



2020
CIVITAS
Cleaner and better transport in cities

DESTINATIONS



D7.3

Demonstration report on Public Transport Enhancement

Deliverable No.:	D7.3
Project Acronym:	DESTINATIONS
Full Title:	CIVITAS DESTINATIONS
Grant Agreement No.:	689031
Workpackage/Measure No.:	WP7
Workpackage/ Measure Title:	Attractive, clean, accessible and efficient public transport
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Date:	01 June 2020
Status:	Final
Dissemination level:	Public

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Abstract

Innovative sustainable urban mobility demonstrations can only be assured with good planning and sound foundations. In this regard, CIVITAS measures are delivered through a tried and tested approach comprising three stages: Design, Implementation and Operations. This report focuses on the third of these and hence updates on the details of measure demonstration across the six sites.

Project Partners

Organisation	Abbreviation	Country
Horários do Funchal, Transportes Públicos, SA	HF	PT
Agência Regional da Energia e Ambiente da Região Autónoma da Madeira	AREAM	PT
Câmara Municipal do Funchal	CMF	PT
Secretaria Regional da Economia Turismo e Cultura	SRETC	PT
Agência Regional para o Desenvolvimento da Investigação, Tecnologia e Inovação	ARDITI	PT
Limassol Tourism Development and Promotion Company Ltd	LTC	CY
Municipality of Limassol	LIMA	CY
Stratagem Energy Ltd	STRATA	CY
Dimos Rethimnis	RETH	EL
The Research Committee of the Technical University of Crete	TUC	EL
Comune Di Rio	Rio	IT
Comune Di Portoferraio	PF	IT
MemEx S.R.L.	MEMEX	IT
Authority for Transport in Malta	TM	MT
Valletta Kunsilli Lokali – Valletta Local Council	VLC	MT
Universita ta' Malta	UoM	MT
Ministry of Tourism	MOT	MT
Guaguas Municipales Sociedad Anonima	Guaguas	ES
CINESI S.L consultoria de transport	CINESI	ES
Ayuntamiento de Las Palmas de Gran Canaria	LPGC	ES
Ingeniería Electrónica Canaria S.L	INELCAN	ES
Sociedad Municipal de Aparcamientos de Las Palmas de Gran Canaria	SAGULPA	ES
Istituto di Studi per l'Integrazione dei Sistemi	ISINNOVA	IT
European Integrated Project	EIP	RO

Sustainable Services	GV21	ES
VectosGmbH	VECTOS-G	DE
Conférence des Régions Périphériques Maritimes d'Europe	CPMR	BE

Document History

Date	Person	Action	Status	Diss. Level
21-01-2020	Antonio Artiles Guaguas	- Template Drafted	Draft	PC, SC, TC, EM
20-02-2020	Site Managers	Drafted text for respective measures	Draft	PC, SC, TC, EM
30-03-2020	Antonio Artiles Guaguas	- Edit and completion of Cluster analysis	Draft	PC, SC, TC, EM
13-04-2020	Antonio Artiles Guaguas	- Site Managers to Review and send back comments	Draft	PC, SC, TC, EM
24-04-2020	Antonio Artiles Guaguas	- Site Managers Reviewed / edited and sent back to Antonio Artiles	Draft	PC, SC, TC, EM
28-04-2020	Antonio Artiles Guaguas	- Peer Review stage one sent to Portoferraio	Draft	PC, SC, TC, EM
05-05-2020	PF	Peer Review 1	Draft	PC, SC, TC, EM
09-05-2020	Antonio Artiles Guaguas	- Peer Review stage two sent to Vectos	Draft	PC, SC, TC, EM
20-5-2020	VECTOS	Peer Review 2	Draft	PC, SC, TC, EM
31-05-2020	Antonio Artiles Guaguas	- Submitted to Coordinator	Final	PC, SC, TC, EM
01-06-2020	HF, A.Quintal	Validation by PC	Submitted	EC

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

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

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Glossary

BRT	Bus Rapid Transit
MOT Certificate	Ministry of Transport Certificate
PT	Public Transport
EMW	European Mobility Week
AVL	Automatic vehicle location

Executive Summary

This report details the results of demonstration setup, implementation activities, ITS deployment and supporting actions for all the sites as outputs of T7.4, T7.5 and T7.6. It also looks ahead to the demonstration phases of the various measures across the six project sites and within the measure categories.

Chapter 1 introduces the WP7 objectives and peculiarities and provides a description of the measures per cluster category.

Chapters 2, 3 and 4 present the demonstration of each individual measure, grouped into the three identified clusters. This structure allows for immediate comparisons to be made about the demonstration phase work in different sites and hence experience and knowledge to be exchanged.

In the majority of cases, measures successfully identified and presented innovative measures for the transport sector not only for residents and citizens but also linked to the special needs of the tourism market.

Improvement on public transport services to offer a better-quality level as well as communication and promotional activities have been crucial to engage potential customers and to achieve a behaviour change in terms of sustainable mobility.

Destinations sites, are working to develop electro mobility not only in terms of private or share services but also to analyse the electrification the urban public transport fleet. In that sense, several pilot tests have been carried out by several partners where interesting data can be provided thanks to the different properties and characteristic of each site.

Real time information services have been identified as strategic services to make public transport attractive to customers. In that sense, Destinations sites have developed several systems (on board, at bus stops and through App).

1 Introduction

1.1 Overall DESTINATIONS Objectives

The DESTINATIONS project aimed to demonstrate and evaluate the effectiveness of innovative sustainable mobility solutions in six tourist sites with different characteristics but sharing common challenges. Cities must provide the high quality, sustainable environments desired by tourists, while providing local sustainable employment opportunities that overcome the seasonal and sometimes informal nature of tourist economies. Achieving sustainable mobility is a vital part of the growth equation for Europe's tourist cities. The project impacts will make a positive contribution to demonstrating how this can achieve growth and therefore provide a benchmark for other EU tourist cities.

The solutions are addressed to:

- Sustainable Urban Mobility Planning for residents and visitors
- Safe, attractive, and accessible public spaces for all generations
- Shared mobility and e-infrastructures towards zero emissions transport
- Smart & clean urban freight logistics at tourist destinations
- Mobility management & awareness for sustainable mobility
- Attractive, clean, accessible and efficient public transport

1.2 WP7 Objectives

WP7 aims at designing, implementing and demonstrating the sites' measures targeted for the improvement of public transport (PT) service as backbone for sustainable and attractive tourist destinations.

The main objectives and tasks of WP7 activities are:

- To design, implement and demonstrate new/enhanced PT services in terms of flexibility, routing and timetables properly targeted to comply with tourist mobility and well integrated in the overall mobility offer of the sites (all sites).
- To design, implement, deploy and demonstrate ITS-enabled solutions to increase the attractiveness of PT towards the tourist and leisure transport demand:
 - Info-services to offer easy and common access to integrated information on PT and tourism services removing the barriers for PT use for leisure trips (Madeira, Las Palmas de Gran Canaria, Elba, Limassol).
 - Smart payment systems to increase the flexibility of the PT offer for tourists (i.e. access to promotional tariff) and to facilitate the interoperability of payment tools (i.e. sale of bundles of services package) (Madeira, Elba).
- To enable the adoption/extension of electric and low emission fleets to increase the attractive potential of the sites in terms of sustainable destinations and to support the take up of innovative PT services suitable for leisure demand (Madeira, Las Palmas de Gran Canaria, Rethymno).

In order to provide the activities related to site coordination, the measures have been clustered as follows:

- (1) Improve PT services, introducing new lines and increasing the quality of service.
- (2) Introduce clean vehicles, clean fuels, and efficient driving for PT fleets.
- (3) Improve integrated mobility and tourism travel information and payment services. In particular, measures in this cluster will play a relevant role in the project answering mobility needs (flexibility, improved accessibility, integrated access to mobility and transport info, etc.) generated by tourist demand and residents.

Overall, WP7 activities are broken down into a number of cross-site and vertical tasks addressing the specific phases and operations of the piloting life cycle.

- Task 7.1 Cross-site coordination of pilots targeted to PT enhancement.
- Task 7.2 User-needs analysis, stakeholders' involvement, service requirements and supporting technologies design for pilots targeted to PT enhancement.
- Task 7.3 Site preparation, solution deployment supporting actions and demo setup for pilots for PT enhancement.
- Task 7.4 Demonstration of improved PT services for tourists and residents.
- Task 7.5 Demonstration of electric, hybrid and liquefied petroleum gas (LPG) buses (and eco-driving).
- Task 7.6 Demonstration of integrated mobility and tourism information and payment services.
- Task 7.7 Data collection for ex-ante, process and impact evaluation of piloting for PT enhancement.
- Task 7.8 Local dissemination and communication of piloting for PT enhancement.

1.3 Task 7.4, 7.5, and 7.6

These tasks comprise the Demonstration or "Operations" phases of the site measures. They take place following the Design and Implementation stages and see measures being taken up by residents and tourists. They cover the following three clusters:

- Task 7.4 Demonstration of improved PT services for tourists and residents.
- Task 7.5 Demonstration of electric, hybrid and liquefied petroleum gas (LPG) buses (and eco-driving).
- Task 7.6 Demonstration of integrated mobility and tourism information and payment.

1.4 Del 7.3 Objectives

In this context, Deliverable D7.3 will detail the results of the demonstration of all the WP7 demonstration measures in each site, in terms of procedures and resources involved in the operation of demonstration services, user acceptance, services and ITS performance, critical

factors and organisation impacts. The report will summarise the outputs of T7.4, T7.5, T7.6 and T7.8. It will collate all the learning from the individual demonstrations and will draw common conclusions for further action. It will be pitched to a city audience so it can be used as part of the evidencing and business model for future investment.

2 Demonstration of Improved PT services for tourists and residents (Task 7.4)

2.1 MAD 7.2 Attractive public transport

Measure description and results

Madeira local partners believed that by making public transport more attractive, it would result in more passengers using this more sustainable mode of transport. In specific, it was worked in three ways: the restyle of the public transport sales points; better information and dissemination activities; and an analysis and response to the user needs.

This measure has a strong relationship with the other measures, especially with MAD2.1, resulting in a **cumulative effect of an increase of 5% of the total public transport** (from 2016, before the implementation of the project, to 2019). Another important result of these two measures is the increase of customers loyalty, 13% of the customers that use monthly pass indicated that are customers with less than 1 year and 13% between 1 and 2 years.

To define the restyle of the public transport sales points, the Commercial Department analysed with the front office staff the needs for the sales offices, considering from one side the type of clients and their requests and, from other side the requests of the staff for better working conditions. The results of the surveys to tourists (MAD2.1) were also taken into consideration, and contact with the Tourism Authority and hotels showed a need for more attractive information.

The main sales office conducted before and after surveys with clients, to understand their needs and for evaluation purposes. From this office, the image and level of information was improved, with a larger network map and dedicated spaces for day-to-day information or campaigns. Seats were also included, plus a queue management system with a TV, which also provides information on public transport campaigns. The vending machines were also restyled with a more attractive design. The survey conducted indicated that **79% of the customers stated that the conditions in this office are good or very good**, and 74% stated that the improvements made were good or excellent. The main improvements were noted with the attendance management and with the comfort of the space.

Complementarily, HF installed 3 deposit and accountability machines for drivers in the headquarters, available 24h. Before the introduction of these machines, the drivers used the remainder of their shifts in the PT information and selling offices, therefore occupying the staff time which could be used to attend to the customers. Drivers, in general, are more satisfied with this process.



Figure 1: Main sale office and campaigns regarding Valentine’s day and Carnival

HF has been very active with the information and dissemination activities. HF started using social media, Facebook and Instagram for more interaction with the customers. These tools seem to be good for information, however, it is not so easy to receive feedback from the customers. HF launched a photo contest for São Valentine and Carnival, asking for a photo on board. Besides the well accepted nature of the campaigns related to these initiatives, a small number of photos were received. It was also learnt than once HF publish a photo with their staff the audience is higher. Knowing that, it reinforces the idea that the staff is the best way to reach customers.

Communication activities

With the support of the local partners, HF defined a communication activities plan. By March 2020, the following initiatives were implemented:

- Short videos were produced to promote the use of public transport. This was done after the reduction of monthly pass fares, a result from the development of a sustainable regional mobility plan (measure MAD2.1). Also, a campaign with flyers, posters and bus doors were developed.
- Information brochures, to disseminate in the sales offices, tourism information point, hotels and website were created: “Top 5 Low Cost Tours”, suggestions for 5 days using only public transport; “Funchal centre by bus”, promoting the use of 5 mini electric buses (measure MAD7.1) in the city centre and connection to the Port of Funchal and the touristic area.
- The campaign “Bring a friend”, the current customers that bring a friend to use the monthly pass had a discount.
- The campaign “Christmas gift check”, despite little adherence to the gift check, the promotion activity also promoting the use of public transport



Figure 2: Communication activities during Children’s day, presentation of new electric buses and Christmas

during Christmas was very well accepted.

- Activities with HF staff children, the “Drawing contest” and the “Carnival mask”. Children enjoyed this activity and it is understood that they passed the word in school of how good it is to use the public transport.

- PT tickets (daily tickets) continued to be sold in the hotels with direct contact with hotel staff to be updated to the tourists needs. Also, Carristur (bus sightseeing service) commercial staff started selling these tickets.

- Promotion during events: European Mobility Week, schools’ visits to HF headquarters, sport events and others.

- For the information on bus stops, the main stops for touristic attractions were updated to have better signing for the touristic points. Also being prepared is the updating of the placard information with a reorganisation and following the new rules for the public transport service.

Tourists and stakeholders’ involvement

Results from the tourist surveys and stakeholder involvement showed the need to have a dedicated bus with more capacity for wheelchair users, which can make the connection between the Port of Funchal and city centre and to other main touristic points. The new bus was publicly presented on September 6th. From the surveys conducted in the port of Funchal, the acceptance and advantage of this bus was understood (*“The HF PMR bus is the best one where I’ve ever been. The best dedicated bus. They are easy and safe. Perfect!!”*).



Figure 3: Dedicated bus for reduced mobility user transport promotional event

In relationship with measure MAD3.1, a plan to improve the accessibility of the bus stops was completed and is being implemented.

In 2019, as a result of these improvements, Horários do Funchal was publicly awarded the Level I certification of the Quality and Service Excellence (QESM) recognition system, developed by the Regional Directorate of Economy and Transport.

2.2 LPA 7.1 Communication for the introduction of the Bus Rapid Transit (BRT)

Las Palmas de Gran Canaria is implementing a BRT that will connect two important points in the low part of the city where 33% of the urban PT demand is located.

The construction of a BRT might cause some inconvenience to neighbours and visitors. For this reason, the main objective of this measure is to carry out a communication campaign in order to raise awareness of the importance and scope of the project, given that the BRT will bring economic and environmental benefits as well as contributing to an eco-friendly city where pedestrians are the main players.

Outputs

A short film to promote the BRT system, as well as sustainable transport modes titled “La Oficina del Tiempo Perdido” (12 minutes), was recorded and presented in a big event during the European Mobility Week 2019, to which citizens and politicians were invited. Furthermore, in order to present the film on social media and other communication platforms, the film is also available in other versions like full or ultra-high definition (Full HD or 4K) – https://www.youtube.com/watch?v=K2mf28a_GIA&t=672s.



Figure 4: BRT and public transport promotional event

In addition, dedicated information sessions for target users such as elderly people, journalists, students, and neighbourhood associations as well as meetings with stakeholders are being carried out.

In order to support these meetings and sessions with visual material, a short video (about two minutes) was recorded to explain the advantages of the BRT and other promotional material was produced.

Learning points / Innovative aspects

The Municipality of Las Palmas de Gran Canaria and Guaguas Municipales need to work in a coordinated way (so a communication commission has been established where periodical meetings are held) together with the police department, the media and Geursa (the local company in charge of drafting the project).

Results

Meetings and dedicated sessions for target users

For the introduction of this new system, Guaguas Municipales and the Municipality of Las Palmas de Gran Canaria have carried out several activities such as:

- Presentation of the commercial tradename for the new BRT system of Las Palmas de Gran Canaria (MetroGuagua) in a public event on 24th November 2016.
- Meetings and events about BRT and CIVITAS DESTINATIONS projects all over the city during European Mobility Week 2017.
- Several meetings focused on stakeholders and target groups:

- Neighbourhood Associations (Mesa y López, Cono Sur and Ciudad Jardín) in November 2017
- Schools (Salesianos and Teresianas) located close to the BRT route in November 2017
- Nursing home representatives in November 2017
- Professional Industrial Engineers Associations in November 2017
- Professional Civil Engineers Associations in November 2017
- Professional Architects Associations in November 2017
- Las Palmas de Gran Canaria University manager in November 2017
- Association of Economic and Financial Experts “Real Sociedad Económica de Amigos del País” in December 2017
- Municipal markets representatives in March 2018
- Sport facilities managers in April 2018
- Hospitals and medical centres managers
- Shopping centres and commercial areas managers in April 2018
- Neighbourhood Associations (Mesa y López, Cono Sur and Arenales) in November 2019

Citizens, politicians, business associations and a variety of stakeholders have been strongly involved in this measure due to, since the beginning of the project, a fluent communication with all of them which has been needed to be able to continue with the project.

2.3 RET 7.2 Improved PT for tourist and citizens

By improving the efficiency, convenience, and accessibility of public transport, the city aimed to encourage tourists and residents to choose public transport for their travels and consequently to reduce traffic congestion and air pollution and to improve the attractiveness of Rethymno as a tourist destination.

Outputs

The measure delivered:

- Improved PT service schedules through the optimisation of route frequency and distance covered, the introduction of new bus lines serving areas over 500m away from existing stops and two new routes to connect the city with the long beach area, in the outskirts of Rethymno, during the summertime.
- 12 new smart bus stops in pilot operation on 3 bus lines, providing real-time information about the expected bus line and arrival time.
- Bike racks on selected bus types in compliance with the legal framework.
- Study about cruise visitors’ needs and expectations.

- Two new PT routes, to serve cruise visitors and tourists during the summer period: i) connecting the port, the historic centre, the coastal area, and the city parking areas and ii) a new sightseeing PT line to connect Rethymno with nearby traditional villages.

The first smart bus stops, providing real-time information about PT routes itineraries, are considered as an innovative service for the city.

The seasonal demand was analysed to help efficient rescheduling of specific PT routes, improving the PT service and, in parallel, increasing capacity during the peak period and operational savings during off-peak.

Learning points / Innovative aspects

Field surveys revealed the PT users' needs and perceptions as a pivotal factor to efficiently design route reschedules and suitable interventions in PT services, in cooperation with the PT operator. The seasonal fluctuation may lead to major operational adjustments to ensure sufficient coverage and satisfaction of the increased demand.

The improved PT services, due to the inclusion of new tailored PT routes, optimised PT schedules and real-time information at bus stops, which made the service more convenient and attractive, resulted in an increase of PT use and users' satisfaction.

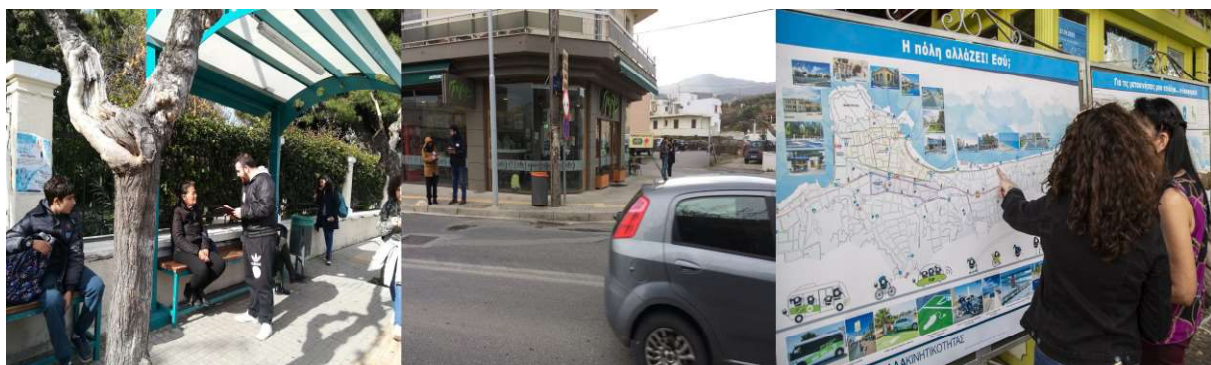


Figure 5: Field Surveys in Rethymno bus stops (left). On-site measurements (middle). Public campaign communicating upgraded services for Public Transport (right).

Results

Rethymno, with a population of 62.000 inhabitants, accommodates 520.000 tourists during the peak season in hotels located in the city centre and at large hotel chains around the city and outskirts. 30% are located at the municipal area borders, adding a huge strain on public transport and mobility services as they travel to and from the city centre for amenities, attractions, and entertainment. The alternative mobility modes are limited to cars, taxi, and PT services, which operate on a limited network/frequency. A more efficient PT, capable of serving the tourism flow to/from the city, and also the nearby communities' inhabitants, with frequent schedules and enhanced routes, based on the actual transportation needs and peaks, will help to reduce the use of private cars, rental cars or taxis.

The measure included a user needs analysis to study the commuters' needs, both citizens and visitors. Findings from 3 field surveys to PT users, citizens, and visitors were analysed to

more efficiently design the bus service. A PT user survey will follow to measure their satisfaction following the measure operation.

The necessity of an integrated approach in order to improve the efficiency of the PT schedule and attractiveness of services, with the ultimate aim to trigger a shift from private vehicles to PT, has been determined at the early stages of the measure planning.

Several bilateral meetings with the PT operator in West Crete (KTEL) – a privately owned entity – took place to negotiate the introduction of new lines and route rescheduling based on a win-win approach. The stakeholder groups engaged also included the Municipal Tourism Board, Municipal Port Authority Trust of Rethymno, Regional Unit of Rethymno, Hoteliers Association, Association of Cruise Ship and Maritime, University of Crete, SYNPOLIS Association of Active Citizens, Rethymno's Association of Disabled People, Parents and Students Association of Rethymno Municipality.

During the measure development, structured interviews involving the Municipal Tourism Office, Port Authority, Union of Licensed Tourist Guides of Crete, TUI Hellas (Crete department), and the Association of Cruise Ship and Maritime Managers offered useful insights with regard to the cruise visitors' needs.

The Municipality has been working closely with the PT operator and tourism-related stakeholders. The Municipal Tourism Board, the Port Authority, the Association of Disabled People, and the Hoteliers Association have been active and very supportive during the development of RET 7.2. The Municipal Port Authority of Rethymno has strengthened its role and interest due to the increased significance of the incoming cruise tourism.

The increased use of PT services from citizens and tourists as a result of RET7.2 and RET7.1 (new e-bus circulation) supports the modal shift from rental car/taxi to PT. This measure is linked with RET 6.1 - Sustainable Mobility Agency, further promoting integrated mobility products to tourists and is considered as one of the priority measures included in the city's upgraded SUMP (RET2.1).

The Municipality of Rethymno managed to ensure a 50.000€ national fund for infrastructure upgrades at 15 bus stop shelters and for informational panels for the bus route maps and time-schedules, with photovoltaic panels for their illumination during the night. In addition, the PT operator has committed to improve the GPS to the whole PT fleet, with private funds, in order to include all bus lines into the real-time information platform.

2.4 ELB 7.1 Improve PT services for tourists

The island of Elba is characterised by a considerable tourist flow in the summer months, when the population residing on the island (about 32.000 people) practically doubles. The proximity of the island from the continent and the many tourist attractions distributed throughout the island induces tourists to use their car within the island territory, often creating great mobility problems that negatively affect the tourist quality of the island in general.

The general aim of the measure is to make the public transport service more attractive in order to reduce the use of one's own car.

The measure interests two interrelated aspects:

- Definition and implementation of improvement activities for the public transport service for answering the tourists' and residents' needs and making the service more efficient resulting in an increase of the bus occupancy index.

- Definition and implementation of some specific collective free services for tourists during the summer period.

Outputs

Through an agreement between the municipalities of Portoferraio and Rio with CTT (PT supplier on Elba) and Tiemme (PT in Piombino), the following was obtained:

- Implementation of the AVM system in the Elba Public transport service. This new system has significantly improved the punctuality of buses and allowed users to know the bus arrivals in real time through the related App.
- Partial renewal of the bus fleet with the introduction of more modern vehicles, three of which (about 1/5 of the total fleet) have already entered into operation and others planned.
- 3 new waiting shelters in the port of Piombino, which are very useful to protect users from the rain and wind.
- New number 2 daily afternoon bus rides to facilitate in particular the movement of students.

Regarding additional free transport services, several have been implemented during the project lifetime:

- In Rio, 2 bus ride services have been activated: the “Marebus” with the aim to connect the central city with near beaches and other smaller neighbourhoods during the summer time, and the “Go Bus”, a winter shuttle service connecting urban areas of the Municipality, integrated with the conventional service provided by the CTT Nord company.
- In Portoferraio, two bus services (“Cosmopoli by night” and “Shopping Bus”) have been activated with the aim of improving connections between peripheral locations or parking areas and the city centre in order to decrease private car use. During 2018, a maritime service (Chicchero) was activated in the bay of Portoferraio to connect the various settlements on the coast with Portoferraio city centre.



Figure 6: “Marebus” service in Rio and “Shopping Bus” service flyer in Portoferraio

Innovative aspects

The innovative aspect of this measure is the agreement to increase the LPT service among the municipalities of Portoferraio and Rio and the public transport companies CTT Nord, operating on the island of Elba, and TIEMME operating in connection to the mainland port and railway station. The Agreement resulted to be a very good practice, because it greatly facilitated the relationship between the parties and the concrete development of the activities, strengthening the motivation towards the common goal of improving the public transport service. The Agreement represents a very new tool, because it goes far beyond the formal service contracts stipulated so far.

Also, the AVM system is an innovation for the public transport of the island both for the improvement of the respect of the timetables and for the real time bus arrival information, thanks to the related App.

Another very important experimentation was the innovative maritime connection, by a little ferry, of Portoferraio town with several settlements of the bay, thus avoiding heavy summer road traffic.



Figure 7: “Chicchero” summer service in Portoferraio and “Chicchero” timetable

Results

The public transport service on the island has been provided by the CTT Nord company for many years. In line with all the small Italian towns, the public transport service utilised by citizens and tourists is limited (ante 2017 data indicated an utilisation of 14% compared to the availability). The low use in the past years has hindered investments aimed to improve the service, due to the risk to make the income statement worse.

The DESTINATIONS project paid a lot of attention to public transport with technical stimulus toward the public transport providers in order to improve the service. The expected and desired result was an increase of the use of public transport both by citizens and tourists. From 2016 to 2019, a slight increase in the number of passengers has been registered; from 611,372 passengers in 2016 to 617,380 in 2019. Of course, these data are affected by the annual tourist presence on the Island. However, it should also be noted that in 2019 there was an increase in passengers despite a decrease in tourist presence compared to 2016.

Year	2016	2017	2018	2019
PT Passengers	611.372	660.129	642.396	617.380

Table 1: Number of passengers in Public Transport service in Elba over the years

The use of public transport to the detriment of private cars has also been promoted, as mentioned, through the provision of additional transport services: about 18,000 people from 2017 to 2019 travelled by bus and boat services provided by Portoferraio and Rio Municipalities within the CIVITAS DESTINATIONS project.

Dedicated data collection has also been carried out, in order to investigate passengers' satisfaction as well as weaknesses and strengths of the services. Passengers were asked to fill-in semi-structured questionnaires, providing quantitative and/or qualitative data.

The results of the surveys showed that the abovementioned additional services were considered very useful in order to avoid traffic congestions and parking problems, especially around the most popular beaches. The services resulted in successfully improving connections among some isolated areas (such as Bagnaiia or Cavo) and the city centres of Portoferraio and Rio, both in terms of the number of daily runs (considering both the conventional LPT and the additional ones) and of the possibility to reach the desired destination with a more direct line. Regarding the mini-ferry, in addition, people underlined the emotional aspects of the trip due to the wonderful view of the landscape from the sea.

Then, regarding the additional mobility services, another result is the good level of users' satisfaction, observed at a qualitative or quantitative level.

2.5 LIM 7.1 Improvement of PT routes, timetables, ticket procedure and bike transportation on buses to make the transport more attractive

This measure aims to provide a PT service that serves the needs of tourists and local people. Better designed routes and timetable adjustments ensure that the service is convenient and attractive to increase the number of PT users.

Outputs

There is a need to combine cycling with the use of PT by installing bike racks on buses and a surveillance system on the back of the bus in order for supporting the installed bike racks. The surveillance system installed after the guidelines of the Ministry of Communication, Transport and Works to ensure the safe usage of the bike racks at the back side of the buses. This will allow cyclists to combine sustainable mobility modes for their leisure trips and enable the combination of cycling and PT.

Furthermore, LTC will install a free wi-fi service on buses, to increase the satisfaction of passengers using PT and attract new users. The completion of the installation of wi-fi services on buses will be finalised by end of June 2020 due to the unexpected delays caused by COVID-19. The provision of Wi-Fi services allows and boosts the modernisation and the

upgrade of the commuting services in order for Limassol to become a “smarter city”. It will also work as a promotional tool for the already created and published Limassol Mobility Application (LIM 7.4). Moreover, a communication strategy has been designed for the promotion of the free wi-fi service, which included advertorials in hotel magazines and local media, communication material and billboards on buses.

Innovative aspects

The introduction of bike racks and Wi-Fi services on buses was an innovative solution for Limassol Region, as it was the first time that PT offers such a service for passengers. By the end of July 2020, LTC will create billboards, advertorials and communication material to promote the new services on Limassol buses.



Figure 8: Bike rack on buses

During the implementation of the measure, LTC faced some constraints with the installation of bike racks on buses. The installation has already been completed under LIM 7.1 and the problem was created while buses tried to get the MOT certificate. After further discussions with the Department of Road Transport the solution was found and LTC proceeded with the installation of 20 video cameras on buses. Stakeholder engagement helped the measure to be completed successfully as they gave guidelines and solutions for its accomplishments.

However, residents and especially tourists were very satisfied with the installation of bike racks on buses, as it is easier for them to combine in their leisure trips and cycling. On the other hand, the Wi-Fi services on buses make their transportation more comfortable and enable them to plan their next destination with the use of the internet and likely the usage of the Mobility Limassol Application created in measure LIM 7.4.

Stakeholder engagement

During the life cycle of the project, stakeholder engagement helped the measure to be completed successfully as they gave guidelines and solutions for its accomplishment. Furthermore, Limassol Bus Company and Ministry of Transport, Communication & Works worked very closely with LTC by providing permissions, availability of their buses and specific guidelines to materialise this measure. The Cyprus Tourism Organisation collaborated at the beginning of the project to change the timetable of buses to be more suitable for passengers.

2.6 MAL 7.1 Integration of ferries into the Public Transport

An integral aspect of the implementation of this measure was consultation with the key stakeholders where both the DESTINATIONS Project and sustainable mobility were promoted. This encouraged the Malta Public Transport (MPT) to launch a new circular bus route, initially planned to be piloted as part of the DESTINATIONS Project, linking the ferry landing site on each side of the Valletta peninsula to the main bus terminus right outside the city, as well as other points of interest and commercial hubs in central Valletta.

Outputs

In addition to this new route, which was launched in January 2018, the ticketing system has been included as part of the RFID card system operated by the public transport operator and includes ticketing options for the national bus network, the inner-harbour ferry services and the vertical connections from the ferry landing site on the other side of the city to Valletta centre.

In addition, during the project lifetime, further connections were launched. In January 2018, an electric trolley bus service was also launched. The fully electric, low-floor open passenger trolley has no fixed schedule, operates on demand, and is stationed right next to the point where passengers disembark the ferry. This service targets mainly tourists touring Valletta and the Three Cities.

Further to these independently implemented services, an Options Analysis and Cost Benefit Analysis were subcontracted to a team of experts. Through this exercise, a demand analysis for the coming 7 years, until 2025, was prepared and this was based on a number of reasonable assumptions. The analysis considered and enumerated the population of Valletta, tourists visiting Valletta via cruise liners, other tourists visiting Valletta as well as the demand created by additional ferry landing sites.

Results

The analysis presents the detailed options for the permanent connection in order to fulfil the needs of those who utilise the connection of the Marsamxett ferry landing site to Valletta city centre. After evaluating each option, the team of experts together with Transport Malta concluded that the best option for this project is the “do-nothing” option. Bearing in mind the existing connections, together with a number of other upcoming projects which are expected to increase the amount of available connections, the team felt that the demand of around 300 daily users with the 60 to 90 at peak hours, which are currently not catered for, will be adequately served through the upcoming projects.

During stakeholder consultation sessions, the need to refurbish a staircase connecting the ferry landing site with upper Valletta was indicated multiple times. The team prepared a plan for this and a full-costing analysis for future project funding opportunities. The aim was to improve the current infrastructure and identify ways to make this facility more easily accessible and safe for use by pedestrians. Such objectives will be achieved through the demolition of the current infrastructure and rebuilding a new staircase that is safer for end users.

In addition to the CBA and Options Analysis, two surveys; a telephone survey with residents of the Valletta Region, to understand their knowledge and use of the ferry system and

connecting PT options, and an in-person survey with users of the ferry service (both residents and tourists), were undertaken in August and September 2018 to understand the awareness and acceptance of the provided service.

Patronage data provided by the Malta Public Transport show a steady increase in users over the past two and a half years, with a peak in the summer months. This can be attributed to an increase in the number of tourists and increased use of the ferry, for which the connection has been facilitated by route 133. The increased usage is also due to increased visibility and promotion of the service.

The baseline and final surveys on awareness are however less conclusive. The telephone survey shows a decrease in the percentage of respondents that are aware of the service. However, the people asked in the vicinity of the service (on or near the ferry service it connects with) have become more aware, with the most observable increase in awareness observed amongst tourists. This could be due to better information provision online (e.g. tallinjaapp, Google Maps, MyMaltaPlan app), better information provision on-site (better signalling) and/or better information provision on-board the ferry. There is also an increase in respondents that have used the service, which can be potentially explained by the above mentioned information provision, as well as partly by the maturity of the service, since it has been in operation for a year longer, so more people (especially locals) have had a chance to use the service.

Learning points / Innovative aspects

It can be said that the ferry service at Marsamxett Harbour is underutilised and the current infrastructure does not support increased patronage due to the topography and the steep hill from the ferry landing site to the city centre.

The creation of inter-modal connections, facilitated through new public transport connections, is new to Malta and supports the shift from road-based travel to sea ferry travel.

Stakeholder consultation was given the utmost priority. This was in view of the fact that, during the project lifetime, Valletta was also the Capital of Culture in 2018. This has led to a flourishing of projects in preparation to this and also in the months following.

Close collaboration was necessary with the following stakeholders in preparation for the CBA:

- Transport Malta (various departments)
- Malta Tourism Authority
- Environment and Resources Authority
- General Retailers and Traders' Union
- Projects Malta
- Grand Harbour Regeneration Corporation

These consultations identified a number of projects being envisaged for the Marsamxett area, which are expected to increase the economic activity in the area, and consequently complement the permanent vertical connection, which is the focus of this report. Without such interaction with these stakeholders, it would have been difficult to have visibility of all current and planned projects in the area under study.

Of particular significance, was collaboration with The Grand Harbour Regeneration Corporation (GHRC) whose primary objective is that of implementing a number of projects to increase the value of our capital city and the complementary urban surroundings of the towns and villages that are located along the shoreline of the Grand Harbour. The GHRC's remit is to ensure that the Grand Harbour area, including Marsamxett, retains their distinctive quality, particularly due to their historical value.

2.7 Cluster analysis

Madeira and Las Palmas de Gran Canaria have been working to provide **better information and dissemination activities**.

Madeira is trying to make it more attractive for citizens and tourists through public transport campaigns fostering public transport in general, and Guaguas Municipales, through meetings and events involving stakeholders, citizens and customers is increasing the understanding of the benefits of the BRT and specially to explain to them how the BRT Works are running, how it affects their daily life, and what the plans are to make their life easier while the BRT is under construction.

Short videos, flyers and other kinds of material were produced in both cities to support these actions. Furthermore, both Madeira and Las Palmas de Gran Canaria have been very active on social media for more interaction with customers. In the case of Las Palmas de Gran Canaria, Guaguas Municipales has become a trending topic on the Twitter account in the Canary Islands thanks to its strategy based on communication and humour, attracting especially potential new young customers.

The results of these actions are increasing not only the number of customers of PT services but also an increasing awareness among citizens and tourists about public transport and sustainable mobility.

Madeira, Elba, and Rethymno have improved PT services through the **optimisation of routes, enhancement of bus stops and introduction of new vehicles in the PT fleet**. The measures of all sites within this task were strongly related with other measures located in other WP7 tasks, due to the improvement of PT needed the implementation of real time information systems or clean vehicles among other actions.

All sites have carried out surveys to tourists and PT in order to better know their needs, so they were able to establish an action plan based on what customers required.

In general terms, the **involvement and participation of stakeholders, customers, citizens and tourists was a key part of this task**, due to it allowing Municipalities and Public Transport companies to be closer to the real users, understand their problems and needs and work together to find solutions.

3 Electric, Hybrid and LPG Buses (and Eco-Driving) (Task 7.5)

3.1 MAD 7.1 Electrical vehicles and clean fuels for public transport and urban fleet

This measure resulted in the following **outputs**: demonstration program for electric vehicles in public transport fleets and produced reports; acquisition of 5 mini electric buses; eco-drive equipment installed in 20 buses and implementation of one eco-driving program; tyre pressure equipment installed in 50 buses; predictive monitoring system installed in 41 buses, and one demonstration exercise of photovoltaic power system installed in two buses.

Demonstration program for electric vehicles in public transport fleets

A demonstration program, coordinated by AREAM, with the support of DRET and HF, was planned to assess technical and economic feasibility of three 100% electric buses, from different sizes and capacities in Madeira and Porto Santo Islands, and studies were carried out:

- December 2017, e.City Gold, Caetanobus, low floor, 12m length, 88 passengers – tested in three public transport operators in Madeira and Porto Santo (HF, SAM and Moinho), in urban and interurban services. The study revealed that the bus is technically feasible, cost-effective, and environmentally advantageous in relation to diesel and natural gas fuelled buses and have suitable power and torque for the required level of demand.
- September 2018 and August 2019, Jest Electric, Karsan, low entry, 5,8m length, 22 passengers – tested in two public transport operators in Madeira and Porto Santo (HF and Moinho) and in a tourist transport service in Rabaçal natural reserve. The bus performed well in the tests run by HF, Moinho and in Rabaçal, demonstrating suitable power and torque and proving to be technically feasible.
- March 2020, AtakElectric, karsan, low entry, 8m length, 52 passengers – tested by PT operators in Madeira Island.



Figure 9: Technical visit to TUB, electric buses test.

All three buses performed the planned services well, demonstrating suitable power and torque for the required level of demand. The main limitations were the dimension and the distance of the chassis from the ground, which prevented its circulation on some roads, and consequently on some routes. The smaller vehicle with greater approach and departure angles, revealed to be a better choice to increase the diversity of services to be carried out.

The battery capacity was another limitation felt. In the acquisition moment it is necessary to consider increasing the battery capacity or adopting fast charging infrastructures in some terminals, or the combination of both, for the bus to operate continuously.

To disseminate the buses demonstration actions, public communication initiatives were carried out and buses were highlighted with images depicting a green urban environment and the DESTINATIONS project. To involve public opinion, free rides were opened to residents and tourist. In this scope, two promotional videos were developed and AREAM and HF participated in local TV shows. The videos were disseminated and promoted on the DESTINATIONS YouTube channel, AREAM's website and YouTube channel.

To improve knowledge about electrical technology, three technical visits were organised, involving local stakeholders, to visit electric bus manufacturers' facilities and buses in operational environment: BYD (China), June 2018; CaetanoBus (Portugal), October 2018; IRIZAR (Spain), November 2018.

Acquisition of 5 mini electric buses

In 2019, HF acquired five mini electric buses from Jest Electric, tested in Madeira under the demonstration program. Currently, the buses are covering a PT service that circulates in the core city, linking the historic zone to the touristic area. These buses revealed to be adequate to these sensitive areas where the environmental and noise impacts must be reduced. The acquisition was co-financed by ERDF (European Regional Development Fund).



Figure 10: Electric bus in the Port of Funchal

Eco-Drive system – Trakm8

Eco-drive systems were installed in 20 public transport buses. The system consists of on-board equipment to monitor drivers' behaviour, once it can determine fuel consumption. Following the equipment installation, followed 6 eco-drive training sessions for 200 drivers, to support and improve the implementation of the eco-driving program and involvement of 50 drivers in the monitoring system and corresponding follow-up of the drivers. The main goal of HF is to improve the performance of the drivers, having continuous drivers' training in eco-drive, to monitor drivers' actions in real time and with reports of the drivers' performance.

Tyre Management System – Continental

A tyre pressure management system was installed in 50 public transport buses. The system improves driving quality and safety of the passengers, bus performance and security, and to contribute to reduce costs and to increase energy efficiency of the PT operator.

Predictive Monitoring System – Stratio

A Predictive Monitoring System was installed in 41 public transport buses. The Stratio system collects and extracts insights from the vehicle's data in real-time and communicates failures before they happen. Real-time monitoring of the remaining useful life of parts and systems supports HF to prioritise repairs and anticipate breakdowns, making data-backed decisions that reduce repair and maintenance costs.

Although there are different factors that influence the **maintenance cost** of a bus, it was found that the **buses equipped with the tyre pressure management system and stratio had a reduction of 17%** (from 2017 to 2019). The total fleet had a reduction of 1% in the maintenance cost in this period, as a result of all activities implemented. Similarly, the bus consumption depends of many factors, but it was found that **the Euro II buses equipped with eco-drive system had a decrease of 4,8%**.

Demonstration of photovoltaic power system

In September 2019, two photovoltaic power systems were installed on the roof of two buses. The system was developed by SOLARBUS, in Norway. This system is very innovative and is in demonstration tests in operational environment (TRL7) in four demonstrating pilots in Norway, Denmark, Chile, and Madeira. For the first time is in running in South Europe, with different conditions of solar exposure and demand service, than the other sites.

The main objective of the demonstration is to evaluate the performance of the system in two buses with different demand services and routes, and assess gains like fuel reduction and solar energy production and store in battery. The installed systems, with 1,2 kW power, feed onboard auxiliary electrical equipment and charge bus's batteries, removing the overload of the motors by the alternators demand, and reducing fuel consumption.



Figure 11: Bus with photovoltaic power system

Data are being collected and analysed and a report will be ready in June 2020. According with the results of this demonstration, this can be a living-lab to boost the installation of similar systems on other buses or fleets, in urban and peri-urban areas.

3.2 LPA 7.2 Hybrid buses in the urban bus fleet

Guaguas Municipales, the urban PT company of Las Palmas de Gran Canaria, has a fleet of 242 buses with an average age of 10 years. Of those buses, 241 were diesel units and just one was a hybrid bus.

In order to reduce CO₂ emissions, fuel consumption, improve general air quality levels, contribute towards the reduction of congestion, and to promote sustainable mobility, Guaguas Municipales will acquire within the CIVITAS DESTINATIONS project three hybrid buses and one full electric articulated bus for urban PT services to replace the oldest diesel vehicles.

Outputs

Under the CIVITAS DESTINATIONS project, 3 hybrid buses have been in operation since August 2018 and 1 fully electric articulated bus (the first one in the Canary Islands) has been in operation since September 2019.

In the case of the hybrid buses which arrived in Las Palmas de Gran Canaria in 2018, a training course for maintenance staff and drivers was carried out in the first month. After that, the three buses started to run in operation in three lines that connect several attraction spots from the point of view of tourists and residents (lines 1, 2 and 17, all of them in the flat area of Las Palmas de Gran Canaria). In March 2020, most of Guaguas Municipales drivers have been trained in this kind of bus.



Figure 12: Hybrid bus (Vectia Veris.12)

Regarding the fully electric articulated bus, which arrived in Las Palmas de Gran Canaria in May 2019, a training course for maintenance staff and drivers was carried out in the first month. During summer 2019 (from June to September) and before being in operation with the general public, a testing phase was carried out in order to better understand the performance of the electric bus in the urban public transport network of Las Palmas de Gran Canaria.

Guaguas Municipales reached an agreement with the university and a group of electrical engineers to collect data about the e-bus testing phase in order to analyse the performance of the new e-bus, taking into account different scenarios (with/without passengers, flat lines, slope lines, with/without air conditioner, etc).

In September 2019, during the EMW, the electric bus started its operation stage, running especially in two of the main public transport routes of the city, lines 12 and 17.



Figure 13: Fully electric articulated bus (Irizar ie-Tram)

Learning points/ Innovative aspect

During the testing phase, some issues were faced, especially related to charging or traction process that were solved by the manufacturer. Furthermore, there were some other problems related to the performance of the e-bus when it was time to start driving on steep slopes that needed some software modifications to be solved.

Being in the Canary Islands (outermost region) has been a handicap from the point of view of maintenance issues and problem solutions, due to the fact that every time a problem appears, the timeline for reaching the solution extends (there are not enough trained staff in the Canary Island yet for this kind of technology, and sometimes it is needed to wait for an engineer or specialised staff to come from the mainland, plus spare parts need more time to arrive from the mainland, etc.), which makes the bus non-operative for more time than it should be.

Results

In March 2020, the kilometres run by each one of the three hybrid buses are 50.000 km (from August 2018 to March 2020), and the save on fuel consumption if they are compared with conventional diesel buses is about 22%.

3.3 RET 7.1 Introducing electric vehicle for PT

Rethymno introduced the first e-vehicles into municipal and PT fleets and by doing so, promotes the electromobility to citizens and visitors.

Outputs

The measure delivered:

- One mini e-bus, with a capacity of 23 people and accessible to people with disabilities, currently operated by the PT operator

- A new circular route, for the e-bus, to connect the city centre with the beach and bus station, serving both citizens and tourists
- A municipal e-car, to serve the operation of the Municipal Technical Services department and in parallel to function serving as moving advertising for electromobility
- Tailored designed signage and informative materials to promote the e-bus operation, e-mobility, and the green profile of the city, including new bus stops, informative signs with the route itineraries, and promotional self-standing boards
- Promotional campaign for electro-mobility, including public events, test drives, distribution of leaflets and postcards

This measure is really innovative, as Rethymno launched the first electric vehicles into the public transport and municipal fleet in the whole region of Crete. It is the first municipality at a national level to operate an electric minibus; the vehicle is suitable for circulation in the narrow streets of the historic centre and is accessible for all.

RET7.1 supports the uptake of e-vehicles in the municipality and region. Rethymno is the first city in Greece that provides zero-emission, free of charge trips for all, leading a good example for neighbour municipalities and other Greek cities. Visitors and citizens embraced this new service and the number of users is constantly increasing as shown by the daily monitoring sheets of the e-bus operation.



Figure 14: Municipal e-car and new mini e-bus accessible for all

Learning points / Innovative aspect

The bureaucratic procurement and licensing procedures caused almost one-year delay to the e-bus circulation launch. However, the enthusiastic acceptance of tourists and visitors was rewarding. The e-bus has drawn attention nationwide and acts as an example for replication for many Greek cities. The fact that the e-bus route has been finally undertaken by the PT operator supports the sustainability of the route after the project's end.

Results

Rethymno aspires to become a “green tourism destination”, and the uptake of electric vehicles into the public and municipal fleet is helping towards this path. Residents and visitors were involved in the definition of the e-bus route, discussing and “voting” alternative

scenarios during open-air interactive workshops. Tailored promotional materials are distributed to visitors through hotels, bus stations and tourism information points to promote its operation. The service was welcomed mainly by tourists, who benefit from the new circular route connecting the city beach with the city centre and the bus station.

The e-vehicle service procurement and the designated circular route was supported and approved by the Municipal Council.

The stakeholders involved in RET7.1 include the PT Operator (KTEL), the Municipal Tourism Office, the Hoteliers Association, the Chamber of Commerce and Industry, SYNPOLIS (the Association of Active Citizens), the Union of Rethymno's Old Town residents, the Travel and Tourist Agencies Association, and Tour Operators.

The effective cooperation with the PT operator was crucial for the operation of the mini e-bus. The PT Operator showed a growing interest in this measure and is going to continue the e-bus route service; and is currently examining the possibility to upgrade its fleet with the procurement of more clean vehicles. Rethymno Municipality also had a fruitful cooperation with the Hoteliers Association and the Travel and Tourist Agencies Association, which supported the launch and promotion of the new e-bus route by displaying and distributing promotional materials to their customers.

The association of Active Citizens SYNPOLIS is actively supporting the e-bus inclusion into the PT fleet and has proposed an expansion of the e-bus route to cover more neighbourhoods. The Association of Disabled People has welcomed the e-bus operation warmly as it provides an opportunity to disabled people to move around the city centre (the e-bus is designed for serving disabled people and has dedicated seats).

With today's knowledge, Rethymno would have more actively involved the PT operator into the measure's design phase; delays which occurred at a later stage with regard to the legislative procurement limitations could have been avoided. The leasing of the e-bus to the PT operator was a key achievement since this approach supports the continuation of the e-bus operation after the project ends, and allows the PT operator to test e-vehicles as a solution for more environmentally friendly PT services in the forthcoming years.

The promotion of e-mobility in Rethymno is the scope of a group of measures: RET7.1- Introduction of electric vehicles into the municipal and PT fleets, RET4.1 - Uptake of electric vehicles by fleet operators which result to the installation of the first public EV charging points in the region, and RET4.2 - Building a sharing mobility culture with the integration of new e-vehicles sharing schemes. E-vehicles is an infant market in Greece when the project started there was not even one e-vehicle circulating to the city, currently more than 10.

Several Greek municipalities contacted Rethymno to gain from its experience for three-car procurement and examine its replication in their cities. Since Rethymno Municipality is leasing the e-bus from the PT operator, this allows its familiarisation with this new technology and its benefits. Based on the experience gained, the PT operator is currently assessing the potential purchase of a 2nd electric bus. Following Rethymno's successful example, the Municipality of Heraklion announced the procurement of two e-buses (€748,000 investment).

3.4 Cluster analysis

Madeira, Las Palmas de Gran Canaria, and Rethymno have been **working to introduce free fuel buses into their public transport fleet.**

Furthermore, Madeira has tested several technologies for saving fuel such as eco-driving, pressure equipment and photovoltaic power system installed in two buses.

Madeira has acquired 5 mini electric buses and tested some other buses from different manufacturers, Las Palmas de Gran Canaria has purchased three 12 meters hybrid buses and one fully electric articulated bus, and Rethymno has involved the public transport company to acquire a mini electric bus for its operation between the city centre and beaches.

In Las Palmas and Rethymno, it has been the first time that electric technology has been introduced for public transport in each of the regions, so the CIVITAS DESTINATIONS Project has served as a lighthouse Project for other regional or following cities for action replication. Furthermore, in the three sites, **electric buses have been received by the general audience with enthusiasm**, so it makes it easier from the point of view of politicians not only from these three destinations sites but also for followers' cities to support the introduction of electric vehicles in public transport fleets.

From the point of view of operation there are some interesting findings.

Madeira tested three different buses (12 m e.City Gold Caetanobus, 6 m Jest ElectriKarsan bus and 8 Atak Electric Karsan bus) that performed the planned services well (suitable power and torque for the required level of demand), but with limitation in terms of autonomy (battery capacity) that requires increasing the battery capacity or adopting fast charging infrastructures in some terminals.

Las Palmas de Gran Canaria purchased a fully electric articulated bus to be tested on different lines (flat and hilly ones), to better understand its performance in the Las Palmas de Gran Canaria urban public transport network. Due to the fact that it was going to be tested on several lines, installation of fast charging infrastructures in some terminals was discarded so the bus was provided with extra batteries. Due to the extra load of the batteries, there were some other issues related to the performance of the e-bus when it was required to start driving on steep slopes that needed some software modifications in order to be solved.

From the point of view of maintenance and logistics, due to the DESTINATIONS cities being located on islands (in the case of Madeira and Canary Islands in outermost regions), there are some interesting findings. **Electric and Hybrid technology is not as developed for heavy vehicles as it is for commercial vehicles.** Being on Islands (especially in an outermost region) has been a **handicap from the point of view of maintenance issues** and problem solutions, due to the fact that every time a problem appears, the timeline for reaching the solution extends (there are not enough trained staff in the Islands yet for this kind of technology, and sometimes it is needed to wait for an engineer or specialised staff to come from the mainland, plus spare parts need more time to arrive from the mainland, etc.) which makes e-buses non-operative for more time than they should be.

4 Demonstration of Integrated Mobility and Tourism Information and Payment Service (Task 7.6)

4.1 MAD 7.3 Smart PT traveller information service and MAD 7.4 Public Transport open and smart ticketing system

The main goal of MAD 7.3 and MAD 7.4 is to perform the demonstration of advanced user information systems and ticketing and fleet control system, with special attention to impaired users. Both measures had a technological importance for HF, the PT operator, improving the operation through integrated solutions that included innovative equipment and software solution.

The main **outputs** are: 1 scheduling optimisation software, 57 buses with an integrated ticketing and the fleet control system, 5 photovoltaic information panels, 3 information monitors, and 1 system dedicated to impaired users (Next Stop Smart).

Before DESTINATIONS, HF operational systems had several constrains related to the outdated systems and to significant technical system failures, so it was urgent for HF to move forward with improvements to repair the systems somehow. These problems did not allow HF to develop new solutions for customers, for example mobile ticketing and promotional tickets campaigns.

Firstly, HF analysed all the technical requirements needed for a new integrated ticketing system and, in September 2018, an innovative pilot test in 15 buses was installed, which integrated the AVL (Automatic vehicle location) and ticketing system, allowing onboard ticket sales and fleet control system, all in just one piece of equipment (console). This integrated system simplified the on-board ticketing operation as it made it easier for drivers to sell onboard tickets, once it brought more reliable real-time information to customers and for planning and monitoring purposes. Another important benefit of this console is that it can be easily removed from the bus and changed to another one, which therefore avoids a bus being inoperative in case of the console's breakdown.

Systems		January 2017 - September 2018	October 2018 - December 2019	%
AVL	Nº of technical failures per month	1,5	0,9	-40%
	Time to solve (hours)	417	38,9	-91%
Ticketing	Nº of technical failures per month	6	5,87	-2%
	Time to solve (hours)	64,7	22	-66%

Table 2: Systems' failures before and after new onboard equipment installed

Considering the **results and achievements** with the solution, from one side, and given the constant constraints encountered with the tender process and recurrent problems with the in-house supplier for the complete ticketing system (MAD 7.4), HF decided to extend the successful pilot test from 15 to 57 buses. The extension to the 42 buses started in January

2020, firstly with the equipment instalment, followed by the software that is expected to be fully operational by July 2020.

All the knowledge regarding the ticketing system requirements collected with the development of MAD 7.4 were used to implement **a full ticketing system with the support of the European Regional Development Fund (ERDF)**.

Complementary to the integrated ticketing and AVL system, HF acquired the GIST3 System (Scheduling optimisation software for public transportation) in December 2017. The GIST3 is the base system where the operator defines the service (bus stops, bus lines, timetables), and then assigns the drivers (taking into account factors such as holidays and hours worked) and the buses with a connection to the maintenance service. This makes clear which bus is available. GIST3 produces new timetables and GTFS (General Transit Feed Specification). The new system has the possibility to be directly linked to the future ticketing system. It will allow the reduction in the current integration failures between the GIST, the intermediate system to support the exploitation and AVL and the ticketing system, and consequently, to reduce the manual interventions to correct the failures.

Keeping **special attention to impaired users**, in June 2020, HF will initiate the tests with a specific mobile app for mobility impaired users, including the blind and deaf, to provide them with better information services. The system establishes an automatic communication line without any intervention from the passenger. The system is divided into two subsystems complementing each other with the development of an app for android and iPhone systems. The main innovation of such a solution is related to the fact that it targets a specific user group (with sight and hearing impairments). In addition, it is a new conceptual approach since it is the first public transport operator in the Region to test a specific solution for impaired users.

Complementarily, HF also acquired 5 new **photovoltaic information panels**, which as well as having a modern design and an autonomous infrastructure, includes a photovoltaic solution to feed the equipment. The panels also take into account a new target group, the impaired users, as it includes mechanisms that facilitates the reading of information by people with disabilities, card reading, and a speaker is also incorporated. In addition, HF acquired 3 new public information monitors to provide better information to the passengers. Both solutions are foreseen to be available in August 2020. During the research phase to define the requirements for this information equipment, the local team contacted the Guaguas project partners.

Learning points / Innovative aspects

The implementation of technological measures faced difficulties at all levels, especially related to legal issues related with the tender process and problems with the ownership of the software. However, the lessons learned during this process were useful to define the requirements for the tender process for the new ticketing system, for example it was asked that the competitors send to HF with the proposals a kit of demonstration, so HF could be sure about the technology that it will purchase. Another important introduction in the tender process was the addition of high penalties if the system or equipment fails during the maintenance period.

4.2 LPA 7.3 Real time mobility and tourism information service

In March 2017, Guaguas Municipales installed 20 real-time information panels powered by solar energy at selected bus stops (after analysing the number of customers of the whole urban public transport network).

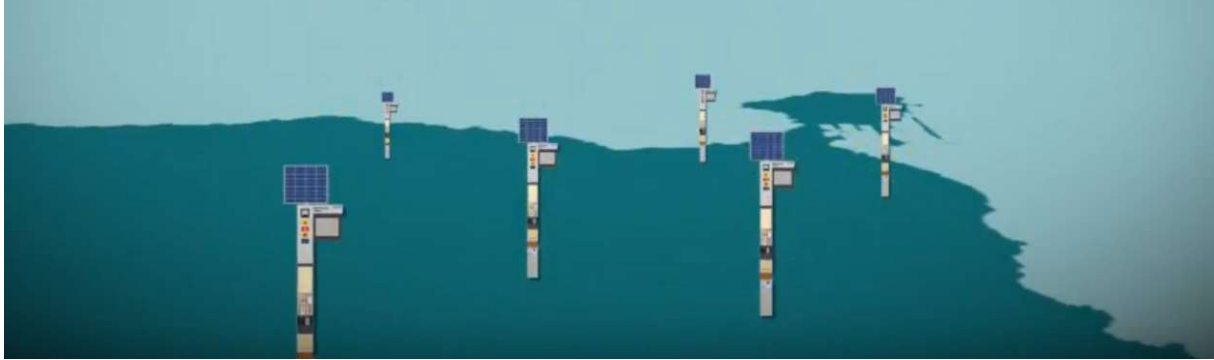


Figure 15: 20 Real-time information panels installed all over the city

Outputs

These 20 information panels are provided with new and innovative functionalities such as devices that allow customers to read the current balance of their contactless smart cards, and electronic devices to allow the visually impaired to have updated arrival times via a voice system.

Learning points / Innovative aspects

After a testing phase, and once the adaptability and performance of this new equipment was checked, due to the fact that the equipment is solar powered (which means that although the equipment costs are initially more expensive than conventional equipment connected to the electric grid), the final costs that include equipment, infrastructure cost and installation and permission times required for working on public streets made the solar powered option much more attractive and feasible.



Figure 16: Real time information panel powered by solar energy

In March 2020, Guaguas Municipales has already installed 74 real-time information panels powered by solar energy (20 of them under the CIVITAS project and 54 with their own resources). Furthermore, there are plans to continue increasing the number of bus stops that will be provided with this kind of technology.

In addition, the **Regional Government of Gran Canaria Island has installed over 100 more panels (with other resources beyond CIVITAS DESTINATIONS)** all over the island for the interurban public transport service. It could be said that CIVITAS DESTINATIONS has fostered the implementation of this kind of product that makes public transport more attractive not only in the city but also on the rest of the island.

4.3 LPA 7.4 Integrated payment solutions for mobility and tourism

This measure can be divided in two different tasks, acquisition, installation, and operation of payment equipment for the BRT, and touristic cards.

Acquisition, installation, and operation of payment equipment for the BRT

This task within LPA 7.4 measure will allow the purchase of two external vending machine as well as on board payment equipment.

To date, passengers can pay for urban PT trips by cash (directly to the bus driver) or they can acquire in advance one of the multiple Guaguas Municipales urban PT smart cards and validate them once on the bus. Nowadays, the validation equipment is installed next to the bus driver, so all customers have to get on the bus by the front door.

The main idea for the BRT (MetroGuagua), is that all customers will pay in advance (not only those customers with a smart card, but also those that pay by cash) and will be able to get on/off the bus by all the doors, regardless of the bus driver. These measures, together with traffic light priority, an exclusive BRT lane, and the alignment between BRT buses and bus stops, will allow the BRT line to be faster, and more efficient, punctual, and attractive for citizens and visitors. Guaguas Municipales will introduce and test two external vending machines before the BRT system is set up in Las Palmas de Gran Canaria.

The operation of payment equipment is a critical part of day-to-day urban PT operation and new equipment and software will be needed. Part of this new equipment will be tested on existing articulated buses in the Guaguas Municipales fleet to check the adaptability and technical communication between validation points and ticket machines. This will be done to avoid any problems related to payment equipment during the first stages of BRT implementation.

Two kinds of equipment will be purchased. The external ticketing vending machine that will be delivered by June 2020 and Smart card validation equipment.

Guaguas Municipales is joining efforts with another smart city project called “Inteligencia Azul” so smartcard validation equipment will be acquired based on its technical requirements. This part of the project has suffered some delays due to some problems to define and get a certification for the payment platform for the bankcard payment.

Touristic Cards

Tourism is a fundamental pillar of the Canary Islands' economy, and in the last years, Las Palmas de Gran Canaria has been positioning as a referent regarding to tourism, especially when it comes to cruise (565 cruise ships visited Las Palmas de Gran Canaria in 2017) and conference tourism.

To date, the urban PT service of Las Palmas de Gran Canaria has focused on citizens' and residents' trips without taking into account that tourism could have some special needs regarding urban PT.

For that reason, Guaguas Municipales enlarged its tariff offer to include new types of tickets focusing on tourism and leisure trips. The enlargement of the tariff offer especially focuses on those who come for a short visit (from one to three days) because the average duration of stays in Las Palmas de Gran Canaria is three days and many visitors stay just for one day (cruise passengers or visitors from other municipalities of the island, especially present in the south).

The Touristic Urban Public Transport Tickets are in operation since October 2018 and are sold together with an urban public transport map at tourist information offices, Guaguas Municipales commercial offices, as well as at some hotels and apartments.



Figure 17: Touristic Urban Public Transport Tickets

4.4 ELB 7.2 Integrated payment

In Elba Island there are few points of sale for public transport bus tickets since the various commercial activities do not consider this sale convenient. This puts many users in difficulty who cannot use public transport because they do not have a ticket, or they have to pay approximately 50% more if they buy it on board.

An alternative/complementary solution for the purchase of these tickets was therefore identified. The best solution was to develop the possibility of buying a ticket via SMS (with a dedicated App on smart phones) according to the different rates linked to the length of the trip. This solution was agreed and confirmed in the convention signed between the Municipalities of Portoferraio and Rio with CTT Nord in the context of the DESTINATIONS project.

Outputs

The SMS ticket payment for 10 and 20 Km (the most used in Elba Island) has been in operation since June 2017.

The SMS ticket payment (after considerable efforts by CTT to the telephone companies) for 30 and 40 Km has been activated starting from July 2018.

Results

Data related to the SMS ticket sales are related to the years 2018 and 2019, when this kind of ticket was available for all the distances, from 10 up to 40 km trips. A positive result has been registered: 954 SMS tickets were sold in 2018 and 1439 in 2019.

Learning points / Innovative aspects

The difficulty and innovation of this activity is the possibility of issuing the SMS ticket not for a fixed line but for the length of the line to be travelled, that is up to 10, 20, 30, 40 Km. Thus, it was more difficult to plan the various transitions between telephone companies and banks.



Figure 18: Advertising for the issue of travel tickets by SMS

4.5 ELB 7.3 APP for user real-time information

The AVM (Automatic Vehicle Monitoring) system is a tool widely used by transport companies both to control fleets and to provide users with information about the arrival of buses via a specific App and / or information panels. For small fleets (e.g. summer services, school buses, etc.) a "lighter" system is much simpler and cheaper which still manages to control the scheduled transport service and give the user information on the position of the bus.

The objective of the ELB 7.3 measure is the validation of the technical and operational viability of the adoption of a light AVM system (CELISO) completed with an innovative "knowledge-based" certification module, with supporting procedures for the validation of touristic bus services performances and with an App to provide real-time bus position.

Learning points

As mentioned above, the success of the measure is, in addition to the quality of the system performance, its simple application both in the design of the route and stops and in the use both by the bus driver and remotely by the technician of the municipality in charge of the control and the final balance of the journeys made. The very low cost of the necessary equipment (only a commercial tablet to be installed in the bus) also impressed the municipal authorities of Portoferraio and Rio who plan to use the system in future years for summer services and also for other winter services (e.g. on school bus services).

The CELSO system was also presented to the other municipalities of Elba that showed great interest in applying the system to their summer services for tourist transport.

4.6 LIM 7.3 PT traveller information system

In LIM 7.3, the deployment of an integrated telematic system with real time information was implemented with the preparation of a new procurement procedure for purchasing and installing the Displays on buses and at bus stops.

Outputs

The awarded company proceeded with the installation of: twenty five Electronic Bus stop Displays on buses to provide real-time information to passengers; the creation of a central system and the necessary software to provide the relevant information based on GPS sensors on the buses; twenty five onboard TFT Displays installed for location-based information inside buses, informing the PT users about the following stops, so that they (especially tourists) know where to get off the bus, the end of route, ticket purchasing, etc.; and finally, installed a content Management System in LTC' offices – a Back office Tool to provide information about POI (Points of Interest), nearby attractions and upcoming events. The system has been designed for both tourists and residents in mind, making their travelling around using PT more efficient in terms of time and comfort.

The system with the 25 Bus Stop Displays with Photovoltaic for PT installed in Limassol Region brings a new dimension into public transport information. The system is based on bi-stable technology, requires power only to update the information on display, and thus, its power source is a small solar panel adequate to achieve autonomy for many days (i.e. 72 hours of autonomy without backlight in the display and 1 route announcement when bus arrived) even in unfavourable solar radiation conditions. Bus stop displays are able to provide accurate information about estimated bus arrivals at the respective bus stops. This shall show the estimated time based on the information received from the PT telematics through SIRI. The Displays will show the information in two languages (English/Greek) and their interface is capable to show estimated time of arrival/departure in real time. The display also provides information regarding the route number, destination and bus stop name.

The onboard TFT Displays include a text communication provided by Content Management System, connecting route information in intermediate stops, multimedia content such as lines, routes, Points of Interest (POIs), stops, campaigns, logos, date/time, and route names and codes.

The Content of the On-board Display is automatically updated in two languages (English and Greek) and includes location-based information to the passengers. Additionally, it shows the

starting point and the origin of the bus as well as the next 4 stops with connecting route information.

The Display has been designed to show multimedia files for campaigns and Points of Interest (POIs), depending on priorities that will be provided through the content management system. The Content Management System shall be used for assigning multimedia content, configuration of the parameters for the multimedia and to send text messages to the on-board display and solar display. The Operator can use this application to inform passengers on buses and at bus stops for specific conditions such as traffic congestion.

Finally, an extra output of €150,000 ERDF funding has been secured and used to install 30 more displays, through the EY-KINISI project (Interreg V- A, Greece – Cyprus Program “2014-2020”), that gave an added value to the measure.

Learning points / Innovative aspects

Another innovative solution is the Web Content Management System. It is a web-based application that allows to configure parameters on the multimedia basis that needs to be shown on the on-board display. It allows to select specific contents in the on-board displays. Through the web content management system, all text messages and information can be uploaded to the displays either as text messages or videos/photos and allow for monitoring of the status of the communication. A campaign or event can be scheduled at a particular time and duration and uploaded to the displays of all fleets or selected vehicles.

Stakeholder engagement

During the four years of the project, stakeholder engagement helped the measure to be completed successfully as they gave permissions, specifications and a strong collaboration in order for the measure to be completed. Specifically, the Ministry of Transport, Communication & Works worked very closely with LTC by providing permissions, specifications in order the displays to be compatible with its system, and close collaboration with the awarded company for the good operation of the system. LTC and the Ministry of Transport, Communication and Works signed a memorandum on 19/8/2019 that includes this strong collaboration and for the future. Limassol Bus Company was a strong stakeholder as they gave the permissions for the installation of the equipment in its 25 buses. Finally, municipalities and communities of all Limassol Region were involved in order to give their permission for the displays to be installed at bus stops in their boundaries.

Results

After the installation of the 25 Displays with Photovoltaic at bus stops, LTC faced some technical problems due to heavy rain. Some of the Displays had problems with water damage but the awarded company found the solution, and they proceeded with refurbishment works on the flags and the replacement of the damaged components with available spare parts.

The measure was very well implemented and on time, although the difficulties faced at the beginning of the implementation with the lack of tender, the awarded company responded on time according to the timeline and immediately solved the problems created.

Residents and tourists are very satisfied with the displays installed because the information given is accurate.



Figure 21: Displays on buses and at bus stops/ web content management system

4.7 LIM 7.4 Mobility application and travel planner for smart phones to provide real-time information

The Mobility application allows travellers to determine the nearest bus stations, bike rental stations, bike sharing stations and electric car charging stations. It also provides options of cycling, walking, and hiking routes, with descriptions regarding distance, level of difficulty, kind of bicycle required and others. Information regarding points of access to the beach for disabled people and landmarks in the region are included in the application. Travellers are able to leave their comments and rating of the mobility products/services used for new users' advice.

Outputs

The application is available for iPhone and android free of charge and provides real-time information and a feedback option. In addition, the application was updated with new functionalities and connected to the National System with Real-Time information with extra ERDF Funding, of 40,000€ through the EY-KINISI project (Interreg V- A, Greece – Cyprus Program “2014-2020”).

Both residents and tourists can download the application and search for all the available information. The application is downloadable and user friendly for both smart phones and tablet users. The app is focusing on the effective use of sustainable mobility modes by both target groups (residents and tourists). More specifically, for residents, it enables people to plan their travel using PT and other sustainable mobility modes better, so as to include these modes in their everyday life and leisure trips. For the visitor, it is a tool to plan their travel around the city and the different attractions using sustainable mobility modes and therefore enriching their experience. Based on our data, currently 6.000 users have downloaded the application.

Furthermore, real-time information is provided regarding the nearest bus stations, airport shuttle service, intercity buses, urban and rural bus routes, itineraries and arrival times at the bus station, bike rental stations, bike sharing stations, and electric car charging stations. It also provides information and maps for cycling lanes and routes, walking paths and routes, and hiking paths and routes. Information provided includes descriptions regarding places of

interest along the routes (or nearby), distance, level of difficulty, kind of bicycle required, kind of equipment required if any, etc. The application features information on access points to the beach for disabled people.

Results

A communication Campaign and a Competition has been organised during February 2019 in order to create awareness and to increase the number of users; radio spots were broadcasted to promote the campaign and competition to the general public; Web promotional banners and articles were published to promote the Mobility Application; and a Google Play campaign delivered to increase users for mobile devices. **After the campaign, 4.840 people had downloaded the App.**

Stakeholder engagement

The key stakeholders are playing a significant role and more specifically the Ministry of Transport Communication and Works, department of Public Transport provided all the necessary information and mapping of Bus Stops. Limassol Municipality provided information concerning municipal parking, and accessible parking spaces for the disabled.



Figure 22: Mobility application and travel planner for smart phones to provide real information

4.8 Cluster analysis

Integrated Mobility and Tourism Information and Payment Service is the widest cluster within WP7 for the CIVITAS DESTINATIONS project.

Each of the sites has implemented their own measures based on their needs, and therefore a wide variety of actions can be found depending on the state of the art of the urban public transport status in the cities.

In this sense, in Madeira, Horários do Funchal focused its efforts on developing an integrated ticketing and fleet control system and the implementation of a real-time information system. Similar measures were taken in Las Palmas de Gran Canaria, where real time information equipment was installed at 20 bus stops and Guaguas Municipales has been working to update its onboard ticketing system. In Elba, a ticketing system based on SMS was developed as well as a fleet control system for Public Transport being put in place. In Limassol, real-time information equipment was installed in both, at bus stops as well as on board buses. An App was also developed for offering real-time public transport information to users.

Even though each city had their own needs in terms of Public Transport infrastructure or technological services, a **common need** can be easily identified for at least three sites, which was solved with the same kind of technology and has a similar impact in terms of public transport users' acceptance. It refers to the installation of real-time information equipment at bus stops. Madeira, Las Palmas de Gran Canaria, and Limassol have chosen **equipment powered by solar energy for the installation of real-time information**, which allows not only for cheaper and faster maintenance, but also faster, easier and more economical installation due to it not needing to be connected to the electric grid.