to some delays on its implementation, by carrying out a survey of users of the service.

**Figure 59 – e-CSS flyer**
At the same time, the creation of an electro-mobility centre in Vitoria has proved to be a positive landmark in the development of EVs in the city. Perhaps the most significant figure for any assessment of the centre's activity is the number of users who have come to find out more about electric vehicles:

- daily average: 13.83 users.
- total number of visits: 1768 users.

Without any direct point of comparison, the daily average is difficult to evaluate on its own. The figure for total visits is easier to interpret, however. We believe the figure is good for the opening period of the centre.

With regard to the centre's informational role, it is worth noting the growing demand for more specific information from some users, with an increase in the quality of the questions.

Finally, it is worth noting the centre’s importance as a person-to-person information point for the general public interested in grants for buying EVs. Many users welcome the chance to receive personal advice as opposed to using other media to answer their queries.

### M02.01 – NEW PUBLIC TRANSPORT NETWORK

The measure introduces an integrated, revolutionary and totally new public transport network, becoming the previous one, based on 18 buses lines, to one new network with 1 tram line and 9 bus lines. This measure is the key factor of the city strategic mobility framework, supplementing the new distribution of Vitoria-Gasteiz based on superblocks concept.

The new public transport network improves the system due to:

- Increasing the frequency of buses on working days.
- Increasing the commercial speed of buses.

Apart from that, it is implemented a huge ad-hoc campaign in order to minimize the negative impact on public transport users during the transition to the new integrated network. The campaign is focusing on participation programs with local stakeholders. This includes: "ambassador group" with stakeholders, dissemination tents, information service on buses and bus-stops, media campaign, etc.

![Figure 60 – New bus-stop shelters installation](image)

The impacts of implementation have been evaluated by analysing operating revenues and costs, and considering service data as vehicle speed, frequency and journey time. Finally, through a face-to-face
survey to users of bus it has been evaluated the percentage of users approving the measure and its awareness.

The main results of the measure evaluation were:

- It is achieved high levels of acceptance (70%), awareness (89%) and quality of service (6.74), but the increase is low compared to ex-ante situation.
- It is achieved high frequency on weekdays (11 min instead of 20 min), even on weekends (16 min instead of 26 min on Saturday, 21 min instead of 27 min on Sunday).
- It is achieved a marked increase of average speed (12.73 km/h instead of 10.77 km/h, an 18%).

After the implementation of this measure, the improvement of the public transport service has been important, especially in terms of frequency and travel times, which has achieved in full the objectives. The commercial speed of public transport has been markedly increased with the new network. This improvement of the public transport service has been reflected in a slight improvement in the perception of the transport system and the measure.

However, the contribution on making public transport more (economically) sustainable has been discreet because it has been increased the revenues due to an increase of the demand, but total costs have been increased as well. The CBA demonstrates most of the benefits are private benefits, benefits that enjoy users of private car passing to bus due to time and fuel savings, however public benefits (benefits that enjoy all society) are lower than cost of implementation the measure. Apart from that, there is a change of trend in safety values, in 2010 and 2011 it has increased the number of injured caused by transport accidents.

This measure has achieved better results thanks to the implementation of the measure about Traffic Light Regulation for the New PT Network and Superblocks Model because the new traffic light regulation enhanced the operation of public transport services. Mobility policy should be a set of measures pushing into the same direction, increasing the results and benefits.

In summary, it can be stated that mobility policies should be constituted by a set of measures pushing into the same direction, increasing the results and so benefits. This is the great added valued coming from projects like CIVITAS.

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**M03.01 – SUPERBLOCKS CONCEPT FOR ACCESS RESTRICTION**

The Sustainable Mobility Plan of Vitoria-Gasteiz establishes a network of main roads along which all motorized vehicles, either public (bus, tram and taxis) or private can circulate. The aim is to disincentive the traffic in the rest of the network. So, the Sustainable Mobility Plan of Vitoria-Gasteiz has developed the so-called superblock concept. A superblock is a geographical space delimited by main streets covering several city blocks. Superblocks concept establishes a hierarchy of streets, according to their volumes of traffic, by separating the crossing roads from the ones just covered by local traffic. One of the objectives of superblocks concept is in fact to reduce the traffic inside the superblocks.

New pedestrian areas appear in the inner of the superblocks. These areas are special places for pedestrians, cyclists, service and emergency vehicles, residents, and freight distribution, with speed limits to ensure a peaceful coexistence of pedestrians, cyclists and drivers. This is supported by the dissuasion of the crossing traffic flows through the superblocks. In this framework a new access control system has been developed to prevent vehicles from entering at the pedestrian streets.

Cameras have been installed to register number plates at the entry and exit of the area delimiting the “almost” pedestrian area of the Central Superblock (S-1).
The main objective of the measure is then to control the access to the city centre compatibly with the new tramway. Additionally, the new access restriction scheme contributes to the superblocks concept by giving priority to the local traffic over the crossing traffic, and redistributing traffic flows from local streets to main roads. Thus, the air and public space quality can be improved thanks to a better private vehicles demand management in the city centre.

The system of cameras works reading the number plates of all vehicles entering and leaving the city centre. If the vehicle entered in the restricted zone takes less than a certain time to exit the forbidden area, the system considers it as a ‘passing-through’ vehicle and therefore the driver is fined. Otherwise, the vehicle is identified as a resident or a goods distribution vehicle and so it has the permission to circulate within the zone. The access restriction scheme foresees, in fact a “white list” of vehicles that includes public transport services, municipal police, fireman vehicles, street cleaning service, and residents. During the time of loading and unloading goods the system doesn’t work, in order to allow access for freight vehicles.

The impacts of implementation have been evaluated by counting the new traffic flows of different vehicles entering the restricted zone. Additionally, by using that information it has been also estimated the related decrease in emissions. Finally, through a telephone questionnaire to citizens it has been evaluated the percentage of population approving the measure.

The main results of the measure evaluation were:

- The tones of CO2 emissions are decreased (-4%).
- The traffic flow have decreased around -60% from 2006 (before CIVITAS and tramway) to 2011 (before measure implementation), and an additional -6% from 2011 until 2012 (after measure implementation). The objective is achieved but the impact of this particular measure is lightly low.

Thanks to the implementation of a bundle of measures linked with the new superblock concept and tramway implementation (e.g. M05.01 – Superblocks Model in Vitoria-Gasteiz) among which there is also the access restriction scheme, the reduction of traffic flows in respect to the situation of year 2006 is huge (around -60%), even if the reduction due to the new access is only about -6%. So the contribution of this measure to goals’ achievements in traffic flow indicator is low. Nevertheless, the initial objective to reduce passing traffic inside the superblock up to 65% from the situation before CIVITAS has been achieved.

This measure has then achieved better results thanks to the implementation of the measure about the building of the Superblocks Model because this new concept has allowed to distribute most of the traffic flows in the main roads, leaving the streets inside the superblock with only local traffic.
Moreover, the fact of fining in function of passing travel time enforces to drive slower than before the installations of cameras.

In summary, it can be stated that mobility policies should be constituted by a set of measures pushing into the same direction, increasing the results and so benefits. This is the great added valued coming from projects like CIVITAS.

M03.04 – TRAFFIC LIGHT REGULATION FOR THE NEW PT NETWORK AND SUPERBLOCKS MODEL

The city of Vitoria-Gasteiz has spread traffic lights to regulate priority in several crosses without a prior planning, usually due to circumstantial decisions or neighbourhood pressures. The characteristic of current traffic light is rigidity, with an excessive number and length of phases. This has led to a significant increase in travel time and a limitation of the real capability of the network.

The Sustainable Mobility Plan of Vitoria-Gasteiz establishes a network of main roads along which all motorized vehicles, either public (bus, tram and taxis) or private can circulate. The aim is to disincentive the traffic in the rest of the network. So, the Sustainable Mobility Plan of Vitoria-Gasteiz has developed the so-called superblock concept. A superblock is a geographical space delimited by main streets covering several city blocks. Superblocks concept establishes a hierarchy of streets, according to their volumes of traffic, by separating the crossing roads from the ones just covered by local traffic. One of the objectives of superblocks concept is in fact to reduce the traffic inside the superblocks, bringing most of this traffic to the main streets.

The purpose of the measure is redesigning the entire city traffic light regulation in order to meet the following objectives: to give fluency to vehicles in the basic network surrounding the superblocks thanks to a sequence of green lights, and to give special priority to public transport. On the other hand, dissuade traffic from crossing the inner superblocks.

![Traffic Light Priority](image)

Figure 62 – New traffic light regulation for PT priority over 17 intersection in Vitoria-Gasteiz

It is designed a new traffic light regulation over 230 intersection regulators in Vitoria-Gasteiz. The measure contributes as well to improve public transport system via a bus priority application in intersections.
To design the new traffic regulation system it is necessary to have a tool to evaluate and compare the traffic regulation alternatives in front of the above mentioned indicators. Micro-simulation model is used as the best tool for this analysis. Then, it is analysed the situation (diagnosis), helping on the model, and make structured proposals for traffic regulation on a scaled way to make easy the implementation and evaluation of the impacts in each step. Finally, the detailed design of the traffic regulation plans.

The impacts of implementation have been evaluated by analysing distance and time journey with a traffic model simulation. Additionally, by using that information it has been also estimated the related decrease in emissions. Finally, through a telephone questionnaire to citizens it has been evaluated the percentage of population approving the measure.

The main results of the measure evaluation were:

- It is achieved high levels of acceptance (70%), awareness (89%) and quality of service (6.74), but the increase is low compared to ex-ante situation.
- It is achieved high frequency on weekdays (11 min instead of 20 min), even on weekends (16 min instead of 26 min on Saturday, 21 min instead of 27 min on Sunday).
- It is achieved a marked increase of average speed (12.73 km/h instead of 10.77 km/h, an 18%).

The economic impact of this measure is important due to the time savings and the high value of time. During the year, 817,562 hours are saved by the citizens, that is, 12,180,835.80 € in terms of journey time savings. This is because the speed is increased so the amount of hours is lower than in the before CIVITAS scenario. The amount of veh-km per year also is lower because users drive along the main streets due to the new traffic light regulation makes them more attractive than going through local streets with longer itineraries. In addition, the impacts on the public transport system are greater than the expected ones. The bus priority regulation in 17 traffic lights intersections are additional positives externalities.

However, the social benefit (emission and energy savings) is low in relative and economical terms. During the year, 2,423 tonnes of CO2 and 8 tonnes of NOx are saved in the whole city. This is because the speed is increased so the amount of hours is lower than in the before CIVITAS scenario. The amount of veh-km per year also is lower because users drive along the main streets due to the new traffic light regulation makes them more attractive than going through local streets with longer itineraries. In addition, the impacts on the public transport system are greater than the expected ones. The bus priority regulation in 17 traffic lights intersections are additional positives externalities.

This measure has then achieved better results thanks to the implementation of the measure about the building of the Superblocks Model because this new concept has allowed to distribute most of the traffic flows in the main roads, leaving the streets inside the superblock with only local traffic. This fact improves the global traffic optimization with the new traffic light regulation on main roads.

In summary, it can be stated that mobility policies should be constituted by a set of measures pushing into the same direction, increasing the results and so benefits. This is the great added valued coming from projects like CIVITAS.

**M04.04 – ENERGY SAVING TRAINING**

In Vitoria-Gasteiz, a city in which most non-pedestrian journeys are made by car, traffic is the second largest source of greenhouse gas emissions and one of the greatest environmental and social impacts into the urban living aspects.

Apart from that, Local Energy Plan and the Local Strategy against Climate Change Plan expect to cut down the CO2 emissions of the transport sector.
Efficient driving contributes to achieve these objectives. Besides, traffic noise, accident risk and vehicles maintenance cost reductions are also improved. The course of eco-driving is a new way of leading the vehicle, which aims:

- A low consumption of fuel.
- A reduction of the environmental pollution.
- A major driving comfort.
- A decrease of risks on the road.

The objective of this measure is to educate all citizens of Vitoria-Gasteiz to take action for a cleaner and more energy efficient driving style. During the Modern Project, 1,000 citizens learn to drive their vehicles in an energy-efficient way enabling them to save 15% of the fuel compared to inefficient driving, which roughly means 270 tons of CO2 reduced per year.

The courses consist on a theoretical part and a practical part with a maximum of 15 people per session. Every session lasts 4 hours and participants can choose to attend the course in the morning or evening schedules. The course is composed by different parts. Firstly each student drives in an urban circuit and the trainer puts down his fuel consumption. Secondly, there is an introduction on how to drive saving fuel. Finally, the student drives in the same urban circuit and his improvements are checked.

The impacts of implementation have been evaluated by comparing fuel consumption and vehicles speed between the first circuit and the second one. Additionally, by using that information it has been also estimated the related decrease in emissions. Finally, through a questionnaire to students it has been evaluated the acceptance of the measure.

The main results of the measure evaluation were:

- After 2012 edition, there have been 601 students attending the courses.
- It has been reduced the fuel consumption (-8.3%) after 2012 edition.
- It has been decreased the average speed (-2.5%) after 2012 edition.
The most important impact of this measure is the reduction of average speed of drivers. This is important to reduce accidents and to calm the traffic in the city and other impacts as noise.

The number of drivers attending the courses is over the half of expected. This is one of the risks of this kind of measures and the goal is not achieved despite the strong dissemination campaign to support the recruitment of people. However, the attendance is higher than previous edition of eco-driving courses.

The reduction of fuel consumption is lower than expected. However, if we compare this result with other studies or other eco-driving courses, the reduction of fuel consumption is similar to them.

It could be interesting to develop a control panel with students of last years, in order to know how the lessons learning are being carried out. It is an important measure to value the progressive attenuation of the learnt skills. Also, it could be interesting to offer testing electric vehicles to familiarize with them, and to compare results with standard cars.

M05.01 – SUPERBLOCKS MODEL

The Sustainable Mobility Plan of Vitoria-Gasteiz establishes a network of main roads along which all motorized vehicles, either public (bus, tram and taxis) or private can circulate. The aim is to disincentive the traffic in the rest of the network. So, the Sustainable Mobility Plan of Vitoria-Gasteiz has developed the so-called superblock concept. A superblock is a geographical space delimited by main streets covering several city blocks. Superblocks concept establishes a hierarchy of streets, according to their volumes of traffic, by separating the crossing roads from the ones just covered by local traffic.

New pedestrian areas appear in the inner of the superblocks. These areas are special places for pedestrians, cyclists, service and emergency vehicles, residents, and freight distribution, with speed limits to ensure a peaceful coexistence of pedestrians, cyclists and drivers. This is supported by the dissuasion of the crossing traffic flows through the superblocks. In this framework other measures included in the CIVITAS project support this concept: the new public transport network, the access restrictions to the city centre, a new traffic light regulation, and the urban freight logistics management.

![Figure 64 – Before and After Implementation of Superblock Model](image)

The main objective of the measure is redistributing traffic flows from local streets (inner streets in superblocks) to main roads (streets separating superblocks). Thus, the air and public space quality can be improved thanks to a better private vehicles demand management in the city.
Before CIVITAS, Vitoria-Gasteiz City Council had been started to work in the pedestrian area of the historical centre. In the framework of this project, a pilot test has been developed in the street Sancho el Sabio and its superblock, in order to have a better knowledge of the problems and solutions that may be encountered during the process of implementation of superblocks. Apart form that, a further development of the superblock model has been achieved implementing traffic calming elements to reduce car speed and give more confidence to cyclists & pedestrian in the inner streets of the superblocks.

The impacts of implementation have been evaluated by counting the traffic flows of vehicles, bicycles and pedestrians in the pilot superblock. Additionally, with a speedometer and a sonometer has been measure the average vehicles speed and the noise level respectively. Finally, through a telephone questionnaire to citizens it has been evaluated the percentage of population approving the measure.

Thanks to the implementation of a bundle of measures linked with the new superblock concept, the reduction of traffic flows in the city centre is huge, changing the modal split from cars to pedestrian and bicycles. The pedestrian surface has been increased and the emissions and environmental impacts has been decreased.

In summary, it can be stated that mobility policies should be constituted by a set of measures pushing into the same direction, increasing the results and so benefits. This is the great added valued coming from projects like CIVITAS.

**M06.01 – PEDESTRIAN AND BICYCLE LANES NETWORK**

City streets in Vitoria-Gasteiz are dedicated largely to the private car in detriment of the pedestrian and bicycle use. Besides the theft of space for the citizen, this situation generates an environmental impact shown in atmospheric and acoustic contamination, especially perceptible in the centre of the city and in the main roads. It generates adverse effects in the public health.

This measure promotes a new network of pedestrian and bicycle lanes within the scope of the Sustainable Mobility and Public Space Plan of Vitoria-Gasteiz. New bikeways are built from 2009 to 2012, increasing the current network from 75 to 115 km. Pedestrian ways also are promoted, increasing their extension from 24% to 69% of the street surface.

The measure is developed by the project partner CEA (Environmental studies centre of Vitoria-Gasteiz City Council). CEA's mission is to ensure the sustainability of Vitoria-Gasteiz, promoting the sustainable development, as a part of City Council.

| Figure 65 – n Super-block street pathway of Ricardo Buesa, April 2010 (inner street S-14 Superblock) |

The impacts of implementation have been evaluated by counting the flow of bicycles and pedestrians in several points of the city. Additionally, by using that information it has been also estimated the
related decrease in emissions. Finally, through a telephone questionnaire to citizens it has been evaluated the percentage of population approving the measure.

The main results of the measure evaluation were:

- It is decreased the number of pedestrians (-0.45%).
- It is increased the number of users of bicycles (+18.4% in 2 years, +9% annual).
- It is decreased the modal split of cars (-6%).
- It has been decreased the number of pedestrian accidents (-18%).

The result of this measure produces a little effect in number of pedestrians around the city. The cause for this is because pedestrians already have a specific space in the city, this measure improves the main pedestrian network. The number of pedestrians has remained almost constant, so it is an improvement respect to the do-nothing scenario. However, it is important to note the high increase of pedestrian in streets like Sancho el Sabio Street, where it has been add new pedestrian surface from the road surface.

However, there has been an important increase in number of cyclists around the city. This increase of bike users may mean an improvement of environmental impacts related with the car use. Thanks to this measure it has been eliminated the main barrier of using bicycles, that is, to have an unconnected network.

As result of that, the modal split of Vitoria-Gasteiz has broken the historical trend of increasing number of private car travels and decreasing number of non motorized travels. This is the best indicator of change of mobility thanks to Sustainable Mobility Plan and CIVITAS Project.

This measure has then achieved better results thanks to the implementation of the measure about the building of the Superblocks Model because this new concept has allowed to distribute most of the traffic flows in the main roads, leaving the streets inside the superblock with only local traffic and more accessible to bikes and pedestrians. This fact improves the mobility of these means of transport in the city.

In summary, it can be stated that mobility policies should be constituted by a set of measures pushing into the same direction, increasing the results and so benefits. This is the great added valued coming from projects like CIVITAS.

M07.01 – URBAN FREIGHT LOGISTICS WITHIN THE SUPERBLOCKS MODEL

The Vitoria Gasteiz Municipality in the last years has carried out a program of reorganization of the overall urban public space according to the “superblocks” philosophy. It is a way of organizing the city that limits the availability of space to cars enlarging the space devoted to pedestrian and social use, and consequently, from the transportation point of view, aims to improve the shift of mobility to more sustainable modes.

This measure too was framed into this general approach. Therefore, as main objective of the measure, there was the need to define a new system of distribution of goods in accordance with the development of superblocks, capable of calming traffic and returning to pedestrian’s quality public space nowadays occupied by vehicles, developing activities not appropriate to this space.

After an important work of state-of-the-art and analysis of needs of the city, it was defined a solution by implementing “proximity areas” reserved to freight distribution enslaved to the superblocks. The delivery work within the superblocks has to be carried from these areas only. As part of the solution,
freight distribution time windows have been modified and the access to the pedestrian areas, which was until now allowed, has been forbidden.

This measure has started to be implemented as a demonstration project in the Central Superblock. However, at the moment of the final of CIVITAS MODERN project, the implementation of the measure still hasn’t been finished. It is mandatory to control the access of vehicles to the pedestrian areas with police, and it is highly recommended to wait a period of consolidation of the measure and the mobility habits of distributors in the area. For these reasons, a complete evaluation couldn’t be performed yet.

**M08.01 – INFORMATION AND TRAFFIC MANAGEMENT SYSTEMS**

Citizens need an effective communication system that facilitates the decision-making process in mobility related matters, to ensure a less costly use of resources (energy, transport) and to modify their final decision relating to mobility.

Give more and best information to the citizens, who are in fact different transport users, about traffic is of great importance in the development of the deep changes that Vitoria-Gasteiz city hall wants to accomplish.

To achieve this objective, it is necessary to build a good information system that collect all the needed information about mobility, understanding mobility as a whole. So the system will contain information about all possible transport ways available to our citizens for travelling through the city: on foot, by car, by bicycle and by public transport.

The purpose of the measure is to improve the information to the citizens, as well as to attain a communication and information system with a reasonable maintenance cost. There are two different parts in the measure: a new mobility information network to obtain images, data, etc. from several points of the city, and a new communication channel with citizens through the mobility website.
To attain a good communication system the City Council has installed a communications system based in a wireless connection. It was introduced this system due to its less implantation and maintenance cost and the geographical scattering of the systems to control. Wireless connection requires fewer infrastructures and maintenance cost than the wire networks. This project is a pilot test, and the initial objective was to have de 5% of the city covered by wireless network.

Apart from this, it has been defined the structure of information that the City Council is going to publish for citizens, defined the responsibility and protocols for its update and developed the needed software in order to extract defined data and publish it in the website.

The impacts of implementation have been evaluated by counting the number of users of the website. Additionally, through a telephone questionnaire to citizens and through an online survey to website users, it has been evaluated the percentage of population approving the measure and its quality level.

The main results of the measure evaluation were:

- The objective of coverage of the wireless network in Vitoria-Gasteiz has been sharply exceeded (15% instead 5%).
- The increase of users is quite limited despite the information campaign carried out after the launch of the new website (+4%).
- The increase of acceptance (+15%) and the quality of service (+43%) has been very important, so the objective has been achieved.

Results have been positive in terms of users of the new services of mobility website, but the increase of users is quite limited despite the information campaign carried out after the launch of the new website. It seems that the demand of users of new media is limited by age, access to internet and new technologies used people. The acceptance level and the quality of service of the mobility website (both indicators related to people vision of the measure) have been sharply increased. This the most important impact of the measure. Apart from that, the final surface of city covered by the wireless network has been higher than expected objective.
6.3 Comparison of objectives, targets and results

Each measure has been characterised by a set of so-called measure level specific objectives with, in most cases, the related tangible targets. This information has been then used at the end of the project to assess the achievement or not of these goals and to which extent. In the MERT, in fact, the actual achieved results are compared with the envisaged ones by using a 'star code' which identifies three different levels:

1. Substantially achieved, when the results are up to 50% of the envisaged target;
2. Achieved in full, when the results are more than 50% of the envisaged target;
3. Exceeded, when the results go beyond the envisaged target.

The city of Vitoria-Gasteiz had a quite large number of measures that has achieved the objectives predicted during the measures definition. As illustrated in the following figure, among the total number of objectives – namely 25 – 52% of them have exceeded the envisaged targets, while 28% has been achieved in full and only 20% reached only up to half of the targeted values.

By going into the details of each measure, it can be noted that the one about the introduction of new pedestrian and bicycle lanes network has exceeded all its envisaged targets; while the most important measure for the city, namely the innovative superbloc model, has exceeded the majority of its foreseen goals with only one of them (out of five) not being fully achieved. Also the energy saving driving courses initiative has been characterised by a similar status of achieved targets since one of them has been exceeded while the other three has been only partially fulfilled.

Finally, the e-car sharing scheme, the new public transport network and the traffic lights regulation for the superbloc model have all the targets fully achieved or exceeded.
Electric vehicles use and e-car sharing scheme

New Public Transport Network

Superblocks Concept for Access Restrictions

Traffic Light Regulation for the New PT Network and Superblocks Model

Energy Saving Training

Superblocks model

Pedestrian & Bicycle Lanes Network

Information and Traffic Management Systems

- Partially Achieved
- Achieved in full
- Exeeded

Figure 69 – Objectives achievement for each Vitoria-Gasteiz measure

Table 19 – Comparison between expected and obtained results for each Vitoria-Gasteiz measure

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<td>6 electric vehicles for e-car sharing services (4 pure EV and 2 Plug-in Hybrid EV)</td>
<td>6 electric vehicles for e-car sharing services (4 pure EV and 2 Plug-in Hybrid EV)</td>
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<tr>
<td></td>
<td>Parking places for electric vehicles in the city center</td>
<td>The city has now 10 public charging points: 2 in the Artium Museum parking, 2 in Eroski of Salburua, 1 in the Electromobility Center, 2 in Iradier Arena parking, 1 in Repsol Elorriaga oil station and 2 in Miñano research center.</td>
<td>The city has now 10 public charging points: 2 in the Artium Museum parking, 2 in Eroski of Salburua, 1 in the Electromobility Center, 2 in Iradier Arena parking, 1 in Repsol Elorriaga oil station and 2 in Miñano research center.</td>
</tr>
<tr>
<td>M02.01</td>
<td>Increase the frequency of the public transport network (from 20 min to</td>
<td>Bus frequency: 11 minutes.</td>
<td>Bus frequency: 11 minutes.</td>
</tr>
<tr>
<td></td>
<td>11 minutes.</td>
<td></td>
<td>The durability of results is intrinsic in the kind of measure.</td>
</tr>
<tr>
<td>Measure</td>
<td>Expected results</td>
<td>Obtained results</td>
<td>Durability of the results</td>
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<tr>
<td>15 min)</td>
<td>Increase the commercial speed of the public transport network (20%)</td>
<td>Increase in commercial speed from 10.77 to 12.73 km/h, which represent an improvement of 18.2%</td>
<td>The implemented PT network will represent the backbone of the entire PT in the next years for the city. The result was extremely significant and represented one of the most important result obtained in Vitoria Gasteiz within the MODERN Project, as also shown by its reflections on the modal split.</td>
</tr>
<tr>
<td></td>
<td>Increase the number of travels in the public transport (15%)</td>
<td>PT users: in 2007 = 12'043'308 in 2008 = 12'642'648 in 2011 = 19'306'719 Increase: 2011/2007 = 60.31% 2011/2008 = 52.71%</td>
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</tr>
<tr>
<td>Minimise the accident rate in the public transport network</td>
<td>Reduction of accidents per bus and year, from 5.63 to 3.55 reaching an improvement of 36.9%</td>
<td>Reduction of fuel consumption average from 56.56 to 53.03 litres/100kms (improvement of 6.24%) Lower CO2 emissions (421 tns/year)</td>
<td></td>
</tr>
<tr>
<td>M03.01</td>
<td>65% reduction of access traffic to the controlled area</td>
<td>The objective to reduce passing traffic inside the superblock up to 65% from the situation before MODERN has been achieved and even exceeded, mainly due to “Superblocks Model” and the tramway implementation (around-60%)</td>
<td>The reduction in traffic flow due to the implementation of the Superblock model within the project and the tramway implementation is huge (-89%, -63%, -59%). These two measures by themselves were almost sufficient to divert the through traffic from the restricted area, so that the implementation of the access control specifically related to this measure reduced only the remaining part of the through traffic which resulted to be quite limited (-6%, -8%, -6% over the three monitored years).</td>
</tr>
<tr>
<td>M03.04</td>
<td>New traffic light regulation completed over 230 intersection regulators</td>
<td>The situation has been improved with real benefits in terms of all of the measurable parameters in the direct comparison.</td>
<td>The durability of results is ensured by the fact that the new scheme has been implemented and is currently working on the traffic lights network and, given the good results, it will be maintained.</td>
</tr>
<tr>
<td></td>
<td>Reduction of travel time in 25 selected itineraries</td>
<td>7 longer itineraries have been used because it came out to be better, in</td>
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<tr>
<td>Measure</td>
<td>Expected results</td>
<td>Obtained results</td>
<td>Durability of the results</td>
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<tr>
<td>M04.04</td>
<td>15% saving in fuel consumption</td>
<td>Total: aprox. 8.3% saving</td>
<td>It is planned to extend this measure to more drivers every year. Additionally, RACVN is currently studying to develop a control panel with students of last years, in order to know how the lessons learning are being carry out. It is an important measure to value the progressive attenuation of the learnt skills. Finally, it could be interesting to offer testing electric vehicles to familiarize with them, and to compare results with standard cars.</td>
</tr>
<tr>
<td></td>
<td>Reduction of CO2 (%)</td>
<td>-210 kg of CO2 per student and year</td>
<td></td>
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<tr>
<td></td>
<td>Keeping the average speed before/after the course</td>
<td>-2.5%</td>
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<tr>
<td></td>
<td>Students very satisfied with the course</td>
<td>Aprox. 80% of students got satisfaction from the courses.</td>
<td></td>
</tr>
<tr>
<td>M05.01</td>
<td>City centre superblocks basic plan and costing</td>
<td>Detailed projects were drawn up to develop 15 superblocks in the city centre, plus the demonstrative superblock and the central superblock. Those 17 superblocks were created and working at the end of the MODERN project.</td>
<td>Durability of the results is expected to be great, because changes are based mainly on infrastructural modifications. The impact is big in the quarters where changes have been made, but they will also affect the rest of the city in terms of motorized mobility and, to a lesser extent, cycling and pedestrian mobility. These results are transferable as long as plans with similar objectives in other cities are based on the same foundations of heavy infrastructural changes and powerful participation, communication and promotion campaigns.</td>
</tr>
<tr>
<td></td>
<td>Demonstrative superblock detailed plan and costing</td>
<td>Elaboration of a detailed plan to develop a demonstrative superblock in the city centre.</td>
<td></td>
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<tr>
<td></td>
<td>Fitting out of a demonstrative superblock with a total extension of 64’797 m2.</td>
<td>Development of the demonstrative superblock to its full extent; development of the central superblock.</td>
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<tr>
<td></td>
<td>Increase in the free public space for activities of living and pedestrian relations.</td>
<td>Pedestrian surface in the demonstrative superblock increased from 45% of the total</td>
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<tr>
<td>Measure</td>
<td>Expected results</td>
<td>Obtained results</td>
<td>Durability of the results</td>
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<tr>
<td>Improvement of the acoustical quality of the area</td>
<td>Noise measured in the demonstrative superblock before the action: 66.50 dBA, and after the action: 61.00 dBA. The result is directly related to the reduction of motorized vehicles in the zone.</td>
<td>Surface before the action to 74% after it.</td>
<td>Durability of the results and their impact in the city are big, because they are based mainly on infrastructural modifications that strengthen cycling and pedestrian trends that had been previously observed in the citizens' mobility behaviour. These results are transferable as long as plans with similar objectives in other cities are based on the same foundations of heavy infrastructural changes and powerful participation, communication and promotion campaigns.</td>
</tr>
<tr>
<td>Reduction of emissions of polluting gasses within the superblock</td>
<td>42% reduction in CO₂; 42% reduction in NOₓ; 38% reduction in particles.</td>
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<tr>
<td>Improvement of the accessibility of the area</td>
<td>Increase of the pedestrian surface from 45% to 74%.</td>
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</tbody>
</table>

**M06.01**

<table>
<thead>
<tr>
<th>Measure</th>
<th>Expected results</th>
<th>Obtained results</th>
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<tbody>
<tr>
<td>New bicycle network basic planning and costing for the city</td>
<td>Elaboration of the Bicycle Mobility Master Plan and development of detailed proposals for each of the cycling network axis; furthermore, construction of several of the bicycle lanes (25 km) to complete the network.</td>
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<tr>
<td>Demonstrative superblock bicycle and pedestrian ways detailed plan and costing</td>
<td>Elaboration of a detailed plan to develop a demonstrative superblock in the city centre; development of the demonstrative superblock.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fitting out of the bicycle and pedestrian ways within the demonstrative superblock</td>
<td>Modal split in the demonstrative superblock shifted from 86% cars/11% pedestrians/3% cyclists to 23%/66%/11% after the measure.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increase in the free public space for activities of living and pedestrian relations</td>
<td>Pedestrian surface in the demonstrative superblock increased from 45% of the total surface before the action to 74% after it.</td>
<td></td>
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<tr>
<td>Reduction of the conflicts between cyclists and pedestrians within the demonstrative superblock.</td>
<td>No studies have been done about conflicts between pedestrian and cyclists in the demonstrative superblock, but the acceptance level of the measure among people,</td>
<td></td>
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<tr>
<td>Measure</td>
<td>Expected results</td>
<td>Obtained results</td>
<td>Durability of the results</td>
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<tr>
<td>Increasing safety</td>
<td>Pedestrian accidents in the entire city have decreased from 187 in 2009 to 160 in 2010. Bicycle accidents have remain constant, whereas the total number of people riding bicycles in the city has almost quadrupled in the last 5 years.</td>
<td>is of 6.06 out of 10 points.</td>
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**UDC in the city centre implementation feasibility report**

| M07.01 | Implementation of a new urban freight logistics routing and scheduling within the demonstrative superblock | A project for the implementation of proximity areas within the Central Superblock was drafted but the implementation phase has not finished yet. | All these results will have long-term duration given that, on the one hand, the measure involves changes in the city structures and, on the other, the participation process to arrive at the solution gives it more strength. |
| Increase in the free public space for activities of living and pedestrian relations | Load-unload areas within the superblocks have been eliminated for a surface of about 35'000 m2, dramatically improving quality of public space. | |
| Improvement of the urban freight logistics within the demonstrative superblock | The delay in the implementation of the measure had the risk of affect its evaluation. Objective not yet assessable. | |

**Wi-max implantation pilot project.**

<p>| M08.01 | A new wireless communication system has been installed in a city area. A new traffic component, a traffic |  |  |</p>
<table>
<thead>
<tr>
<th>Measure</th>
<th>Expected results</th>
<th>Obtained results</th>
<th>Durability of the results</th>
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</table>
| Real time mobility information system                                   | A new space has been developed for the website. Traffic real time information has been published in this area. Moreover, all the available mobility information has been integrated in a same space (car, bus, bicycle ...) | In this moment, we have 15% of the extension of the city covered by Wi-max          | The durability of results is expected to be great, because:  
  § we have filled our real time traffic system using services based in DATEX II, that is a standard developed for information exchange between traffic management centres, traffic information centres and service providers  
  § we expect to connect other traffic management systems and new city areas in order to increase the information  
  § new wireless communication system will provide the connection of these new elements in an economical way. |
| 5% of the extension of the city covered by Wi-Max                      |                                                                                 |                                                                                 |                                                                                         |
| Good acceptance of the measure                                          |                                                                                 |                                                                                 |                                                                                         |

### 6.4 The Cost Benefit Analysis

The Cost Benefit Analysis (CBA) is a popular tool to assess the impacts of transport-related measures. It permits to monetise different environmental, social and financial impacts in order to make them comparable. This is particularly important in the urban transport context since financial gains of projects are often not ample enough to cover the initial investments. However, by taking into account social and environmental impacts – the so-called external costs – the CBA highlights the relevance of a measure for the entire society.

In the case of Vitoria-Gasteiz, the following measures have been considered to be the most suitable for carrying out a CBA.

**M02.01 – New PT Network**

The lifetime of the measure has been set to be equal to 10 years. It is a period enough to consider the consolidation of the measure and its impact in the mobility behaviour of the citizens (people are getting used to the new public transport services). The discount rate used has been 3.5%, following the suggestion of Guide to Cost-Benefit Analysis of investment projects (EC DG Regional Policy, 2008).
The considered costs have been the operation costs – in this case, it is the cost of service of bus network. Additionally, some positive externalities have been considered in terms of:

- Economic benefits due to the increase of passengers and consequently revenues (public benefit – monetised);
- Journey time savings for old users of public transport due to the improvement of buses network (private benefit – monetised).

The results suggest that the measure produces a NPV\(^{31}\) of 89'518'000 € over 10 years (in 2010 prices), based on a one-to-one comparison between the B-a-U case and the new public transport network. Most of the benefits are private benefits, that is benefits that enjoy users of private car shifting to bus due to time and fuel savings. In fact, public benefits (benefits that enjoy all society) are less than cost of implementation the measure.

M03.04 – Traffic Light Regulation for the New PT Network and Superblocks Model

Even in this case the lifetime of the measure has been set to be equal to 10 years. It is a period enough to consider the consolidation of the measure and its impact in the mobility behaviour of the citizens (people are getting used to the new public transport services). The discount rate used has been 3.5%, following the suggestion of Guide to Cost-Benefit Analysis of investment projects (EC DG Regional Policy, 2008).

The considered costs have been the investment costs obtained by taking into account the investment in new technologies, the modernization of the control centre and the implementation of the changes on traffic lights) during the years needed to amortize this investment. In this case the amortization duration of the investments will be around 10 years (when the technology and the traffic lights will need to be changed again).

Additionally, some positive externalities have been considered in terms of:

- Journey time savings (private benefit – monetised) as the difference between before and after implementing the measure for all citizens.
- CO2 emissions savings (public benefit – monetised).
- NOx and small particles emissions savings (public benefit – monetised).
- Economic benefits due to the reduction of use of fuel (private benefit – monetised).
- Economic benefits due to the reduction of oil dependence (public benefit – not monetised).
- Economic benefits due to the improvement of quality of life in local streets due to a lower traffic flow in the secondary streets (public benefit – not monetised).

The results suggest that the measure has a NPV of 140'721'000€ over 10 years (in 2010 prices), based on a one-to-one comparison between the B-a-U case and the new traffic light regulation. Most of the benefits are private ones involving private car users in terms of time and fuel savings. On the other hand, in fact, public benefits (applicable to the whole society) are lower. Nevertheless, they result to be higher than the costs of implementing the measure.

M06.01 – Pedestrian and Bicycle Lanes Network

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\(^{31}\) Net Present Value.
In this measure the CBA has been made to quantify the positive externalities generated by part of this measure, namely the one referred to the bicycle lanes since the pedestrian mobility is difficult to be evaluated correctly. The lifetime of the measure has been set to be equal to 20 years. It is a period enough to consider the consolidation of the measure and its impact in the mobility behaviour of the citizens. The discount rate used is 3.5%, following the suggestion of Guide to Cost-Benefit Analysis of investment projects (EC DG Regional Policy, 2008).

The considered costs have been the investment costs and the maintenance costs. Additionally, some positive externalities have been considered in terms of:

- Journey time savings (private benefit – monetised) as the difference between before and after implementing the measure for all citizens.
- CO2 emissions savings (public benefit – monetised).
- NOx and small particles emissions savings (public benefit – monetised).
- Economic benefits due to the reduction of use of fuel (private benefit – monetised).
- Economic benefits due to the reduction of oil dependence (public benefit – not monetised).
- Economic benefits due to the increase of safety related to a lower use of cars (public benefit – not monetised).

The results suggest that the measure has produced a NPV of €197'087'000 over 20 years (in 2010 prices), based on a one-to-one comparison between the B-a-U case and the new public transport network. Most of the benefits are private benefits, benefits that enjoy users of private car going to bicycle due to time and fuel savings. In fact, public benefits (benefits that enjoy all society) are less than costs of implementing the measure.

6.5 Focus on bundled or cooperative measures

An integrated model to regulate traffic, access and urban space organisation through the definition of so-called superblocks is one of the strategies the city developed tested through the MODERN project. The objectives of this initiative were to reorganise traffic to free up space, redefine the public transport network to improve accessibility and coverage, consolidate the network of cycling paths, set up a network of pedestrian walkways, and identify infrastructure required for parking and delivery of goods.

The superblock model is part of the city program and/or a consequence of the implementation of a sustainable vision, exchange of experiences and lessons learned with other measures or cities. This measure has been favored within the CIVITAS project as an integrated developed of several actions in the city because synergies have been achieved by other measures. In this case, the measures M02.01 (“New public transport network”), M03.01 (“Superblocks concept for access restriction”), M03.04 (“Traffic light regulation for the new PT network and superblock model”), M06.01 (“Pedestrian & bicycle lanes network”) and M07.01 (“Urban Freight Logistics within the Superblocks Model”) have supported in an important way to the success of this new urban planning concept.

From the evaluation perspective, when estimating the cumulative effects of a group of measures having similar main objectives and insisting on the same spatial area, the different starting time is the sole binding element for being able to identify the contribution of each measure to goals’ achievements. In the case of Vitoria-Gasteiz, since almost all the measures started in the same period of time, only cumulative effects can be showed.

During MODERN project, the urban bus network was radically reorganized (passing from 17 bus lines network to a network of 9 bus lines and 2 tram lines), pedestrian areas increased by more than 50% and bicycle lanes were extended from 38km to 148km.
The data obtained from the mobility survey conducted in 2011 confirms that Vitoria-Gasteiz is meeting the objectives of the SM&PS Plan and MODERN project. Pedestrian trips have increased by 40%, while there was a 50% increase in the number of daily trips by bus and tram. The new public transport network is safer, more punctual and the commercial speed faster. The private car has suffered a noticeable decrease in the modal split. It has gone from 36% recorded in 2006, down to 28% in 2011. Meanwhile, the share of cycling has doubled from 3.5 to 7% of all trips. In fact, Vitoria-Gasteiz is nowadays the Spanish city where bicycle is most used.

An integrated model to regulate traffic, access and urban space organisation through the definition of so-called superblocks is one of the strategies the city developed tested through the Modern project. The objectives of this initiative were to reorganise traffic to free up space, redefine the public transport network to improve accessibility and coverage, consolidate the network of cycling paths, set up a network of pedestrian walkways, and identify infrastructure required for parking and delivery of goods.

Thanks to the implementation of a bundle of measures linked with the new superblock concept, the reduction of traffic flows in the city centre is huge, changing the modal split from cars to pedestrian and bicycles. The pedestrian surface has been increased and the emissions and environmental impacts has been decreased.

In summary, it can be stated that mobility policies should be constituted by a set of measures pushing into the same direction, increasing the results and so benefits. This is the great added valued coming from projects like MODERN.
6.6 Measures up-scaling

Introducing the concept of superblocks in a city is a measure with much impact, which requires a political and strategic decision very strong, and the support of all stakeholders. This point is critical because everyone must believe in the project and go in the same direction. There is a risk that this measure is used by the parties as political confrontation. In this sense it is strongly recommended to sign previously an agreement between all stakeholders such as the Sustainable Mobility Agreement of Vitoria-Gasteiz.

Such measures should be part of an overall strategy for sustainable mobility and its impact depends on the implementation of other measures to discourage private car use. In this sense, this measure is part of the proposals of Sustainable Mobility Plan of Vitoria-Gasteiz, so that synergies are achieved between them and the impacts of them are multiplied. However, in Vitoria-Gasteiz it should have implemented more decisive measures to discourage car use as the extension of the zone of the regulated parking in streets.

This measure has very important costs: human and technical resources assigned to planning the new conception of the city, the campaign of public information and participation of social partners, and especially the construction works in the affected areas.

The cost of implementing this measure in the superblock pilot project S-14 (Sancho el Sabio Superblocks), has been excessive because the changing of the entire pavement in the area. In the pilot superblock it has been reformed the pavement of all streets. This solution is fine but it has an excessive cost, so that it could only apply for emblematic superblocks.

It may be searched for more economical solutions for the implementation of this measure in additional areas of the city. Else, the high cost of this measure make difficult to extend this measure to the rest of the city. A cheap solution to other superblocks is to build the pavements with a cheaper material, or just play with the senses of movement in the inner streets.

6.7 Lesson learned

The combination of MODERN project with the Sustainable Mobility and Public Space Plan of Vitoria-Gasteiz has favoured synergic effects on both projects boosting the cooperation among the different Modern partners and local administration. Synergies with other measures multiply the results.

Also, it is very important the commitment of key actors based on political and strategic motives, that is, the coalition between key stakeholders due to converging believes in directions of solution. The Sustainable Mobility Plan of Vitoria-Gasteiz is a project shared by all stakeholders, which is also supported by the Sustainable Mobility Agreement. This set of measures is part of the proposed actions of Sustainable Mobility Plan, so all stakeholders pulling in the same direction. The government of the City Council believes in the project and its opportunity and key stakeholders support it.

Although the project comes to an end, the measures taken have been developed with the aim that in the future continue to provide a service to the citizens of Vitoria-Gasteiz.

Electro-Mobility Centre, for example will be exploited for at least the next four years. As far as the e-car sharing service is concerned, once its activity started, various initiatives to attract new users (distribution of promotional bonuses, test by congressmen from other European projects) are going to be carried out. The developments and bet on new, cleaner and more efficient technologies in transport made in this project, allow Vitoria to be a showcase and a best example on sustainability that can be transferred to other cities. Both e-car sharing service and the charging points network are based on market solution available for other cities too.
As already said, the key element is the superblock philosophy, but the implementation of the new network has general elements which can be replicated in other realities. One of the most important has been related to the information actions and campaign carried out to minimize the impact of such a drastic and sudden change on the population and to achieve consensus on such a complex and impacting operation. In this case the transferability is mainly methodological, ranging from the methodology adopted to define the new network, to the design and exploitation of the information campaign, to the realization of the planned modifications.

Regarding traffic light regulation for the new PT network and superblocks model in Vitoria-Gasteiz, the analysis methodology is a general one and can be adapted and applied to other cases and cities. The software used to model the network and the traffic lights is a commercial one, very diffused not only in Spain but all over Europe. Of course the model applied is strictly related to the superblock philosophy, but can be also implemented in other cases in which the road network has to be hierarchically split and ordered, encouraging the traffic through privileged itineraries and avoiding to pass through other areas of the city. The main transferability is, anyway, methodological.

Energy saving training has a low implementation cost and the obtained impacts are high. In addition, the cultural circumstances of each city make the impact of this measure higher or lower. Therefore, this is a measure that can be applied in cities where drivers have an aggressive driving. In these cities larger decreases in fuel consumption and accidents can be achieved. The economic benefits are clear due to the fuel savings but these are private benefits for private vehicles drivers, while the public advantage, as the reduction of externalities such as emissions, is much lower. The current economic situation may make these courses more attractive as the economic benefit to the driver is evident.

As for the freight distribution, the developed scheme is transferrable and can be adopted under many different conditions. Of course it has been specifically studied to comply with the superblocks philosophy, but a wider application can be foreseen. The Vitoria Gasteiz Municipality has achieved a deep experience and knowledge in this field which can be transferred.
7 Overall Analysis of Results

Creating and promoting sustainable urban transport behaviours and systems is an important priority in creating healthy environments and a good quality of life for citizens. For this, the evaluation of measures carried out in the scope of the MODERN project provides a significant contribution to the identification and promotion of good practice solutions in Europe. As part of the third CIVITAS phase, the MODERN evaluation assessed the achievements in urban mobility and transport in the four participating cities.

Hence all MODERN cities have integrated the objective on mobility behaviours change as an important part because a large contribution to improve urban sustainability comes from this. The ‘soft’ measures to change mobility related attitudes are rather less costly, but can be very effective in changing behaviour.

In this framework from each of the 42 individual evaluations conducted, a large numbers of measure-specific key results were highlighted. These measure-specific results are the foundation from which conclusions can be drawn with respect to the overall project contributions.

At project level, 286 indicators have been taken into account for the impacts evaluation of the interventions, of which 133 directly measured on field, 67 modelled and 86 collected through surveys and questionnaires totally involving a number of people closed to 50'000.

According to the CIVITAS approach, each city was asked to identify groups of measures characterised by the same or similar objectives and, accordingly, weighted upon a certain number of impacts – defined as “cooperative measures”. On the other hand, when estimating the cumulative effect of a group of measures having similar main objectives and insisting on the same spatial area, the different starting time is the sole binding element for being able to identify the contribution of each measure to goals’ achievement; otherwise only the cumulative results can be evaluated. In this second situation the measures’ cluster has been defined as “bundled”. A posteriori this is what has been observed in the MODERN cities where almost all the measures started their implementation in the same time period; for this reason only cumulative effect could have been showed.

MODERN contributed to emphasise the need of defining strategies and measures aiming at increasing the use of sustainable transport modes. As a result the project cities faced a shift from private vehicles to public transport the quantification of which have been derived from some main measures results.

By improving the PT services and implementing innovative changes in the urban network, the MODERN project has also helped cities to positively change their modal share. A great success is represented by the Spanish superblock model that induced a decrease in private vehicle use of 67%, an increase of pedestrians equal to 57% and of bicycle users of 9%. Additionally, with the introduction of the new metro line the city of Brescia has foreseen to have an increase in PT users of 11.4%. On the other hand, Coimbra by implementing the e-ticketing system has obtained an increase of PT users of 1.2% and, in the demo area where the mobility management actions have been tested, there has been an increase of PT users equal to 10.3% and a decrease of private cars of 24%.

The city of Brescia through a questionnaire on origin-destination flows concerning systematic mobility obtained significant information that, projected on the overall urban network, gave a modal shift towards PT equal to 4%. A similar way of thinking has been applied to the city of Coimbra that, thanks to the survey carried out on purpose for the new e-ticketing system assessment, obtained a modal shift to PT of 2%. Finally, the innovative city planning implemented by Vitoria-Gasteiz with the Superblock concept induced an important shift to public transport equal to 7.9%.
By considering the fleet composition of each city and an average consumption for the different fuels considered (i.e. gasoline and Diesel), it has been calculated the increase of energy efficiency achieved in terms of **fuel savings**. With these assumptions the city of Brescia potentially saved 7.9 mil of litres, Coimbra 2.8 mil of litres and Vitoria-Gasteiz 11.9 mil of litres.

In the framework of energy efficiency improvements, Brescia and Coimbra together contributed to increase the energy production from renewable source more than 4GWh per year. Coimbra and Vitoria-Gasteiz also implemented actions on energy saving driving training that allowed to decrease the fuel consumption by 15% and 8.3% respectively.

Additionally, the city of Craiova, by introducing a car-pooling service for workers in the industrial areas has saved – during the short pilot test – more than 700 litres of fuel. This represents a significant potential saving also as project result if also considering the potential introduction of B30 blended Diesel in all the Portuguese PT fleet, that would represent a saving of traditional Diesel equal to 268'000 litres.

Energy efficiency and pollution reduction often go in parallel. Hence, by taking into account the fuel savings, the cities have also decreased their level of **CO2 emissions**, namely the city of Brescia obtained a reduction of 14'529 tons, Coimbra of 6'725 ton and Vitoria-Gasteiz of 24'487 tons.

Additionally, the city of Brescia through the renewable energy production and Coimbra with the mobility management actions have reached an annual decrease of CO2 tons equal to 323 in total. Taking into account the CO2 emissions, all MODERN cities have achieved a decrease going from 3% of Brescia car-sharing, through the 19% of Coimbra driving training action to 42% obtained by the superblock model implemented in Vitoria-Gasteiz.

All MODERN cities have implemented measures aiming at improving **safety and security** conditions. In this framework Brescia faced a decrease of the so-called ‘death index’ by 58.3%, Coimbra obtained an improvement of the accident risk of 33%, Craiova thanks to the new e-ticketing system together with the PT security program achieved a 2% of decrease in fraudulent events and an improvement of PT passengers feeling the transport secure equal to 15%.

Generally, improving the quality of life comprises not only wealth and employment, but also built environment, physical health, education, leisure time and social inclusion. In this context many measures contributed to improve the level of PT service quality perceived (e.g. plus 43% due to the implementation of information and traffic management systems in Vitoria-Gasteiz) which is also represented, for instance, by the increase in female users (+5.2%) in Coimbra and the huge number of people using PT during the mobility week in Brescia (+164%).

Finally, from an economic view point, if considering the outcomes of the CBA conducted for the so-called focused measures, the city of Brescia obtained a pay-back period of 12 years for purchasing 2 hybrid buses to be fuelled by the PV system, 15 years for the car-pooling service\(^\text{32}\), and 15 years also for the car-sharing service\(^\text{33}\). The city of Coimbra with the measure on the new e-ticketing system got a NPV of 1.82 mil Euro over a 15-year period, while the implementation of infomobility tools had a NPV of 11.6 Mil Euro over 10 years. The results coming from the financial analysis of Craiova innovative chopper system for trams showed a pay-back period of 10 years. Also in 10 years the city of Vitoria-Gasteiz got a NPV of 89'518'000 € in respect to the assessment of the new PT network, while, over the same time span, the new traffic lights regulation showed a NPV of 140'721'000€ and reported the majority of benefits toward private car users in terms of time and fuel savings. Lastly, the Spanish measure on new bicycle network produced a NPV of 197'087'000€ over 20 years.

\(^{32}\) Under the hypothesis to cover 25'170 km by 2025.

\(^{33}\) Under the hypothesis to cover 6'673'219 km by 2025.
8 Lessons learned and recommendations

One of the most important aims of the CIVITAS Initiative is fostering local capacity building. This should comprise also the evaluation aspects that often come out to be the weakest link. Not all the cities involved in a CIVITAS project had, in fact, previous experiences in the field of evaluation. Moreover, the level of knowledge could be rather uneven among different partners and some of them could be required to spend a lot of time and efforts to learn how to perform a proper evaluation of the implemented measures. Hence all of them have to understand how the specific evaluation procedures foreseen by the MAESTRO methodology should be implemented and, from the MODERN project experience, it can be affirmed that in many cases the requested efforts have been often underestimated mainly from the public administration authorities when involved in some evaluation activities such as data collection campaigns for indicators measurement. For this reason it is necessary to bear in mind that more resources should be allocated to cities for evaluation activities.

Concerning the process evaluation aspect, it has revealed to be still a rather new concept to the cities and its advantages are mostly unknown to them. It took a lot of time to make cities understand that by accurately filling the process evaluation templates there could be gathered important information on the reasons which have led to the failure of some activities and which solutions on hindering occurrences have been found by cities. Therefore it could be desirable to further promote the awareness of process evaluation to reach a high level of understanding and acceptance already from the beginning of the project.

During the MODERN project development many guidelines have been produced and distributed among partners responsible for local evaluation activities in order to support and guide them through the project development. All this documentation should be used by the next cities aiming to take part to future CIVITAS Initiative projects during the proposal phase in order to demonstrate their consciousness on the level of quality and rigorousness required for developing the evaluation activities. In details, the future project proposals should develop a detailed evaluation framework for each measure foreseen to be implemented by specifying the list of indicators to be used for assessing the interventions, the time schedule and methodologies for data collection campaigns together with a recovery plan in case of facing some problem during the measure development in order to assure in any case a sound evaluation.

An additional crucial point that needs to be considered is whether the type of organisational structure adopted by the CIVITAS Plus projects should be changed. The internal working structure has in fact been organised vertically from project to local level. By doing this the project evaluation team advises and controls the evaluation in the cities often without having the real understanding of the situation and difficulties. Problem solving by gathering the information at its core has been proved to be more effective than steering different actions from the distance. As a result it could be advisable to revise the future CIVITAS projects structure by considering the possibility to have the overall evaluation task managed by a single organisation at project level who will employ professionals expert in evaluation activities which will be asked to spend the majority of their time in the city they should evaluate. By doing that it will be hopefully taken over the issue of not having always the pulse of the situation and, on the other hand, there will be a certain knowledge on the level of quality assured for what concerns the evaluation activities and outcomes.