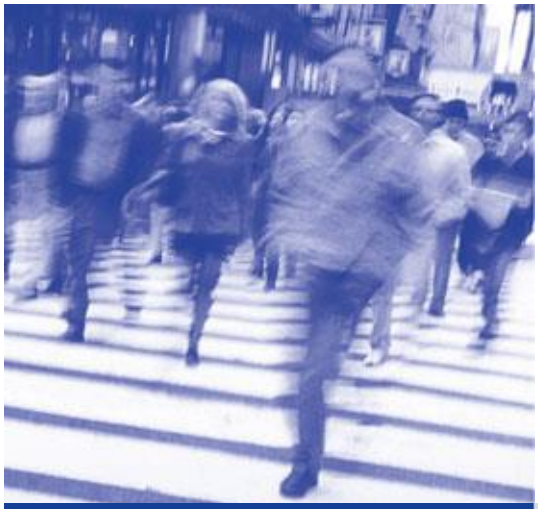

CiViTAS
Cleaner and better transport in cities

CAPITAL

CAPITAL Report on the Long-term Impacts of CIVITAS Measures

Deliverable No.:	D1.6
Project Acronym:	CAPITAL
Full Title: CIVITAS CAPITAL – making the best of CIVITAS	
Grant Agreement No.:	604778
Workpackage/Measure No.:	1
Workpackage/ Measure Title: Capitalising on CIVITAS Themes	
Responsible Author(s): Dr Damian Stantchev and Prof Tom Rye	
Responsible Co-Author(s):	
Date:	October 2016
Status:	Final
Dissemination level:	Public

2020
CiViTAS
Cleaner and better transport in cities
CAPITAL

THE CIVITAS INITIATIVE
IS CO-FINANCED BY THE
EUROPEAN UNION

THE CIVITAS INITIATIVE IS CO-FINANCED BY THE EUROPEAN UNION

Abstract

The long-term evaluations of eight CIVITAS measures undertaken within the CIVITAS CAPITAL project are presented in this paper. More than 80 measure leaders within the CIVITAS projects ARCHIMEDES, ELAN, MIMOSA and MODERN were identified, contacted individually and invited to apply for funding for the long-term evaluation of their measure(s). Applications from Italy, Portugal, Spain, the Netherlands and Slovenia were received. The long-term evaluations of measures implemented in the cities of Donostia San Sebastian, Funchal, Bologna and Utrecht were approved and funded by the CIVITAS CAPITAL Activity Fund.

The impacts measured by the long-term evaluations were mainly positive, resulting in significant benefits to cities in the form of better air quality, less carbon emissions and better health and quality of life.

The measure leaders provided, along with the long-term evaluation of the impact of their measures, an assessment of the process of setting up and carrying out the long-term evaluation process and the problems associated with replicating the methodology employed in the long-term evaluations.

Project Partners

Organization	Country	Abbreviation

Document History

Date	Person	Action	Status	Diss. Level
October 2016	D Stantchev and T Rye		Final	PC

Status: Draft, Final, Approved, and Submitted (to European Commission).

Dissemination Level: PC = Project Coordinator, SC=Site Coordinator, TC=Technical Coordinator, EM=Evaluation Manager.

Table of Contents

List of Figures

List of Tables

1 Executive Summary

The long-term evaluations of eight CIVITAS measures have been undertaken within the CIVITAS CAPITAL project. More than 80 measure leaders within the CIVITAS projects ARCHIMEDES, ELAN, MIMOSA and MODERN were identified, contacted individually and invited to apply for funding for the long-term evaluation of their measure(s). Applications from Italy, Portugal, Spain, the Netherlands and Slovenia were received. The long-term evaluations of measures implemented in the cities of Donostia San Sebastian, Funchal, Bologna and Utrecht were approved and funded by the CIVITAS CAPITAL Activity Fund.

The impacts measured by the long-term evaluations were mainly positive, resulting in significant benefits to cities in the form of better air quality, less carbon emissions and better health and quality of life.

The measure leaders provided, along with the long-term evaluation of the impact of their measures, an assessment of the process of setting up and carrying out the long-term evaluation process. The difficulties which they reported back were mainly related to the willingness and readiness of the organisations involved in the pilot projects to participate in the long-term evaluation. Other political influences were also mentioned.

The measure leaders were also asked to provide feedback on the problems associated with replicating the methodology employed in the long-term evaluation. More specifically, they were requested to provide more detailed information on how the methodology was replicated and which information sources and data collection methods were employed. The main problems associated with replicating the methodology were largely related to the impossibility of collecting data comparable with the data collected in the pilot project and/or the impossibility of adopting the same methodologies employed in the pilot project to collect the data.

Participating cities were asked to provide their assessment of the optimal timeframe for conducting a long-term evaluation of a measure after the completion of the pilot project. The timeframe of 4-5 years after the completion of the pilot project was considered optimal for conducting a long-term evaluation.

The long-term evaluation is a costly exercise, especially if primary data has to be collected again through surveys or observations. Therefore, the importance of assigning proper financial resources prior to the start of a mobility project was pointed out.

Last but not least, long-term evaluation has been described as a learning experience, the benefits of which are more valuable when looking at the processes and gaining an understanding of why changes have occurred, rather than focusing solely on the actual impacts. Such an approach however requires a degree of flexibility and an acceptance that some of the objectives need to be redefined. Moreover, the full benefits are unlikely to be achieved when the impacts of measures are assessed in isolation, and it may well be more sensible to consider and evaluate them as a wider package.

2 Introduction

2.1 CAPITAL's place in the CIVITAS Family

CIVITAS CAPITAL is one of the two support action projects currently running under the CIVITAS Initiative. It builds on previous actions such as VANGUARD and CATALIST and offers its support to the CIVITAS demonstration projects DYN@MO and 2MOVE2 in addition to supporting the CIVITAS community at large. It helps CIVITAS to develop a strong identity towards Horizon 2020. Furthermore, CAPITAL seeks synergies with CIVITAS WIKI, with which it shares its communication channels, thematic cooperation activities and online collaboration platforms.

The mission of CIVITAS CAPITAL is to contribute significantly to the goals of the EU's Transport White Paper by capitalising systematically on the results of CIVITAS and creating an effective "value chain" for urban mobility innovation. CAPITAL will initiate and sup-port a mainstreaming process of CIVITAS principles based on a strengthened community of stakeholders. CAPITAL will help CIVITAS to build the bridge towards a more advanced identity within Horizon 2020. It will help to create a more structured link with large-scale deployment in support of Transport White Paper goals.

3 Evaluation – on different terms

While the short term stretches over a short time period, the long-term perspective could be 5-10 years or even more. In the CIVITAS Initiative context, it could be said that (short-term) evaluation activities are carried out during the project life span, often 3-4 years, while long-term evaluation activities are taken up later after the project time in order to do follow up studies.

Short-term evaluation generally covers one year or duration of project funding and uses before and after data. Long-term evaluation can include projecting impacts into future through forecasting and scenario-building. It can involve time series data for schemes or measures over years, using running, ongoing surveys or planned, repeated long-term effect surveys.

Long-term evaluation could thus seek to answer whether the long-term impacts of measures have been different from short-term impacts. Or, if the CIVITAS pilot measures have been up-scaled as an effect of the relative successful pilot implementation, and eventually have come to cover a larger geographical area or system, then how much greater proportionally has the impact been?.

Do short and long term evaluation lead to different results? It is reasonable to assume that some structural effects will show. In some cases there may be no impact evidence in the short term, but detectable positive impacts on long term, consistent with much of the literature on price elasticity of demand, for example, which shows that effects of price changes for public transport or fuel are greater in the long term than in the short term. In other cases there will be impacts in the short term, but because of poor measure maintenance, “rebound” effects (where people get used to a measure such as, for example, road user charging), or changes in background conditions, the impacts decline. In both cases the processes (the stories) are important to capture; what has actually happened over time since the measure or scheme was launched?

Another difference may be related to the actual scale of the project and its objectives. Long-term evaluation most likely will come into play in case of large-scale, long-term, multi-site comparative designs compared to short evaluations of a single measure in a city. For either ends of the time or size scales, there are basically two fields of assessment – the impact and process evaluation. The characteristics of these fields will be briefly outlined below. For further information, see Dziekan et al. (2013).

3.1 Impact and process evaluation

Impact evaluation seeks to describe the effects of the measure's implementation in comparison with the situation before the implementation. The impacts that usually are focused on in the evaluation are strongly related to the objectives of the measure. The impact is not the actual new scheme itself (the output) but the outcome: e.g. the impact it has on people's mobility or the urban environment.

To be able to assess the outcome, the objectives have to be expressed as measurable indicators. Doing the long-term evaluation follow-up requires access to or at least knowledge of previous evaluation elements and activities, indicator data collection methods and analyses, so that short and long term impacts can be compared. Impact evaluation is often based on quantitative data; time series may be available and annually updated even after the project finished years ago. An example of the latter is fuel consumption data for alternatively fuelled buses, as most operators will collect this data regularly and retain it over time.

Process evaluation focuses on the means and procedures by which a measure is implemented; it tells the story of planning, implementing and operating the new scheme, technology or infrastructure. Hence, it begins during project development and continues throughout the life of the project. Its intent is to assess all project activities, negative and positive factors which are influencing the measure implementation process and thus provide information to monitor and improve the project, as well as information and guidance to followers who may wish to emulate the project.

Doing the long-term evaluation follow-up, access or at least knowledge of previous process evaluation elements and activities will allow for simplified procedures and asking the right persons; qualitative interviews are very common methods in process evaluations.

3.2 General evaluation issues

Evaluation is not always simple and clear cut. Each measure has one or more objectives, and there may be a combination, a bundle, of measures. Objectives may also be very overarching: a large modal shift between private car and bus, a more lively and cleaner city centre, coordinated urban freight. Then, these have to be operationalized into indicators that are quantifiable, measurable, and still clearly linked to the objectives. Each objective could relate to several measures, whereas each measure should be linked to several indicators.

Figures 1-4 below show two things: 1) it is important to be able to control for (or at least estimate the impact of) other confounding factors; 2) the impact of the measure itself as well as other factors may vary over time. One important aspect of long-term evaluation is thus to be able to

assess changes in the context. What has changed since the measure was implemented and how can we estimate these changes and the impacts they may have on what we intend to measure?

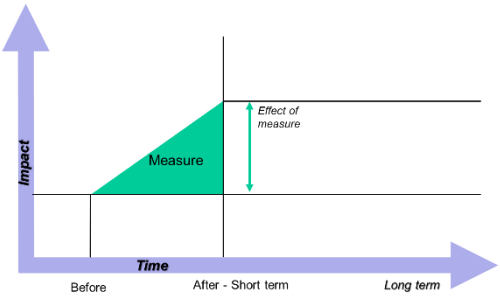

Figure 1: Short term evaluation shows significant effect of measure

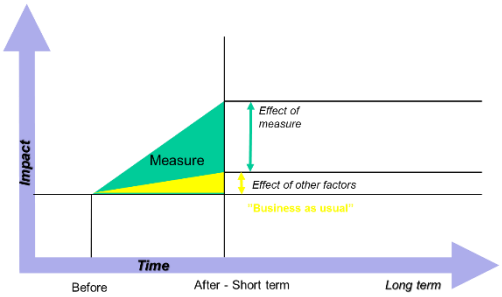

Figure 2: While considering the do-nothing scenario effects, the effects are significant but not solely caused by the measure

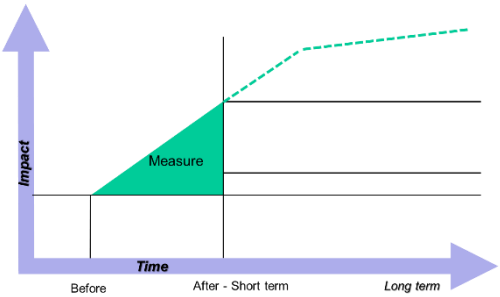

Figure 3: on longer term, the impact increases, but the increase rate diminishes over time.

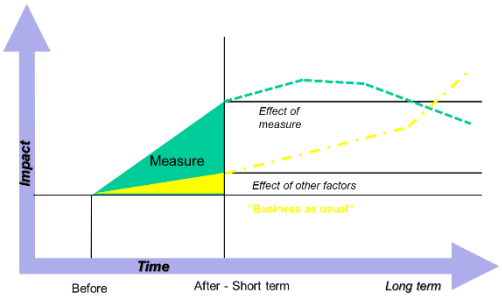

Figure 4: Here the impact of the measure is in fact starting to decline, whereas impacts of other factor increase

3.3 Availability of documents

We assume that the measures or schemes of interest have all gone through the process of planning, implementation and (short term) evaluation. Then, it is recommended to look for the following steps that have been taken towards project realisation:

- Clearly defined objectives
- Which target groups?
- Other measures related to the same objectives
- Which factors were chosen as indicators?
- Were targets for success set? For certain areas or population of users?
- Were these targets met in the short term?
- Type of data collection and study design
- Clear results, incl. various analyses (Cost Benefit Analysis (CBA), up-scaling, transferability etc.)

If it concerns a previous CIVITAS Initiative project, or co- funded through other European or National funding sources is it likely that this information will be publicly available, but parts may be difficult to assess. It may for instance be possible to obtain information of a specific measure, but as indicated in Figures 1-4, the “true” short term effect maybe more difficult to distinguish, as several measures may interact. Therefore, it is recommended to get as much information as possible of all the measures that were included in the program or project.

3.4 Evaluation design

While collecting information about the measure and previous evaluation, it is important to clarify the evaluation design. Referring to the impact-time charts above in Figures 1-4, the study design tells a lot how certain one can be of the “true” measure impacts.

In general, the evaluation design is a plan for collecting and analysing evidence that the measure will have the impact it purports to have. The earlier choice for a particular design is frequently influenced by the need to compromise. The more certain the answers, the more costly the evaluation and vice versa.

Below in Figures 5-10 are shown some examples that might characterize the situation while entering on long-term follow-up studies. If a case/control design – the theoretically preferred research design, which allows the effect of the measure to be isolated from the effect of background factors such as the wider economy, fuel price increases and so on - has been used, it is likely to be of a quite limited scale. Rather, we might be looking at measures with baseline partly or totally lacking. It is also possible that the situation illustrated by Figure 10 occurs; the objective of the long-term evaluation refers to a certain measure, but for some reason the main indicator connected to the objective has not been measured properly and thus, the results are of no use. If this happens to be the case, it is not recommended to do a long-term impact evaluation at all (process evaluation would still be possible to do).

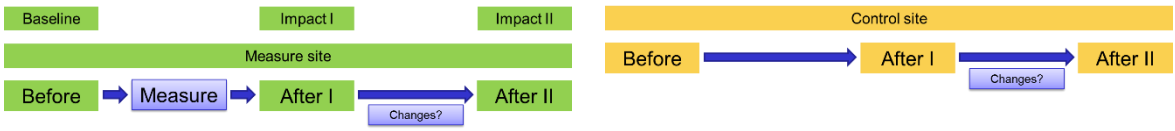

Figure 5: Evaluation with control group/site, baseline data for case/control, “After I” are short term impacts and “After II” long term impacts

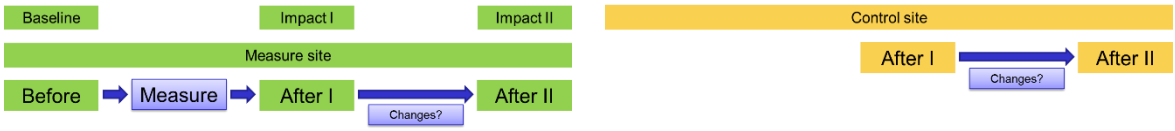

Figure 6: Evaluation with control group/site, baseline data for case only

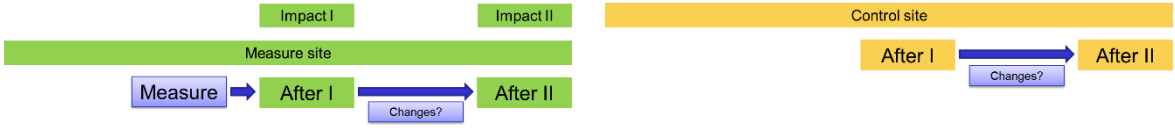

Figure 7: Evaluation with control group/site, no baseline data available

Figure 8: Evaluation of case only, with baseline data

Figure 9: Evaluation of case only, no baseline data

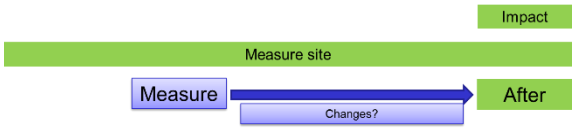

Figure 10: Evaluation of case only, neither baseline nor short term impact data

3.5 Scenarios and forecasting

Forecasting can be used to provide a prediction or estimate of the impacts of a measure, or of the city's transport system without the measure. It is therefore useful as a means of establishing the business as usual scenario, but also the scenario with the planned measures, or with a different set of measures, as a comparator. Once actual before and after data are available, these can be compared with the predictions to see how accurate these were. Scenarios can also be used in measure selection to help to choose between packages of measures – different scenarios paint different pictures of the future with a given package of measures.

3.6 Data collection and survey techniques

Data collection encompasses a wide variety of methods, data sources and units of data elements. Looking at, for example, the CIVITAS Core Indicators, corresponding data are either derived or measured. Data could be physical units (e.g. vehicles or pedestrians counted as they pass a given point on a street), economic data, or people's revealed preferences and behaviour collected through survey instruments.

Sometimes the key issue in the longer term is to repeat the short-term evaluation, and in this case it is key to follow the earlier procedures. Data sources may be available as continuous data series such as operational data or biannual surveys. Then, it is strongly advised to use these ongoing data sets, as it also allows for later follow-ups and monitoring through continuous time series.

However, the long-term evaluation perhaps aims to look at impacts and processes with a "fresh eye" and go beyond earlier designs. Therefore, some guidelines for conducting a survey are summarized below. For further reading, refer to Dziekan et al. (2013).

The survey process contains the following steps:

- Define survey purpose and be very clear as to the key facts that the survey is intended to obtain.
- Undertake preliminary planning:
    - Collect background information.
    - Design sampling.
- Select survey method.
- Design survey instrument.
- Conduct pilot.
- Implement survey.

At the preliminary planning stage the user faces the choice of doing a quantitative or qualitative study. The purpose of impact evaluation generally is to obtain information from a broad cross section of users - a population that one would like to describe through a sample. A qualitative approach would be much more appropriate if the key aim is to gather “softer” more explanatory data about *why* measures have had the observed effect.

However, to be able to say something meaningful about the long-term impacts of a measure solely based on personal interviews or focus groups is likely to be challenging. Therefore, from now ononly quantitative designs are referred to as the main components of impact evaluation. But for the analyses of processes in both the short and long-term, a more qualitative approach is recommended.

The use of available guidelines for survey design and sample selection, such as Dziekan et al. (2013), based on experience in previous CIVITAS projects, is also recommended. If possible, use similar designs as previously used in the short-term evaluation, but do not assume that chosen designs are by definition the best possible solutions – review them against best practice.

If the comparison between short-term and long-term impact is crucial, changes to the survey design compared to the method used in the short term should be avoided as far as possible. If the long term impact, or in fact the circumstances when the survey is conducted is more important, the survey validity and reliability should be key. For example, if the previous modal split survey had obvious flaws, there is no reason to repeat a poor design unless comparability between surveys is most important.

4 Participating cities and measures

4.1 Selection of measures

The long-term evaluations of all measures were funded by the CIVITAS CAPITAL Activity Fund.

Although no formal calls were issued, more than 80 measure leaders within the CIVITAS projects ARCHIMEDES, ELAN, MIMOSA and MODERN were identified, contacted individually and invited to apply for funding for the long-term evaluation of their measure(s).

The measure leaders were asked to submit the following information:

- Description of the measure that they want to evaluate.
- Evidence that the measure was properly evaluated during the CIVITAS demo project, including a summary of the impact evaluation results.
- Estimated costs of carrying out the impact evaluation again, now, broken down into staff time and cost per hour, subcontracting costs, and any other costs such as meetings, travel, food etc.
- Co-financing by the city or other applicant in terms of staff time, if any.
- If the applicant is not the measure leader, a very brief statement by the organisation responsible for implementing and operating the measure to confirm their support of the applicant and willingness to cooperate with the long term evaluation.
- Timescale for gathering the data and presenting it in a format that allows the data to be easily compared to the original data (from the period of the project) as presented in the MERT for that measure.

Despite the straightforward application process and the offer of a 5K Euro funding per measure, substantial difficulties in finding cities interested in the long-term evaluation of their measures were encountered. Many of the measure leaders who participated in the demo projects have left their organisations or they were no longer interested in conducting a long-term evaluation. Some measure leaders reported that they would be unable to collect the data to replicate the methodology. Other measure leaders declined to participate as they regarded the long-term evaluations as a costly exercise, especially if primary data had to be collected again through surveys or observations.

During the first call in August 2015, the successful applicants were from a single city (San Sebastian), even though they represented different organisations; subsequently San Sebastian City Council withdrew from the process. The geographical scope of the long-term evaluations was extended by initiating a second call in November 2016 and securing applicants from other countries such as Italy, Portugal and the Netherlands.

The process of managing the long-term evaluations entailed the following tasks:

- Initiating the (informal) call for the long-term evaluation of CIVITAS measures;
- Managing the entire application process;
- Negotiating with the applicants the budget for conducting the long-term evaluation of their measures;
- Making a recommendation to the European Commission which applications to approve;
- Provide guidance and support to successful applicants throughout the long-term evaluation process; advise them on methodological, conceptual and procedural issues;
- Meet with the applicants (if necessary) to obtain assurance of the quality of their past and planned work

4.2 Participating cities and measures

The participating cities and the approved measures are shown in the table below.

CIVITAS Project	City	Measure
CIVITAS ARCHIMEDES	Donostia San Sebastian	High quality public transport corridors in San Sebastian (Measure 16)
CIVITAS ARCHIMEDES	Donostia San Sebastian	Business district shuttle bus in San Sebastian (Measure 17)
CIVITAS ARCHIMEDES	Donostia San Sebastian	Bus traveller information in San Sebastian (Measure 73)
CIVITAS MIMOSA	Funchal	Green PT Line (FUN2.1)
CIVITAS MIMOSA	Bologna	Road Pricing Policies (BOL3.1)
CIVITAS MIMOSA	Utrecht	Utrecht road safety label (UTR5.1)
CIVITAS MIMOSA	Utrecht	City distribution by boat (beer boat) (UTR7.2)
CIVITAS MIMOSA	Utrecht	More flexible access for cleaner freight traffic (Cargohopper) (UTR7.3)

Table 1: List of participating cities and the approved measures

5 Some long-term evaluation results

5.1 Donostia San Sebastian

5.1.1 Measure 16: High quality public transport corridors in San Sebastian

5.1.1.1 Measure description

Within this measure, the ambitious UNE EN-13816 quality standard on collective passenger transport was implemented in two main corridors in San Sebastian, lines 5 and 28. The quality standards covered eight different aspects, which were monitored by the certification body on a yearly basis:

- Offered service: the offered service may guarantee that occupancy ratios would not exceed 3 passengers per square metre
- Accessibility: all buses must be adapted to handicapped people
- Information: updated and reliable information regarding service provision must be provided at all bus stops

- Waiting time and service frequency: waiting time must not exceed more than 25% the programmed scheduling. Expeditions must not accumulate more than 5 minutes delay or arrive 1 minute before scheduled time.
- Customer attention: a Customer Attention Plan should be in place and a Customer Attention protocol followed by staff. Complains should be answered within 20 days.
- Comfort and cleanliness: there should be an inspection and cleaning protocol to guarantee optimal conditions in terms of comfort and cleanliness
- Security: a Safety and Security Plan should be issued and put in practice
- Environmental impact: low emission vehicles should be used to run the service

After a planning and design phase, two high quality transport corridors were implemented. The corridors combined dedicated platforms for bus lines with all dimensions of quality in public transport according to the UNE EN-13816 quality standard.

For the implementation of the quality standards DBUS was supported by external specialists in the matter. The external support included customer satisfaction surveys of the service provided by the high quality public transport corridor.

In addition, a promotional campaign on the advantages of the new service was implemented. The campaign was delivered by a specialist communication company in coordination with DBUS.

Aware of the importance highlighted by passengers of the feeling of security as part of the perceived quality, DBUS installed 22 security cameras in the buses that operate the high quality corridors.

In order to improve reliability and average speed of public transport, the city has undertaken the building of a dedicated platform and has reprogrammed UTC´s to ensure PT priority.

Other quality elements like fleet management and traveller information were addressed in separate measures (73 and 74).

The following tables summarise the main assets of the enhanced High Quality Public Transport Corridors:

Characteristics of LINE 5		
	High Quality Bus Corridors	**“Before” situation**
Route length	9,3 km	9,3 km
Stops	27	27
Average distance between stops	403 m	403 m
Dedicated bus lanes	4,3 km (46%)	2,7 km (29%)
Priority intersections	30	0
Frequency	6-8 min	7-14 min
Fleet	18 m (articulated) EEV technology	18 m (articulated)
On-board real time information	Yes	No
Stops with real time information	11 (41%)	6 (22%)

Table 2: Characteristics of Line 5

Characteristics of LINE 28		
	High Quality Bus Corridors	**"Before" situation**
Route length	11,6 km	11,6 km
Stops	28	28
Average distance between stops	414 m	414 m
Dedicated bus lanes	5,1 km (44%)	2,5 km (22%)
Priority intersections	57	0
Frequency	6 min	7-8 min
Fleet	18 m (articulated) EEV technology	12 m
On-board real time information	Yes	No
Stops with real time information	11 (39%)	7 (25%)

Table 3: Characteristics of Line 28

5.1.1.2 Summary of evaluation results during CIVITAS ARCHEMEDES (2008 – 2011)

The measure has resulted very successfully in promoting a modal shift towards public transport. Between 2006 and 2011 there was an increase of 2,55 million extra travellers in CTSS-DBUS's public transport system, which represents a 9,6% increase in the number of users. If compared to the BaU scenario, the improvement in public transport services has resulted in an 8,6% increase in the number of users. It should be highlighted that, according to the surveys conducted, nearly 40% of all new users were former users of the car or motorbike.

From an operational perspective, the improvements in service operation have contributed to achieving an excellent punctuality index of 98.20 on lines 5 and 28. Also, the average speed of buses along the corridors has increased approximately by 2km/h as compared to the BaU scenario in both lines. The average journey time was reduced by more than 3 minutes.

This improved operation has been acknowledged by the users, whose perceived quality of service has significantly increased, from 7.3 in 2006 to 7.6 after the measure was fully implemented. It should be noted that the public perception survey conducted among users has revealed that quality attributes such as punctuality and reduced journey times were perceived as very important, with an average score of 8.79 in 2011.

This package of measures was part of an overall strategy aiming to reduce the number of cars entering the city and circulating within its neighbourhoods. In this regard, the implementation of the High Quality Bus Corridors has contributed to a reduction in the number of cars entering to the CIVITAS corridor of more than 7,500 cars per day.

Overall, this situation has provided significant benefits in the form of better air quality and less carbon emissions, resulting in a better health and quality of life for Donostia-San Sebastian citizens.

Furthermore, the revenues from public transport usage have increased due to the implementation of the measure. Compared to the BaU situation, the high quality public transport corridors have increased DBUS' revenues by more than 515,000€ in 2011.

Finally, in terms of benefits and costs, the benefit to cost ratio (BCR) was 2,88 which means that benefits are nearly three times larger than costs. This result reveals that the implementation of the High Quality Bus Corridors is a very cost-effective measure.

5.1.1.3 Summary of long-term evaluation results (2015)

The data for all indicators and a summary of the impacts are presented in Table 4.

The indicators used for the economic assessment of measure 16, both within the CIVITAS period and after, have shown that during the ARCHIMEDES period (2008-2012), the revenues per kilometre on lines 5 and 28 of the ARCHIMEDES High Quality Public Transport corridors experienced a significant increase (7%), due to the fare increases and mainly due to the increase of passengers on these bus lines.

Starting in 2012, a decreasing trend in operating revenues was observed (3.7% decrease between 2012 and 2015). This is mostly due to the decreased DBUS patronage resulting from the fare integration, as well as from the more efficient fare structure, where frequent travellers benefited from discounted travel. However, in 2015 there was a slight increase in revenues in accordance with the increased number of passengers.

Regarding capital costs, after a period of significant investments during the ARCHIMEDES project, the level of investment required to maintain the high level of service of lines 5 and 28 has significantly decreased. In 2015, capital costs per km have been reduced to 50% of that of 2012, the last CIVITAS year. On the other hand, operational (personnel and fuel) and maintenance (workshop and materials) costs experienced a significant increase during the ARCHIMEDES years, maintenance costs in particular. This was due to the required fleet increase (which resulted in higher maintenance) to implement the desired quality standards and the higher labour costs associated with this. After the CIVITAS project these costs are now stable, even showing a decreasing trend.

The long-term environmental effects of ARCHIMEDES have also been evaluated. That would have normally been done using a traffic model, but because the model was no longer available to the city, an alternative approach has been used within this long-term evaluation.

A survey has been conducted among public transport users of lines 5 and 28. More specifically, 1,500 users of these lines (corresponding to 12% of its users) were surveyed regarding their perception of the different improvements implemented by DBUS. The survey also asked users about the previous mode of transport they used for their trips, if different from the bus. The factors affecting modal shift were also investigated.

The survey results showed that 20.7% of bus trips were shifted from car, while 1.3% where previously made using a motorbike.

According to DBUS estimates, the average journey length in the DBUS network is 3.5 kilometres long (without substantial changes over the last years). According to the patronage level of lines 5 and 28, this means that every year 5.52 million car kilometres and 0.35 million motorbike kilometres are saved in favour of the public transport system.

Having these data, it is possible to estimate the emissions savings of this modal shift induced by DBUS improvements. In order to do so it has been assumed that the average age of the car and motorbike fleet in Donostia-San Sebastian is the same as the average Spanish one (12 years and 13 years respectively). The average occupancy has also been considered equivalent to the average Spanish case (1.6 for cars and 1.1 for motorcycles). Finally, according to Traffic Directorate records, the share between petrol and diesel cars is 41% and 59% respectively.

According to the average emissions factors estimated by the Spanish National Emissions Inventory for vehicles of that age, the yearly savings of 689,4 tonnes of CO_2, 12,4 tonnes of CO, 2,7 tonnes of NOx and 0,1 tonnes of PM were achieved.

Amongst the main factors affecting modal share, comfort is acknowledged as the main reason for using public transport services. This is followed by reasons related to a more efficient use of travel times (i.e. punctuality and time savings). These observations are consistent with the main action lines developed within CIVITAS to improve public transport operation by increasing the quality of the service offered and improving its performance operation and efficiency.

In terms of impacts on the society, factors such as the feeling of security among the users of the High Quality Bus Corridors and the public perception level towards the effectiveness of the system have been assessed. The implementation of a surveillance security camera system within the ARCHIMEDES project contributed to a high customer's feeling of security, with an excellent index of 7.9 during the last year of the project in 2012. Three years later the feeling of security remains as high with an index of 8.0 in 2015.

To assess the public perception level of the different measures implemented by DBUS within CIVITAS, a survey was carried out among 1,500 users of lines 5 and 28 (12% of the daily passengers) in 2011 and 2012. The survey has been repeated in 2015 (2013 and 2014 figures have been interpolated). The results show that effectiveness issues (such punctuality and reduced journey times) were ranked very high during ARCHIMEDES (8,9 and 8,8 in 2011 and 2012, respectively) and are even better perceived three years after the finalisation of the project (9,1 in 2015), which demonstrates that quality standards have been maintained and even improved over these years.

In order to assess the overall impact of the measure on the transport system, the dynamics in the number of users of the public transport system (regularly monitored by DBUS) and the number of private cars entering the CIVITAS corridor (monitored by the municipality through regular counting campaigns) were analysed. The number of public transport users experienced a very important increase during the ARCHIMEDES years, changing from 26.7 million travellers in 2007 to 29.0 million in 2012, when the project finished. However, in 2013 the number of DBUS travellers dropped to 27.7 million, due to the effect of the fare integration (which resulted in a shift from DBUS to Lurraldebus services) and an increase in motorised travel. This figure is still above the

number of users estimated for the reference scenario in that year (BaU). Most importantly, during the following years the number of DBUS users increased again, reaching 28.2 million travellers in 2015. However, the growth pattern is not as fast as during the ARCHIMEDES period.

Regarding the number of cars entering the CIVITAS corridor, the steady decrease during the ARCHIMEDES years has been followed by a significant increase in car traffic levels, reaching a figure in 2014 (45.3 thousand cars) equivalent to the first year of ARCHIMEDES (44.8 thousand cars in 2008). It should be noted that traffic levels during the ARCHIMEDES project were significantly affected by the economic crisis in Spain, which reached its most acute stage in 2012. It can be assumed that the recovery of the economic activity yielded some increase in motorisation rates. However, in 2015 a decrease in car traffic levels has been observed.

The ARCHIMEDES period witnessed a significant improvement in terms of punctuality of bus services operating lines 5 and 28, increasing the number of services arriving/departing on time from 92% in 2006 to 98.5% in 2012, when the project finished. This high rate of accuracy of timekeeping has been maintained and even improved, although at a slower pace, during the subsequent years, reaching 98.9% in 2015.

The improvements in lines 5 and 28 within ARCHIMEDES (bus lanes, light priority on crossroads, quality standards, 18 metre articulated buses, etc.) contributed to an increase in the overall perceived quality of service with an index of 7.6 in 2012 (as compared to the 7.3 achieved in 2006), which has been maintained and even slightly increased after the finalisation of the project, reaching 7.8 in 2015.

In terms of traffic safety, the early stages of the ARCHIMEDES project resulted in a slight increase in the number of monthly accidents (10% increase in 2010 as compared to 2006) due to the 15% fleet increase (from 105 vehicles in 2006 to 121 vehicles in 2010). In 2011 the number of injuries and deaths decreased by 22% as compared with the previous year, reaching lower levels than in 2006 and initiating a decreasing continuing trend until 2015 that was only interrupted in 2012. This is a significant result, considering remarkable increase in the number of buses operating and the mileage.

Measure 16: High Quality Bus Corridors –Indicator results

Indicators		Baseline 2006	After 2011	LTE 2015	Comments
ECONOMY					
Operating revenues (€/km)	**Real**	4,21	5,22	5,14	A decrease in revenues between 2011 and 2015, but regained in 2015
	BaU	4,21	4,73	4,83	
Capital costs (€/km)	**Real**	0,00	0,09	0,01	Capital costs per km maintained a decreasing trend since 2011
	BaU	0,00	0,00	0,00	
Operating costs (€/km)	**Real**	3,08	3,65	3,73	An increase in operating and maintenance costs during 2006 – 2011 due to higher maintenance of the enlarged bus fleet and higher labour costs. However, these costs stabilised in 2015 and are since showing a decreasing trend.
	BaU	3,08	3,46	3,53	
Maintenance costs (€/km)	**Real**	0,36	0,42	0,42	
	BaU	0,36	0,40	0,41	
ENVIRONMENT					
CO_2 emissions savings (tonnes)			88	689,4	Emissions savings resulted in improved air quality, better health and quality of life. **NB:** A traffic model was used within ARCHIMEDES, but was no longer available for the long-term evaluation. This explains the big differences in the results obtained during the ARCHIMEDES project and the long-term evaluation. During the long-term evaluation, a survey among 1500 PT users of lines 5 and 28 was conducted to investigate their perception of the improvements implemented by DBUS and the factors affecting modal shift. Survey results showed that 5.52M car km and 0.35M motorbike km per year were saved in favour of the PT system. The average journey length in the DBUS network is 3.5 km. Taking into account this information, the emissions savings of this modal shift generated by the improvements in the DBUS system were calculated.
CO emissions Savings (tonnes)			3	12,4	
NOx emissions Savings (tonnes)			18	2,7	
PM emissions savings (tonnes)			3	0,1	

Indicators		Baseline 2006	After 2011	LTE 2015	Comments
SOCIETY					
Feeling of security	**Real**	n/a	8,0	8,0	The implementation of a surveillance security camera system within the ARCHIMEDES project increased the customers' perception of security (a result of 8,0 out of 10 in 2011). This high perception of security remains high in 2015.
	BaU	n/a	n/a	n/a	
Public perception level (effectiveness)	**Real**	n/a	8,9	9,1	The public perception level of the different measures implemented by DBUS was measured by a survey of 1500 users of lines 5 and 28 (12% of the daily passengers) in 2011 and 2012. The survey was repeated in 2015. Punctuality and reduced journey times were ranked very high during ARCHIMEDES. However, perception is even better in 2015, which demonstrates that quality standards have been maintained and even improved since the project ended.
	BaU	n/a	n/a	n/a	
TRANSPORT					
Accuracy of timekeeping	**Real**	92,0%	98,2%	98,9%	There was a significant improvement in terms of punctuality of bus services operating lines 5 and 28. This high rate of accuracy of timekeeping has been maintained and even improved, although at a slower pace, during the subsequent years, reaching 98.9% in 2015.
	BaU	92,0%	93,3%	94,3%	
Average speed of buses	**Real**	13,3	15,7	15,8	The increased traffic levels since 2011 resulted in a slight reduction of the average speed of buses and a slight increase of the average journey times in the following years, although the figures for 2015 are comparable to these for 2011.
	BaU	13,3	14,0	14,5	
Average journey time	**Real**	24,5	20,0	20,2	
	BaU	24,5	23,3	22,4	

Number of PT users	**Real**	26.670.005	29.216.698	28.233.941	The number of PT users increased by 9.6% between 2006 and 2011. Furthermore, 40% of all new users were former car or motorbike users. Passenger numbers dropped in 2012, but that was due to the new integrated ticketing system, and not measure-related. The numbers of PT users increased again in 2015.
	BaU	26.670.005	26.907.709	27.101.968	
Indicators		**Baseline 2006**	**After 2011**	**LTE 2015**	**Comments**
Number of private cars entering the CIVITAS corridor	**Real**	51.343	43.720	44.762	Traffic volumes decreased in 2011, but numbers were up again in 2015. The increase in the number of cars was not measure-related, but can be attributed to the recovery of economic activity since 2013.
	BaU	51.343	44.015	n/a	
Quality of service	**Real**	7,3	7,6	7,8	All these positive impacts, such as punctuality of bus services, accuracy of timekeeping, quality of service, safety aspects have been maintained and even improved.
	BaU	7,3	6,7	6,7	
Injuries and deaths caused by transport accidents	**Real**	4,2	3,6	2,4	
	BaU	4,2	4,0	n/a	

Table 4: Measure 16: High Quality Bus Corridors –Indicator results

5.1.2 Measure 17: Business District Bus Service

5.1.2.1 Measure description

This measure was concerned with the introduction of bus services for commuters that connect four peri-urban business districts (Zuatzu, Miramón, Poligono 27 and Belartza) with the ARCHIMEDES high quality public transport corridors and major public transport nodes in the city.

The initial approach was to operate shuttle buses in the business districts, but after a technical study, it was recommended to implement direct bus lines to the four industrial areas connecting them directly to most of Donostia-San Sebastian districts.

Following the results from the technical study, the Municipality of Donostia - San Sebastian identified the necessary changes in the infrastructure and the bus stops in order to improve public transport operations in the business districts. In particular, priority measures such as dedicated lanes and priority at traffic lights were implemented (4 out the additional 5km of bus lanes implemented within CIVITAS affect routes connecting with business districts, while all 80 priority measures in traffic lights affect those lines). In addition, waiting facilities at bus stops in business districts were improved.

After these improvements, the frequency of service in the four business districts was as follows (as shown in Figures 11 and 12):

- Zuatzu: on weekdays, every 6-8 minutes before 9a.m. (line 5 Express University-Zuatzu) and every 20 minutes the rest of the day (line 5), from Town Center and Antiguo.
- Belartza: on weekdays, services every 20 minutes (line 25), from Town Centre and Antiguo.
- Miramon: on weekdays, services every 6 minutes (line 28) from Town Center and Amara, every 30 minutes (line 31) from Altza, Larratxo, Intxaurrondo, Gros, Riberas, Loiola, Poligono 27 and Aiete, and every 60 minutes (line 35) from Arriola, Antiguo and Aiete.
- Poligono 27: on weekdays, every 30 minutes on peak hours (line 26) from Town Center, Amara, Riberas and Loiola, and every 30 minutes (line 31) during all day from Altza, Larratxo, Riberas, Loiola, Miramon and Aiete.

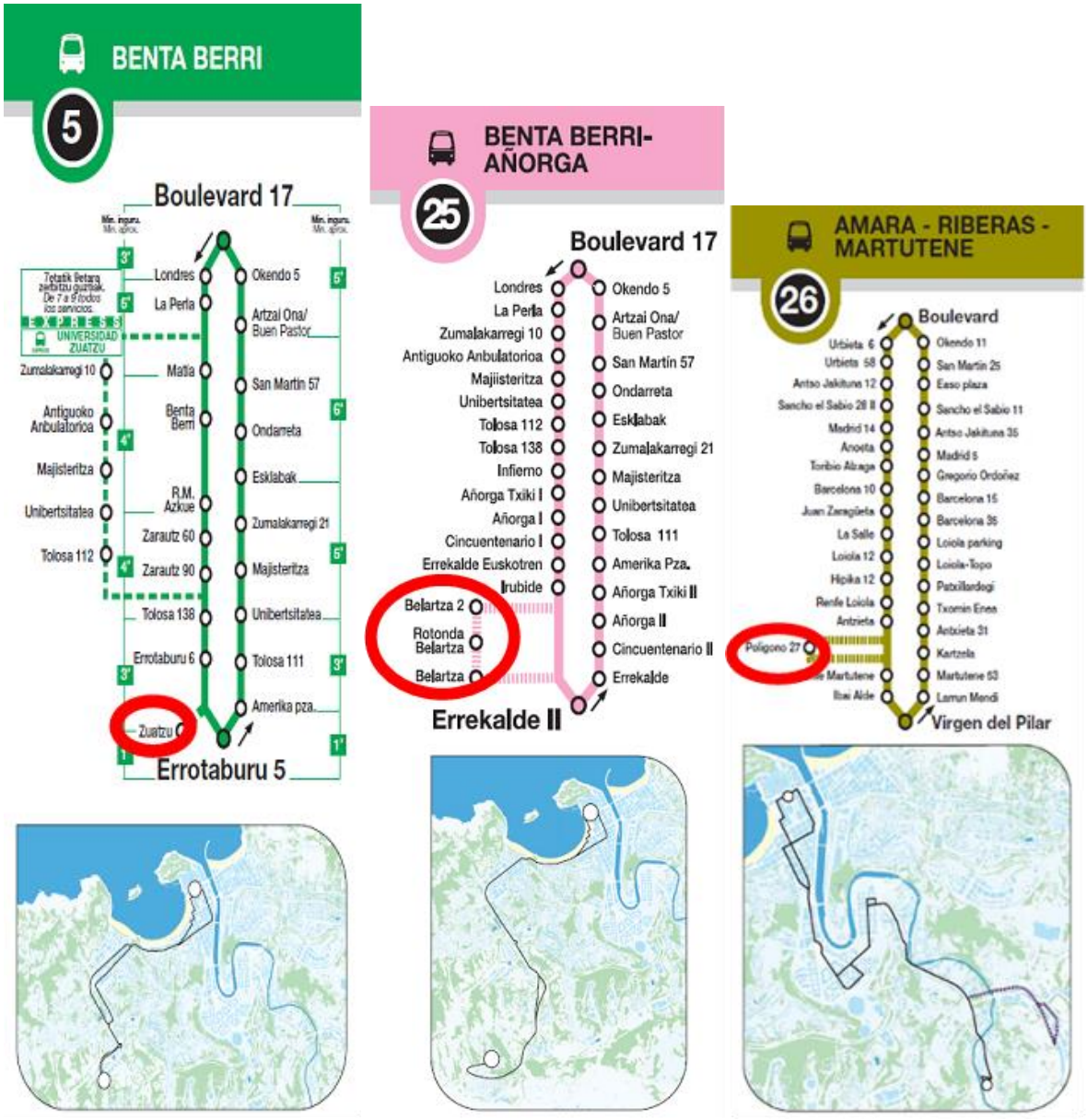

Figure 11: **New PT operating in industrial areas (1)**

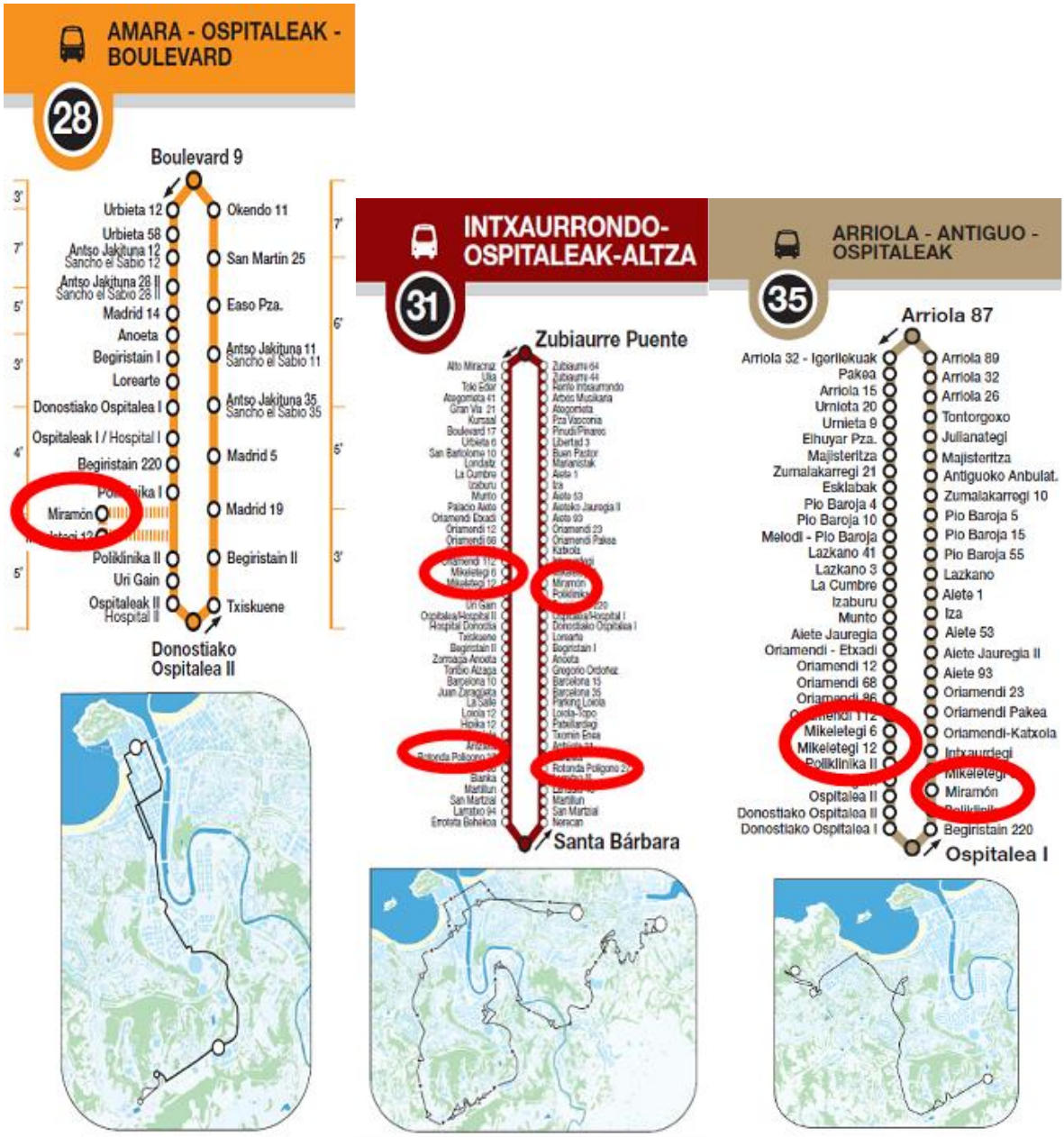

Figure 12: **New PT operating in industrial areas (2)**

With these improvements, the business districts benefit not only from the direct public transport connection to the city centre, but also from increased frequency of services and high quality standards. Also lines 5 and 28, serving Miramon and Zuatzu business areas, were operated using articulated buses, thus increasing the service capacity of the system in these areas.

5.1.2.2 Summary of evaluation results during CIVITAS ARCHEMEDES (2008 – 2011)

The main goal of this measure is to increase the use of the public transport among commuters travelling to the four main business districts in Donostia-San Sebastian by providing competitive

and attractive public transport services connecting to these areas. This package of measures is part of an overall strategy to reduce the number of cars entering the city and circulating within its neighbourhoods.

The impact evaluation of this measure has focused on the quality of service dimension and the impact on bus patronage and traffic levels, since environmental and cost issues are evaluated within other related measures, aiming to improve the public transport in the city.

The measure has succeed in these main goals, since the use of public transport has increased in these industrial areas with 123,000 extra travellers in 2010 and 230,500 in 2011, as compared to 2006 levels. While car traffic levels entering these areas have decreased over the same period almost 2,500 cars per day.

Modal shift towards public transport is the result of improved services. The implementations of the new direct bus services to the business districts and the improvement of the infrastructure (bus lanes and light priority) has led to an increased in punctuality, with 97.2% of all expeditions on time in 2011. The travellers' perception of quality of service has accordingly increased (from 7.0 in 2006 to 7.6 in 2011).

The process evaluation of this measure has revealed the importance of flexible approaches to technical solutions, able to be adapted to user's preferences. Although the initial approach was the implementation of shuttle buses connecting with the business areas, the on-going dialogue with stakeholders revealed that commuters prefer one stage trips (from home to work) rather than two or more stage trips using shuttle buses. Then the extension of regular services was decided, yielding promising results, as described above.

If shuttle buses or other two-stage alternatives are to be implemented, special attention to optimal coordination in the provision of optimal intermodal conditions are key element for success.

As with all mobility initiatives in business areas, is not easy to gain support from their managers and companies representatives, which not always see the clear link between improved mobility and better employees performance. On-going dialogue should be established since the beginning stages of the project.

5.1.2.3 Summary of long-term evaluation results (2015)

The data for all indicators and a summary of the impacts are presented in Table 5.

The overall impact of the improved bus services on the district areas was assessed through the analysis of the dynamics in the number of users of the public transport on these lines (regularly monitored by DBUS) and the number of private cars entering the business areas (monitored by the municipality through regular counting campaigns). In terms of bus patronage, the bus services to the business districts implemented within ARCHIMEDES were very well accepted by commuters and the use of public transport substantially increased in these industrial areas after the CIVITAS project ended. After ARCHIMEDES, the number of users in these areas has steadily increased, although at a slower pace (14% increase between 2012 and 2015), currently accounting for 424 thousand travellers. This trend contrasts with that observed for the whole

DBUS service, which suffered a reduction in terms of patronage after the implementation of the fare integration scheme.

One of the reasons behind this great success in bus services operating in the business districts is its improved performance operation, the accuracy of timekeeping being one of its main indicators. The improvements implemented within the ARCHIMEDES project resulted in a significant increase in punctuality rates, reaching 97.8% of all services in 2012, by the end of the project. This rate has been maintained after the project, currently accounting for 97.6% of all buses arriving/departing on time. This improved operation has contributed to an increased perceived quality of service, which in the business district buses was a bit lower than for the overall DBUS system (7.0 in the reference year, while the whole DBUS was ranked 7.3). However, the ARCHIMEDES project placed the perceived quality of these lines at the same level of the overall system, being ranked 7.6 in 2012, when the CIVITAS project ended. This high level of perceived quality has been maintained and even slightly increased over the last three years since ARCHIMEDES finished, reaching 7.8 in 2015.

Indicators		Baseline 2006	After 2011	LTE 2015	Comments
TRANSPORT					
Accuracy of timekeeping	**Real**	91,9%	97,2%	97,6%	Positive impacts such as punctuality of bus services, accuracy of timekeeping, quality of service have been maintained and even slightly improved.
	BaU	91,9%	93,2%	94,2%	
Quality of service	**Real**	7,0	7,6	7,8	
	BaU	7,0	6,5	6,5	
Number of PT passengers in business districts	**Real**	122000	352500	424296	A significant 125% increase of PT users between 2008 and 2011. A much more modest 21% increase between 2011 and 2015, which is in contrast to the declining trend in passenger numbers for the whole DBUS system following the implementation of the integrated ticketing scheme.
	BaU	122000	123087	123976	
Number commuters arriving by car to the business areas	**Real**	22560	20111	20591	Car traffic volumes decreased in 2011, but numbers were up again in 2015. This is consistent with other measures and can be attributed to the recovery of economic activity since 2013.
	BaU	22560	20247	n/a	

Table 5: Measure 17: Business District Bus Service –Indicator results

5.1.3 Measure 73: Bus Traveller Information

5.1.3.1 Measure description

Within this measure, a more efficient information system was put in operation in order to provide current and potential public transport users with the ability to better plan their trips and optimise their travel times, mostly by reducing waiting times at stops and favouring a reliable connection with other routes and services.

Before the CIVITAS project, DBUS offered a rather good information system to travellers, including information panels at a limited number of bus stops, but there were opportunities to improve the quality of access to bus information for all people and especially for disabled people. Furthermore, the advances in telecommunication technologies provided the opportunity to design new interactive services.

Therefore, DBUS implemented a new travel information system which provided real time information such as arriving bus line, waiting times, connections, incidents in the service, through the following means:

- Real time information system on-board announcing next stop and connections
- Provision of bus arrival times by SMS messages. This is an on-request service for which users are required to send a SMS message (0,15€ + VAT) to a certain number including the bus stop identification number. As a response, the user will receive a SMS including the waiting times for the different busses arriving to that stop
- Provision of bus arrival times via Bluetooth, providing the same information as the SMS system, but free of charge
- Electronic information panels at bus stops providing information on arriving busses, waiting times and eventual disruptions or re-directions of the services
- Renewed web site including real time information at bus stop level and a route planner where users can introduce their origin and destination address (street name and number are requested) and different combination of public transport routes are provided, including journey times, itinerary, required transfers, etc. In addition, an estimation of the energy saved as compared with the same route made by car is provided.

The on-board and web information systems were adapted to meet the needs of visually impaired people. More specifically, audio messages announcing next stop and possible transfers were introduced on-board, while the website used a device to adapt the information provided (design, text fonts, etc.) to the needs of visually impaired people.

5.1.3.2 Summary of evaluation results during CIVITAS ARCHEMEDES (2008 – 2011)

The traveller information system has been very successful, with more than 3,500 daily requests for real time information via SMS or the website. The provided information is highly reliable, with 98.1% of all the information requests assessed as correctly answered by the users. When assessing these figures, it should be born in mind that 60,000 users have access to real time information at the bus stops through electronic boards.

As for the importance that public transport users place over information issues, a survey was carried out among DBUS users. Results revealed that information issues are perceived as very important, with an average score of 8.47 out of 10. User demand for quality information services is therefore very high. Complementing this figure, a user's satisfaction survey revealed a very

high acceptance level (average of 7.55) regarding information provision in DBUS' service. This figure is almost identical to the one achieved in the reference year (2006). The fact that high satisfaction levels are maintained is a very remarkable result, bearing in mind that users' expectations were also very high, as revealed in the public perception survey.

5.1.3.3 Summary of long-term evaluation results (2015)

The data for all indicators and a summary of the impacts are presented in Table 6.

In order to determine the importance that public transport users place over the different dimensions of the bus service, a survey was carried out in 2011 and 2012, among 1,500 users (12% of the daily passengers) of the two most representative lines in the CIVITAS corridor (lines 5 and 28). The results showed that information issues were perceived as very important, with an average score of 8.5 in 2012 (8.3 in 2011). The survey was repeated in 2015 revealing an even higher level of user demand for quality information services, reaching a score of 8.9.

To complement the above result, users' acceptance towards the actual implemented information systems of DBUS was also investigated. During the ARCHIMEDES years, the survey results showed that acceptance levels towards information systems were not affected (neither improved nor worsened), remaining stable around the 2006 mark (7.4 out of 10) for the duration of the project. After the CIVITAS project, satisfaction has also remained stable, which is also a remarkable result if we keep in mind that this period witnessed the implementation of a new integrated scheme, including a change in the fare and ticketing system, a process where good performance of information services is essential.

Finally, in terms of performance operation of the information services, indicators such as 'number of information requests' and 'reliability index of real time information requests' were assessed. The number of information requests, which experienced a significant increase during the CIVITAS period, has doubled after the ARCHIMEDES project, reaching its peak in 2014, reaching 5.5 million information requests. It should be highlighted that the reliability of the information provided has remained at a very high level both during and after ARCHIMEDES. In 2015, 97.5% of all information requests are responded in a satisfactory way and this level of service has been consistent throughout the whole project.

Indicators		Baseline 2006	After 2011	LTE 2015	Comments
TRANSPORT					
User acceptance for information services	**Real**	7,4	7,4	7,5	Satisfaction levels remained stable throughout the pilot project and after it, especially following the implementation of a new integrated ticketing system, which required good performance of information services.
	BaU	7,4	6,7	6,7	
Number of requests for real time information (web & SMS)	**Real**	n/a	1301802	4118597	The number of information requests has substantially increased throughout the pilot project and has more than tripled in 2015.
	BaU	n/a	n/a	n/a	
Reliability index of real time information requests	**Real**	n/a	98,10%	97,50%	The reliability of the information provided has remained at a very high level both during and after the pilot project, which indicates that information requests are dealt with in a satisfactory manner.
	BaU	n/a	n/a	n/a	
SOCIETY					
Public perception level (information)	**Real**	n/a	8,3	8,9	Users perceive information issues as very important and their demand for quality information services remains high.
	BaU	n/a	n/a	n/a	

Table 6: Measure 17: Business District Bus Service –Indicator results

5.2 Funchal – Measure FUN 2.1 Green Public Transport (PT) Line

5.2.1 Measure description

The CIVITAS MIMOSA measure “Green Public Transport (PT) Line" aimed at creating a bus line to supply a tourist and residential area with a well-planned high-performance service. The objective of the measure was to encourage residents and tourists to use public transport instead of taxis or private cars in the target area, which is one of the most popular urban areas in Funchal.

Initially, it was planned to use hybrid/electric vehicles, but it was not possible to purchase this kind of buses due to technical limitations. Instead, the latest Euro V buses already bought before CIVITAS were used.

As the PT operator is responsible for the service and the local Municipality for street design, traffic management and bus stop layout, integrated actions between the PT operator and the Municipality have been necessary aiming to increase the PT usage by locals and tourists alike.

Another important activity implemented was the Tourist Kit, which gives the opportunity to the tourists to purchase a public transport ticket at hotels. This package has started as an auxiliary action to support the Green Line and promote public transport in hotels. Nevertheless, it turned out to be one of the most important and more interesting features of this measure, creating breakthroughs in terms of nurturing green and responsible mobility habits. The Tourist Kit action is in line with the European Action Plan for Urban Mobility, a document where the Commission emphasises the importance of public-private partnerships.

This measure has developed along three phases during the project lifetime. The third phase of the Green Line was not planned at the very beginning but it was necessary because some public transport commuters complained about losing a direct connection to their homes. Consequently, the Green Line split into three lines, with suitable levels of frequency, supplied by Euro V buses and with nearly all bus stops subject to improvements. Moreover, communication with residents and tourists also got better due to the multimedia kiosks installed on street and due to several communication campaigns that were conducted.

After the MIMOSA project ended, the service has undergone some additional changes due to construction works along the catchment area, namely the expansion of the cycle lane, which diverted the service and other intensive traffic to a parallel street along a 1.5km stretch long. This represents the fourth phase of the Green Line.

5.2.2 Summary of evaluation results during CIVITAS MIMOSA (2008 – 2012)

The impact evaluation results of the Green PT Line were positive and the outcomes of the measure were already visible during the lifetime of the implementation. Several key results from the evaluation showed the evolution between 2008 (before the implementation of the Green Line) and 2011 (after the implementation). First, the streamlining of the network led to a decrease of 25% in operating costs between 2008 and 2011. Secondly, pollutant emissions caused by buses in the target area decreased by 43% in PM10 and by 13% in CO2 due to the decrease of kilometres driven by buses after the network reorganization and due to the use of Euro V buses along the Green line which are more energy efficient. Thirdly, the number of accidents in the target area involving buses has decreased by 30% (also influenced by a general decrease in traffic flows within the area). Fourthly, the implementation of the Green Line is perceived as useful or even very useful among interviewed commuters.

Considering 2015 horizon and the scenario in which tourists will use PT system by buying the “Tourist Kit” ticket to access the city centre instead of using the free hotel courtesy services, the

CBA showed that the financial benefit produced by the Tourist Kit will be economically attractive, equalling to nearly 7 Million Euros and a half.

The main barrier encountered during the measure implementation was the current informal business arrangements between hotels, taxi companies and tourist operators which undermined the efforts undertaken to persuade tourists to use PT modes. The main driver that smoothed the decision-making process was the high degree of involvement of the Regional Government in transport affairs. Among other promotional activities, the Regional Government sponsored a green mobility award to recognize efforts made by some hotels in promoting the Tourist Kit. This award raised awareness towards sustainable mobility actions such as the Green Line.

The Tourist Kit had been proved to be efficient and the results highlighted that this ticket is an incentive which is appropriate for cities with high rate of tourism and easily replicable. Indeed, if the PT connection between the airports/main stations and the tourist areas already exist, a special public transport ticket for tourists will incentivise them to use PT instead of taxi to reach their hotels.

The Green Line is a long-term agenda-setting measure, which is jointly understood by both the PT Operator and the Municipality as a significant step to enhance the PT facilities. The MIMOSA measure contributed to launch concrete activities and stimulate stakeholders to closely cooperate towards a sustainable mobility system for Funchal.

5.2.2.1 Summary of long-term evaluation results (2015 – 2016)

The data for all indicators and a summary of the impacts are presented in Tables 7-12.

The key long-term impacts of the Green Line in Funchal are as follows:

- **Financial balance was achieved** – the operating revenues of the public transport service in the Green Line target area have increased by 17% against the scenario before MIMOSA, whereas the operating costs have been reduced by half (-49%);
- **Reduction of pollutant have progressed positively in a range of 27% (CO2eq) to 56% (PM10)** – due to the allocation of Euro V buses to this area and also as a result of decreased level of services (less trips per day);
- **High acceptance and satisfaction levels** – this measure is perceived as essential for the development of local economy (based on tourism). The satisfaction rates among the PT users in the target area have generally risen due to the quality of the buses, information provision, higher commercial speed of the service, and improved bus stops;
- **Bus service is becoming more and more popular**, attracting more 23% passengers than if the project would not had been implemented;
- A vibrant area such as the one of the Green Line corridor has to be a safe one. **The number of accidents related to the PT service has decreased to barely a half** in comparison with the BaU for 2015. This fact is of paramount importance for the livability of the area, in particular, and for the whole tourism of the Region, in general, and occurs in a phase where traffic levels seem to be increasing compared to 2011 figures and the **number of vehicles is higher than the forecasting model BaU would predict**;

- **High hotel support for Tourist Kit** – Three years after the former assessment, the number of hotels is the same, but the number of tickets sold by the hotel's staff is steadily increasing, which show that the Tourist Kit is perceived by the Operator as a business model, whilst it also shows the commitment of all local major players in contributing to a healthy and more sustainable urban environment;
- **Bus stops improvements** – the bus stops in the area were substantially improved with shelters, seating availability, and information about either the bus lines and city network;
- **Increase social inclusion** – in line with what was found in 2011, substantial achievements have been made in the inclusion of people with mobility limitations, namely wheelchair users which increased sharply due to the implementation of the Green Line**.**

Indicators		Baseline 2008	After 2011	LTE 2015	Comments
ECONOMY					
Operating revenues (€/per year)	**Real**	3,678,168	4,043,666	6,299,860	Financial balance was achieved: the operating revenues from the public transport service in the Green Line target area have increased by 17% against the scenario before MIMOSA, whereas the operating costs have been reduced by half (-49%)
	BaU	n/a	4,413,976	5,395,053	
Operating costs (€/per year)	**Real**	4,384,928	3,794,367	3,204,591	
	BaU	n/a	5,197,963	6,337,913	
ENVIRONMENT					
NOx emissions (tonnes per year)	**Real**	14.87	10.84	9.55	The measure resulted in a healthier urban environment – emission savings a result of the introduction of Euro V buses and an overall decrease in the number of km travelled by buses (less trips)
	BaU	n/a	15.23	15.75	
CO_2 eq. emissions (tonnes per year)	**Real**	1,464	1,277	1,125.31	
	BaU	n/a	1500,32	1,551.89	
PM10 emissions (tonnes per year)	**Real**	0.55	0.29	0.26	
	BaU	n/a	0.57	0.59	

Table 7: Measure FUN 2.1: Green PT Line –Indicator results

Indicators TRANSPORT		2007 (before CIVITAS; N=28)	2012 (phase 3 of Green Line; N=187)	2016 (long-term effect; N=150)	Comments
Perception of PT service quality	**Real**	7.0	8.5	7.9	The measure improved the perception of PT service quality and this trend continued after the end of the project.
	BaU	n/a	n/a	n/a	
Indicators TRANSPORT		**Baseline 2008**	**After 2011**	**LTE 2015**	**Comments**
Number of PT users (tickets sold)	**Real**	4,086,853	4,096,422	5,039,888	Bus service is becoming increasingly popular, attracting 23% more passengers than if the measure has not been implemented.
	BaU	n/a	4,087,095	4,087,418	
Number of PT related accidents in target area	**Real**	43	30	23	Safety has improved, even though traffic levels seem to be rising and the number of vehicles in 2016 is higher than the BaU figures.
	BaU	n/a	43	43	

Table 8: Measure FUN 2.1: Green PT Line –Indicator results

Indicators TRANSPORT		Baseline 2006	After 2012	LTE 2016	Comments
Traffic level (total number of cars)	**Real**	29,463	21,900	23,760	During the MIMOSA project, the total traffic level decreased from 29,463 vehicles in peak hours to 21,900, a total of 7,563 fewer vehicles. After 2012, the flow of vehicles increased, decreasing again in 2016. The increase in traffic levels can be attributed to two factors: construction of many new buildings in the past few years in the target area and the fuel price, which is lower in 2011. However, vehicles are less space consuming than before (less heavy vehicles such as trucks and buses and more small ones such as private cars and motorcycles). The number of vehicles in 2016 is higher than the BaU scenario, therefore this is a shortcoming of the measure and an area for improvement which requires the attention of local authorities, such as the revision of local traffic policies.
	BaU	n/a	25,044	22,097	
Indicators TRANSPORT		**Baseline 2008**	**After 2011**	**LTE 2016**	**Comments**
Commercial speed of public transport service	**Real**	21.3	23.1	22.9	The commercial speed in 2016 is 17% higher than if no measure has been implemented. This gain in speed should be perceived favourably among commuters and should improve their perception of PT quality of service.
	BaU	n/a	19.3	19.6	

Table 9: Measure FUN 2.1: Green PT Line –Indicator results

Indicators		Baseline 2008	After 2012	LTE 2015	Comments
SOCIETY					
Number of hotels supporting Tourist Kit	**Real**	0	19	0	The level of support for the "Tourist Kit" (45% of hotels) has not changed since 2012 and has resulted in an increase of PT ticket sales by hotel staff. The number of passengers swapping the courtesy bus in favour PT has increased.
	BaU	n/a	0	19	
Total number of courtesy buses in the catchment area	**Real**	12	6	5	
	BaU	n/a	12	12	
Number of Km travelled by courtesy buses	**Real**	193,928	134,443	131,874	
	BaU	n/a	193,928	193,928	
Number of passengers travelling in courtesy buses (year)	**Real**	157,273	116,382	115,056	
	BaU	n/a	139,528	167,981	
Number of Tourist Kit tickets sold	**Real**	0	4,963	6,170	
	BaU	n/a	0	0	

Table 10: Measure FUN 2.1: Green PT Line –Indicator results

Indicator: Number of spatial equipment/layout in target area bus stops		Baseline 2008	After 2011	LTE 2016	Comments
Shelters (% of bus stops)	**Real**	57	89	90	The improvements to bus stops have continued beyond the MIMOSA project. Between 2011 and 2016, when comparing to the BaU scenario, all the parameters have progressed very favourable and only the percentage of bus stops with bus docks is fewer than expected if no measure has been implemented. This is due to the increased number of bus stops that do not have a bus dock.
	BaU	n/a	63	69	
Seats (% of bus stops)	**Real**	26	78	85	
	BaU	n/a	31	37	
Bus docks (% of bus stops)	**Real**	91	95	88	
	BaU	n/a	91	91	
Information about bus lines (% of bus stops)	**Real**	77	97	98	
	BaU	n/a	83	89	
Information about city network (% of bus stops)	**Real**	40	95	85	
	BaU	n/a	46	51	

Table 11: Measure FUN 2.1: Green PT Line –Indicator results

Indicators		Baseline 2008	After 2011	LTE 2015	Comments
Number of wheelchair users	**Real**	24	349	269	There was an increased inclusion of people with mobility limitations after the measure implementation and this policy continues after the measure.
	BaU	n/a	24	30	

Table 12: Measure FUN 2.1: Green PT Line –Indicator results

5.3 Utrecht

5.3.1 Measure UTR 5.1 Road Safety Label

5.3.1.1 Measure description

Children in particular are a vulnerable group in road traffic and need to learn how to act safely. The surroundings of many primary schools are not sufficiently safe and recognizable for road users. Road safety of schoolchildren is a shared responsibility of the city, the schools, the children and their parents at all of Utrecht's 110 primary schools.

The Utrecht Road Safety Label (URSL) offers schools the opportunity to set up and execute a structural traffic education plan at their own pace, to raise awareness of road safety by education and to improve road safety around schools. The measure 'Road Safety Label' had the objectives of increasing road safety in primary school areas, reducing the number of car trips and increasing of the number of walking-trips and trips by bicycle to primary schools. The objective was to create recognisable, safe school zones and increase the satisfaction with road safety in primary school areas among children, their parents and teachers. To stimulate high quality traffic education at primary schools and to guarantee this education, a quality label for primary schools was developed. This quality label was adopted by nine provinces in the Netherlands, among which Utrecht. To determine whether a school was qualified for the road safety label, a list of criteria was used. The criteria were clustered in the following five themes:

1. Traffic education in theory
2. Practical traffic education
3. Involvement of parents
4. A safe school zone
5. The school's policy towards safe mobility.

5.3.1.2 Summary of evaluation results during CIVITAS MIMOSA (2008 – 2012)

The main results of the measure at the end of the implementation period were as follows:

- 82 primary schools (75%) were working towards the road safety label by raising attention for road safety in education and improved road safety around schools.
- School zones were uniform and recognisable by the use of road signs and markings.

Below is a summary of the results for each of the indicators used in the evaluation.

Transport: Road safety

A key pillar for the increase of road safety was the development and implementation of a safe uniform school zone, because the infrastructure of primary schools in Utrecht was not always how it should be. An overload of traffic signs and other visual interruptions prevented the relevant signs from receiving the necessary attention. Furthermore, different types of materials were used to achieve the same goal. The city of Utrecht actively wanted to contribute to a safer school environment by implementing infrastructural improvements.

The aim was to achieve a clear, recognizable and uniform design for all school zones. To this purpose, the city developed a plan in 2008 for a school zone. Utrecht chose to use existing

materials, such as road signs, sustainable road markings and poles, instead of new concepts. Elements of the school zone were:

- Road signs to indicate crossing children and a lower maximum speed limit
- Road markings to indicate school zones
- Fencing to install on sidewalks near school exits
- Measures to prevent parking such as poles / bollards and/or stopping prohibitions
- Optional: Slow ramps or speed bumps, road isles with poles and road markings and pedestrian crossings

Initially, the uniform school zones were implemented in five locations with eight primary schools. After evaluation, the concept was rolled out to other schools in the city. The investment costs of a uniform school zone were about €6.500 per school.

In October 2012, at the end of CIVITAS MIMOSA, the city of Utrecht had redesigned the surroundings of 54 primary schools that participate in the road safety label measure, which is a bit more than half of all the 104 schools in Utrecht.

Transport: Modal split

The modal split of home to school trips was measured from a sample of schools during the implementation period and was distinguished by parents, children and parents (city wide). There is no single figure presented about the model split, nevertheless the following was concluded:

- Bicycle and walking are for all schools the dominant modes of transport (even when differentiated by participation and non-participation in the road safety label). Combined share is between 76% and 95%.
- City wide modal split surveys among parents for home-school trips show similar percentages regarding walking and cycling. However, in 2011 on average still 12% of the parents bring their children to school by car.
- It could not be stated that modal split was influenced by the measures related to the road safety label (Utrecht, 2013).

Society: Participation

This category consists of two indicators: the number of schools working towards the label (indicator 3) and the number of schools that have reached the label (indicator 4). The target was that in 2011 80% of the primary schools in Utrecht would participate in the measure. The highest percentage that was achieved was 67% participation. This was still considered a good result because schools were participating voluntarily. In October 2012, 38 primary schools received the label and 32 schools were actively working to meet the criteria.

Society: Satisfaction

Based on surveys among school staff and the annual citizen questionnaire it was concluded that parents of children at participating schools were much more satisfied with road safety in the school

zone than parents from non-participating schools. The percentage of parents who thought the school zone was (reasonably) safe increased from 56% to 78%, whereas on the non-URSL school it increased from 23% to 32%. Furthermore, regarding the judgement if it was safe enough to cycle to school, parents of children at “label schools” were more positive than other parents.

5.3.1.3 Summary of long-term evaluation results (2016)

After the initial success and cooperation by all stakeholders, the interest in the Utrecht Road Safety Label (USRL) seems to have declined. Around 40% of the primary schools in Utrecht have the label, but there is little interest by new schools to pick it up (3 schools) and there is a considerable number that did not resubmit their interest for keeping the label (16%). Reasons are mainly uncertainty about the future of the label, a large variety of suppliers of toolkits, full agendas of activities at schools and a changed governance structure regarding school mobility in Utrecht.

The future of the road safety label is at this moment unsure: it seems that both Municipality and Province are developing own action plans towards school mobility, and synchronisation of efforts is strongly needed to keep this measure fruitful towards the future, despite the enthusiasm of schools and traffic committees to put effort in improving the safety and sustainability of school mobility.

What other schools and cities may learn from this is that good governance, clear goals and long term effort is needed to achieve safe and sustainable school environments. The Utrecht Road Safety Label (URSL) has been a very good initiative to bring together stakeholders and to pay attention to school mobility in a positive way. Safety around schools in Utrecht (as well as in other parts of the Netherlands) is perceived very good and URSL has definitely had a positive impact. The road safety label is positive, mainly because it is cooperative action among various stakeholders and it unites instead of separates. It is an umbrella-label for a large number of individual actions that all aim at safer school environments, reduction of accidents and injuries, a more sustainable school environment and healthier children and parents.

The URSL mainly used safety as a trigger to pay attention to school mobility and school surroundings. Currently, other triggers are getting more attention, such as climate, food and healthier lifestyles. Regarding the latter, a focus on active mobility modes such as walking and cycling is beneficial for both the environment, climate and healthier people. In that respect, the URSL can perhaps be regarded as an important basis to pave the way for a more general school mobility label, including safety.

Below is a summary of indicator results collected in 2016. Please note that the results are not directly comparable with the results collected during the CIVITAS MIMOSA project. This is mainly due to difficulties related to data collection and the impossibility to replicate the methodology used in the pilot project. Therefore, where possible, data from other recent studies were quoted.

Transport: Road Safety (indicator 1)

The figure below shows the updated number of schools with a uniform school zone in 2014 and 2016 compared to the end of CIVITAS MIMOSA. Since 2012, another nine schools have implemented a uniform school zone. The data shows that the largest growth of numbers of school

zones was achieved between 2009 and 2010 (right after the pilot). In 2016, there are 63 schools with a uniform school zone, which represents about 58% of all primary schools in Utrecht. When looking more in depth to these 63 schools it appears that:

- 38 of them are around schools with an active road safety label;
- 17 are around schools that lost the label;
- are around schools that have stopped to achieve the label; and
- 1 is around a school that is still active to achieve the label.

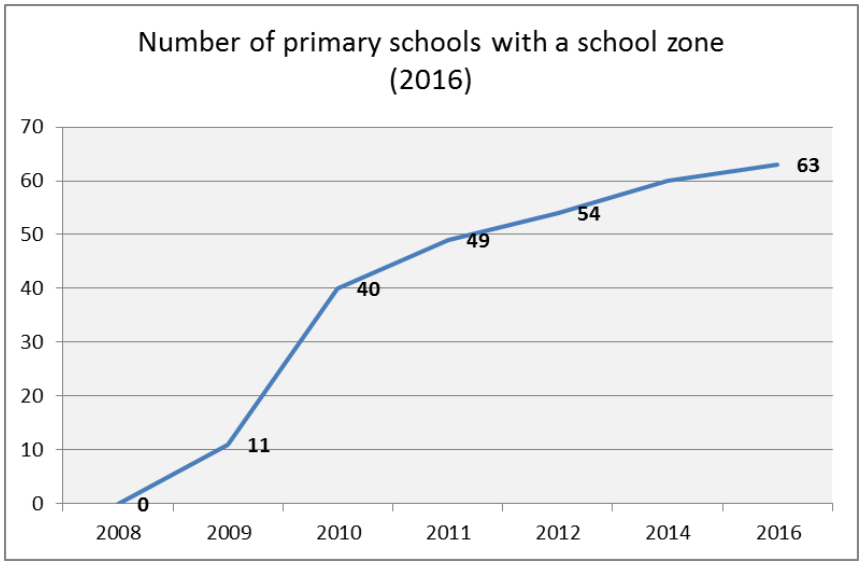

Figure 13: Number of primary schools with a uniform school zone per year in 2016

Transport: Modal split (indicator 2)

The modal split of walking and cycling to primary schools is generally very high in the Netherlands compared to other countries in Europe. In Utrecht the combined share of walking and cycling (active modes) of URSL-schools was between 76% and 95%, based on surveys in 2012.

There is no recent modal split data available for the USRL-schools that are scientifically comparable with the data that was collected during CIVITAS MIMOSA. The most recent study in which the modal split at primary schools was analysed was about the “Gezond op Pad: Lekker Lopen, Fijn Fietsen” project (Utrecht Natuurlijk, 2016). The 18 schools that have participated in that project have a slightly different location than the majority of schools that (have) participated in the USRL: on average they show a higher share of car usage towards the primary schools (see table 13). Before the start of the project week, the 18 schools reported around 68% modal share for the active modes. At the end of the project week this rose to 78% and after some months it was 76% (although the ex-post measurement was not claimed to be fully representative).

	Before (1)	During (2)	After (3)
Car	30,3%	21,6%	24,0%
Bicycle	43,6%	50,6%	62,3%
Foot	25,2%	27,0%	13,7%
Moped/scooter	0,9%	0,7%	0,0%

Table 13: Modal split of children to school (Utrecht Natuurlijk, 2016)

More interesting is the analysis of the changes in the modal split and reasons why children come to school by bicycle or on foot. Interesting facts to share are:

- About 10-16% of the children that come by car to school would prefer to come by bike or on foot because this is “more fun”. Around 12% would like to come by other mode (“helicopter” or “balloon”).
- Around 30% of the children that come by car to school like this mode of transport and see no reason for change.

When asked the parents, they report the following interesting opinions:

- Around 31% of the parents indicate that they bring their children by bicycle to school because it is so close.
- 23% of the parents report health as the main reason for cycling.
- 20% of the parents bring their children by car because they have to drive onwards to work, this is the dominant reason for car usage. Safety was only reported in 2% of the cases.

Society: Participation (indicator 3 and 4)

Indicator 3 and 4 are about the number of schools that are working towards getting the road safety label (3) and the number of schools that have achieved the road safety label (4). The results for 2016 are presented in figure 14. Compared to the initial evaluation in CIVITAS MIMOSA, two more categories of schools have been added to the indicator list:

1. % of schools that were active to achieve the USRL, but never achieved it.
2. % of schools that had the USRL, but that lost it

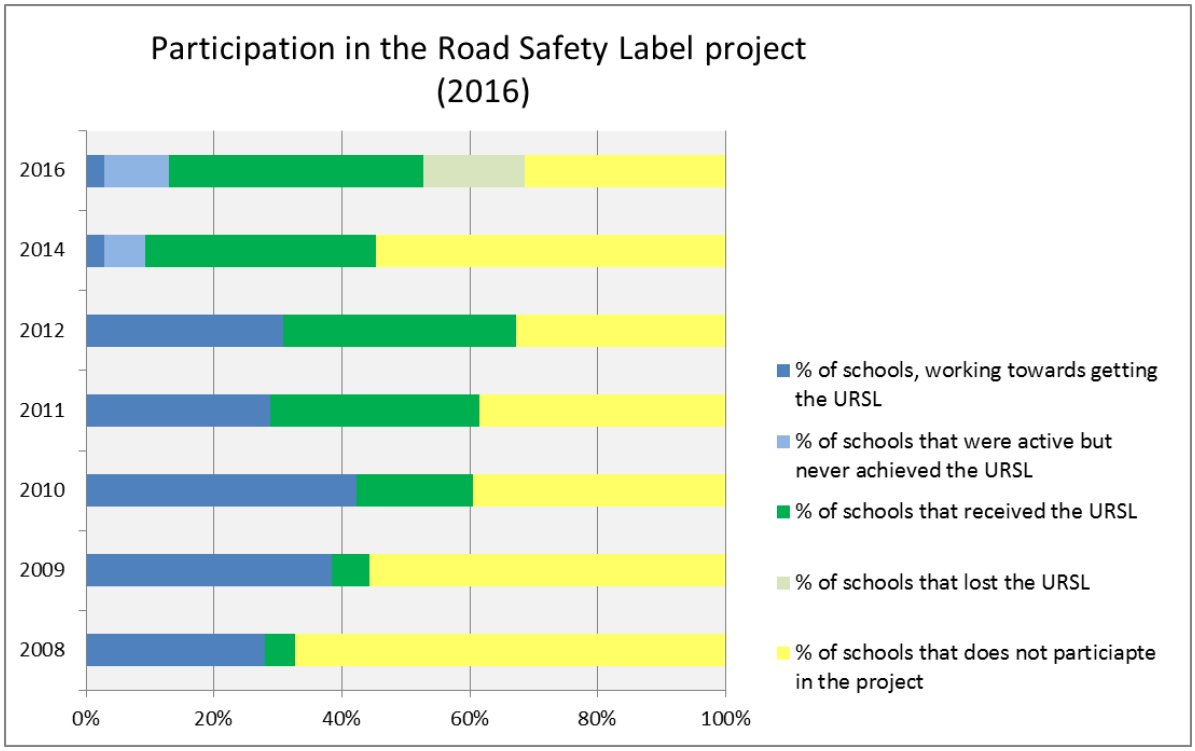

Figure 14: Percentages of primary schools that worked towards the label (USRL), received the label or did not participate (new data added for 2014 and 2016)

At the end of CIVITAS MIMOSA, 38 primary schools had received the label and 32 schools were active on achieving the label. In 2016:

- 43 schools have the USRL;
- 3 schools are active to achieve the USRL;
- 17 schools lost the USRL; and
- 11 schools had started working on the label but quit somewhere in the process.

This is a remarkable change that indicate that the attention for USRL and the willingness to achieve it is declining. The average time it took for schools to get the label was 2.5 years.

Society: Satisfaction (indicator 5)

There is no recent user satisfaction information available that is based on surveys among parents, schools and children. The information in this section is based on interviews held with representatives from the municipality and the education support organisation CED (formerly known as Eduniek).

In general, schools, parents and children are very satisfied with attention paid to safe and sustainable school mobility, as it is of major concern for all stakeholders. Many, if not all, primary schools have established committees for safe and sustainable school mobility, consisting of parents and staff members from the schools (in many cases, it is the director that participates in

the traffic committee). The traffic committee usually initiates, programmes and executes actions about traffic and mobility.

The reality is that the influence of the committee is determined heavily by the enthusiasm of individual participants. These so-called 'local heroes' can stimulate action and are a strong enabler towards the success of actions. The downside of this is that it is difficult to control and plan the success of traffic committees, therefore it is always heavily influenced by 'spontaneous' triggers.

5.3.2 Measure UTR 7.3: Flexible Access for Cleaner Freight Traffic

5.3.2.1 Measure description

The original measure as implemented in MIMOSA focused mainly on the introduction of the Cargohopper, zero emission city distribution vehicle. The Cargohopper was a response to the cities' ambition to regulate access to the inner city by polluting vehicles by stimulating the usage of clean vehicles and to reward transport companies to invest in 'super clean' vehicles. This reward consisted of elements like:

- Exemption from legally allowed time windows of delivery of goods.
- Allowing freight deliveries during the night.
- Exemption from the prohibition of the use of bus lanes.
- Providing subsidies for purchasing new clean vehicles.

A low-emission zone (LEZ) was installed in July 2007 with limited access to the city centre by vehicles below emission standard Euro4 (figure 15). The rules for access have been stricter since January 2015.

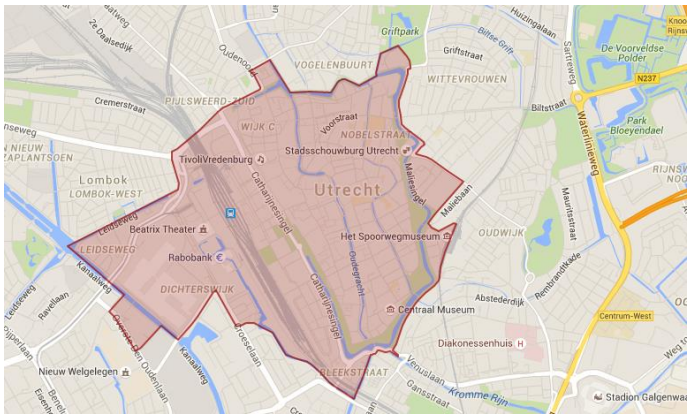

Figure 15: Low Emission Zone Utrecht (since 2007)

The low emission zone covers almost the whole city centre. About 5% of all inhabitants (in the region 16,813 inhabitants as at 1st January 2012) live in the city centre. Moreover, the city centre is visited daily by about 48,000 people working in the area (more than 20% of all jobs in Utrecht

are in the city centre) and about 163,000 people travel to and from Utrecht central station in the city centre every day. Utrecht is visited 6.9 million times a year for leisure activities. Most important activity of visitors is shopping and most shops are in the city centre. The area has about 8,200 houses and 3,800 businesses. About 21% of all Utrecht wholesalers and retailers are in the city centre and more than a third of all catering businesses (2011: 390 catering businesses). Therefore, in addition to the local residents, many visitors are affected by emissions in the city centre.

5.3.2.2 Summary of evaluation results during CIVITAS MIMOSA (2008 – 2012)

The reported measure results in MIMOSA were focused on Cargohopper 1.0. In 2011, Cargohopper 2.0 was introduced, but its impacts were not taken into account at that time.

Environment: Emissions

The direct environmental benefits of this measure came from implementation of CH1.0. Implementation of the Cargohopper meant a daily reduction of 5 delivery van trips from the City Distribution Centre (Stadsdistributiecentrum: SDC) into the city centre and back. This was a trip with an average distance of 20.6 kilometres. A part of this route was replaced by the Cargohopper trip; however the Cargohopper had to be loaded. Loading the Cargohopper was done with a light truck. The distance this light truck travels from the SDC to the Cargohopper loading point is 16.4 kilometres. The calculated impacts in terms of CO2, NOx and PM10 is summarised in table 14. This data was taken from the original measure evaluation report, in which more background information is described about the methodology used.

Total impact Emissions Cargohopper 2009-2012 (kg)						
Utrecht no.	Pointer no.	Indicator	BaU	After	Difference After - BaU	%
1	8	CO_2 emissions	31623 kg	8548 kg	-23075 kg	- 73%
2	10	NO_x emissions	67.8 kg	49.3kg	-18.5 kg	- 27%
3	11	PM_{10} emissions	6.8 kg	3.0 kg	-3.8 kg	- 56%
Source: own calculation						

Table 14: Impact Emissions Cargohopper 1.0 (Utrecht, 2013a)

Transport: Freight movements

As Cargohopper 1.0 replaced existing transport from Hoek, its capacity was fully used since its introduction in 2009. This means each Cargohopper trip replaced freight of 5 delivery vans. Cargohopper made 255 deliveries a year. To load the Cargohopper 255 light truck trips of 16.4 kilometres were made. So Cargohopper saved 1275 delivery van trips a year. According to Hoek transport the average delivery van trip distance is 20.6 kilometres. Therefore, the introduction of the Cargohopper immediately led to a decrease in freight movements.

Total transport results are a decrease of 5,100 delivery van trips and taken into account the light truck trips a decrease of 4,080 freight movements in four years. This makes a saving of 5% on delivery van trips in the city centre and 88,332 km diesel vehicle trips saved. Table 15 contains the savings by the end of MIMOSA (Utrecht, 2013a).

Total impact freight movements (number of trips and km)						
Utrecht no.	Pointer no.	Indicator	BaU	After	Difference After - BaU	%
4	25	Total delivery van trips in the city centre	104171	99071	-5100	-5%
		Total freight movements Cargohopper measure	5100	1020	-4080	-80%
		Total diesel freight vehicle kilometres Cargohopper measure	105060 km	16728 km	-88332 km	-84%
Source: Utrecht delivery profile 2009 and estimation freight load development Hogenberg (2012) and Hoek transport						

Table 15: Impact Emissions Cargohopper 1.0 (Utrecht, 2013a)

5.3.2.3 Summary of long-term evaluation results (2016)

The Cargohopper no longer is in operation in Utrecht. Therefore, it was not possible to collect quantitative data for the long-term evaluation of the measure. Some lessons learnt from the measure implementation during the MIMOSA project are presented below.

Firstly, Cargohopper in Utrecht was an important stepping stone for TansMission (initiated by Hoek Transport) to develop the Carhophopper vehicles. Without the initial steps taken by Mr van der Linden in 2008, that delivered CH1.0, a successful CH2.2 in Amsterdam may not have occurred. In addition to the vehicle itself, the logistical concept was more important. One of the lessons learnt relates to the regulation and promotion of new and clean vehicles for distribution in a strongly competitive market with low profit margins. TransMission and Hoek Transport can be called frontrunners in the sense that they have looked at sustainable forms of city distribution purely from a market perspective. Most other intiatives are set up primarily from an environmental perspective, which in then end leads to an unprofitable business case and therefore limited upscaling potential; once the subsidy stops, the vehicle stops.

The Cargohopper case study has shown that it takes an entrepreneurial perspective from a city administration and a sustainable perspective from the business sector to launch new initiatives. The city of Utrecht has played an important role, to cooperate intensively with the initiators in the set up phase. Although Cargohopper is no longer operational in Utrecht, there is renewed interest in taking a ‘next step’ in the organisation of Utrecht’s city distribution schemes. This involves the LEZ and the logistical concepts behind e.g. beerboat and Cargohopper.

Thanks to a covenant to achieve Zero Emission City distribution (following the Dutch Energy Treaty responding to the Kyoto and Copenhagen climate treaties), there is renewed interest in clean city distribution. Cities like Amsterdam can help to support this.

Finally, a mind (and action) shift is needed in goods delivery. With online shopping really boosting and the so-called “tsunami of white vans” causing troubles, the basics of the delivery concept

need to be rethought. It should be more and more the end-user dictating how goods should be delivered to achieve efficient goods delivery, and not the hauliers. Actions in this direction however go beyond the scope of this study.

5.3.3 Measure UTR 7.2: City distribution by boat

5.3.3.1 Measure description

Truck-based freight distribution was and still is a major concern in Utrecht's city centre. Heavy vehicles damage the historical cultural heritage of the city and cause nuisance in the form of accidents, noise and air pollution. The city council has therefore introduced a number of vehicle restrictions in the inner city including time windows for freight traffic to deliver goods and a low emission zone.

Since good accessibility is crucial for the city's economic viability, it was also decided to expand the existing water transport with the introduction of a zero-emission electrical vessel to transport goods to clients, shops, bars and restaurants in the city centre. This concept is known as 'The Beer Boat' since the vessel initially transported mainly beer and beverages to catering businesses along the canals. The majority of the clients are breweries who use the Beer Boat to deliver goods to catering businesses along the inner city canals. Without a Beer Boat, breweries are restricted to using small EEV4 delivery vans. This is due to length, weight and emission restrictions. These small vehicles, on average, have a loading capacity of up to five roll containers, meaning that the Beer Boat has the capacity of up to ten small freight trucks.

The first diesel powered Beer Boat was launched in 1995 and was aimed solely at reducing damage to the historical infrastructures. In 2007, the city became aware of the additional sustainable effects of transporting goods by water and the potential of electric mobility. Utrecht has set itself the objective to:

- Decrease road goods traffic in the city centre; and
- Make better use of the potential for waterborne transport for supplying the city.

The MIMOSA measure therefore consisted of the implementation of a new electric vessel and a search for new customers and suppliers to increase the volume of freight transported by boat.

5.3.3.2 Summary of evaluation results during CIVITAS MIMOSA (2008 – 2012)

The main evaluation results were as follows:

- The introduction of a zero emission vessel resulted in an immediate emission savings of 38 tonnes of CO_2, 31 kg of NO_x and 6 kg of PM_{10} emissions during the CIVITAS MIMOSA period.
- A zero emission vessel was considered a low risk investment in Utrecht as the client base was big enough and stable and there were many profits. The net present value was positive for its total lifetime (30 years) with a discount rate of 3.5%. Furthermore, the Beer Boat was already profitable with very low freight loads.

- Road vehicle restrictions and local circumstances were helpful, if not necessary to make waterborne transport an attractive alternative.

The city of Utrecht expected that without a zero emission boat, road freight traffic trips to the city centre would grow, as will PM_{10}, NO_x and CO_2 emissions (although at a slower pace, due to engines getting cleaner and cleaner). A forecast was made on the basis of national freight transport numbers in the past and the Utrecht city growth model which predicted that freight transport growth in Utrecht between 2005 and 2030 would be 100%. These values were used in the business as usual scenario.

Environment: Emissions of CO_2, NO_x and PM_{10} (indicators 1, 2 and 3)

The direct environmental benefits from the measure came from a reduction in small delivery vans trips driving into the city centre. The new Beer Boat itself is not considered to have any impact on the environment in the study area. As the electric Beer Boat runs on green electricity the emissions for the new boat are zero.

All reported values are based on the cleanest possible diesel vans, meaning that real emission reductions might be higher. The figures below show the calculated development of different emissions for all freight transport in the city centre, assuming that all city centre transport is done with vans. In all graphs it is clear that introducing the zero emission boat gave immediate emission reductions. As there was only small growth in freight volume for the Beer Boat (and no growth in Beer Boat trips) and this small growth corresponds to a very small portion of total road freight traffic, emissions for road freight traffic follow virtually the same trend as BaU.

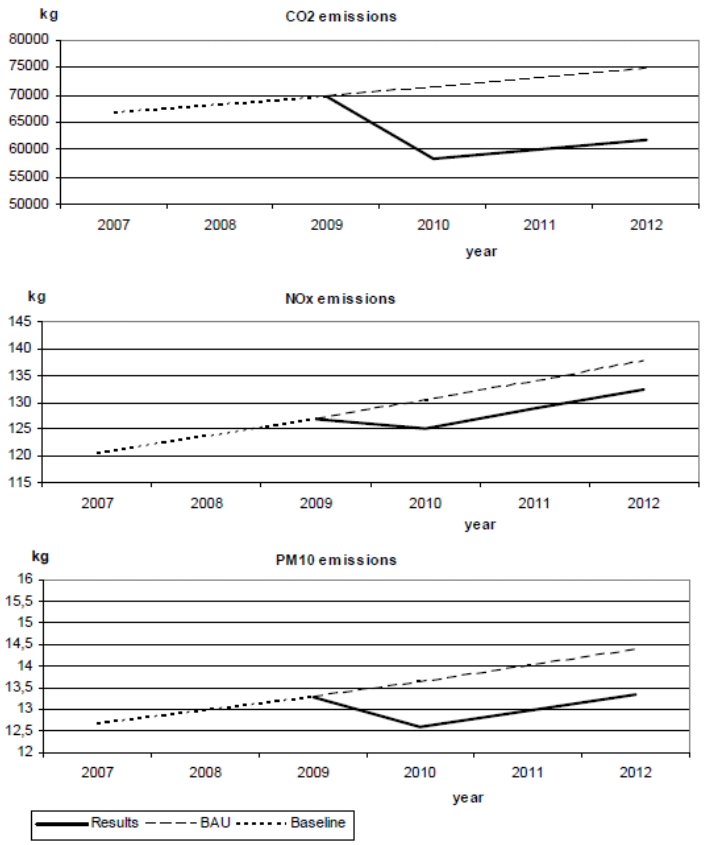

Figure 16: Emission savings from the Beer Boat

The implementation of the zero emission Beer Boat during CIVITAS MIMOSA reduced CO_2 emissions by more than 38 tonnes, NO_x emissions by 31 kg and PM_{10} emissions by 6 kg. For the total estimated city centre emissions this means a decrease in CO_2 emissions of 13%, NO_x emissions by 6% and PM_{10} emissions by 10%.

Transport: Freight movements (indicator 4)

The Beer Boat aimed at reducing road transport in the city centre. However as expanding waterborne transport by attracting new clients after implementation of the electric boat had not succeeded at that time, there is no significant road transport reduction. In relation to road and waterborne transport, the after situation is the same as BaU and BaU follows the baseline trend. The electric Beer Boat has not had a significant impact on the total freight transported in the city centre as expanding the market (and the freight volume) has yet to succeed at the end of CIVITAS MIMOSA.

Economy: Capital costs, operational costs and revenues (indicators 5, 6 and 7)

The introduction of the electric Beer Boat imposed different costs and revenues for the city of Utrecht. The purchasing costs for the electric Beer Boat were €600,000. After implementation, the Beer Boat should have revenue of €200,000 in 7 years for the municipality (about €30,000 a year). The Beer Boat revenues were €90,000 each year and the operational costs were about

€60,000. The Beer Boat was not profitable for the 4-year CIVITAS MIMOSA period, but there was expected that the Beer Boat will have a lifetime of 30 years.

For the Beer Boat measure a cost benefit analysis was conducted as well. The results show that the Beer Boat measure yields positive effects for all stakeholders. Also, although the NPV's were small compared to BaU, effective results on emissions and truck reduction were notable. The most important conclusion that can be drawn from the CBA results was that even at low transport volumes, the Beer Boat is cost-efficient and that it was a low-risk investment.

For the CBA calculations in the MIMOSA evaluation a large number of assumptions have been made that make this CBA rather artificial. For example, it was assumed that the zero emission vessel was purchased in 1995 while actually this was the case in 2010. In 1995 the concept started in reality with an old diesel vessel.

5.3.3.3 Summary of long-term evaluation results (2016)

Below is a summary of indicator results collected in 2016. Please note that the results are not directly comparable with the results collected during the CIVITAS MIMOSA project. This is mainly due to limitations related to data collection and the impossibility to replicate the methodology used in the pilot project. Therefore, where possible, data from other recent studies were quoted.

The good news is that nowadays the beer boat is still up and running. The concept is still the same as at the end of the MIMOSA project. It has a stable number of clients that hire the boat and deliver now slightly more goods to slightly more pubs and restaurants than in 2012.

Already for a number of years, there are several plans for extension of the concept to also the streets further away from the canal. This requires some additional investments (small vehicle) to be able to reach those pubs and restaurants located there. Until now no decision has been made about changes to the concept.

The city centre, and especially the streets along the canal benefit a lot from the beer boat. The beer boat is zero emission, reduces the number of diesel vans that block complete streets when delivering. The beer boat showed that sustainable transport can be beneficial if there is a (perceived) positive business case for all stakeholders. The strict vehicle regulations along the canal (as a result of the historic constructions underneath) are a push towards sustainable transport in the city centre of Utrecht.

There is certainly potential for optimisation of the concept to be able to deliver quicker and to more delivery addresses along the canal. Also with some extra investments a wider area can be delivered.

The question is now if it is possible with the current organisation of the beer boat to make the next steps. It looks like that for further growth it could be more successful when the private sector runs to concept. That could be as an entire take over of the concept but also as a concession that is being granted by the municipality for a certain period.

Environment: Emissions of CO_2, NO_x and PM_{10} (indicators 1, 2 and 3)

The amount of CO_2, NO_x and PM_{10} emissions of road transport have in general declined during the last four years, because newer vehicles are in use that have cleaner engines. On the other hand, the amount of traffic increased as a result of the better economic situation and intensive construction works in the zone around the Utrecht Central train station.

In addition to the beer boat, Utrecht also implemented other measures to achieve better air quality. The situation in Utrecht was that the air was not clean enough to meet the European requirements. Within the MIMOSA measure 7.3 (Flexible Access to Cleaner Freight Traffic) a low emission zone was implemented in 2009. In addition to the original regulation, since January 2015 the LEZ cannot be entered by diesel person vehicles and light trucks that are older than 2001. These are vehicles without a soot filter. The size of the LEZ has not been changed. Vehicles powered by fuels other than diesel can enter the LEZ. Some exceptions are made for special vehicles, for which an exemption can be allowed for a maximum of 12 days per year.

According to research conducted by TNO (TNO, 2016), it was discovered that compared to 2014, the amount of polluting vehicles (passenger cars and light trucks) was reduced by 80% for diesel passenger cars (2,8% share forecast[1] for 2015 compared to the 0,5% measured) and with 70% for light trucks (6,5% forecast to 1,8% measured). The LEZ restrictions will have an impact of the share of clean vehicles in the city centre. The question is to which extent this has led also to cleaner air and less pollution. Measurements, forecasts and analyses have according to TNO not measurably significantly led to a reduction of air pollution *because of the LEZ regulation*. The autonomous developments had a large impact on the 16% air pollution reduction that was measured. However, it was concluded that regarding PM's the introduction of the LEZ had a positive impact, because the reduction of PM's was higher than in Rotterdam and Amsterdam where no additional restriction measures were installed at that time.

For vans, that deliver the pubs and restaurants along the canal, the pace of moving towards cleaner engines goes at quite a high speed (also as a result of the LEZ) as can be seen in the table below (TNO, 2016):

Van category	2014 (in %)	2015 (in %)
Euro 5	38	49
Euro 4	34	31
Euro 3	19	18
Euro 2	7	1
Euro 1	2	1

Table 16: Percentage of vans used in the city centre of Utrecht by emission category

Looking at the amount of goods that the beer boat transported yearly, we can assume that 1,560 trips by van are being saved yearly. A trip by van is on average is estimated as 8 km in the city

[1] In this prognosis it had been taken into account that the vehicle fleet follows an autonomous flow of 'cleaning', because engines are getting cleaner.

centre of Utrecht. When using an Euro 4 diesel van this results in emission savings in the centre of Utrecht per trip of 3,9 g of NOx, 0,36 g of PM and 1712 g of CO2. For Euro 5 this is an emission saving in the centre of Utrecht per trip of 3,6 g of NOx, 0,02 g of PM and 1784 g of CO2. For this calculation, values of the Dutch ministry for heavy vans were used.

Transport: Freight movements (indicator 4)

In the MIMOSA evaluation it was assumed that 5 roll containers could be transported by a van. On a weekly base around 150 roll containers are transported, making a number of 30 trips by van being saved weekly and 1560 trips by van yearly. The beer boat makes yearly on average 260 trips. In general the amount of traffic increased as a result of the better economic situation and a severe construction works in the zone around the Utrecht Central train station.

Economy: Capital costs, operational costs and revenues (indicators 5, 6 and 7)

In the recent years no capital costs were made for the beer boat. The first costs of this type can be expected when the batteries need to be replaced. The forecast is that this will happen around 2019/2020. The amount of this cost will be around 17 to 20 thousand Euros. When the concept will be extended with pubs and restaurants along the street of course extra capital costs need to be made for a zero emission vehicle to deliver the pubs and restaurants away from the canal. There no concrete plans for this extension right now.

The operational costs of the beer boat are similar as during the MIMOSA period: around 60,000 euro per year. Also the average revenues per year are identical, around 90,000 euro a year. The amount that the vessel was rented grew, so the price per hour could decrease to stay cost neutral.

Based on the values above it is possible to calculate a CBA for the beer boat concept. However, the uncertainty in the values and the large amount of assumptions in the previous CBA give a re-calculation of this CBA a high degree of false security. Therefore, there has been decided not to do this exercise again.

The MIMOSA CBA showed a positive NPV for the concept, even in the low situation. When using the 2016 status and values in the previous CBA the outcomes are similar as the low scenario of the MIMOSA CBA.

5.4 Bologna

5.4.1 Measure description

In 2006 Bologna was the first city in Italy to implement a road pricing policy within its Limited Traffic Zone (LTZ), based on an intelligent transport system (ITS).The LTZ is a large central area where every day, between 7am to 8pm, the circulation of vehicles has been restricted. SIRIO, the electronic traffic ‘policeman’, controls entrance into the LTZ by using video cameras. SIRIO is made up of loop detectors linked to the Municipality police control station. A photo is taken of each vehicle as it enters in order to report its licence plate number. The number is matched with a list of authorized vehicles. All non-authorized vehicles are issued with a fine.

By introducing this measure, Bologna wanted to redefine and update its current road pricing policy in response to traffic indicators and to allow more flexible access control. In particular, Bologna Municipality carried out a study to develop an IT system that would identify and distinguish vehicles according to different parameters such as vehicle models, size and emissions. This study and the road pricing system it inspired, are innovative actions in Europe's urban transport arena. A revision of the system has finalised the strategy as part of the city's urban traffic master plan. The system focused on the external costs of journeys made with private cars and accordingly makes access control more flexible.

To date, access to the Limited Traffic Zone has largely been based on an authorisation process that grants access to public transport operators, residents and freight deliveries. To make the system more flexible, the road pricing scheme also enables occasional users to enter the LTZ by paying an access toll.

In addition, the measure aimed at completing a semi-pedestrian area within the Limited Traffic Zone (in the University district) in order to demonstrate the impact of road pricing policy on people's behaviour and environmental awareness. This part of the Measure included an urban circulation study, evaluation of road closures and the introduction of video cameras.

The Municipality of Bologna completed its actions to raise social acceptance of road pricing and traffic limitation measures through public events, conferences and the media. A training course on the new software was organised for users and new operators.

5.4.2 Summary of evaluation results during CIVITAS MIMOSA (2008 – 2012)

Several key results came out from the impact evaluation. First, all pollutants (CO, CO2, NOX and levels of particulate) decreased comparing data from before and after implementation, due to reduced access to the Limited Traffic Zone. Secondly, the number of accesses to the LTZ remained stable comparing the results of the studies conducted before and after the measure. Considering that the LTZ was set up in 2006, several policies regarding environmental issues and mobility needs have been applied prior the measure and the stable results can be interpreted as the achievement of a ceiling (the numbers were already reduced so far that there no further reduction was possible). Thirdly, a significant reduction in vehicular access within the semi-pedestrian area was observed, 69% between 2006 and 2012. Finally, an excellent level of awareness of public road pricing policies was confirmed from the two surveys - most people know the Municipality's most important road pricing policies well.

Indeed, road pricing systems are a sensitive issue not among citizens which often consider private cars as the most convenient transport mode for shopping. For this reason, the shop owners are reluctant to accept the LTZ enforcement that they considered as a threat to their businesses in the city centre in favour of shopping centres providing convenient parking lots in the surrounding of the city centre. This has long been a barrier to the implementation.

One of the most important drivers of this measure was the political support. After a year and a half of lack of political leadership, the City of Bologna has had a new mayor and a new Mobility City Councillor since May 2011. Since their arrival they have shown great interest in sustainable

mobility issues. It has therefore been possible to tackle the difficulties and barriers encountered with more efficacies.

Two main recommendations can be made for cities which would implement similar interventions. First, it is recommended to be aware of the potential challenges which can result from the implementation of public policies affecting directly current individual behaviours. Therefore, widespread information campaigns must be planned prior to and during the measure to highlight and strengthen the coherence between political commitments and public administration activities. Such campaigns contribute to encourage debates with all stakeholders in order to continuously adapt policies and reach appropriate long-term context oriented solutions. A second recommendation concerns the highly controversial discussion regarding LTZ areas in city centre. To avoid conflict escalation it is recommended to encourage debate and dialog among citizens, shop owners and the municipality.

The results of the evaluation underlined the success of the implementation of the new road pricing policies. The communication campaigns contributed to increase citizens' acceptance for LTZ area. The "T-days", in which the LTZ has been closed to all traffic except for pedestrians and bicycles, has become a particular successful event since advantages of these "protective areas" were visible to all stakeholders. This event will continue in the future along with further considerations to implement other pedestrian zones in the city.

5.4.3 Summary of long-term evaluation results (2016)

The data for all indicators and a summary of the impacts are presented in Tables 17-23.

The main results from the long-term evaluation of the measure can be summarised as follows:

1. *Significant pollution reduction in the city centre:*
    - between 2003 and 2016, - 64% of CO emissions have been calculated (-20% compared to the end of the Project);
    - between 2003 and 2016, -40% of CO2 emissions have been calculated (-19% compared to the end of the Project);
    - between 2003 and 2016, -36% of particulate emissions have been calculated (-13% compared to the end of the Project).

1. *Reduction in number of accesses into the LTZ area*: between SIRIO implementation and 2016 a decrease of 40% of private vehicles' daily entrances has been recorded (-14% compared to the end of Mimosa). It entails also a significant reduction of flows into the "pedestrian area", where during an average working day, the flows drop of -65% (-7% compared to results achieved at the end of the project).

2. *Citizens' general agreement on mobility policies implemented by the Municipality*: the survey returned similar results compared to Mimosa's investigation. The results coming from the new survey showed that more than 54% of the respondents approve administration' choices, which indicates that mobility improved or remain good.

3. *The long-term evaluation has shown that highest results can be achieved years later*: Thanks to the Mimosa project, Municipality's employees developed their expertise in sustainable mobility solutions and the positive impacts can be noticed over the years.

ENVIRONMENT: Indicators 1-4 (Emissions)

Indicators 1-4		Baseline 2007	After 2012	LTE 2016	Comments
CO_2 emissions (kg/day)	**Real**	16,15	14,26	11,49	Emissions of pollutants have decreased after the end of the project and the trend continued in 2016.
	BaU	16,23	16,23	16,23	
CO emissions	**Real**	290,5	235,3	189,1	
	BaU	257,4	257,4	257,4	
NOx emissions	**Real**	32,65	27,87	23,47	
	BaU	31,72	31,72	31,72	
PM 2.5 emissions	**Real**	1,815	1,611	1,428	
	BaU	1,833	1,833	1,833	
PM 10 emissions	**Real**	2,484	2,209	1,883	
	BaU	2,514	2,514	2,514	

Table 17: Measure BOL3.1: Road Pricing Policies –Indicator results

TRANSPORT: Indicator 5

Indicator 5: Number of crossings into the LTZ (Average weekday in February)					
Period	**pre Mimosa** baseline 2007	**BAU** (average 2006-2007)	**Mimosa** 2012	**Post Mimosa** 2016	**Comments**
From 7:00 to 20:00	38.860	39.374	35.156	31.008	Stable, albeit not a substantial decrease during the last year of the project. This trend has continued in the long term, despite the introduction of a ticket since 2012 allowing unauthorised vehicles to access the city centre.
All day	51.171	52.033	45.883	39.353	

Table 18: Measure BOL3.1: Road Pricing Policies –Indicator results

TRANSPORT: Indicator 9

Indicator 9: Number of crossings into the University area (average working day)			
Pre Mimosa (2006)	**Mimosa last year** (2013)	**Present situation** (2015)	**Comments**
3.700	1.405	1.312	A significant decrease in the number of cars has been observed after the measure implementation, which has also continued in the long term.

Table 19: Measure BOL3.1: Road Pricing Policies –Indicator results

SOCIETY: Indicators 6-7-8

DISCLAIMER: In order to introduce and modify road pricing policies, the Municipality of Bologna took particular care to involve residents and gather their opinions. Surveys were therefore conducted to gather information on residents' degree of awareness (indicator 6), of acceptance (indicator 7) and the perception of city centre accessibility (indicator 8) in order to inform further Municipality decisions and policies. After the Mimosa project was implemented, the Municipality did not think it was necessary to ask residents the same questions in order to evaluate their degree of awareness, acceptance and perception of accessibilities regarding topics that have become part of their life and habits. Society indicators were therefore measured using different questions to show residents' awareness, acceptance and accessibility of road pricing policies implemented by the Municipality of Bologna. Therefore, surveys were changed, and no direct comparison of before/after data was statistically possible.

Indicator 6: Awareness of road pricing policies	Answer	2011 Total	2016 Total	% change between 2016 - 2011	Comments
6.1 Mimosa - "Did you know that the Municipality recently modified traffic access to the city centre?"	Yes	82,40%	100%	17,60%	Results show an increase in the awareness of citizens, which is a result of the efforts put by the Municipality into advertising and information campaigns.
6.1 Capital - "Do you know the Municipality recently added five new cameras to check traffic access into the city centre and the introduction of a payment daily ticket?"	No	17,50%	0%	-17,50%	This question represents a modification to the original survey. The survey conducted during MIMOSA asked citizens if they "have heard of SIRIO, the electronic traffic system controlling access to the city centre". Since the implementation of SIRIO in 2005, repeating the same question was considered irrelevant. The new question explores in a better way the current awareness of citizens and their interest in the new adjustment to the measure implemented by the Municipality, i.e. the placement of five new security cameras at the end of 2015, which provide control over every gate in the historical centre.
	No answer	0,10%	0%	-0,10%	

Indicator 6: Awareness of road pricing policies	Answer	2011 Total	2016 Total	% change between 2016 - 2011	
6.2 - Where did you hear about it? (more than one answer is possible, the most frequent answers are reported)	Newspapers	33%	36%	3%	The importance of communication channels other than 'personal experience' has increased since 2011. Results suggest the right mix of communication tools.
	Personal experience	18%	9%	-9%	
	TV-radio	16%	21%	5%	
	Road signs	13%	9%	-4%	
	From other people	13%	16%	4%	
	Brochures and leaflets	7%	6%	-2%	

Table 20: Measure BOL3.1: Road Pricing Policies –Indicator results

Indicator 7: Current acceptance of the measure restrictions (baseline)	Answer	Survey Pre Mimosa 2005	Survey 2016	% change 2016 - pre Mimosa	Comments
7.1 - Opinion of possible disadvantages of SIRIO	reduction in customers	22,0%	9,2%	-12,8%	Most of the concerns seem to have subsided in 2016
	risk of shop closures	15,7%	8,4%	-7,3%	
	residents leaving the city centre	11,9%	12,2%	0,3%	
	city centre isolation and deterioration	13,4%	18,5%	5,1%	
	reduction in safety in the historic centre	10,9%	0,0%	-10,9%	
	more difficulty reaching the historic centre	26,1%	21,1%	-5,0%	
	no answer	0,00%	30,6%	30,6%	
7.2 - Opinion of possible advantages of SIRIO	possible reduction in air pollution	13,44%	24,40%	11%	The percentage of people approving the introduction of SIRIO remains high, although it is lower than in 2005. In 2005, before the beginning of the measure, citizens had high expectations of it. In 2016, when the measure resulted in some mobility restrictions, some citizens changed their attitude and were no longer so favourable of it.
	possible reduction in noise pollution	14,88%	9,20%	-6%	
	reduction in historic centre traffic	16,49%	18,90%	2%	
	making the city a better place to live	14,61%	15,50%	1%	
	better LPT and taxi speed and efficacy	14%	8,20%	-6%	

	more parking – for residents and people with access permits	12,80%	4,50%	-8%	
	more pleasurable shopping	13,58%	4,30%	-9%	
	no answer	0,00%	15,00%	15%	
7.3 – Do you agree with the introduction of SIRIO?	Yes (*)	77,80%	62%	-16%	
	No	22,20%	55%	33%	
Indicator 7: Current acceptance of the measure restrictions (after MIMOSA)	**Answer**	**Survey After Mimosa**	**2016 survey**	**% change 2016 - after Mimosa**	**Comments**
7 During the last 12 months, the quality of life in Bologna:	Improved	3,2%	8%	5%	The perception of quality of life in 2016 remains as high as that at the end of MIMOSA. The negative answers have been attributed to influences originating from the financial and economic situation, health issues, work conditions and are not linked to any mobility problems. Note: the baseline and after results are not comparable as the two surveys contained different questions.
	Remained good	51,6%	46%	-6%	
	Remained negative	6,1%	7%	1%	
	Got worse	36,5%	36%	0%	
	Don't know	2,3%	3%	1%	
	No answer	0,3%	0%	0%	

Table 21: Measure BOL3.1: Road Pricing Policies –Indicator results

Indicator 8: Perception of the physical accessibility of the LTZ area (Baseline Survey) Indicator	Answer	Total Before Mimosa	Total 2016	Differences 2016 - Before Mimosa	Comments
8 before - Which public action should the Municipality of Bologna take to facilitate access to the city centre following the introduction of SIRIO? (3 possible answers)	more parking outside the city centre (and PT connections)	26,32%	33,4%	7%	The lack of parking, as in other big historical Italian cities, is confirmed as the most important mobility problem. However, simply increasing parking availability cannot be a sustainable solution. The Municipality should therefore continue to strengthen other areas such as provision of PT services, park and ride services in the suburbs and access to information about mobility services.
	more PT services	29,80%	14,0%	-16%	
	bus ticket discounts for the city centre	28,45%	27,6%	-1%	
	city centre access for methane and cleaner vehicles	6,23%	12,3%	6%	
	more city centre permits	2,75%	6,9%	4%	
	None	0,73%	1,9%	1%	
	Other	2,44%	1,1%	-1%	
	Don’t know	3,27%	2,8%	0%	

Table 22: Measure BOL3.1: Road Pricing Policies –Indicator results

Indicator 8: Perception of the physical accessibility of the LTZ area **(After results survey)** **Indicator**	**Answer**	**After Mimosa**	**2016**	**% change 2016 - After Mimosa**	**Comments**
8 after - What are the most important mobility problems (2 possible answers, the most frequent have been reported)	Lack of parking	24,60%	26,96%	2,4%	Compared to data collected during the MIMOSA project, there has been an increase in perception that cycling is dangerous (unsafe) as well as a reduction in the perceived levels of pollutants and noise. The lack of parking continues to be the most important mobility problem following the introduction of the measure.
	Environmental and noise emissions	28,61%	21,67%	-6,9%	
	Traffic density	17,94%	18,00%	0,1%	
	Bike riding is dangerous	13,93%	23,29%	9,4%	
	No critical situations	10,67%	2,54%	-8,1%	
	Non-regulated parking	3,56%	4,38%	0,8%	
	Don’t know/No answer	0,68%	3,18%	2,5%	

Table 23: Measure BOL3.1: Road Pricing Policies –Indicator results

6 Assessment of the long-term evaluation process

6.1 Donostia San Sebastian

The same evaluation approach as in the ARCHIMEDES project has been used for the long-term evaluation of PT measures in Donostia – San Sebastián. In most cases, the same indicators have been collected and compared against both the baseline situation (before ARCHIMEDES) and the situation right after the project.

The long-term evaluation (LTE) provided by CIVITAS CAPITAL has been a very straightforward process due to the experience gained during the ARCHIMEDES project, whose evaluation approach was regarded as very clear and sound; combined with the fact that there have not been major changes in the technical staff from DBUS, whose evaluation skills have been maintained and improved after the finalisation of the project. Also, for the LTE, DBUS has counted with the support from the same consulting team that helped in evaluation matters during ARCHIMEDES.

The process has also benefitted from the monitoring and evaluation practise consolidated during the ARCHIMEDES both within the Municipality and DBUS. In particular, the following information sources and data collection methods used within ARCHIMEDES have become standard practice and are continued after the finalisation of the project:

- FINANCIAL RECORDS: data collection from DBUS financial records regarding investments and yearly fares revenue, as well as operation (personnel and fuel) and maintenance (workshop and materials) costs
- PERFORMANCE RECORDS: the AVL (Automatic Vehicle Location) system produces records on the nº users and other operational characteristics used for the evaluation, such as punctuality, travel times and speed.
- USERS SATISFACTIOIN SURVEY: a yearly on-board survey is conducted among the users of public transport, complemented by a continuous web based survey throughout the year, in order to gauge the overall user's satisfaction with DBUS services, and the perceived quality regarding relevant aspects of PT provision, such as the feeling of security, information provision, etc.
- INFORMATION PROVISION: The travel information system regularly registers the number of information requests made through the web site or via SMS, and the requests that have been answered correctly to the customer.
- TRAFFIC LEVELS: monitored by the municipality through regular counting campaigns

Nevertheless, there are other evaluation activities that were solely undertook for the purposes of the CIVITAS CAPITAL long-term evaluation, that would have otherwise not been made, since they do not form part of the regular monitoring and evaluation practice:

- PROJECT SPECIFIC SURVEY: within ARCHIMEDES a project specific survey was conducted among public transport users of lines 5 and 28. Particularly 1,500 users of these lines (corresponding to 12% of its users) were surveyed regarding their perception of the different improvements implemented by DBUS. The survey also interrogated users about the former mode of transport they used for their trips, if different from the bus. As well as the reasons modal shift. The survey has now been repeated in 2015 (with 2013 and 2014 figures interpolated).

- ENVIRONMENTAL EFFECTS: within ARCHIMEDES, a traffic model was used for the evaluation of environmental effects. Unfortunately, this modelling practice was not continued and an alternative approach has been used within this long term evaluation (as described in 4.2.2.)

As a conclusion, the easy availability of data regarding most of the indicators used for the LTE (which are monitored by DBUS on a yearly basis) can be regarded as the key factor favouring an easy long-term assessment. While the availability of CIVITAS CAPITAL funds has contributed to an even sounder LTE, allowing to cover all expected impacts and making the full comparability possible.

On the other hand, the use of expensive and complicated evaluation approaches (e.g. modelling tools), difficult to sustain over time, can be highlighted as the only difficulty encountered during the LTE.

As for the timing, according to DBUS practise, it is recommended that a range of key performance indicators are monitored and used for a basic assessment of measures on a yearly basis. While a 4-5-year period is considered an optimal timeframe for an in-depth re-assessment of measures, capable to identify long-term impacts and trends.

6.2 Funchal

6.2.1 Appraisal of the evaluation approach

Evaluation is a learning process in which sometimes the evaluator needs to redefine its strategy so as to follow recent trends of the measure related to the subject of investigation. This was the reason why it was necessary to cancel the indicator that measured «acceptance level» which was under the society umbrella and that was considered in the shortly-after assessment report and replace it by another one that fits into the transport umbrella and it is the «PT commercial speed of the Green Line». Both provide indications about the attractiveness of the new public transport system introduced by the Green Line.

As said before, because evaluation is not only a one-time exercise, and is rather a progressive process, also the specific objectives of the measure had to be redefined either because they were too ambiguous or vague or because they just were too ambitious. Thereby some of the objectives were not fully accomplished due to emerging deviations from the original working plan. For example, the local evaluation team has sought to prepare a full-scale environmental assessment, but due to the failure in purchasing hybrid/electric busses, it was found necessary to downsize the impact of the Green Line strategy. The hybrid buses could have led this measure to achieve even more meaningful results in terms of service quality (regarding to satisfaction with buses emissions) and emissions savings.

Other important deviation relies on the negative feedback from the resident population. When this feedback arose, the implementation shifted and a 3rd phase began. This event threatened the evaluation time plan and created some misjudgments when we look into some indicators chosen (e.g. the perceived quality of the service decreased when measure started).

As for the data gathering process, one can confirm that the local team has kept the routines of collecting specific data on a regular base, a key pre-requisite that enabled this long-run evaluation strategy. This is a priceless heritage of MIMOSA for the political and public agenda of mobility in Funchal. Most of the indicators sought followed the POINTER core indicators. There is however, some new city-specific indicators that were established during the MIMOSA lifetime and that were kept being collected and recorded. Such indicators are the number of hotels that adhered to the Tourist Kit, the number of spatial equipment/layout in target area bus stops, the number of wheelchairs transported or the number of accidents involving PT vehicles.

A wide range of methods to collect data and information were required to evaluate to which extend the Green Line measure was successful. The in-situ assessment campaign comprised the following evaluation methodologies: *i*) collection of the bus speed in the AVL system of the PT Operator; *ii*) surveys at bus stops; *iii*) counting vehicles and courtesy buses at specific spots along the catchment area; *iv*) collection of data of the PT Operator using the annual and official accountability reports of the company; *v*) collection of other data making specific queries to the company (such as the number of accidents in the designated area or the number of wheelchairs transported).

Looking in depth and with a critical view to the main methodologies chosen, the meaningful lessons taken out of the surveys data need special care. Surveys were conducted with care; however it has its flaws as well, as they rely on fairly irregular sample sizes. Therefore, none of the surveys collected has pretensions to be statistically representative because no statistically aleatory methods were chosen, leading to a decrease in accuracy of the results.

Unfortunately, the appraisal of the quality of the PT service is very limited due to different factors intervening in the quality assessment. The accurate description of a PT quality assessment would require that the same factors were the same repeatedly in all the questionnaires. This however was not technically possible.

Nevertheless the surveys were important to get an insight perspective over the global situation and this routine of surveying citizens and asking their opinion about mobility-wise measures was important for local practitioners and politicians start handling real data instead of relying solely on educated guesses that was previously the mainstream approach to problems.

Counting activities comprehended an on-street campaign to count vehicles. It's important to consider that the counting spots covered only a limited area within this measure's catchment zone, so results must be considered as approximately. Nonetheless, one could conclude that the increased traffic in the target area is one of the bottlenecks that local authorities will have to deal with to curb the entrance a high volume of vehicles in historical places. It was found that the type of vehicles has changed, with an increased number of motorcycles and a decreased number of trucks and other heavy vehicles. This result is important and addresses the goal of recent interventions in the area whose purpose was to make the zone more bicycle and walking-friendly.

All the described monitoring activity was a step that began with this project and is nowadays a standard pattern to support decision-making processes. So, and to sum it up, thanks to CIVITAS-

MIMOSA, technical implementations were tested and baselines were fixed and these now stand as a reference for further projects.

6.2.2 Some thoughts about long-term evaluation

Among the variables that ease the data collection processes related to the Green Line, one has to mention that the research on which this report is based on was conducted by the site leader during the CIVITAS-MIMOSA project (also responsible for all evaluation matters in the package of measures that Funchal has undertaken) and by his project assistant. Both of them work in the planning and studies department of Horários do Funchal, which is the public transport operator in the city of Funchal that implemented the Green Line, so they are acquainted with evaluation methodologies and techniques.

One of the most striking achievements that this report has come up with refers to behavioural changes that often, as we know, are not immediate. Hence, whenever the target is to measure behavioural changes, it is wise to conduct long-term impact assessments, as results are likely to evolve over time and shortly-after results can be misleading. This longitudinal work evaluated the long-term effects and provides sound empirical evidences that evaluating a measure 8 years after first implementing it (and 3 years after all the implementation works have come to an end) seems to be reasonable to identify meaningful variations especially concerning cultural and attitudinal issues. Keeping this idea in mind, one could advise the importance of assigning proper financial resources prior to the start of a mobility project that can cover all the expenses required to perform a series of long-term analysis, including the maintenance of data sharing collaborations and continuous and regular data collection processes. In fact, establishing regular and repeated surveys and counting campaigns over a period of time after the completion of a measure could be mandatory in future CIVITAS projects and a precondition to access to EU funding. This underlying principle is a structural change, but it is instrumental for the future achievement of new and revised outputs and outcomes.

The establishment of how long after the project has finished should a long-term evaluation be conducted depends on some key factors, such as the scope of the measure or the extent to which follow-up activities took place. This reflection is important to define new action lines for the future of EU funded projects and the role that long-term evaluation plays in the transfer of knowledge and experiences throughout Europe and beyond.

6.3 Bologna

6.3.1 Process evaluation

Process evaluation has to be based on real data and be as much objective as possible. Mimosa project had selected a comprehensive evaluation approach, focusing on several indicators related to environment, transport and society, able to provide a general representation of the city in all its aspects. These indicators were measured differently, and retrieving data from different sources. The most important indicator to be monitored is the number of crossings of the Controlled Traffic Zones, inasmuch the first goal of the measure. The number of entrances in the Controlled Traffic

Zone represent the key data: the trend of incoming vehicles shows a considerable decrease and means that the measures taken have been effective and their goals have been achieved. In the past 13 years, the incoming flow of private vehicles has almost halved, passing from 66.348 (2003) daily entrances to 39.353 (2016).

The Measure was supported by many drivers and was successful. Overall, the Municipality's efforts to improve the quality of mobility all around the city should be acknowledged: after the closing of the EU Project, the Administration did not want all that work to go to waste and continued to follow the best practices received from Mimosa. In this way, urban mobility improved, the solutions for sustainable mobility continued to be effective (such as the Mobility Management, the car pooling or the automatic-centralized control of the traffic lights) and, over years, a decrease in the general congestion could be noted, also by citizens.

The Measure needed a strong political support, especially in the first phase of implementation, when restrictions of mobility may be not completely accepted and the citizens' resistance to these changes may compromise the success of the Project. In Bologna, this happened at the beginning of the implementation of Mimosa, when there was no political leadership. Only in 2011, the City had a new mayor and a new Mobility City Councillor, who committed to the Mimosa project. Two years without a political head were absolutely complicated in terms of choice of the mobility actions to be carried out and planning/budgeting of economical aids for this actions.

After 2011, no further political changes occurred and mobility could be carefully planned. It would be interesting to understand how political replacement could influence the measure when it is already underway. On 5th June 2016, there was the election of the new mayor, but it is too soon to know if any change is going to occur.

Another relevant driver for the sustainable mobility is the Municipality's constant involvement in several European Projects, thanks to which it is possible to promote the research and development of new technologies that support mobility through raising the citizens' awareness about road safety, improvement of public transport and green solutions. The opportunities offered by different ranges of programs and funding initiatives contribute to support local authority's strategies in terms of mobility, enhancing already planned activities or promoting innovative actions.

The last but absolutely not the least driver for the mobility policies is communication and dissemination. Municipality is particularly focused on activities aimed at sharing with citizens the objectives and the results achieved. Once a year, the *European mobility week* takes place in the city. It is a project that was born to make citizens commit to mobility problems and to promote sustainable behaviour in the field of urban mobility.

6.3.2 Assessment of long term evaluation

The long-term evaluation requires an approach to be comparable with the previous one, chosen for Mimosa evaluation. It means that the indicators and methodologies adopted have to be as close as possible to the previous ones in order to allow the comparison between historical and new data. Generally, long-term evaluation could imply problems due to:

- impossibility to collect data comparable with Mimosa's ones and/or impossibility to adopt the same methodologies to collect them;

- implementation of new measures and tools which may overlap with the measure at issue: the outcomes benefits are highly affected by this boundary solutions and it is not possible to separate results coming only from the measure analysed.
- change of the political head of the city: the new political leader could be not interested in replicating analysis on the measures implemented by another administration;

The evaluation chosen for Mimosa was designed to be meaningful and, at the same time, conceived to allow easy future replications. However, a new evaluation can be carried out only if the new Public Administration agrees to provide data, although it is no longer involved in the project, as in our case. Thanks to the precious support of Bologna Municipality, the new process evaluation did not find any kind of difficulty: indicators could be easy recollected and they did not require any further assumption related to other measures or city policies.

This evaluation uses free data annually published by the Ministry of Transport (registered annual car fleet in Bologna) and daily vehicles' entrances recorded by SIRIO system (stored by Municipality). The survey is the only source of data with some elements which could raise methodological issues. Replicating the original surveys was not a problem. Nevertheless, the new survey should investigate a sample including more than 300 users in order to be highly representative of the general citizens' perception. Unfortunately, the budget allocated for the evaluation did not allow it. Secondly, subjective indicators coming from surveys or questionnaires are affected by the citizens' individual perception, which is not necessarily strongly connected to the measure and rather it is highly influenced by other social boundary conditions. Any measure has to investigate its degree of acceptability among citizens but, in the meantime, it is worth remembering that almost all the city users do not have enough knowledge in mobility's care to give significant feedback. Citizens' answers to mobility surveys on city's problems often focus on the same issues: traffic congestion and lack of parking nearby the city centre. Pollution and noise come only second. Certainly, lack of parking and congestion are the most common and ordinary problems of citizens' everyday life. The most important aspects concerning health and quality of life (noise and pollution) seem to be more neglected than the first ones. This simple instance shows how sometimes Public Administrations have to focus on essential measures which could improve the quality of life, even if they are not felt as the most urgent by citizens. Moreover, problems underlined by citizens' answers are often in conflict with each other and they cannot be all solved in the meantime.

A short-term evaluation has to investigate the level of acceptance inasmuch as it helps to understand how public administration supports the measure with essential activities of dissemination and presentation to citizens of the goal achieved. On the contrary, in long-term evaluation, acceptance is more conditioned by all socio-civic elements behind the measure and it is very difficult to understand the how much they can affect the citizens' response. Any measure evaluation is affected by all the elements which influence society and the citizens' way of living. The more time passes from the first implementation of a measure, the more such elements become crucial in how the measure is welcomed by the citizens. Over time, citizens tend to forget the situation before the implementation of the measure and their feedback is more influenced by all the external elements. Furthermore, the economic conditions highly affect citizens' perception of a measure. It is quite complicated to evaluate how much economic situation influence the feedback of a single measure. It is the greater external element likely to significantly affect any

mobility measure, since it defines the spending capacity of citizens and, in the meantime, involves their mobility requirements. Moreover, the economic situation affects public offers and related investments in sustainable mobility and in public transports. According to all these elements, long-term evaluation could not be too much far from the previous one (Mimosa) because there is the risk to evaluate the same measure in two completely different social scenarios. In order to analyse exclusively results coming from the measure investigated, the evaluation has to be replicated only where social contest does not change significantly (public transport offer, city booming or the opposite) and it has to be carried out not too long after the end of the measure: it is reasonable to assume 4-5 years as timeline for the analysis.

6.4 Utrecht

6.4.1 Measure UTR 5.1: Road Safety label

The long-term evaluation was as much as possible based on the original methodology that was used during MIMOSA. However, some changes had to be made, caused by a lack of data availability and given resources. The financial resources for the long-term evaluation were significantly lower than for the original evaluation. Therefore, reasonable decisions in the approach had to be made. In addition, not all the indicators were as relevant for the measure evaluation as originally thought. For example: a very obvious indicator is the change in modal split of home-school trips. It is logical to assume that stimulating measures for alternative modes (walking/cycling) will have a positive impact on the modal split for those modes. Numerous studies have already shown this and this measure was no exception. However, it is impossible to isolate one intervention from a whole series of actions to determine the contribution in the change of modal split by one particular measure. Mobility science is no medical science, events cannot be measured in a cetirus paribus situation. Therefore, modal split was not measured again, but taken from a very recent study around similar interventions in Utrecht.

The measurements of the school participation could easily be taken from the cities' database of school participation in the label. That showed quite an accurate figure, although one school can have more locations and therefor the total number of schools may differ a bit. We concluded that there are around 100 primary school locations in Utrecht, which is a very good estimate. From the database it could also be concluded how long it took schools to obtain the road safety label, based on their initial subscription and the date of obtaining the label.

Satisfaction levels could not be measured in the long-term evaluation for budgetary reasons and because some of the original analyses were based on a city-wide citizens monitor that was not performed during the long-term evaluation.

After all, the long-term evaluation of this measure was quite feasible and well-timed. It provides Utrecht and potential follower cities necessary information about involvement of schools in a longer term; it is challenging to motivate them in the first place, but it is more difficult to keep them on board afterwards. All in all the conclusion is that a focus on safe and sustainable mobility of primary schools needs continuous efforts and provide a fertile ground for future sustainable mobility behaviour. The LTE is perhaps more valuable when looking at the processes (why have changes occurred) rather than the actual impacts.

6.4.2 Measure UTR 7.3: Flexible Access for Cleaner Freight Traffic

The long-term evaluation of this measure could not be based on the original methodology that was used during MIMOSA, mainly because Cargohopper disappeared in Utrecht. Therefore, it was decided to provide a chronology of occurrences since the end of MIMOSA, based on interviews with representatives from the city of Utrecht and TransMission. All in all this has led to a satisfactory overview of the current situation, including a description why.

After all, the long-term evaluation of this measure was quite feasible and well-timed, although it took quite some time to get in contact with the right contact persons. It provides Utrecht and potential follower cities necessary information about involvement of the logistical sector in a longer term; you need long-term cooperation, transparent regulation to enable a level playing field and finally you need to look at innovations from a budgetary perspective . Like the other LTE analyses that have been made, looking at the process of a measure was more relevant than focussing on the actual impacts.

6.4.3 Measure UTR 7.2: City distribution by boat

The long-term evaluation was as much as possible based on the original methodology that was used during MIMOSA. Also the assumption that were made and described in the MERT of this measure have been used in this long-term evaluation. However, some changes had to be made, caused by a lack of data availability and given resources. The financial resources for the long-term evaluation were significantly lower than for the original evaluation.

Most important to know was what has happened in the recent years and how operations evolved. Also the decisions that need to be made in the near future about the ownership and upscaling of the concept are important to know. This information has become available in a number of interviews and a study of reports on the beer boat. The exact values of the operations differ per interview and per report but all are in the same order of magnitude.

The calculations of the emissions and the freight movements avoided were based on the amount of goods that were transported by the beer boat into the city centre of Utrecht. That amount increased slightly, as well as the amount of deliveries.

It was unfortunately not possible to receive detailed and publishable data from the municipality about the freight movements by road transport in the city. There is a general trend that more freight vehicles entered the city centre the last decade but this is also a result of huge construction works near the Utrecht Central train station.

Regarding the costs, no detailed information has been received from the port department. The calculations are based on calculations on the statement that the costs and revenues were similar as during the MIMOSA period.

After all, the long-term evaluation of this measure was quite feasible and well-timed. It provides Utrecht and potential follower cities necessary information about the beer boat a few years later after the pilot. It proves that when the concept is good, it can also flourish despite that there are

no longer subsidies available and the initial attention floats away after the MIMOSA project terminated.

7 Conclusions

The impacts measured by the long-term evaluations summarised in the table below are mainly positive, resulting in significant benefits to cities in the form of better air quality, less carbon emissions and better health and quality of life.

Measure	Summary of impact
High quality public transport corridors in San Sebastian (Measure 16)	The positive impacts have been maintained and even improved after the end of the demo project
Business district shuttle bus in San Sebastian (Measure 17)	Measure benefits continued after the completion of the demo project
Bus traveller information in San Sebastian (Measure 73)	Measure benefits continued after the completion of the demo project
Green PT Line (FUN2.1)	The positive impacts have been maintained and even improved after the end of the demo project
Road Pricing Policies (BOL3.1)	The positive impacts have been maintained and even improved after the end of the demo project
Utrecht road safety label (UTR5.1)	Long-term evaluation results inconclusive due to limitations in data collection and impossibility to replicate the methodology for all indicators
City distribution by boat (beer boat) (UTR7.2)	Long-term evaluation results inconclusive due to limitations in data collection and impossibility to replicate the methodology for all indicators
More flexible access for cleaner freight traffic (Cargohopper) (UTR7.3)	An impact evaluation has not been conducted because the Cargohopper was discontinued

Table 24: Summary of impact evaluations

The measure leaders provided, along with the long-term evaluation of the impact of their measures, an assessment of the process of setting up and carrying out the long-term evaluation

process. The difficulties which they reported back were mainly related to the willingness and readiness of the organisations involved in the pilot projects to participate in the long-term evaluation. Other political influences and/or instabilities were also mentioned.

The measure leaders were also asked to provide feedback on the problems associated with replicating the methodology employed in the long-term evaluation. More specifically, they were requested to provide more detailed information on how the methodology was replicated and which information sources and data collection methods were employed.

The main problems associated with replicating the methodology were as follows:

- The impossibility of collecting data comparable with the data collected in the pilot project and/or the impossibility of adopting the same methodologies employed in the pilot project to collect the data;
- The implementation of new measures and tools which may overlap and/or intervene with the measure under evaluation. The outcomes and benefits may be highly affected by these new measures and it is not possible to separate results coming only from the measure analysed.
- Change of political power in the city. The new political leader may not be interested in replicating the analyses on the measures implemented by another administration.

The ready availability of data regarding most of the indicators used for the LTE has been regarded as the key factor favouring an easy long-term assessment. Collecting data on a regular basis is therefore crucial. Participating cities recommended that a range of key performance indicators are monitored and used for a basic assessment of measures on a yearly basis. For an in-depth re-assessment of measures, a 4-5-year period is considered an optimal timeframe.

Participating cities were asked to provide their assessment of the optimal timeframe for conducting a long-term evaluation of a measure after the completion of the pilot project. Establishing how long after the pilot project a long-term evaluation should be conducted depends on some key factors such as the scope of the measure or the extent to which follow-up activities took place. The timeframe for conducting a long-term evaluation is important when defining new action lines for the future of EU-funded projects and the role that long-term evaluation plays in the transfer of knowledge and experiences throughout Europe and beyond. The timeframe of 4-5 years after the completion of the pilot project was considered optimal for conducting a long-term evaluation. It has been acknowledged that whenever the target is to measure behavioural changes, it is wise to conduct long-term impact assessments, as these changes are not immediate and results are likely to evolve over time. However, as time goes by, some negative issues in relation to re-establishing collaborations, data availability, political changes and other influences may occur and impede the long-term evaluation process.

The long-term evaluation is a costly exercise, especially if primary data has to be collected again through surveys or observations. The importance of assigning proper financial resources prior to the start of a mobility project was pointed out. Establishing regular and repeated surveys and counting campaigns over a period of time after the completion of a measure could be mandatory in future CIVITAS projects and a precondition for access to EU funding.

Last but not least, long-term evaluation has been described as a learning experience, the benefits of which are more valuable when looking at the processes and gaining an understanding of why changes have occurred, rather than focusing solely on the actual impacts. Such an approach however requires a degree of flexibility and an acceptance that some of the objectives need to be redefined. Sometimes the long-term evaluation cannot be fully accomplished due to deviations from the original working plan, as demonstrated by the examples of Funchal (failure to purchase hybrid/electric buses) and Utrecht (the decision to discontinue the Cargohopper), where the specific objectives of these two measure had to be redefined. Moreover, due to the nature of the evaluation process and the fact that the 'ceteris paribus' principle does not apply to mobility science, it is impossible to isolate one intervention from a whole series of actions to determine the contribution of one particular measure to, say, modal split. Therefore, the full benefits are unlikely to be achieved when the impacts of measures are assessed in isolation, and it may well be more sensible to consider and evaluate them as a wider package.

8 References

Dziekan, K., Riedel V., Müller S., Abraham M., Kettner S. and Daubitz S (2013) 'Evaluation matters - A practitioners' guide to sound evaluation for urban mobility measures', Waxmann Verlag GmbH, Münster.

TNO (2016): Effectmeting milieuzone personen- en bestelverkeer in Utrecht. Arjan Eijk & Marita Voogt, TNO 2016 R10230. Delft, 25 March 2016.

Utrecht (2013): Focus Measure Evaluation Results UTR 5.1 Road Safety Label. Patricia Stumpel-Vos, city of Utrecht, February 2013.

Utrecht (2013a): Measure Evaluation Results UTR 7.3 Flexible Access for Cleaner Freight Traffic. Patricia Stumpel-Vos, Geisje Hoetjes and Marijn Kik (City of Utrecht) and Justin Hogenberg (University of Twente), city of Utrecht, February 2013.

Utrecht Natuurlijk (2016): Eindrapportage Gezond op Pad: Lekker Lopen, Fijn Fietsen (in Dutch). Maarten van Deursen (Utrecht Natuurlijk) en Stefan van der Wal (SME Advies), 27 January 2016.