

CiViTAS
Cleaner and better transport in cities

MIMOSA

BOLOGNA • FUNCHAL • GDAŃSK • TALLINN • UTRECHT

Measure Evaluation Results Template

6.1. Eco Drive in Large Fleet

Claudio Mantero (Horários do Funchal)

André Freitas (Horários do Funchal)

Andreia Quintal (Horários do Funchal)



THE CIVITAS INITIATIVE
IS CO-FINANCED BY THE
EUROPEAN UNION

Final Version

February 2013

Executive Summary

Funchal's steep hills make driving around the city expensive in terms of financial and environmental costs. To minimise the negative impacts, Funchal decided to work towards fostering environmentally-conscious driving habits among drivers of the public transport fleet. The measure 'Eco Drive in Large Fleet' aimed at testing, modifying and carrying out eco driving training for bus drivers, drivers of the municipalities, taxi drivers and training school drivers. The data collection system Trafilog was installed on ten urban buses to show the fuel consumption and to provide location-based solutions through real-time GPS data of these vehicles. As a complementary module of the originally planned measure, Eco driving behaviours were also conveyed to the general public by organizing awareness raising campaigns. The objectives of the measure were to reduce fuel consumption and pollutant emission generated by the targeted vehicles and to raise acceptance of eco-driving behaviours among drivers.

The measure was implemented in the following stages:

Stage 1: Purchase of Trafilog system (Eco Drive monitoring system) (May 2010) The PT operator, Horários do Funchal (HF), equipped ten buses with Trafilog. This system provided tracking and monitoring tools and therefore contributed to cost savings of fleet operational costs.

Stage 2: First eco-Driving campaign (May 2010) The Municipality launched eco driving campaigns involving 180 City Council drivers as well as taxi drivers, bus drivers and training school drivers. The participants drove in a pre-established course using vehicles equipped with real-time monitoring equipment, capable of diagnosing the main intervention driving points.

Stage 3: Trafilog system validation and calibration (June 2010) Trafilog has a warning system that alerts when the driver executes wrong driving behaviour according to acceleration, braking, turns, over speeding. Due to the specific topography of Funchal, where narrow streets and tight turns are frequent, the Trafilog system needed to be calibrated to fit the conditions particular to Funchal streets.

Stage 4: Implementation of the driver's tutoring scheme (April 2011) HF organized weekly face-to-face tutoring for drivers showing them their performances (registered by the monitoring system) and giving tips to improve their driving behaviours. This tutoring took place over several weeks.

Stage 5: Implementation of additional eco-driving courses (February 2012) The Municipality organized additional training courses to 22 of its drivers to refresh learning skills gained two years before. The purpose of the workshop was to train "pioneer eco-drivers" to show good practice in Funchal's driving community.

The impact evaluation focussed on assessing the reduction of fuel consumption and the improvements achieved in driving skills among the participants of the eco-driving training, which have to be interpreted carefully. **Two key-results** came from the evaluation: Firstly, the module of eco-driving campaigns addressed to Municipality drivers contributed to reduce fuel consumption by 6% . Secondly, the tutoring scheme bundled with a tracking record of

drivers' performance showed that drivers consumed 3% less fuel and highlighted a progressive and positive trend toward eco-driving behaviours: 9% less sudden turning, 11% less over speed; 12% less severe breakings; and 13% less sharp accelerations. Consequently, the buses equipped with Trafilog software have contributed to a decrease of the emission levels of CO₂ equivalent by 2%.

From the process evaluation, **the main barrier** encountered was the failure of the monitoring system. Indeed, some monitoring instruments did not register any data which affected the reliability of the monitoring system. After further breakdowns the system was turned off. Therefore, the results have to be handled with care since they are not representative for the overall fleet of HF. **One of the main drivers** was the creation of a database gathering valuable information on each driver profile (in terms of accelerations, turning, breakings and compliance with speed limits) and the interest that drivers showed during the training period to receive feedback on their driving behaviours and the motivation of drivers to improve their driving behaviour.

One of the main recommendations to implement this measure is to keep in mind that the drivers as key-actors for improving economic efficiency of the PT fleet by adopting an eco-driving behaviour, should be continuously motivated to use their eco driving competences. Hence for an ongoing contribution to an enhancement of the PT system, rewarding actions or a regular feedback like the one provided by driver's trainers are suggested for the drivers. This can promote the common understanding that everybody has a role to support the economic efficiency and helps to internalize the new way of driving.

The measure was an innovative pilot project to encourage drivers to adopt an environmentally friendly driving behaviour. As one of the pioneer projects in data collection on drivers' behaviours, the process applied and results achieved provide a good basis for further development of such initiative. Even if the rate of participation to the several training activities did not reach the initial expectation (212 participants vs. 290 expected), the initiative to raise awareness on eco driving among drivers was a crucial step to overcome challenges of fuel consumption on Madeira Island. The efforts carried out by the PT operator and the Municipality demonstrated the willingness of decision-makers to search context-oriented solutions towards sustainable mobility. Changing behaviour is a matter of time and requires long-term commitment in a step-by-step process.

A Introduction

A1 Objectives

The measure objectives are:

(A) High level / longer term:

- Tackle the negative impacts of vehicle pollutant emissions on urban air quality;
- Increase economy efficiency of the urban transport system.

(B) Strategic level:

- Develop an efficient attitude among professional drivers in particular, and all drivers, more broadly.

(C) Measure level:

- (1) Study the eco-driving procedures best adapted to the specific topographic conditions of Funchal;
- (2) Improved fuel efficiency of vehicles;
- (3) Decrease vehicle emissions;
- (4) Increased eco-driving acceptance

A2 Description

Eco Driving has been recognized as one of the most promising solutions occurring in the urban environment by the recently published *Action Plan on Urban Mobility*. It would thus be important to establish in Funchal long-running eco-driving policies to have a broader understanding of the assets this activity can bring. In the scope of this measure, three modules were developed and can be distinguished according to its target audience:

PT drivers: The project development will be featured by the installation of Trafilog end unit in Horários do Funchal vehicles, followed by a monitoring period that will be an ongoing procedure and will include non-monetary incentives (or communication activities) to keep the drivers awareness high. This holistic approach of Eco Driving was tested, upgrading the training campaigns for professional drivers that already were running some months before CIVITAS to public transport drivers.

Municipality drivers: Amongst the professional drivers this measure, in liaison with Awareness Raising Campaigns Measure, intended to target not only bus drivers, but also Municipalities drivers, taxi drivers and driving school drivers. With a global number of 200 drivers, the Municipality of Funchal has huge fuel consumption and vehicles maintenance costs. In turn the fuel consumption contributes to the city's air pollution and noise levels. In Funchal Municipality, specific eco-driving training and consequent evaluation were never implemented before, although the drivers were advised on some aspects of this matter. These drivers are responsible for putting in motion a wide range of vehicles, ranging from secretarial matters (for which passenger vehicles are used) to garbage service (which make use of heavy trucks).

Measure title: **Eco Drive in Large Fleet**

City: **Funchal**

Project: **CIVITAS-MIMOSA**

Measure number: **FUN 6.1.**

Citizens in general: Local authorities also felt the need to expand the eco driving procedures and techniques to the general population, fostering eco-driving workshops along the measure lifespan. This activity must be considered as a complementary action that was not directly assessed within the evaluation framework of this measure.

Overly, what sets this measure apart is that cutting-edge equipment was installed to evaluate the bus drivers' performance on eco-driving procedures and demonstrate the eco-driving added value. Moreover, the PT operator, in order to motivate the participation of drivers, developed a tutoring scheme to keep motivation levels high amongst experienced drivers and to value positive evolutions on eco-driving.

B Measure implementation

B1 Innovative aspects

The innovative aspects of the measure are:

- **Use of new technology, nationally** – The Trafilog system installed in Horários do Funchal buses is a sound technological innovation that can provide valuable information for decisions-makers European-wide. Horários do Funchal was the first national company seeking to optimize eco-driving techniques with this technology, following good examples of National Express in the UK, Arriva in the Netherlands and Denmark and Iveco in Israel where this system is originally from.

- **New conceptual approach, regionally** – This measure is essential to introduce, a range of eco driving habits in professional drivers through specific training. What sets this concept apart is its integrative scope, assembling a number of companies with large fleets together with the Municipality.

- **Targeting specific user groups, regionally** – Horários do Funchal has a specific statute of community college for drivers and want to organize a specific campaign for professional drivers and in a broad sense to develop a new sustainable attitude among drivers.

B2 Research and Technology Development

Context and Purpose

An Eco Driving project ideally targets the problem of reducing fuel consumption, by delivering a new concept and new incentives for self-organizing performance. In Funchal, research was taken forward to explore a broader and wider approach, including parameters not directly related with fuel consumption but essential in terms of road safety, passenger comfort and quality of service.

The gist of the project and the main ideas that led Horários do Funchal (HF) to propose a new and innovative Eco Driving training are based on two main pillars:

- *Continuity*: the project is build on previous experience accumulated, thus fitting perfectly in the mid-term project of Horários do Funchal, that committed itself with a forthcoming goal, that is, to be recognized by 2015 as a sustainable mobility company. To achieve this objective, the Company defined a strategy in which Eco driving is included, and occupies a special status.

- *Impact on regional framework*: transport accounts for 60% of the total energetic consumption in the Island, according to the Regional Energy Plan (2002). There are few heavy industries and Horários do Funchal plays a strategic role in the regional energy framework.

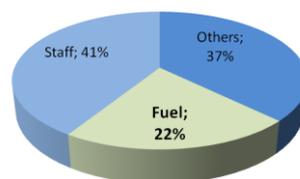
During the development phase of this measure, the most important document produced was a state-of-the art document which identifies best practices that are actually being carrying out throughout Europe to learn from cutting-edge projects in this field. This document was entitled Eco Drive in HF – State of the art and future development proposals (Eco-drive na HF – Estado da arte e propostas de desenvolvimento futuro). Another important document was the Evaluation of Eco Drive in HF and proposals of incentive schemes (Avaliação do eco drive dos motoristas e sistemas de incentivos), produced in March 2010 and was instrumental to discuss with the PT board one incentive matrix to facilitate driver’s performances that is socially and energetically worth telling and that effectively contributes for improving PT Operator performance.

So it is useful to summarize all the information collected to prepare the drivers tutoring scheme applied by Horários do Funchal which has helped to deliver ongoing messages to the drivers and to increase their motivation. Due to financial constraints, the PT Operator decided not to undertake an incentive structure with a monetary basis. Considering that the incentives are intangible, communication plays a key role, to clearly explain the mains topics of the project to the drivers, seeking to involve them in the core business of the Company and in its projects and initiatives.

Description of RTD Activity

Eco Driving procedures relate not only with fuel consumption, but also guarantee environmental savings, and passengers comfort and safety as well. The research undertaken to support the implementation has focused more on the economical part of the program, as it is easier to automatically develop tools to measure and grant monetary value to these aspects. In the campaigns developed within CIVITAS-MIMOSA, the remaining aspects will be considered as well.

Chart B.2.1: HF costs breakdown (2008)



Fuel actually represents a sound place in the overall cost structure of HF, accounting (in 2008) for 22% of the total annual costs of the Company, even though a decrease in the number of the overall kilometres have been made. It is fairly important to act accordingly and tackle this trend, introducing Eco Driving to cope with this problem, a measure that has to be followed by many others, such as reduction in the total number of Km, fleet renovation, development of efficient vehicles, and so on.

Chart B.2.2: HF main operational indicators

	2007	2008	Δ
Km (10 ⁶)	7.533	7.387	-2%
Fuel costs (10 ⁶ €)	4.011	4.773	19%
Custo/Km	0,53	0,65	21%
Fuel costs/overall costs of HF	19%	22%	16%

In a context where the fuel consumption rose 71% between 2002 and 2008 when CIVITAS was launched in Funchal, it is urgently trying to reach, at least, 6% reduction in consumption.

Back in 2004, an energy audit of Horários do Funchal highlighted Eco Driving as one of the major variables that could lead to 6% energy consumption reduction. These projections made known the roots of the problem and led Horários do Funchal to start investing in this field through specific training.

Horários do Funchal has been steering training to its drivers since 2008, when it delivered a programme of 420 hours targeting all its drivers.

- **Eco driving (2008):**

This training resulted in stunning 8% savings. However, these results were achieved in experimental conditions with no passengers onboard.

Monitored on real settings revealed a 2% fuel savings comparing September 2008 (when the training began) and February 2009 (three months after the end of the training course). However, if one looks beyond at data of September 2009 (eleven months after training) it will be lead one to understand that there was not any added value with eco driving training since the savings dropped to nil. This trend stresses the need to not measure and evaluate the success of Eco Driving training in unreal settings. Also the nature of the indoor and experimental training, very focused on theoretical contents, is doubtful: on one side it is able to deliver the message and explain the main concepts; but passing to real effects, the results show these practises are far from being efficient since there aren't savings in the mid-term.

It urged us to encompass the reduction during training with meaningful reductions whenever drivers face real driving conditions. Here lies the strategically strength of the incentives/tutoring scheme.

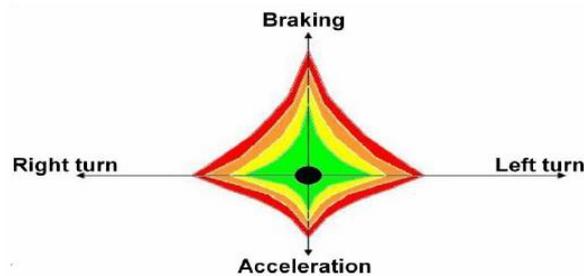
This training was followed by a new one in late 2009. All of these were co-funded by RUMOS, an FSE specific program aimed for Madeira Region.

- **Technology support to the measure**

- *Eco Drive monitoring system*

Horários do Funchal has purchased new software called Trafilog costing less than the traditional consumption meters but that don't read the real consumptions, rather it scans it through an informatics algorithm.

Picture B.2.3: Example of one Trafilog output



Trafilog is a system aiming to save money from fleet operational costs using tracking and monitor tools. It provides location based solutions, through real time routing of all vehicles with GPS data. It also produces real-time alerts and reports to the driver's trainers who are controlling the system or even to the drivers.

One of the most interesting features of the system is its ability to rank drivers behaviour according to breaking, acceleration, turning and speed.

This aspect leads to another notable feature. The system enables the construction of a Driver Risk profiling, built using sensors measuring many items between two axes. The driver's controller thus analyses and warns of dangerous or aggressive driving as well noticing the location of the vehicle in case of an accident.

Trafilog system works in a continuous loop as in every classic digital control system: sensing, evaluation, action.

- **European endorsement**

Eco Driving theme currently deserves more and more attention from the European Commission. The recently released action plan for the urban mobility Green Paper (COM [2009] 490 Final) put emphasis on the inclusion of Eco Driving training onto the driving exams for non-professional drivers, bringing this issue to the top of the political agenda. This is the assumption of the importance of the subject and is a consequence of successful projects. To learn from these previous experiences, Horários do Funchal compiled some best practices that are being set into motion throughout Europe. Information was searched in "Fleet Project", as well as in "ECODRIVEN, Campaign Catalogue for European Ecodriving & Traffic Safety Campaigns". But it is CIVITAS the provides deepen information on the development of incentive schemes. Malmo (Sweden), developed this tool in CIVITAS II project, enabling 13% savings immediately after training to 3% when no refreshing is given.

Malmo offers an important testimonial, unveiling the potential of Eco Driving in which savings is concerned, but also revealing the dramatic impact reduction on a medium-long term perspective, where the non existence of meaningful incentives hampered the driver's motivation.

This experience is in line with the one Horários do Funchal itself has. Funchal's PT Operator previous projects unveil the lack of incentives schemes. In real settings, drivers often miss the advice, orientation and proceedings learned during training. So it is important, on the one

hand, to stop insisting on experimental sessions. And, on the other, to test in real settings the incentive schemes effects.

All in all, recent results in European projects such as the one carried out in Malmo, confirm successful applications of incentive schemes whilst others that do not include it fail to provide consistent results after 3 months.

- **Evaluation and monitoring of the bus drivers**

The project development was featured by the installation of Trafilog end unit in Horários do Funchal vehicles. Followed by the monitoring period that comprises an ongoing procedure which includes the involvement of the drivers trainers who are tutoring the drivers on an ongoing basis, showing them their performances weekly as regards to events and giving them tips to improve their performance. Ideally they will keep on doing better every day.



Picture B.2.4: *Trafilog console flashing a warning light*

But firstly, the system parameters (acceleration, breaking and turning) had to be calibrated and correctly tuned according to specificities of the local terrain, so than a reference scenario could be defined and drivers performance compared to it.

To do so, the driver trainers drove Volvo's B12B and B12M, one hour per day, during a full week in June 2010 in all the routes these busses normally operate. One engineer sat behind the driver and monitors the Trafilog console that was located above the driver seat and could also be assessed in its laptop. Whenever a warning light flashed, showing that an abnormal event had occurred, the engineer recalibrated the turnings, acceleration and breaking in the exact spot so than a tolerance could be given during the implementation phase. All of these made use of G-force sensors to enhance comfort experience. Provided that this recalibration makes any attempt of results comparison with other cities not realistic, this step was essential because otherwise the warning lights would flash much more often due to the rough terrain where the busses operate in Funchal, even when the driver's attitude was considered to be exemplar.

The strategy to evaluate the drivers was to monitor the events curve throughout the weeks during real settings, that is, performing regular PT service with passengers. The baseline scenario (T0) will be given by two months (February/March 2011) when drivers were unaware that their performance was being tracked down. This baseline will be compared with the driver's performance monitored during the following months. During this period, driver's trainers will continuously educate drivers to understand their profile and improve their techniques.

Each driver feels the need to be personally informed. So the driver trainers will provide ongoing feedback to all the drivers subject to monitoring, highlighting that they should perform well, explaining as clearly as possible the meaning of the initiative and arguing how

they can benefit from it. Arguably, drivers will start paying more attention to their driving conduct.

B3 Situation before CIVITAS

One can hardly say that eco-driving is a consolidated concept among Funchal drivers. Even though general orientations on this matters have been included within the latest training programs carried out by the PT Operator Company, general population and professional drivers alike have little information available on eco-driving procedures. On the other hand, the topographical specificities of the city, that often lead to high fuel consumptions, air and noise emissions, are also responsible for car additional exhaust and high maintenance costs. This situation has huge impacts on family budgets and also on the financial sustainability of local PT services. These problems can be minimized by the general implementation of eco-driving procedures.

As HF is one of the most relevant energy consumers, the PT operator, in 2004, was submitted to an energy audit. The audit recommendations advise the reduction of bus weight during the fleet renewal process, reduction of total idle time at the terminal and the implementation of Eco-driving procedures. This study concluded that Eco-driving can represent a share of 6% of fuel savings of the fleet's annual consumption.

B4 Actual implementation of the measure

The measure was implemented in the following stages: **Picture B.4.1: Trafilog installed on the bus**

Stage 1: Purchase of Trafilog system (Eco Drive monitoring system) (May 2010) – Horários do Funchal decided to equip 10 Euro V buses (Volvo B12B and Volvo B12M) with Trafilog with a single investment cost of nearly 670€, and telecommunication costs around 100€ per month. This system aimed to save money from fleet operational costs using tracking and monitoring tools.



Picture B.4.2: City vice-mayor introducing an Eco Driving training program

Stage 2: First eco-Driving campaign (May 2010) – CMF launched eco driving campaigns involving 180 City Council drivers and many more professional drivers, including taxi drivers, bus drivers and training schools drivers. The participants drove in a pre-established course using vehicles equipped with real-time monitoring equipment, capable of diagnosing the main intervention driving points.



Picture B.4.3: Trafilog validation and calibration

Stage 3: Trafilog system validation and calibration (June 2010) – Trafilog has a warning system that alerts when the driver executes bad driving behaviour (acceleration, braking, turns, over speeding). Due to the specific topography of Funchal, where narrow streets and tight turns are frequent, the Trafilog system needed to be calibrated to fit the Funchal streets specificities because very outstanding events show up. For example, there happened to many accelerations due to sudden slopes.



Stage 4: Implementation of the driver's tutoring scheme (April 2011) –

Due to financial constraints, the Company decided not to undertake an incentive structure with a monetary basis. Instead, the PT Operator decided to put driver's trainers tutoring the drivers on an ongoing basis, showing them weekly their performances as regards to events and giving tips to improve their performance and keep on doing better every day. The strategy to evaluate the drivers is to monitor the events curve throughout the weeks during real settings. The baseline scenario (T0) was given by a two month period in which drivers were unaware that their performance was being tracked down (data from February and March 2011). This baseline will be compared with the driver's performance monitored during the following months. During this period, driver's trainers will continuously educate drivers to understand their profile and improve their techniques and explaining clearly as possible the meaning of the initiative and how they can benefit from it. Arguably, drivers will start paying more attention to their driving conduct.

Picture B.4.3: Driver's training checking driver's behavior



Stage 5: Implementation of additional eco-driving courses (February 2012) –

The Municipality has taken forward additional training courses to some of its drivers to refresh learning skills gained two years before. The purpose of the workshop was to provide key influencers in Funchal's driving community with eco-driving knowledge and techniques.

Picture B.4.4: Second Eco-driving training course



All trainees then received an individual performance report, in which a profile analysis was drawn up assessing positive formation actions, shortcomings and potential fuel consumption reductions.

B5 Inter-relationships with other measures

The measure is related to other measures as follows:

- **FUN 1.1 Sustainable Fleet** – Both measures share the aim to improve the overall fleet performance, especially in terms of fuel consumption. Fuel consumption in Sustainable Fleet measure is evaluated with the overall fleet, whereas in Eco-Driving measure only buses equipped with Trazilog were monitored. So the influence of Sustainable Fleet in Eco Driving is small, but on the opposite direction there is a strong effect on fuel consumption reduction in the overall fleet owing to the work carried by the Eco Driving measure.

Measure title: **Eco Drive in Large Fleet**

City: **Funchal**

Project: **CIVITAS-MIMOSA**

Measure number: **FUN 6.1.**

- **FUN 4.1. Awareness Raising Campaign for Sustainable Mobility** – Both measures share the objective to develop eco-driving skills among the general population and raise awareness for these matters.

C Impact Evaluation Findings

C1 Measurement methodology

C1.1 Impacts and Indicators

The evaluation tasks for Eco Drive in Large Fleet measure will grant efforts on accessing a wide range of impacts, as it's showed below, covering three big areas MAESTRO assess and granting information on how to collect information, who collects it and when:

Table C1.1.1: Specific impact indicators related with Eco-drive in Large Fleet

Evaluation category	Evaluation sub-category	Impact	Indicator	Description and Source of data	Success quantification	Baseline	After Data collection
Energy	Energy Consumption	Fuel Consumption	1 – a) Fuel consumption of the bus fleet equipped with Trafilog; b) fuel consumption of the CMF vehicles (POINTER core indicator 4)	Data unit: L/100Km, quantitative, measurements. Source: PT Operator and CMF	Reduce fuel consumption in 6%, at least, comparing before and after the monitoring with Trafilog; and comparing the CMF vehicles.	February, 2011	August, 2011
Environment	Pollution	Emissions	2 – CO2 eq. emission levels of the buses subject to monitoring (equipped with Trafilog). (POINTER core indicator 8)	Data unit: Kg/Km, quantitative, calculation Source: PT Operator is responsible for this indicator. Data gathering and analysis will be carried out by OCCAM (a private consultancy company)	Reduction of transport related emissions in buses: CO2 in at least 2%	February, 2011	August, 2011
Transport	Transport System	Smooth driving	3 – Striking driving situations (turning, accelerations, breaking and excess speed) (City specific indicator)	Data unit: Number, quantitative, collected, measurements, (events/Km) ● PT operator is responsible for collecting data using Trafilog	Reduction in the number of aggressive turning, breaking and acceleration in at least 2% among bus drivers subject to monitoring	February, 2011	August, 2011

Measure title: **Eco Drive in Large Fleet**

City: **Funchal**

Project: **CIVITAS-MIMOSA**

Measure number: **FUN 6.1.**

Detailed description of the indicator methodologies:

1 - Fuel consumption of the fleet – This indicator is intended to show the expected improvements in the driving behaviour and is easily measured by Trafilog for urban buses. For the Municipality vehicles, the fuel consumption per driver and vehicle are compared before and after the eco driving training. **This indicator corresponds to the specific objective 2.**

2 – CO₂ eq. emissions of the buses subject to monitoring – 10 Euro V buses of the PT Operator fleet were selected to accommodate the Trafilog system. OCCAM, a private consultancy company specialized in environment and energy evaluation, calculated the evolution of the emissions from February to August 2011 using COPERT IV. **This indicator corresponds to the specific objective 3.**

3 - Smooth driving –The variations in driving situations are collected using the Trafilog software. **This indicator corresponds to the specific objective 1, 2 a 3.**

List of potential effects that were not measured

Following POINTER specific recommendations, Funchal considers very important to think and discuss all possible effects a measure can have. At this time, it was made an impact brainstorming, joining all agents related with the implementation of the measures. Possible impacts which have not been measured are presented below:

Measure title: **Eco Drive in Large Fleet**

City: **Funchal**

Project: **CIVITAS-MIMOSA**

Measure number: **FUN 6.1.**

Table C1.1.2: List of potential effects that were not accessed

Impacts category	Effect	How does it impact?	Why it was dropped
Economic	Operating costs	Owing to the expected improvements in the driving profile, the maintenance costs and the fuel costs will arguably decrease with the implementation of the tutoring and monitoring scheme	Not a direct impact of this measure (it is more related with FUN 1.1.)
Energy	Fuel consumption per driver	Fuel consumption could point out savings among drivers who consume less. However, since Trafilog does not highlight fuel consumption per driver and since the pilot scale of this measure is small in terms of number of buses equipped	Trafilog has limited capacities to access properly this indicator
Environment	NOx and PM emissions	Emissions derived from better driving techniques could have been an important outcome of the measure	Unlike what was planned, the consultancy company have not provided data about NOx and PM. Thus, evaluation will focus on in depth measurement of CO2 equivalent pollutants, rather than trying to measure more pollutants. This leads to a resources optimization, needed for other components essential to the successful implementation of the measures
Social	Increased safety feeling	Increase feeling of safety	Non-existence of specific 'before' survey that can evaluate this effect
Transport	Accidents	Improvements in the driving profile could lead to a decrease in the number of accidents	Despite it is obvious relevance for this measure goals and expected output number 3, it was not assessed due to technical problems: it was not possible to identify if the buses monitored were involved in meaningful accidents.
	Stiking events per diver	It would be important to analyse the evolution of striking evets per driver to look for meaningful improvements in the driver's attitude	Trafilog has limited capacities to access properly this indicator

C1.2 Establishing a Baseline

The information regarding when and how the baseline was collected/measured is duly described above in table Table C1.1.1..

Measure title: **Eco Drive in Large Fleet**

City: **Funchal**

Project: **CIVITAS-MIMOSA**

Measure number: **FUN 6.1.**

C1.3 Building the Business-as-Usual scenario

Even considering that BAU is an educated-guess, one should not overestimate the reliability of the assumptions below because they are based on limited sources of data (short trial period).

Table C1.3.1: BAU assumptions for each indicator

Indicator	BAU assumptions
1 - a) Fuel consumption of the fleet equipped with Trafilog b) Fuel consumption of CMF vehicles	a) BAU is meant to be the same as the data collected during the months of February and March, when the drivers were unaware that Trafilog was installed on the buses b) BAU is assumed to be the same during the 2 nd trimester of 2012 as it is on the 1 st (so before training)
2 - CO2 eq. emission levels of the buses subject to monitoring	BAU is meant to be the same as the data collected during the months of February and March, when the drivers were unaware that Trafilog was installed on the buses
3 - Striking driving situations	

C2 Measure results

The results are presented under sub headings corresponding to the areas used for indicators – economy, energy, environment, society and transport.

C2.1 Economy

Not applicable

C2.2 Energy

1 - Fuel consumption of the fleet

HF Bus fleet

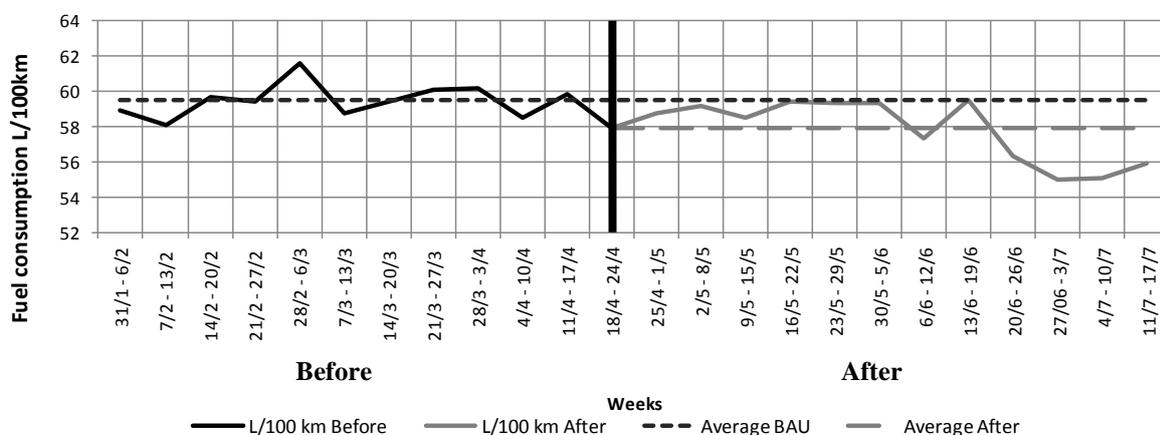
Fuel costs are one of the major components in the overall cost structure of a Public Transport Operator. As a public Company, it is important to be as efficient as possible to better spend public resources. Arguably, in a context characterized by growing fuel prices, this makes these matters even more relevant and important.

Even though Trafilog does not provide drivers with the knowledge of who consumes less (the system only logs information per bus and so they only know the average per bus) the consumption is arguably one of the indicators that drivers pay more attention and are more keen to improve.

Table C2.2.1: Fuel consumption of the fleet equipped with Trafilog (n=10)

Indicator	Before Feb - Mar 2011	B-a-U Apr - Aug 2011	After Apr - Aug 2011	Difference: After – Before	Difference: After – B-a-U	Difference (%): After –Before	Difference (%): After – B-a-U
1 – L/100km	60	60	58	-2	-2	-3%	-3%

Chart C2.2.2: Fuel consumption of the fleet equipped with Trafilog (n=10)



The bus consumption has been monitored for a total 24 weeks and the total energy consumption was reduced by 3% during the implementation phase. The decrease of fuel consumption is far from being considered successful because it owes mainly to a breakdown in the last weeks of implementation as one can confirm in the graph above.

Of course it can also have happened that seasonality deviations like summer/winter or holiday period/school period might have occurred and create a sort of bias that improves the fuel consumption record during summer/holiday period (less consumption). But it is also worth mentioning that fuel consumption was not an issue handled by the tutoring scheme due to the limitations of the Trafilog system in providing this information per driver. So it could be here the reasons why the fuel consumption did not accompany the more robust improvements one can encounter further in the document.

CMF vehicles

Table C2.2.3: Fuel consumption of the Municipality vehicles (n=22)

Fuel consumption (L/100km)	Before	B-a-U	After	Difference:	Difference:	Difference: (%)	Difference: (%)
	1 ^o trimester 2012	2 ^o trimester 2012	2 ^o trimester 2012	After – Before	After – B-a-U	After –Before	After – B-a-U
Passenger light vehicle (n=3)	8,1	8,1	7,7	-0,4	-0,4	-5%	-5%
Passenger light vehicle (4x4) (n=2)	12,4	12,4	12,3	-0,2	-0,2	-1%	-1%
Freight light vehicle (n=4)	11,4	11,4	11,0	-0,4	-0,1	-3%	-3%
Freight light vehicle (4x4) (n=1)	11,2	11,2	11,1	-0,1	-0,2	-1%	-1%
Freight heavy vehicle (6m3) (n=3)	39,0	39,0	39,0	0,1	0,1	0%	0%
Freight heavy vehicle (15m3) (n=9)	108,5	108,5	109,5	1,0	1,0	1%	1%
1 - Total	35,9	35,9	33,9	-2,0	-2,0	-6%	-6%

As for the Municipality vehicles, the total fuel consumption has decreased by 6% after the last training that was held in February 2012. This fuel reduction is irregular and one can confirm that fuel consumption got even higher with what Heavy Goods Vehicles. This might mean that Eco Driving training should not be similarly addressed for different categories of vehicles.

C2.3 Environment

2 – CO₂ eq. emissions of the buses

Local Public Transport in Funchal supplied by Horários do Funchal is responsible for emitting high levels of CO₂. This occurs because of the rough terrain where efficient buses cannot operate. But this does not mean that efforts to improve the driver’s attitude cannot produce positive effects on greenhouse emissions.

Improving air quality is a high level goal of CIVITAS and of this measure in particular. So a pilot test was carried out to track down the contribution of the monitor and tutoring scheme to CO2 emissions reduction. The following are the results obtained.

Table C2.3.1: CO2 eq. emission levels of the buses subject to monitoring (equipped with Trafilog, n= 10 buses)

Indicator	Before Feb - Mar 2011	B-a-U Apr - Aug 2011	After Apr - Aug 2011	Difference: After – Before	Difference: After – B-a-U	Difference (%): After – Before	Difference (%): After – B-a- U
2 – CO2 eq. kg/km	1,45	1,45	1,42	-0,03	-0,03	-2%	-2%

The emission of CO2 eq. by buses has decreased slightly by 2% in the period April-August 2012 compared to the based months of February/March 2012. According to data collected by a private consultancy hired in the frame of Sustainable Fleet measure (FUN 1.1.), HF has emitted about 12.600 Tons CO2 in 2010. If this 2% reduction in a limited number of buses was extrapolated to the overall fleet, it could equal to 252 Tons reduction in one year which is a very interesting outcome to further pursue.

Fuel use and creation of carbon dioxide emissions are directly linked, so one that reduces its fuel use can also expect a similar reduction in vehicle-related CO2 emissions. In this calculation it has also been taken into consideration the contribution that smoother driving attitudes (analysed further in the document) have on emissions of fossil carbon dioxide. The training has thus helped to streamline driving techniques that are applicable to Funchal operational conditions and help achieving the goal of decrease vehicle emissions in the city.

C2.4 Transport

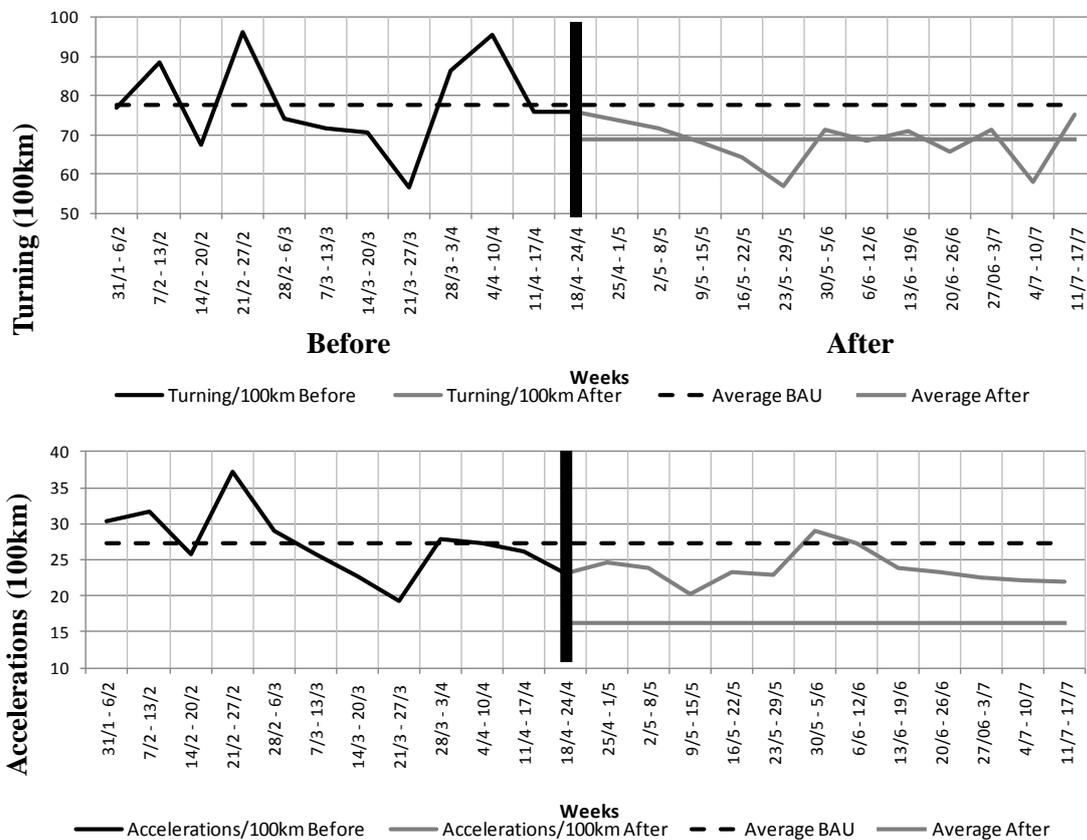
3 – Smooth driving

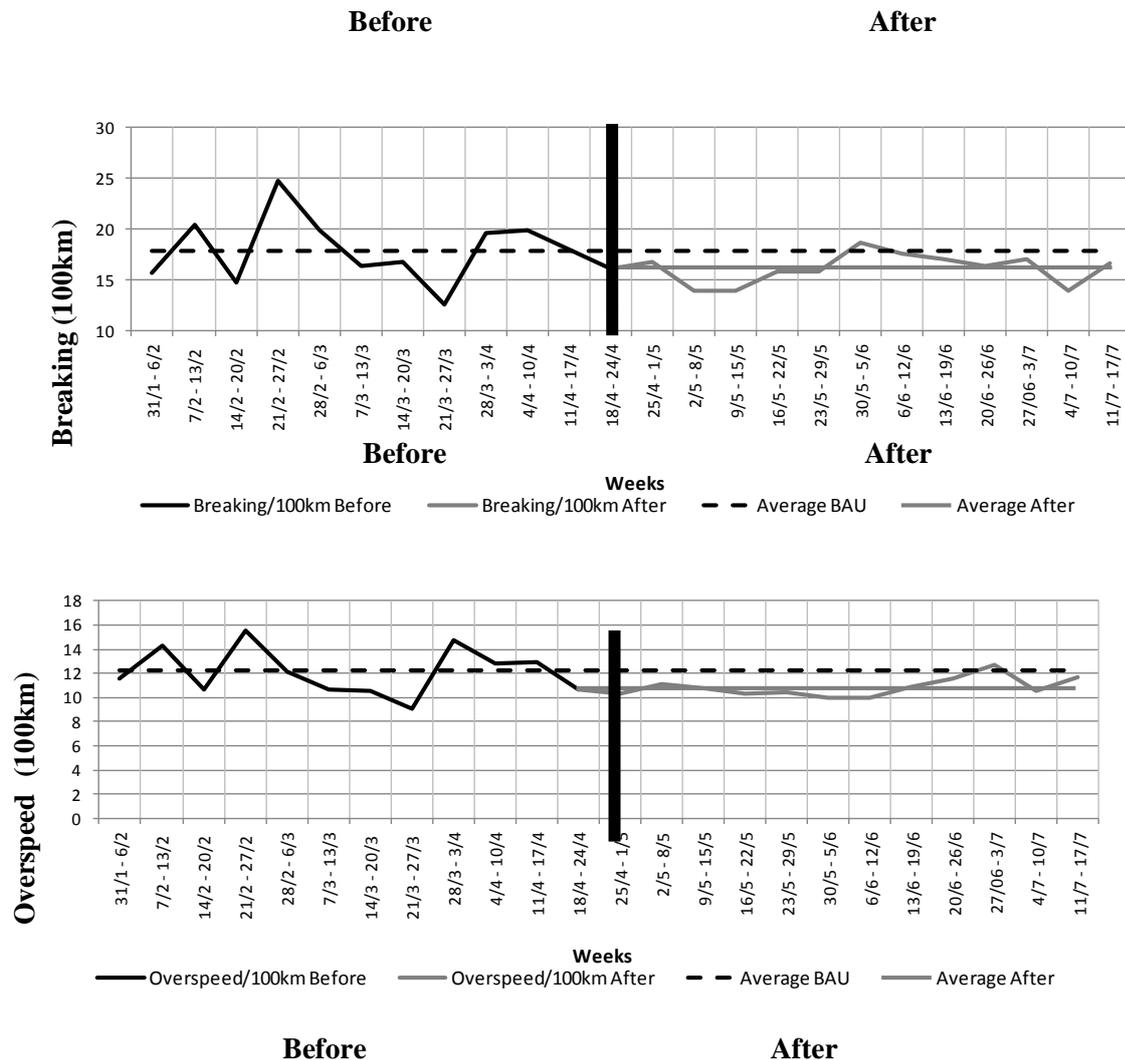
The analysis of the so-called striking driving situations seeks to provide a grasp on a comprehensive and broad understanding of some of the most important characteristics of the driving performance, namely turning, accelerations, breaking and over speeding. Due to the special characteristics of Funchal, narrow and steep streets, the system was duly calibrated before the baseline was collected, so than the system did not bounced back too many «events» and only highlight situations that really result from abnormal driving performances. Because it is less common when assessing eco driving training, this indicator can be considered as the most important outcome of the measure.

Table C2.4.1: Striking driving situations (n= 10 buses)

Indicator	Before Feb - Mar 2011	B-a-U Apr - Aug 2011	After Apr - Aug 2011	Difference: After - Before	Difference: After - B-a- U	Difference (%): After - Before	Difference (%): After - B-a- U
N° Turning (100km)	18	18	16	-2	-2	-9%	-9%
N° Accelerations (100km)	27	27	24	-3	-3	-13%	-13%
N° Breaking (100km)	78	78	69	-9	-9	-12%	-12%
N° Overspeed (100km)	12	12	11	-1	-1	-11%	-11%

Table C2.4.1: Evolution of striking driving situations (n= 10 buses)





All the effort to lower fuel consumption can be worthless if the driver has an aggressive driving style. Therefore, the PT Operator has long been making an effort to incentive bus driver's to adapt their driving style to the specific circumstances of the network like sudden slopes and of the capabilities and limitations of the buses.

During the pilot test, sharp turnings have decreased by 9% during the implementation phase when comparing to the baseline period, excess speed¹ by 11%, breaking by 12% and acceleration by 13%. Breaking seem to be the event that occurs more often, and therefore the decrease of severe breaking in 12% is fairly important to guarantee the comfort and safety of the public transport passengers. Surely one is able to realize that severe breaking figures started from a very high starting line (78/100Km) because often sharp breaking is of paramount importance in Funchal to avoid accidents.

¹ Noteworthy that over speed is the only parameter that has nothing to do with specific characteristics of Funchal. It is dimensioned according to the national law that sets 50km/h as the maximum speed limit in urban areas.

Measure title: **Eco Drive in Large Fleet**

City: **Funchal**

Project: **CIVITAS-MIMOSA**

Measure number: **FUN 6.1.**

Improvements in the accelerations driving style have also been important to deliver less dangerous or aggressive driving. These improvements are likely to contribute to improve user's satisfaction but unfortunately this feature was not evaluated.

The indicator of driver's characteristics is probably less influenced by seasonal external characteristics than, for example, fuel consumption, and can thus be considered a more direct outcome of the implementation of this MIMOSA measure.

Many factors entail the building blocks of Eco Driving. These striking events that Funchal was able to identify provide food for thought and therefore help to achieve the measure specific level of studying the eco-driving procedures best-adapted to the specific topographic conditions of the city.

C2.5 Society

Not applicable.

C3 Achievement of quantifiable targets and objectives

No.	Target	Rating
1	290 professional drivers (CMF and HF) trained in eco-driving principles and attitudes	*
2	Reduction of public transport fleet fuel consumption in 6% (measured before and after the launch of the monitoring system)	Buses: O Municipality vehicles: **
3	Reduction in the number of accidents related to bus drivers subject to personal monitoring	NA
4	Reduction in the number of aggressive turning, breaking and acceleration in at least 2% among bus drivers subject to monitoring	***
5	Reduction of transport related emissions in buses: CO2, NOX and PM in at least 2%	**
6	Increase eco-driving knowledge among professional drivers and citizens	NA
NA = Not Assessed O = Not Achieved * = Substantially achieved (at least 50%) ** = Achieved in full *** = Exceeded		

During the measure lifetime, a total of 232 drivers were educated in eco driving principles in the following way:

- 180 drivers in May 2010
- 10 drivers with personal tutoring following the monitoring campaign record by Trafilog in 2011
- 22 Municipality drivers in February 2012

Some indicators were not assessed for a variety of reasons. Accidents on the one hand were not subject to monitoring due to technical problems which did not allowed us to track down

meaningful accidents caused by buses equipped with Trafilog. Whilst the driver's appraisal was not possible to consider for evaluation purposes since the Consultancy Company did not conduct a survey. Also they have not given the data concerning NOX and PM emissions derived from the introduction of Trafilog system.

Reduction of fuel consumption was not significant enough in public transport buses. This can happen due to the fact that the personal feedback given by the driver's trainers has focused only on the «unusual driving situations» because the Trafilog system does not produce reports about fuel consumption per driver.

On the other side, the Municipality vehicles have come up with an overall decrease of 6% after a conventional training characterized by the delivery of some basic concepts followed by ongoing monitoring. This favourable result was not the same regardless of the kind of vehicle subject to training. Light vehicles have yielded more favourable results than heavy vehicles whose consumption was kept pretty much unchanged.

Reduction of CO2 transport related emissions was achieved in full and according to what was envisaged before the implementation of the measure. A 2% reduction is a result of less fuel consumption and a safer and less dangerous driving performance.

The main achievements this measure has come up with relate with the number of unusual events it prevented from happening. Ranging from a 9% decrease (in relation to sharp turning) to 13% decrease (in relation to sharp accelerations), the tutoring scheme supported by the informatics system have been able to improve driver's techniques. Although these results can be directly linked with the measure core activities, it is important to mention that it would be essential to pay closer attention to bus drivers driving conduct in the long-term and this was not possible during MIMOSA lifetime. Hence even the most promising results as the ones encountered with the unusual events assessment, should be handled cautiously.

C4 Up-scaling of results

This Eco Driving experience is the first step towards a new and improved look into driver's performance analysis. Incoming analysis may lead us to know if there is a gender or an age bias in driving, or whether drivers tend to drive in a less efficient way when they get back to the main station without passengers. And what about the extra hours one may do, are they linked to non efficient driving? All of these important questions require specific analysis and could be explored in the framework of follow-up initiatives together with the addition of other important variables that could be introduced into a training scheme, like accidents for example.

Also, Eco Driving competitions could be fostered at a regional level, in which it is a kind of initiative with a big impact on a wide audience. For example, it's possible to organise car races, with a default itinerary and see who used least fuel. The most efficient drivers can be awarded with new green vehicles such as electric bikes.

In the future, if there is any need to refresh knowledge regarding eco driving, it should be considered the chance to make only "snack training", a type of training developed in ECODRIVEN project that fits our needs since eco-driving trainers often have to come from the Mainland. This way, they could administer short classes, not longer than one hour, to many drivers, reducing the number of days the trainers have to remain in the island and consequently the expenses of this initiative.

C5 Appraisal of evaluation approach

All the data with regard to buses was collected during a time series of 6 months, namely from February to August 2011. A few breakdowns have occurred after August and the system was turned off. The Municipality drivers, on the other hand, were only evaluated in the second campaign and the connection between the first campaign held in 2010 and the second campaign held in 2012 cannot be directly assessed. So the monitoring approach of both modules did not have a long-term evaluation methodology and the results achieved should therefore be read carefully because experience outlined in the R&D section reminds us that the effects tend to fade away with time. Further research will be needed to know, if the tutoring system developed by the PT Operator was able to overcome this limitation of Eco-driving campaigns.

On the other hand, the characteristic of the Trafilog system limits its use for consumption purposes. Nevertheless, Trafilog is a cutting-edge technique to record and analyse the global traffic profile and emphasis was put on a more holistic approach, seeking any evidence of improvement in aggressive driver's behaviour.

Obviously, optimizing fuel consumption will lead to economical savings which would be also be important to highlight if the implementation lifetime could have been longer. It is also expected that the eco-driving procedures learned might become viral and be transmitted by drivers to other colleagues and also out of their place of work, namely among families and friends, making the benefits of this measure go beyond CIVITAS-MIMOSA lifespan. This effect was not assessed though.

C6 Summary of evaluation results

The key results are as follows:

- **Less fuel consumption on buses and Municipality vehicles** – Fuel consumption of the buses equipped with Trafilog have reduced 3% while the total fuel consumption in the Municipality vehicles have been reduced by 6%. Light passenger vehicles especially have successfully experienced fuel consumption reductions, whilst the traditional approach of eco driving (baseline-monitoring-followed by theoretical lessons and again followed by ex-post monitoring) have failed to work well on heavier vehicles like trucks. This can probably be explained because the methodological approach should differentiate lighter vehicles from heavier ones.
- **Bus drivers have acquired safer and friendlier driving techniques** – unusual driving milestones have improved a lot with the implementation of a tutoring scheme based upon the Trafilog monitoring system. This approach has benefited specially the accelerations that have diminished by 13%, benefiting users feeling of a safe and smooth bus ride.
- **Less CO2 eq. emissions** – As a result from the achievement mentioned on the two bullets before, bus emissions have been driven down 2% CO2 eq.

C7 Future activities relating to the measure

Fuel consumption is a real menace for sustainability of the financial structure of a PT Company. The likely decrease of the viability of public funding is a challenge for training Eco Driving skills. This is one additional reason to underline the importance of an incentives to endorse lasting Eco drive practices. This MIMOSA measure in a nutshell gives food for thought for scholars, technicians and politicians in Funchal to prepare forthcoming projects in order to maintain the monitoring system of PT buses alive and kicking beyond the project lifespan even if the monitoring system is neither conventional nor the Trafilog.

As for the Municipality, MIMOSA has given them a baseline scenario with the second campaign organized by themselves in 2012. The Municipality has also realized that the training course for passenger vehicle cannot be the same as the one targeting trucks. They have to be separately addressed. So the Municipality will be striving to showcase the Eco Driving benefits by starting a long-run monitoring scheme focusing on fuel consumption alone and adapting the theoretical approach that best suit trucks.

D Process Evaluation Findings

D.1 Deviations from the original plan

The deviations from the original plan comprised:

- **No money for awareness was given** – Financial incentives are arguably the ones that best trigger people’s reaction to new procedures and routines. The incentive system can create a moral hazard in good drivers because changing attitudes from an inefficient profile to an efficient one will be rewarded and they will earn more than a good driver who drove efficiently all over the year. But unlike what was previously thought after the planning phase, the incentives delivered to drivers have come to be non monetary (or softer). The gist was to assign key persons (driver’s trainers) that have the ability to influence drivers, empowering them with the responsibility of improving their performance indicators (named after unusual driving situations). This has happened due to a couple of reasons: on the one side, because the PT board has acknowledged that the financial situation of the Region and of the Company itself cannot ensure any reward of this kind and on the other side because it was not possible to give all the drivers a chance to be evaluated and thus the rewards would not be equally distributed.
- **Supplementary eco driving course for the Municipality drivers** – The Municipality felt the need to conduct additional eco driving courses to their drivers to refresh learning skills gained two years before and to collect data about fuel consumption that was not available regarding them. This has happened because the consultancy company hired to conduct the first eco driving campaign in 2010 failed to prepare an enduring training programme that would track the fuel consumption for each driver him / herself. On the other hand the Municipality failed to purchase instant consumption meters to have a long-run record of driver’s consumption.
- **Trafilog and tutoring system** – The Trafilog system and the tutoring scheme allowed trainees to receive an individual performance report, in which a profile analysis was drawn up assessing positive formation actions, shortcomings and potential fuel consumption reductions. This feedback was not planned at the very beginning but can consider being a positive deviation that enhances the measure.

D.2 Barriers and drivers

D.2.1 Barriers

Overall barriers

- **Technological limitations (10 – Technological)** – In Funchal not all the buses suit all the networks specified. Moreover, the system that Horários do Funchal have purchased to evaluate and monitor the drivers (Trafilog) is more accurate on more modern buses than the older ones since it’s basically an informatics software. So HF decided to equip 10 of their newest buses (Volvo B12B and Volvo B12M, all Euro V) with Trafilog and seek to monitor driver’s performance. Moreover, the Trafilog system proved to be inefficient to track down the fuel consumption for each driver itself. However they proved to be tough very successful to monitor and to trace the wide range of driving profile (accelerations, turnings, breakings over speed) of each driver.

- **Measures goals had to be scale down (4 – Problem related)** – This measure has failed to fulfil the high level goal of increasing economy efficiency on urban transport systems because this is a short-period test (the implementation was planned to be longer) aiming to improve the driving attitude of a small sample of drivers (roughly 10). On the other hand, the implementation was developed during a semester only. All in all, considering the low number of driver's involved in this measure and the short period in which this measure has been developed, the impacts have to be moderated and this measure should therefore be considered only as a pilot.

Preparation phase

- **Institutional barrier (2 – Institutional)** – Due to the city landscape and narrow streets, there has been a need to recalibrate the warning signs, signalling that the driver was being too aggressive. The Human Resources department was reluctant at this stage to implement an incentive scheme that penalizes and awards drivers till they recognize that the software is collecting accurate data that really fits the local landscape.

Implementation phase

- **Institutional threats to ensure that all drivers are equally monitored (2 – Institutional)** – The Human Resources department felt responsible that any incentives should cover potentially every single driver. However, it was not possible to assign all the bus drivers to the lines monitored, as the monitoring area comprises only a few lines.
- **Financial context blocked the provision of monetary incentives (9 – Financial)** – Due to the national bailout programme and to technical barriers resulting from the barrier that sprung up during the preparation phase, the PT Operator felt difficulties in conceiving a scheme based upon the provision of a monetary incentive to drivers who save more fuel.

Operation phase

- **Technological barrier (10 – Technological)** – After several breakdowns, Trafilog system was turned off at the end of 2011. It has not been completely understandable why the system collapsed/stopped providing data.

D.2.2 Drivers

Overall Drivers

- **Problem related (4 – Problem related)** – Many different areas within the PT Operator (environment quality, Human Resources, Exploration, Projects management) came together to work on this measure, so one can mention that this common effort and the team spirit which arose from it is one important outcome of the implementation of this measure. Obviously, this achievement was welcomed very enthusiastically by the PT Operator board that saw different areas setting a task force to take this measure forward.
- **Trafilog provides valuable assets to a holistic approach of Eco Driving (10 – Technological)** – Even though Trafilog system proved to be inefficient to track down the fuel consumption for each driver him / herself, it turned out to be very successful to monitor and to trace the wide range of driving profile (accelerations, turnings, breakings...) of each driver.

Operation phase

- **Strong involvement and feeling of self-improvement (4 – Problem related)** – According to the driver's trainers, each driver subject to monitoring now feels the need to be personally informed about their performance. In sum, one of the main drivers encountered during the operation phase was to realize that there are some driver's for whom this information is useful and it performs positively even without economical incentives.

D.2.3 Activities

Preparation phase

- **Planning and involvement of key stakeholders which have interests in stake with Eco driving (7 – Planning)** – The Municipality developed workshops on eco-drive, assembling Interurban PT drivers, driving schools personnel, drivers from the Municipality and drivers of the urban PT service. The Vice-mayor of Funchal attended these technical workshops so as the participants can understand the importance of this matters.
- **Measure was combined with running sustainability events (6 – Positional)** – Eco-driving was one of the activities at the centre of the European Mobility Week of 2010 and 2011. One demonstration to raise awareness for the advantages of smart driving techniques was the analysis of CO2 and fuel consumption of people who attend the events/workshops held during the European Mobility Week.

Implementation phase

- **Coping with difficulties through involvement of different areas (8 – Organizational)** – Foster cooperation among different departments of the PT Operator. This is a key step for a clear definition of the incentive scheme actually deployed (based upon the tutoring scheme).

Operation phase

- **Trafilog as a HR planning tool (7 – Planning)** – The Trafilog system was used mainly for training purposes (to educate the driver's and see what they can do better) rather than for ranking the entire driver's performance and giving them a financial incentive.

D.3 Participation

D.3.1. Measure Partners

- **Horários do Funchal** - As directly responsible for the coordination and realization of the measure
- **Municipality of Funchal** – Was directly involved in this measure as co-responsible for eco-driving training and monitoring of municipality service fleet.
- **Madeira Tecnopolo** – As technological experts, aided in the benchmarking of software solutions for fleet monitoring purposes and provided technical support to the adaptation of the Trafilog system.

D.3.2 Stakeholders

- **All private entities with big fleets** – All entities with big fleets that got together in the first training campaign developed have benefited from the measure. These stakeholders include: post offices, taxis, driving schools.

D.4 Recommendations

D.4.1 Recommendations: measure replication

- **Trafilog can be found especially useful for fleets that perform long and interurban trips** - If the Trafilog system is validated and correctly tuned, all the consumption data both for the baseline and for the monitor phase will be fully collected through this system, so that measurements will be stated in measurable and verifiable forms. Follow-up cities wishing to take up Trafilog for fuel monitoring can do so provided that they have long and inter-urban trips (fuel consumption is measured every 5 minutes so it will not make such a meaningful gap if the trip is longer than 1 hour).
- **Trafilog seems to be more accurate on more modern busses** - Since the Trafilog is an equipment that reads information from the CAN system (Controller area network), it is able to determine the acceleration and power output of the engine, the fuel consumption and other mechanical parameters, the G-sensor gives the parameters concerning to passengers comfort. So it can be installed in different vehicles /drive train systems, though in Funchal it was only installed in Volvo's Euro V buses of the PT Operator fleet. Follow-up cities should analyse the feasibility of Trafilog in different vehicles/models.
- **The driver's trainers can provide a baseline framework** – For the calibration and fine-tuning of Trafilog, Horários do Funchal used the driver's trainers driving skills to act as a baseline framework (or ideal driving performance) upon which the driver's was ranked and compared. This technique can be found useful for take up cities.
- **Bear in mind the target of the training course** – In the midst of an effective Eco Driving training, the contents and the approach of an Eco Driving should differentiate the target audience. The experience of the Municipality shows that passenger vehicles and heavy vehicles have to be addressed differently and therefore tailored training should be developed.
- **Soft rewarding actions can be effective too** – the experience of this measure shows that driver's correspond well to ongoing feedback like the one provided by driver's trainers. This can promote a shared feeling that everybody has a role to support the economic efficiency and this action could play a decisive role in that objective.

D.4.2 Recommendations: process (related to barrier-, driver- and action fields)

- **Take a broader approach to Eco Driving** - Eco Driving is far more than simply delivering advice related with gears or with maintaining a steady speed. But this is the core content of nearly every eco driving program. There are not many studies that focus on the medium-long time effects of the Eco Driving programs, which are the key topic that gives this activity and this measure in particular a strategic range. This measure has failed to provide a long/medium-run perspective on these matters.

Measure title: **Eco Drive in Large Fleet**

City: **Funchal**

Project: **CIVITAS-MIMOSA**

Measure number: **FUN 6.1.**

- **Eco Driving is a tool to change a Company driving culture** – this Eco Drive experience – small in numbers, though huge when we take into consideration a long term corporate sustainability – should be considered as an important measure to support and leave a lasting legacy to the regional public transport modernization.
- **Drivers are keen to be subject to monitoring when they have a good relationship with their tutors and their fuel consumption is not directly assessed** - The experience has shown that drivers accommodate well the idea of being subject to a monitoring programme. They are keen to improve their driving techniques because the system is not able to provide results for fuel consumption for each person *per se*, rather than by the entire group. The personnel data is limited to the analysis of the events, and it is this parameter that they were expected to improve with the help and support of the trainers.