2020 CiViTAS
Cleaner and better transport in cities

DESTINATIONS

D5.1

Compilation of SULP Baseline

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Abstract

This document constitutes the deliverable D5.1 "Compilation of SULP Baseline" provided in Annex 1 of the Grant Agreement of the Project CIVITAS DESTINATIONS.

This document reports the SULP Baseline provides the characterization and diagnosis of the logistics system of the six sites involved: Funchal, Limassol, Las Palmas de Gran Canaria, La Valletta, Rethymno and Elba, which constitutes the reference situation. The logistics system baseline includes the identification of the main infrastructures, the political and regulatory framework, public and private stakeholders, the procedures and technologies used for transportation and delivery of goods, as well as problems, barriers and needs identified by the stakeholders.

This document also focuses on solutions that will be developed during the project, aiming to improve the efficiency of the logistics systems in the six sites, namely management optimization tools, municipal regulation, last mile delivery systems, shared freight distribution systems, cleaner transportations and fuels, logistics services for tourists, among others.

Project Partners

Organisation	Country	Abbreviation
HORÁRIOS DO FUNCHAL TRANSPORTES PÚBLICOS S.A.	Portugal	HF
AGÊNCIA REGIONAL DA ENERGIA E AMBIENTE DA REGIÃO AUTÓNOMA DA MADEIRA	Portugal	AREAM
CÂMARA MUNICIPAL DO FUNCHAL	Portugal	CMF
SECRETARIA REGIONAL DA ECONOMIA, TURISMO E CULTURA	Portugal	SRETC
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MEMEX S.R.L.	Italy	MEMEX
AUTHORITY FOR TRANSPORT IN MALTA	Malta	TM
VALLETTA KUNSILLI LOKALI	Malta	VLC
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MINISTRY OF TOURISM	Malta	MOT
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AYUTAMIENTO DE LAS PALMAS DE GRAN CANARIA	Spain	LPGC
INGENIERIA ELECTRONICA CANARIA SL	Spain	INELCAN
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CONFERENCE DES REGIONS PERIPHERIQUES MARITIMES D EUROPE - ASSOCIATION	France	CPMR
BEIJING UNIVERSITY OF TECHNOLOGY	China	BJUT

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1. Executive Summary

Deliverable D5.1 “Compilation of SULP Baseline” reports the outputs from T5.2 and T5.4 of the Annex 1 of Grant Agreement, which includes T5.2.1. “Logistics context analysis”, T5.2.2. “User-needs analysis for logistics demo services”, and T5.4. “Design of services and supporting technologies design for freight logistics pilots”. The Compilation of SULP Baseline also reports the outputs from T5.8. “Data collection for ex-post, process and impact evaluation for freight logistics services”, which includes the identification of impact and process evaluation indicators, in the scope of the ex-ante evaluation.

The document reports the work carried out by the six sites, Funchal, Limassol, Las Palmas de Gran Canaria, La Valletta, Rethymno and Elba, in the first 12 months of the CIVITAS DESTINATIONS project, under the 10 measures of WP5, which includes the SULP Baseline developed in measures MAD5.1, LPA5.2, ELB5.2, RET 5.1, LIM 5.1 e MAL 5.1, and the freight logistics pilot actions developed under measures MAD5.1, LPA5.1, ELB5.1, RET5.1, RET5.2, LIM5.2 and MAL5.1.

Deliverable D5.1 comprehends chapter 2 – Compilation of SULP Baseline and chapter 3 – Design for freight logistics pilots:

- Chapter 2 focuses on the SULP Baseline that provides the characterization and diagnosis of the reference situation of the logistics system of the six sites involved, which includes knowing the main infrastructures, the political and regulatory framework, public and private stakeholders, the procedures and technologies used for transportation and delivery of goods associated to logistics, as well as the needs identified by the various stakeholders.
- Chapter 3, which is based on the needs identified by the stakeholders, focuses on defining solutions to improve the efficiency of the logistics system, in the scope of designing new services and solutions for managing the distribution process of goods, including the design and functioning of solutions, stakeholder involvement, identification of support technologies and defining the implementation phases of the solutions.

The work carried out for Deliverable D5.1 is reported by the leaders of the measures, with contributions from the various partners involved.

2. Compilation of SULP Baseline

2.1. SULP Baseline Methodology

The SULP Baseline developed in the scope of Deliverable D5.1 was based on the methodology for a SULP elaboration, developed under the ENCLOSE Project, Energy Efficiency in City Logistics Services for Small and Mid-sized European Historic Towns, carried out within the IEE Programme, and published in the document Guidelines: Developing and implementing a sustainable urban logistics plan.

The SULP Baseline aims to characterize and diagnose the reference situation of the logistics system of the urban area of the cities and regions involved, which includes knowing the main infrastructures of the system, the political and regulatory framework, public and private stakeholders associated to the logistics system, as well as methods and technologies used for transportation and delivery of goods.

A study area is selected in the six sites involved, with high pressure on the logistics system, and for which a more detailed analysis is carried out concerning the main economic and social sectors generating the displacement of goods, the proceedings and technologies used and the energy and environmental impact of the goods transportation.

For the survey, statistical sources, existing political plans and previous technical studies are used and, to remedy the lack of information in some areas, questionnaires are carried out among the local stakeholders.

Knowledge on the logistics system and on how it functions, allows regional and local managers of the various sites to identify the main problems and needs, as well as to identify the existing barriers and opportunities to improve, and constitutes a starting point for stakeholder involvement and for the definition of actions and project implementation.

Each site involved is responsible for defining the level of detail required for the survey, as considered useful for the SULP development of its site.

2.2. Madeira/Funchal

2.2.1.1. Geography and population

The island of Madeira, with about 758.4 km^2, concentrates an enormous diversity of landscapes, vegetation, microclimates and traditions. Therefore, it has become a tourist destination of excellence, attractive throughout the year, thanks to the amenity of its climate and the wide variety of events promoted.

Throughout the island, there are mountains of high altitude. The slopes with steep slopes and deep valleys characterize the Madeiran landscape. Due to the irregular terrain, flat areas are very scarce.

Figure 1: Geographical position

The central massif that separates the north and south coast of the island determines its settlement and urban occupation. The southern coast, with a less rugged relief and more favorable weather conditions (less exposed to the prevailing winds and less rainy), presents more attractive conditions for the establishment of the population and the installation of economic activities.

Regarding the demography, in 2011, according to data from the latest census, Madeira had 267,938 inhabitants, an increase of 9.6% compared to 2001.

As for the Municipality of Funchal, in which occupies an area of 76.15 Km^2, distributed in ten parishes, where, based on the results of the 2011 Census, 111.892 inhabitants (about 41.8% of the population of the Autonomous Region of Madeira). Therefore, Funchal is the most densely populated municipality of the Region. This high population density is aggravated if we take into account that the occupation of the territory does not happen in a homogeneous way, that is, the settlement of the population is generally below 700 meters.

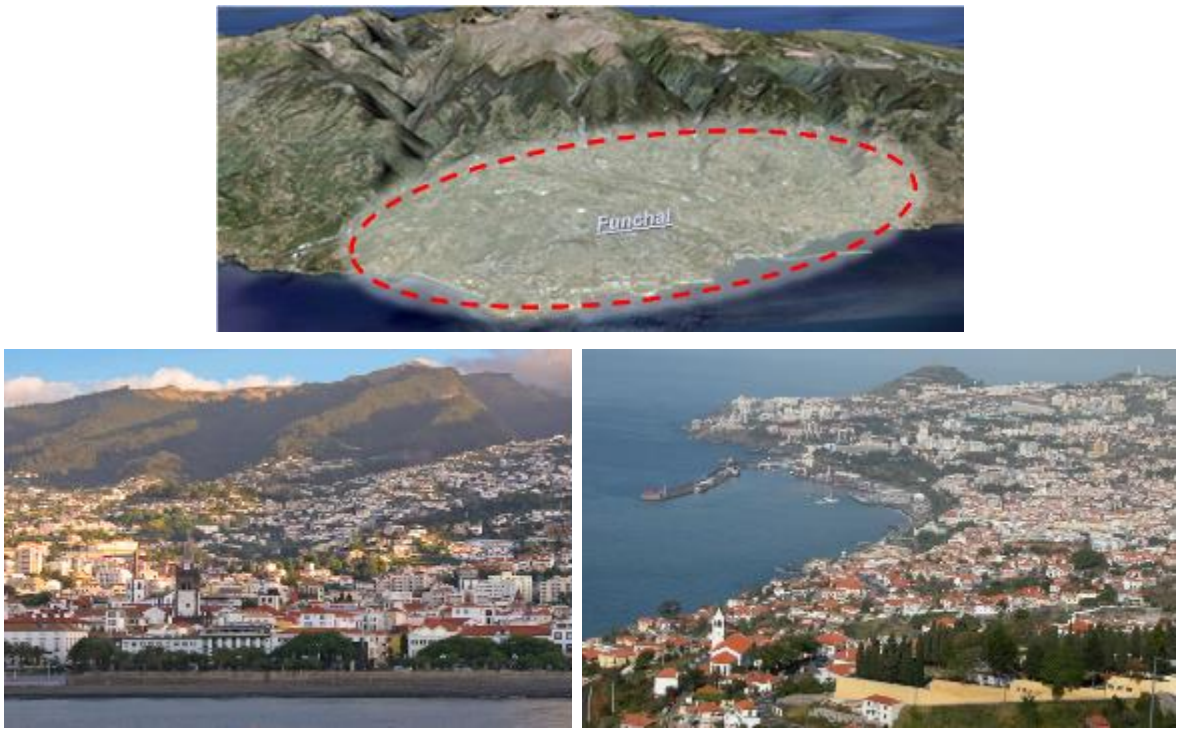


Figure 2: Funchal city, Municiplity of Funchal

Compared to 2001, the results of the 2011 census points to a growth of the resident population in the Municipality of Funchal (7.6%), which translates into 7,931 individuals.

	Residents			Families	Habitations	Buildings
	Total	Men	Women			
2001 (N.º)	103961	48497	55464	31648	39056	24956
2011 (N.º)	111892	52076	59816	39940	52115	29243
Variation 2001-2011 (%)	7,6	7,4	7,8	26,2	33,4	17,2

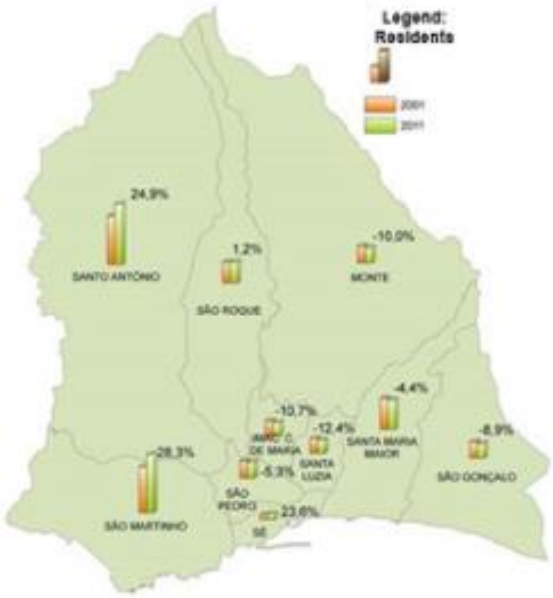


Figure 3: Demographic evolution in Funchal (2001-2010)

Its insularity presents additional challenges for the Region in terms of transport and accessibility, and this is a major challenge, since it involves a permanent effort to annul the isolation and maintain constant links with the outside world. However, it also presents opportunities, since the islands have a strong attraction and the tourist potential, among others, is valuable.

Transport plays a fundamental role in the economic and social development of both Madeira and Funchal. The mobility of the population and the movement of goods and merchandise contributes to the dynamism of the economy and to the competitiveness of companies, with repercussions on the quality of life of the population.

Over the past two decades, benefiting from Community funds, Madeira has implemented an important set of transport infrastructures. At the level of road accessibility, it is worth highlighting the implementation of a road network that has significantly improved the internal accessibility, reducing the times of connection between municipalities and promoting the emergence of new centralities.

2.2.1.2. Mobility and traffic

The urban network is macro cephalous, where Funchal occupies the top of the hierarchy and maintains its hegemony. However, thanks to the new road infrastructures, the complementarity between this city and the surrounding urban centers has increased and the urban network has become more cohesive, making it possible to distinguish a more dense and continuous urbanization.

The results of the 2011 Census show that the inflows and outflows of the population are quite pronounced in the municipality of Funchal. Due to work or study, the population that enters the municipality represents about 24.5% of the resident population. Conversely, the population leaving Funchal represents only 6.6% of the residents.

The 2011 census also revealed that in the municipality of Funchal, more than half of the resident population that exercises a profession uses the light motor vehicle as a driver in its commuting movements (53.24%). 22.16% of the residents uses the public transport while 11.11% of the population travels on foot to the workplace.

Following the trend, in the last 10 years, the number of cars in Funchal has increased by 18% while the number of motorcycles increased by 75.3%. Residents in Funchal own about 44% of the regional car park. The motorization rate of the resident population in Funchal was estimated at 430 vehicles/1000 inhabitants in 2015, slightly lower than the national average.

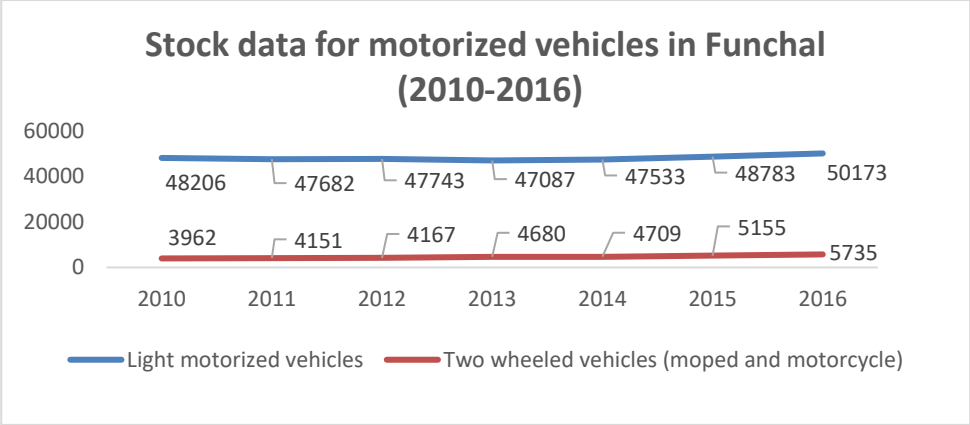


Figure 4: Evolution of car park in Funchal (2010-2015)

Regarding the number of entrances within the city core, according to the traffic counts, it was estimated that per day, more than 51.000 motorized vehicles enters the city core.

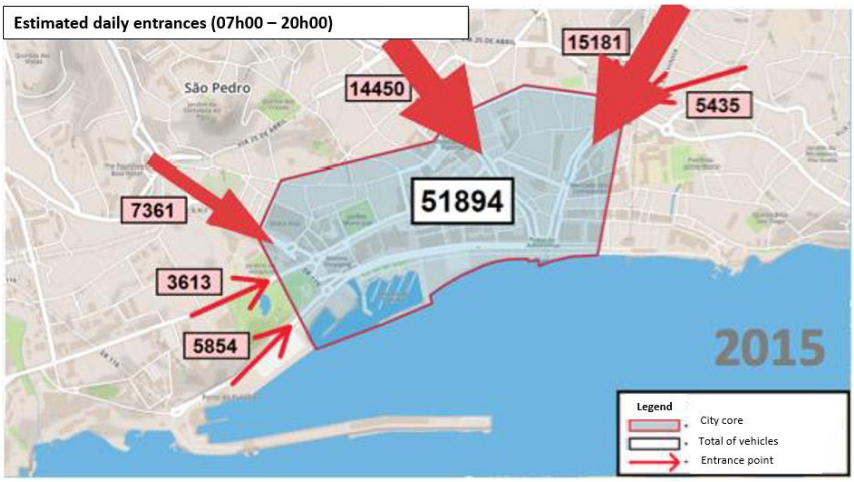


Figure 5: Volume of motorized vehicles - estimated daily entrances in the city core (7h00 - 21h00)

The structure of the existing transport system in the municipality has some problems that interferes with the system of accessibility and mobility of vehicles and pedestrians. The points below shows the diagnosed problems identified at a municipal level:

- Congestion/volume of traffic in the historical center of Funchal (mainly at peak times, taking and leaving passengers);
- Convergence of road traffic in specific roads;

- Structure of the road network (dimension, slope, paving);
- Pedestrian mobility (inclination, type of pavement, discontinuity);
- Lack of information for accessibility to different areas;
- Lack of connectivity of the pedestrian network;
- Accessibility to different types of infrastructures (public buildings, social and health services);
- Insufficiency of the public passenger transport system (urban and interurban);
- Excessive concentration of passenger transport vehicles on specific roads;
- Absence of bus lanes dedicated to public transport;
- Poor freight transport system in the city center;
- Irregular loading and unloading actions (outside authorization period, unauthorized places);
- Excessive street parking in the center of the city;
- Irregular parking in charging areas (non-payment and / or parking in an inappropriate place);
- Inadequate traffic light system;
- Absence of an effective and efficient system for monitoring and monitoring the transport system and mobility.

2.2.1.3. Energy consumption and CO_2 emissions in the transport sector

According to the SEAP (Sustainable Energy Action Plan) for the Municipality of Funchal, there was a 18.1% reduction in CO_2 emissions between 2010 and 2015.

The commerce and services sector continues to be primarily responsible for the CO_2 emissions due to the large share of electricity in this sector, accounting for about 36.5% of CO_2 emissions in the municipality. As the transport sector, although it maintains the second pollutant emissions source, the CO_2 emissions showed a reduction by 19.6% as a result of a decrease in consumption for fossil fuels. However, between 2013 and 2015, this reduction was only of 2.7%.

The increased use of solar energy in the residential, commercial and service sectors, and industry, mainly for water heating and environmental heating, also contributed to the reduction of verified CO_2 emissions.

Sustainable indicator	2010	2013	2015	Variation 2013-2015 %	Variation 2010-2015 %
CO2 emissions per capita [t/hab]	4,61	3,96	3,78	-4,7%	-18,1%
CO2 emissions per sector [t]					
Residential	98 470	87 349	83 209	-4,7%	-15,5%
Municipal services	4 443	4 151	4 035	-2,8%	-9,2%
Commerce and services (non municipal)	200 106	176 961	162 002	-8,5%	-19,0%
Publich Lighting	12 806	12 080	10 310	-14,6%	-19,5%
Transportation	179 801	148 542	144 483	-2,7%	-19,6%
Primary and secundary setor	19 967	14 522	18 391	26,6%	-7,9%

Figure 6: Variation of CO_2 emissions in Funchal

As for the energy consumption in the municipality of Funchal, there was a 13.9% drop in the final energy demand between 2010 and 2015, with a slowdown between 2013 and 2015, with a minimum reduction of 0.1%. Analyzing the evolution of energy demand between 2010

and 2015: gas oil fell by 23.3% and gasoline decreased by 10.4% while the demand for electric energy fell by 7.9%. As for the share of renewable energy resources in the final energy demand increased from 1.6% in 2010 to 4.1% in 2015, which contributed to a 55% increase in solar energy consumption in the residential, commercial and services sectors and industry. The use of LPG in transport between 2013 and 2015 (the use of LPG in transport started in 2013) saw a 564% increase in demand. Regarding the evolution of energy consumption by sector, between 2010 and 2015, it should be noted that all sectors have reduced their consumption, especially the transport, commerce and services sectors, public and residential lighting, with reductions above 11%.

Municipal services which, in this period, showed a 3.4% reduction in energy consumption, nevertheless increased between 2013 and 2015 by 4.7%, which was mainly due to the administrative transfer of four treatment plants from wastewater to municipal services. Regarding the primary and secondary sectors, there was a 42.9% increase in energy consumption between 2013 and 2015. It should be noted that these sectors were the ones that presented the greatest reduction in energy consumption (32.1%), between 2010 and 2013, following the economic crisis that was felt at the time, with direct implications for the economic revitalization of these sectors and, consequently, for energy demand. After 2013, the revitalization of these sectors brought a significant increase in energy demand, respectively, 53% in construction, 51% in the primary sector and 31% in industry.

Sustainable indicator	2010	2013	2015	Variation 2013-2015 %	Variation 2010-2015 %
Final energy consumption per capita [MWh/hab.]	12,1	10,47	10,46	-0,1%	-13,9%
Final energy consumption per capita [MWh]					
Residential	232 304	206 945	205 276	-0,8%	-11,6%
Municipal services	7 630	7 036	7 370	4,7%	-3,4%
Commerce and services (non municipal)	361 734	310 029	312 154	0,7%	-13,7%
Publich Lighting	19 282	18 301	17 127	-6,4%	-11,2%
Transportation	686 535	593 997	577 793	-2,7%	-15,8%
Primary and secundary setor	51 662	35 084	50 126	42,9%	-3,0%

Figure 7: Final energy consumption in Funchal

2.2.1.4. Policies and regulation framework in logistics

City centers have been going through an increasing loss of vitality, partly resulting of a lack of a distribution for urban goods. While traditional forms of intervention reveals themselves unable of dealing with these questions, logistic systems and new practices of urban distribution management are emerging as a more effective answer to ensure the maintenance and the development of the activities that contribute both to city centers dynamism and to the enhancement of urban environment.

Urban logistics is a concept that sums up a set of functions which, by adding value to the simple transport of goods, includes, for example, deliveries and collections of goods in urban centers, also involving storage activities, stock management, waste collection and home delivery services, functions within the framework of environmental quality improvement policies. As part of the wider context of the freight transport system, urban logistics should not be considered in isolation but related to the distribution system of the urban context in question.

Cities are today the main consumers of goods and services, with freight transport accounting for about 10 to 18% of total urban traffic, generally corresponding to the distribution of small cargoes, which involves frequent trips, causing negative impacts on the urban environment and a deterioration on quality of life. On the other hand, commerce development will only become possible if it is based on a sophisticated logistics organization. The definition and preparation of urban or periurban spaces for the location of logistics platforms, whether macro or metropolitan in scale, whether micro or local scale, should be a central concern of future municipal performance.

Load and unload operations in city centers are hardly able to regulate only with the instruments of the past decades - traffic rearrangements (directions of movement) and consequent increase of short parking spaces, rush hour times but do not coincide with the trading hours, dedicated but permanently occupied places with parking, etc.

In the case of Funchal, the city suffers under the steadily increasing traffic caused by supply of shops and business, as well as by transport of large shipments. The increase of supply and freight services, reflects an increase in pollutant emissions and illegal parking, aggravating the pedestrian circulation, in particular the tourists.

Currently, there aren´t any legal framework regarding freight logistics in the Municipality, which leaves all the logistics to be done by the private sector distributors. Although parking places geared towards load and unload operations are regulated by traffic signs that were deployed according to the national framework the lack of regulation is severely hampering the distribution process. Therefore, there is the need to reinforce the legislation, introducing new legal tools.

2.2.1.5. Main infrastructures for logistics

Logistics platforms are the most important infrastructure to plan and organize the dispatch/receipt of flows of goods with origin/destination outside a territory.

The advantages lies in the possibility of optimizing the processes of distribution/collection of loads while reducing costs associated with the transport chain. In theory, the location of a logistics platform will generate so many more benefits the closer it is to the consumer centers. Under these circumstances, the many flows of small loads travel shorter distances while the connection to large transport terminals (port, rail, and airport) is carried out on larger vehicles and less movement.

The consolidation and deconsolidation of groupage cargo on Madeira Island took place until the entrance of the Caniçal Port in 2005, in warehouse-type spaces around Funchal, where the commercial port of the Autonomous Region of Madeira was located.

In addition to the relative location between the consumer center and the large transport terminal, due to operational and accessibility issues, logistics platforms must be deployed on flat and wide terrain in order to allow cargo handling in an efficient way. On the island of Madeira, characterized by a very rugged terrain, this condition is not easy to meet. In addition, in the area of Funchal and the surrounding area, the main consumer center of the island, the less sloping terrains have long been inevitably occupied by buildings and various constructions, remaining the steepest terrain in whose construction is

not only more costly but also becomes more vulnerable to natural hazards. To that extent, it was necessary to find a compromise between the availability and suitability of the deployment space and the proximity to Funchal. In the last years, two logistics platforms have emerged in the adjacent municipality of Santa Cruz located in the western part of the island.

Figure 8: Geographical localization of the freight terminal and freight operators in Madeira

The main distribution operators are Loginsular (2010) and Logislink (2012), which are about 7 km from Funchal and about 23 km from the Port of Caniçal, whose entry into operation has allowed rationalizing the circuits of distribution of consumer goods leading to a qualitative leap in performance in terms of efficiency. Both platforms offer specialized services covering a range of transport and logistics solutions, especially in the sensitive segment of perishable food products.

Considering the strong adhesion of traders and transporters of the Region to the solution of the logistics platforms, it is admitted that there is room for other business initiatives based on the creation of a new logistic platform.

2.2.1.6. Stakeholders and roles in the logistics sector

Given the geographic localization of the island, many logistic companies provide services through sea and air. However, only the terrestrial transportation will be considered in agreement with the scope of the CIVITAS DESTINATIONS project.

Stakeholder	Role
SRETC – Secretaria Regional de Economia, Transportes e Cultura	Government entity responsible for handling issues related with regional economy, transports and culture.
DRTT – Direção Regional dos Transportes Terrestres	*DRTT* is the department of the Regional Government of Madeira that implements the regional policy to be developed in the land transport and road transport sector, namely in the planning and management, development, control and supervision of transportation systems.
ACIF – Association for Commerce And Industry in Funchal	*ACIF-CCIM* is a non-profit private legal entity, which, as a business association, represents the companies that carry out their activity in the areas of Commerce and Services, Industry and Tourism. Therefore, its responsibilities are broadened, requiring more general interventions at regional level.
Horários do Funchal, Transportes Públicos, S.A	The main public transport operator in Funchal.
CTT – Correios de Portugal S.A	Provides services related with the distribution of mail, courier services, urgent mail, and merchandise.
SDIM - Sociedade de Distribuição de Imprensa da Madeira	Logistic company that provides services for press distribution.
Logislink	Execution in terminal of logistics, of operations of formation and decomposition of units of load, grouping, storage and delivery and complementary operations, including the provision of technical advisory service for the management of companies.
MRW – Transporte Urgente	MRW is a company that deals in shipping goods for national and international shipments. They operate in logistic platforms in several countries.
Loginsular	Launched in 2010, Loginsular is a company specialized in logistics, distribution and transportation of food products.

Table 1: Description of potential stakeholders

2.2.1.7. Systems and tools for logistics management

The logistic plan that will be undertaken will address the most suitable technology to improve the logistic process within the municipality of Funchal and thus provide economic, environmental and energy benefits. This stage will be further addressed in the freight logistic pilots section.

2.2.2. Study area characterisation

2.2.2.1. Selection of study area

The pilot area in which the freight logistic system will be tested was already identified. The measure will focus in an area that concentrates several commerce activities, which

motivates a significant pedestrian volume. The proximity of several load and unload areas is also a key factor in which it is expected that the implementation of the SULP will also provide a reduction in the average permanence time in loading and unloading operations.

The study area identified below encompasses several streets such as João Tavira (131 meters), Queimada de Cima (141 meters), Queimada de Baixo (141 meters), Bispo (157.8 meters), Padre Gonçalves da Câmara (62 meters) and south segment of Ferreiros (112 meters), including Largo do Município (102 meters). It is an area that has a very consolidated edification level, accommodating mainly activities for commerce and services. As far as its road configuration is concerned, these streets, except for Largo do Município, are closed to traffic (although it is allowed to access between 8 pm and 10 am) and the respective roads were the subject of a gradual process of pedestrianization that began in 1992.

As far as the transversal profile of the streets is concerned, the width between the streets varies between 3.50 meters (intermediate section of Rua da Queimada de Baixo) and 6,77 meters (Rua dos Ferreiros). In the surrounding area, there are several parking spaces reserved for loading and unloading operations.

Figure 9: Target area in Funchal for MAD 5.1 (evaluation process)

2.2.2.2. Freight and logistics regulation

The center, as a privileged area for commercial activities and services, presents permanent supply needs, however, some obvious inefficiencies in the supply and distribution of goods, have led to the progressive implementation of parking spaces for loading and unloading operations. The operations for loading and unloading are carried out on the road in spaces marked by the traffic signaling national regulation, (No. 22-A/98). The horizontal signaling is complemented by vertical signaling (C16) and an additional panel indicative of the time in which the loading and unloading operations are allowed to take place.

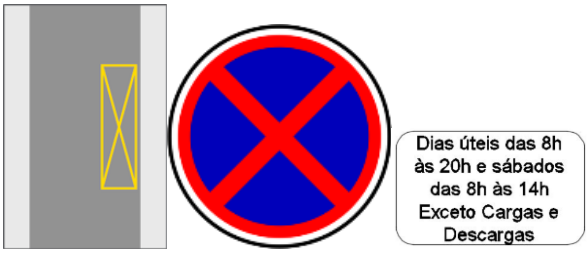
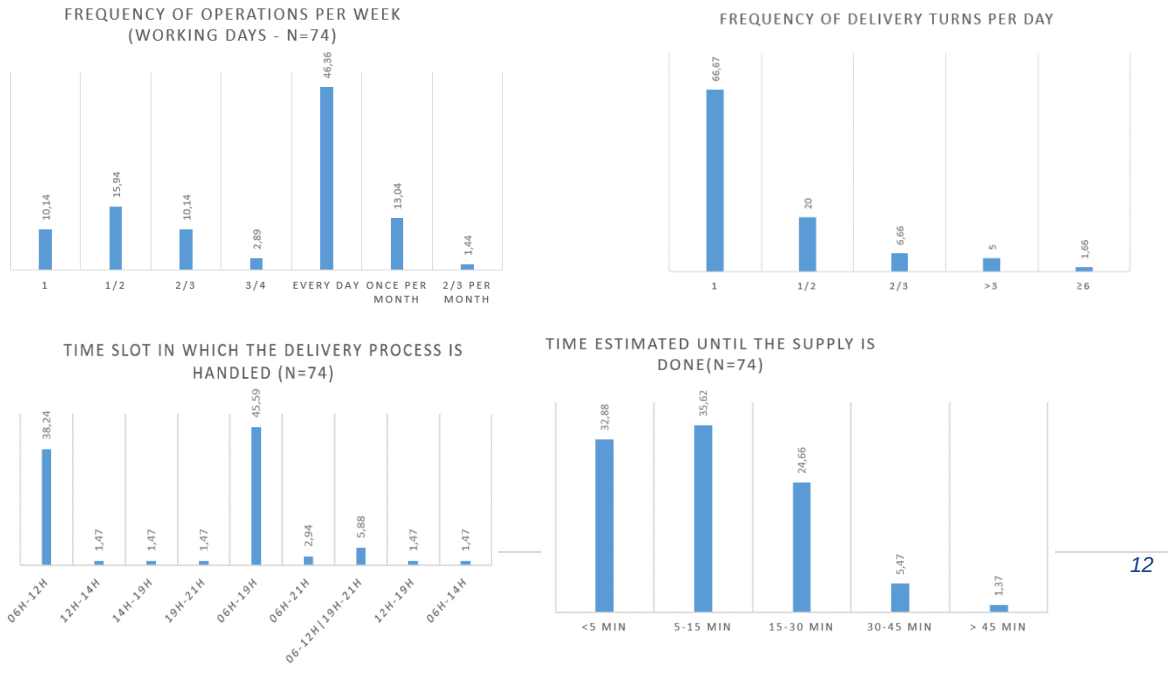


Figure 10: Example of traffic signs and road markings used to identify dedicated parking spots for load and unload operations (M14a; C16 and Model 7d, according to the national rode code)

Currently, there isn´t any regulation aimed at freight logistics management, except for the one within the national code for road traffic that states that only vehicles that are conducting load and unload operations are allowed to use these parking spots (article n.º 50, point f). Nevertheless, it is relevant to highlight that frequently, the parking spots are occupied by light passenger vehicles, hampering the distribution process. The need to develop a municipal regulation to guide the loading and unloading operation is a decisive element for the capacity building of the actions recommended in measure 5.1. The terms in which the regulation will be drafted is further described in the freight pilot action.

2.2.2.3. Logistics services

In order to clearly identify the logistic needs within the target area, a survey was geared at local traders (N=74) to assess several patterns. The most important lessons to be learned are that the vast majority (46.7%) supply every day at least once (66.7%). 38.2% of the deliveries are handled between 6:00 a.m and 12:00 a.m. and 45.6% between 6 a.m. and 7 p.m. With regard to loading and unloading operations, most traders reports that the average of their supplies falls between less than 5 and 30 minutes, with 32.8% reporting less than 5 minutes, 35.6% between 5 minutes and 15 minutes and 24.7% between 15 minutes and 30 minutes. The urban morphology in the study area is not an obstacle to the optimization of logistics according to merchants (71.3%), who point out that factors to be improved should be taken into account, such as the expansion of areas dedicated to load and unload operations (48.4%) and access to more flexible roads (19.4%). In terms of acceptance, 47,3 of the inquiries are satisfied with the current distribution process.



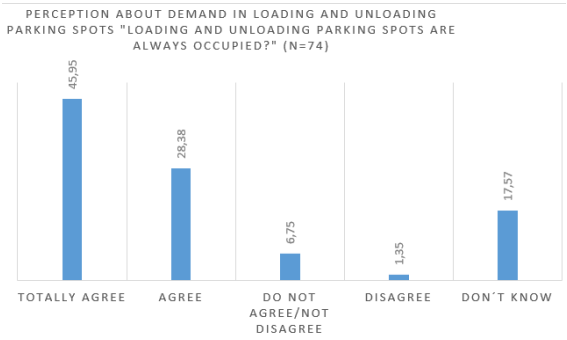


Figure 11: Main findings regarding the survey geared at local traders within the target area for the evaluation

2.2.2.4. Characterization of logistics flows

Notwithstanding the fact that the area under study has a consolidated pedestrian network, with no roads intended for road traffic, the profusion of commercial and service activities, lead to frequent loading and unloading operations, in order to guarantee supplies. The surveys along with the traffic counts revealed a supply service with distinct patterns, related to the nature of the product and its perishability.

The road system that circumscribes the study area offers a reduced flexibility for loading and unloading maneuvers, which is only authorized between 8 pm and 10 am. For loading and unloading operations, there are also 5 places in the surrounding area, identified (A-B) in the following picture.

Figure 12: Parking spots dedicated to load and unload operations in the surroundings of the target area

In order to better understand the pattern flows of these operations, several data was gathered, that also supported the ex-ante evaluation process. During the traffic counts, 4 entrance points were considered, in which the majority of the vehicles accessed the area the in target point 1 (28,3%) and 3 (28,7%).

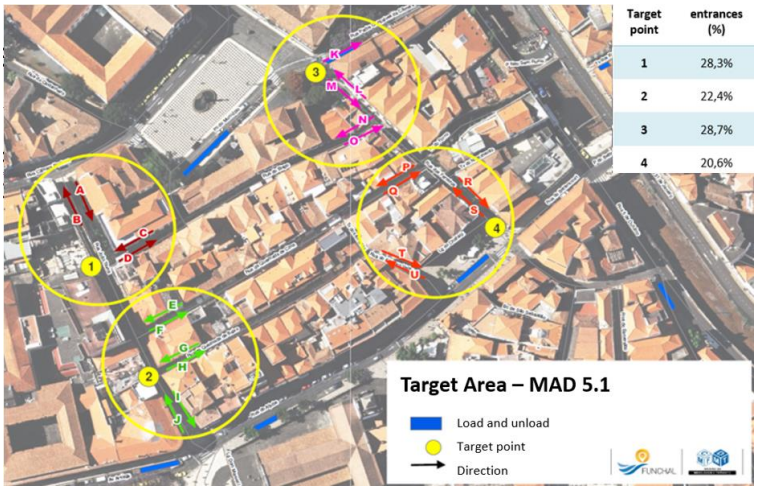


Figure 13: Distribution of entrance points and traffic dynamics within the target area

Regarding the demand in the load and unload operations within the area, identified in the parking spots A-E, it was estimated that at least 25% of the vehicles are parked in these reserved areas for more than 1 hour.

Time (minutes)	<30	30-35	>60
Vehicles (%)	55%	20%	25%

Table 2: Permanence time in the dedicated parking spots for load and unload operations

Due to the exiguity of the streets, the drivers showed some difficulties in manoeuvring the vehicles, creating constraints in the pedestrian circulation whilst damaging the pavement.

Figure 14: Photos that shows the difficulties in the manoeuvring process

2.2.2.5. Energy and environment aspects

Obtaining data regarding energy and environment is crucial not only in truly assessing the impacts of the logistic service upon the environment but also in reinforcing the communicational approach that will be engaged towards local traders. This set of indicators

refers to the environmental analysis, resulting from the traffic flows for loading and unloading operations in the targeted area. In order to estimate the pollutant emissions, traffic counts were carried on within the target area from 6 am to 10 am in which the volume of vehicles were recorded, as well as their type. The extension (km) travelled for each vehicle was also assessed. Following the gathering of this data, the information was then uploaded to *Copert*, an emissions simulator to assess the levels of CO, NOx, CO_2 and PM 10/2.5 emitted within the target zone. The methodology used as well as the parameters are described in detail in the evaluation sheet1.

Regarding the composition of the fleet, it should be noted that the most dominant type of vehicle refers to light commercial vehicles (78.6% ((44)). It should also be noted that no less polluting vehicles are used in the supply process, all of which are powered by fossil fuels. As far as distance travelled, only the extension within the study area was considered. In the target area, it was concluded, calculating the distances of the segments of the roads, that the vehicles cover 13.750 km daily, which results into significant emissions of pollutants and noise, when considered for a medium-long time period. Thus, in general and by aggregating the pollutants mentioned below (CO, NOx, CO_2, PM10 and 2,5) daily, vehicles that charge and discharge the area of emission emits 967.91 g/km of pollution.

		Diesel		Petrol		**Total**
		Passenger Vehicles	Light commercial Vehicles	Motorcycle	Light passenger	
Vehicles	Number	9	44	1	2	**56**
Distance travelled	Daily	2316	10312	374	748	**13750**
	Monthly (22 days)	50.952	226.864	8.228	16.456	**302.500**
	Annual (264 days)	611424	2722368	98736	197472	**3630000**
Pollutant (per vehicle and type)	CO (g/km)	0,21	0,65	1,8	1,47	**4,13**
	NOx (g/km)	1,03	1,36	0,17	0,1	**2,66**
	CO_2 (g/km)	237,51	344,79	61,98	316,43	**960,71**
	PM10 (g/km)	0,06	0,12	0,02	0,02	**0,22**
	PM2,5 (g/km)	0,05	0,11	0,02	0,01	**0,19**
	Total (g/km)	**238,86**	**347,03**	**63,99**	**318,03**	**967,91**

Table 3: Estimation of pollutants emission (g/km) per type of vehicle in the target area

2.2.2.6. Main needs and problems in Logistics

The multiplication of flows in the city, associated with the increase in the rate of motorization, the hypermobility of the economic agents and the diversification of the locative logics of the activities causes an intense and multidirectional traffic that the urban structure does not have the capacity to support leading to dysfunctions in the economic systems (time constraints, reduced productivity, delayed deliveries, increased energy consumption, etc.)

[1]https://docs.google.com/spreadsheets/d/1W1EXpjIau3Kn2tYU1C5r8pFqESXTXpowb2fQcpyhut8/edit#gid=813460689

and urban (congestion, parking shortage, loading/unloading difficulties, noise and atmospheric pollution, etc.).

Traditional policies affecting traffic conditions, schedules and loading/unloading sites have proved to be insufficient to solve these problems. Urban logistics emerges as a strategic concept, capable of giving relevant contributions, and there are already several experiences in European cities.

Difficulties in handling the urban flows of goods result from the quantity and variety of products, requirements related to their nature, the type and density of operators, the needs and the parallel information generated.

The problem deepens in the central areas, due to constraints, they add the inherent ones to the circulation resulting from the morphology and urban experiences.

The densification, diversification and complexity of urban flows of goods and services have increased in the last decades as trade and distribution transformations occurred and the consumer has become more influential in business strategies.

The type of the activity introduces specific constraints on the distribution process. In food trade the requirement of regular supply, the diversity of products and the perishability of some induce multiple flows, usually with short and often overlapping delivery times. These conditions are exacerbated in the hours of greater traffic intensity, given the dispersion of the units and the greater limitation of the periods of supply. In non-food trade, the great diversity gives rise to very different flows, but the frequency of supply is, as a rule, smaller.

Services have assumed a growing importance in urban flows, as a consequence of the corporate reorganization (externalization of functions) and changes in the structure of consumption and acquisition of goods by the families (deliveries of goods and provision of services at home). Of all the issues identified, it is important to highlight the following:

Congestion problems - Traffic intensity in the city, and particularly in the central area, is primarily responsible for reducing daily commutes and for dilating their average times, aggravating the cost of transport and harming trade. The delivery of the products, mainly in the food units and in the on-trade channel, is done by several operators on the same days of the week, favouring the morning, resulting in an increase in freight traffic and congestion due to multiple simultaneous loading/unloading operations. At certain times of the year (especially in Christmas), the movement of passengers and goods increases, further aggravating the distribution. In central areas, urban morphology makes it difficult to flow traffic. In turn, the ban on access to vehicles on some axes penalizes the establishments located there. To supress the difficulties, distribution companies are forced to change the organization of deliveries, often with additional costs.

Problems for loading and unloading operations - Most establishments do not have their own park to carry out the loading / unloading, forcing the goods vehicles to stop on the sidewalk or the road. When they exist, they are narrow and/or difficult to access. The improper occupation by private vehicles in the places of loading and unloading on the public space obliges the vehicles of merchandise to operate in infraction situation, with possible penalization of the companies and its impact on distribution costs. The difficulty of parking

increases in service travel since, in general, they are less planned and the vehicles circulate more frequently, spending more time next to each establishment.

Problems of cargo transport companies and service provision - The use of vehicles not adapted to the urban network, whether in size, mode of operation or auxiliary equipment of loading and unloading, aggravates supply problems, implying more displacement, traffic increase, fuel expenses, etc. Difficulties in communicating with drivers in transit aggravate these problems, due to the impossibility of reorienting the turns.

The table below resumes the information provided previously.

Categories	Barriers
Congestion	Worsening of travelling times; Concentration of deliveries (morning); Constraints imposed by urban morphology.
Load and unload operations	Illegal occupation of parking spaces reserved for load and unload operations
Traffic and circulation policy	Conflicts among pedestrians and vehicles; Lack of legal tools, such as a load and unload municipal regulation; Deficiencies in the distribution planning; Inadequacy of the type of vehicle
Social	Resistance to change; Lack of awareness regarding environmental impacts

Table 4: Barriers identified in the distribution process

2.3. Cyprus/Limassol

2.3.1. Regional and city overview

2.3.1.1. Geography and population

Located on the southern coast of Cyprus, Limassol, is geographically the second largest city on the island with a population of approximately 237,000. It is one of six districts in Cyprus and covers an area of 34.87 square kilometers. Limassol is located on the southern coast of the island, stretching westward to the Paphos district and bordering the district of Nicosia on the north and Larnaca on the east.

Its central position offers easy access to all major cities as well as Troodos Mountains within a 35 to 45 minutes' drive. It is also conveniently situated only 40 minutes away from both Larnaka and Pafos airports.

Limassol's historical centre is located around its medieval Limassol Castle and the Old Port. Today the city spreads along the Mediterranean coast and has extended much farther than the castle and port, with its suburbs stretching along the coast to Amathus. To the west of the city is the Akrotiri Area of the British Overseas Territory of Akrotiri.

The City Center of Limassol is about 1.54 square kilometers. It is the central business district of the city and therefore it is very busy. The traffic is high, especially during rush

hours. Mostly the congestion is cause by freight logistic vehicles that bring supplies to the shops in the area. Also in the Limassol City Center there are existing buslines and cycling roads that run along the coast in the touristic area.

The coast line of Limassol until the St. Raphael's Hotel, from the central area of Limassol, covers about 0.88 square kilometers. Most of the hotels are located near that strech of coast line. There are bus stops located along the coast line which are easily accessible.

The central area of Limassol is visited by tourists regularly throughout the year. Some of the main touristic destinations are Anexartisias and Agiou Andreou shopping districts, the Molos promenade, the medieval castle and Limassol's marina. To arrive there tourists use the bus stops from their hotels in the tourist coastline area where their hotels are.

Figure 15: Cyprus map indicating the region of Limassol

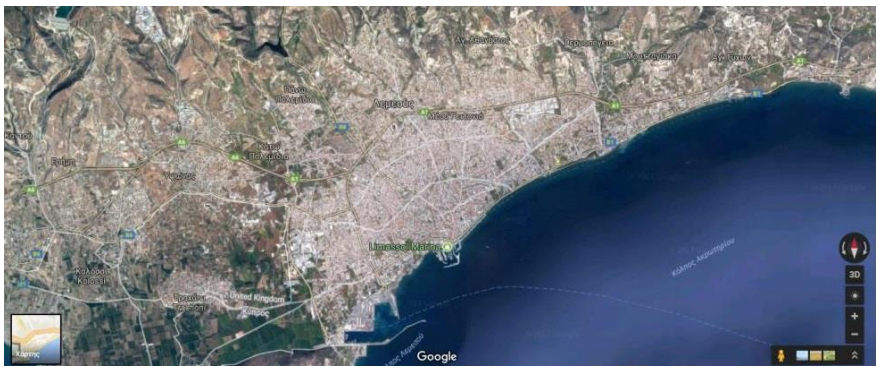


Figure 16: The city of Limassol

The current population of residents of Limassol is around 237 000. The current number of visitors for 2017 in Limassol is around 20 286.

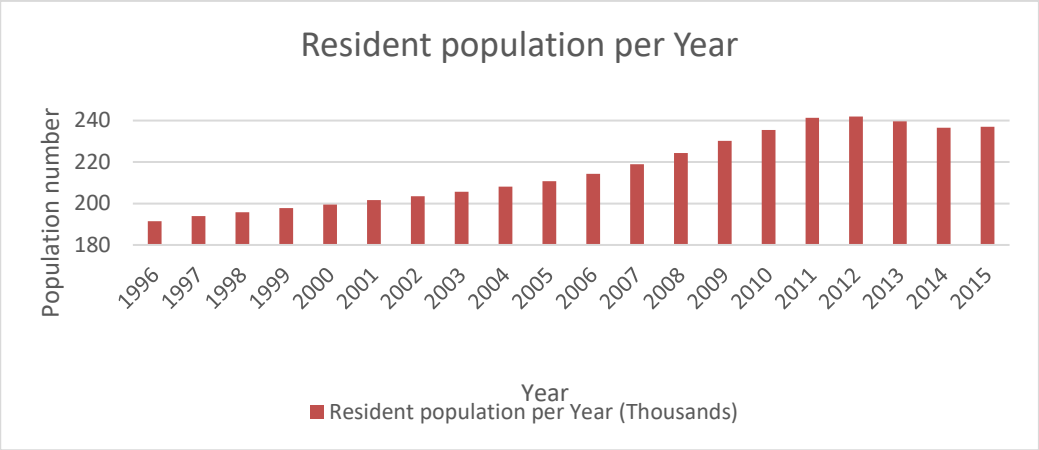


Figure 17: Evolution of residents' population from 1996 to 2015

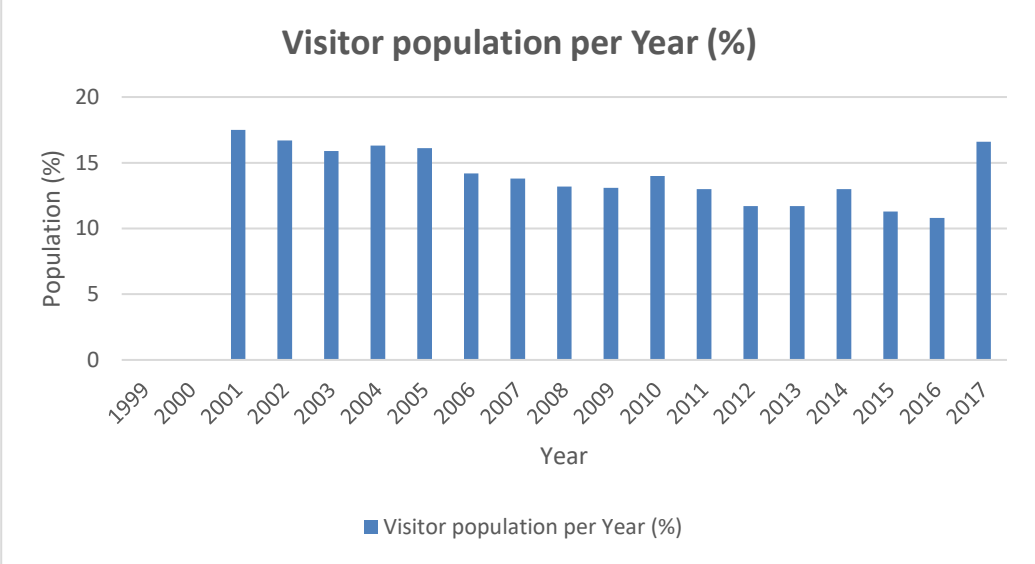


Figure 18: Evolution of visitors' population since 1999 to 2017

2.3.1.2. Mobility and traffic

For the area of Limassol there are 270,000 everyday movements, which corresponds to 1.7% per resident. There has not been a census only for the SMTAP area, therefore this information is not available.

There are not any accurate measurements yet for the modal split. Just estimations at the moment. Also, these estimations are for Limassol, not just the City Center. No measurements for the City Center are available. The same goes for the separate modal split between tourists and residents.

Transport Mode	Modal Split Estimation
Public Transport	3%
Cycling	1%
Cars	85%

Table 5: Estimation of modal splits per transport mode

The urban freight logistics make up a big part of the traffic in Limassol central area. Also they contribute to the air and noise pollution in that area. The main problem for the tourists

is that sometimes that pedestrian streets and sidewalks are occupied from the logistic tracks while unloading their cargo to the nearby shops. This forces the pedestrians to go into the road so they can go around the other side.

2.3.1.3. Energy consumption and CO_2 emissions in the transport sector

Upon conducting the Statistical Service there is no information yet on the energy consumption in the SULP area. The CO_2 emissions in the transport sector in Limassol is 911 400 t CO_2 per year.

Upon conducting the Statistical Service there are no data regarding energy consumption at the moment.

2.3.1.4. Policies and regulation framework in logistics

Upon contacting Limassol Municipality, the Road Transport Department (Ministry of Transport, Communications and Works) it seems that there are no sectoral plans or relevant legislation in the field of logistics in the study area at the moment.

There are not any political objectives defined for the region of Limassol in terms of energy, environment and sustainability.

2.3.1.5. Main infrastructures for logistics

There are not any infrastructures for logistics in the study area. Only a few parking spaces at the side of the road allowed only for unloading the goods to the shops.

2.3.1.6. Stakeholders and roles in the logistics sector

Stakeholder	Role
Shop Owners	Demand of goods delivered to their shops

Table 6: Stakeholders in the logistics sector in Limassol

2.3.2. Study area characterisation

2.3.2.1. Selection of study area

The study area for the development of the SULP will be the City Center of Limassol.

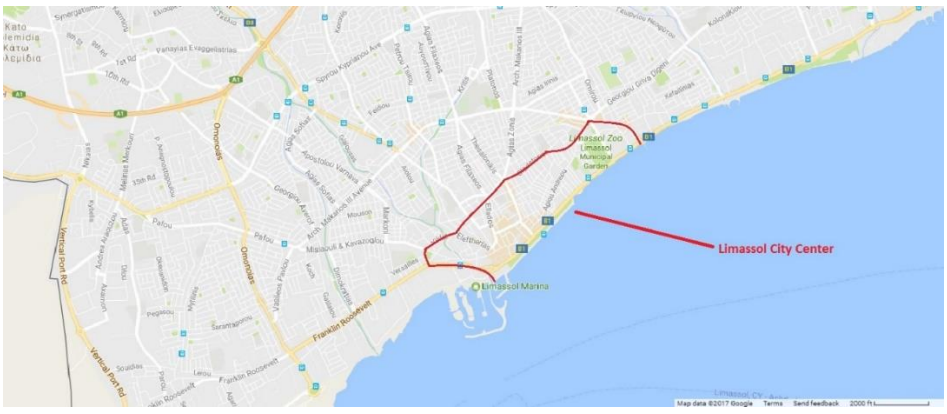


Figure 19: The Limassol City Center (SULP area)

In the City Center of Limassol there is the Anexartisias and Agiou Andreou shopping districts. Most logistic vehicles can be found in these areas due to the demand of the shops to be supplied with goods. This causes traffic congestion along with noise and air pollution in that particular area. Also it poses a threat to pedestrians as the logistic vehicles sometimes park on the sidewalks or on the pedestrian roads to unload the goods in front of the shops.

The Limassol City Center is very busy with locals and tourists since the two major shopping districts are located there. The roads are narrow in most cases and it has a lot of one-way roads. Sometimes it is very difficult to move around with a car in these narrow streets.

2.3.2.2. Economic activities

Type of establishment	Number
Hotels	14
Shops	34
Markets	1
Restaurants and bars	50

Table 7: Economic activities in Limassol

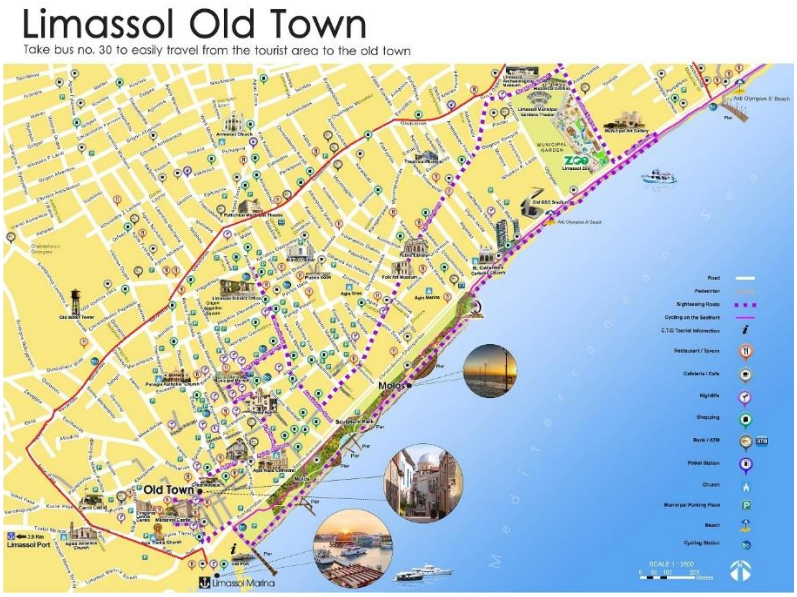


Figure 20: Overview of Limassol's City Center commercial activities (SULP area)

Figure 21: Hotels (red dots) in Limassol's City Center (SULP area)

2.3.2.3. Freight and logistics regulation

Upon contacting Limassol Municipality, the Road Transport Department (Ministry of Transport, Communications and Works) it seems that there are no rules or procedures for implementation and inspection in the study area.

2.3.2.4. Characterization of logistics flows

Upon contacting Limassol Municipality, the Road Transport Department (Ministry of Transport, Communications and Works) it seems that no such studies have been made to acquire this kind of information.

2.3.2.5. Energy and environment aspects

Upon conducting the Statistical Service there is no information yet on the energy consumption in the SULP area. The CO_2 emissions in the transport sector in Limassol is 911 400 t CO_2 per year.

Most logistic vehicles can be found in these shopping district due to the demand of the shops to be supplied with goods. This causes traffic congestion along with noise and air pollution in that particular area. Also, it poses a threat to pedestrians as the logistic vehicles sometimes park on the sidewalks or on the pedestrian roads to unload the goods in front of the shops.

2.3.2.6. Main needs and problems in Logistics

There need to be regulations, rules and procedures when it comes to logistics in Limassol. There are not proper infrastructures in the study area, which are much needed. The freight logistic vehicles in the study area cause many problems such as air and noise pollution, traffic congestion, and also pose a hazard for the locals and tourists.

2.4. Gran Canary/Las Palmas

2.4.1. Island overview

Cities experience high impacts (due to pollutant emissions, noise, vibrations, safety hazards, etc.) and consequently high direct and external costs of urban freight operation. The Sustainable Urban Logistics Plan (SULP) of Las Palmas de Gran Canaria will develop a set of efficient measures for facing different and conflicting interests of the various stakeholders involved (Municipality, citizens, shopkeepers, transport operators, etc.).

2.4.1.1. Geography and population

Las Palmas de Gran Canaria is one of the cities with the best climate in the world thanks to its location, next to the Tropic of Cancer, and also thanks to the trade winds coming from northwest Atlantic. The result is an average temperature of 17ºC in winter and 25ºC in summer. Las Palmas de Gran Canaria is located in the Northeast of the Gran Canaria Island.

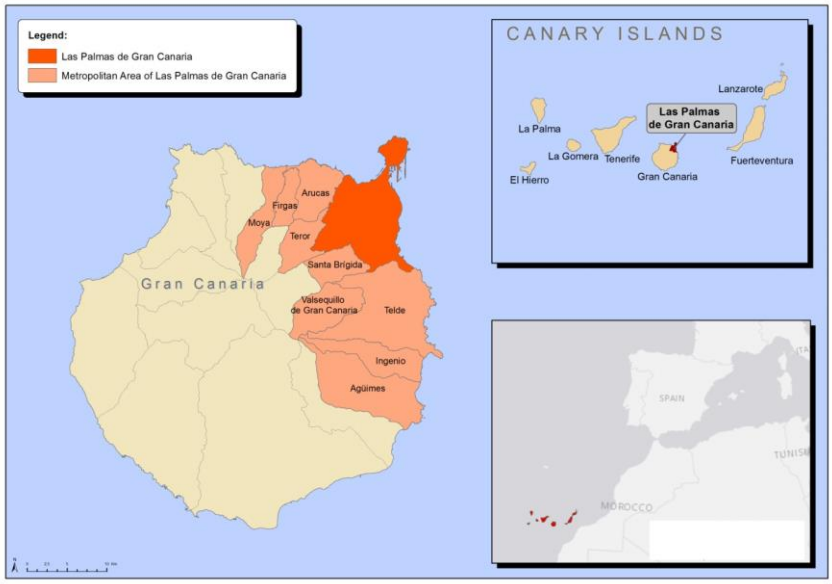


Figure 22 – Site map

The wonderful geographical location of Las Palmas de Gran Canaria makes the city also the European Capital of Mid-Atlantic and a cultural and financial bridge between Europe, Africa and America. It is the capital city of the island (Gran Canaria), and shares the status of the capital of the Canary Islands with Santa Cruz de Tenerife (Tenerife).

The city is located in the Northeast of Gran Canaria, only 18 kilometres away from the International Airport of Gran Canaria, making it easy to reach by plane in only two and a half hours from Madrid, four hours from the main European cities, and only at a six-hour flight from the American continent.

The geographical conditions that characterize Las Palmas de Gran Canaria are particular, finding the city divided into two different areas: the “lower” and the “upper” areas. On the one hand, the lower area is completely flat and the most inhabited neighbourhoods are

settled down there. On the other hand, the upper zone – which surrounds the lower zone – , is hilly and has slopes, terraces and an irregular distribution of streets and buildings. This complex territory led to an irregular development of the road network and to some accessibility restrictions for pedestrians, cyclists and handicapped people.

Whereas the municipality of Las Palmas de Gran Canaria has an area of 100,55 Km², the island of Gran Canaria has a total area of about 1 560,1 Km². According to the Spanish National Institute of Statistics (INE, http://ine.es/), the population of Las Palmas de Gran Canaria was 378 998 inhabitants in 2016. Moreover, it is also important to highlight that the metropolitan area of Las Palmas is ranked amongst the top 10 ones in Spain, with an overall population of 600.000 inhabitants. Las Palmas de Gran Canaria represents the 45% of the overall population of the island of Gran Canaria (845 195 inhabitants in 2016) and the 18% of the Canary Islands (2 101 924 inhabitants in 2016).

Population	Las Palmas	Gran Canaria island	Province of Las Palmas	Canary Islands	Spain
2016	378.998	845.195	1.097.800	2.101.924	46.557.008
Weight (%)	-	45%	35%	18%	1%

Table 8: Relative weight of the population of Las Palmas

Although the population growth was positive in the period 2000 – 2016, it did not follow a continuous upward trend. Since 2014 the population of Las Palmas de Gran Canaria has been decreasing.

Year	Population	Annual growth rate (%)	
2000	358.518	-	-
2001	364.777	1,7%	↑
2002	370.649	1,6%	↑
2003	377.600	1,9%	↑
2004	376.953	-0,2%	↓
2005	378.628	0,4%	↑
2006	377.056	-0,4%	↓
2007	377.203	0,0%	↑
2008	381.123	1,0%	↑
2009	381.847	0,2%	↑
2010	383.308	0,4%	↑
2011	383.343	0,0%	↑
2012	382.296	-0,3%	↓
2013	383.050	0,2%	↑
2014	382.283	-0,2%	↓
2015	379.766	-0,7%	↓
2016	378.998	-0,2%	↓

Table 9: Population of Las Palmas de Gran Canaria. Annual growth rate (Period 2000-2016)

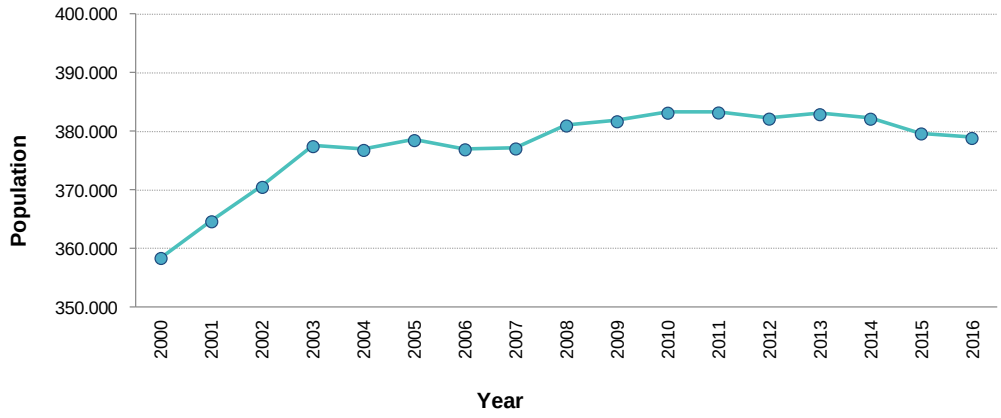


Figure 23: Population of Las Palmas de Gran Canaria. Annual growth rate (Period 2000-2016)

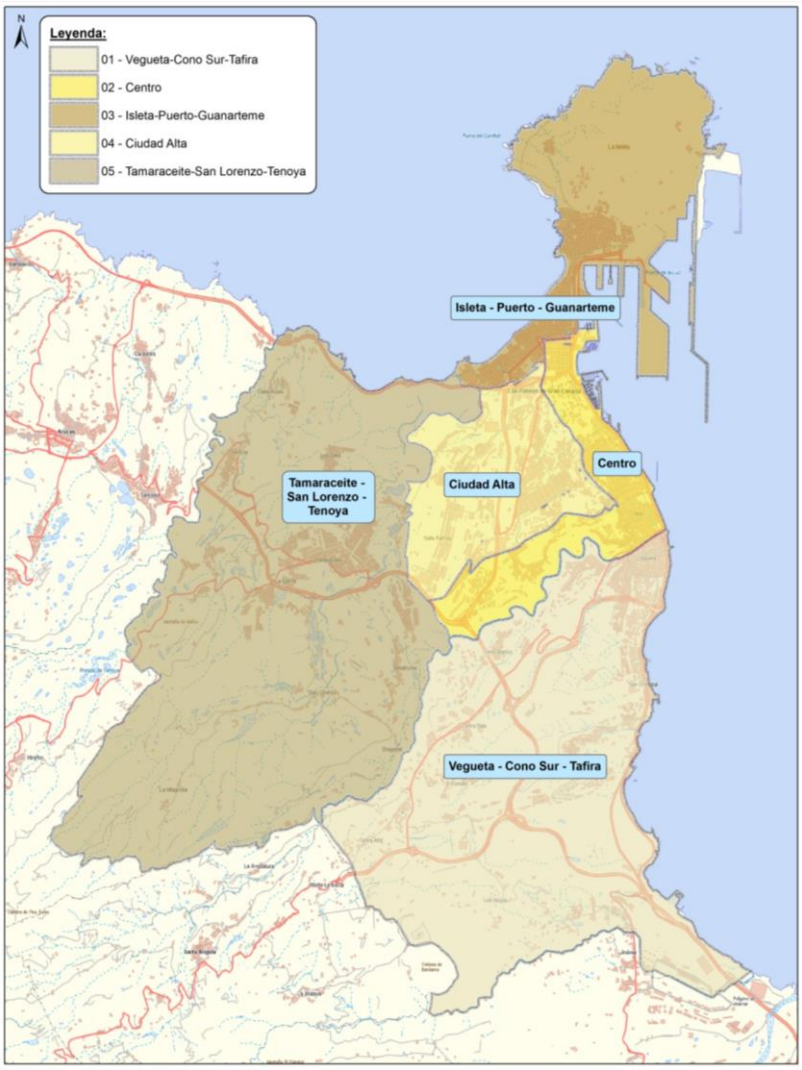


Figure 24: Districts of Las Palmas de Gran Canaria

The Ciudad Alta district is the most populated area of the city. However, the district with a higher population density (inhabitants / km^2) is *Isleta - Puerto – Guanarteme*:

District	Population	%	Population density (Inh./ Km²)
01 - Vegueta - Cono Sur - Tafira	68.827	18%	111,6
02 - Centro	81.319	21%	241,8
03 - Isleta - Puerto - Guanarteme	71.102	19%	311,8
04 - Ciudad Alta	104.377	28%	266,9
05 - Tamaraceite - San Lorenzo - Tenoya	53.373	14%	55,7
Total	**378.998**	**100%**	-

Table 10: Population of Las Palmas by districts (2016)

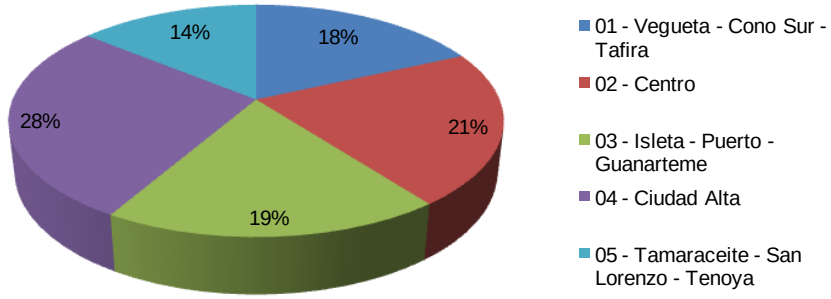


Figure 25: Population of Las Palmas by districts (2016)

Tourism has a huge impact in logistics operations in all touristic hotspots. Therefore, it is important to identify seasonal variations in order to assess properly urban freight management at these sites. However, the case of Las Palmas de Gran Canaria is slightly different from other CIVITAS DESTINATIONS sites because there are no seasonal peaks regarding tourism. In fact, tourists' flows keep a regular trend all over the year: on the one hand, on winter most of the visitors come from Central and North European countries; on the other hand on summer tourists come mainly from other Spanish regions.

Regarding large numbers, Las Palmas de Gran Canaria beat all the records in 2016 with over 400 000 tourists spending at least one night in the city (over 1 300 000 overnight stays). There are more than 7 000 beds available in the hotels of Las Palmas, as well as some other touristic accommodations (apartments, etc.).

Besides these 400 000 overnight stays, over 650 000 tourists made a one-day trip to the city every year, although they are usually accommodated in touristic resorts located in the south of the island. Therefore, Las Palmas de Gran Canaria receives around 1 000 000 - 1 200 000 visitors per year, which accounts for more than 30% of the overall arrivals at the Canary Islands.

It is also important to point out the increasing significance of an emergent market such as the cruises. Las Palmas de Gran Canaria is becoming, year after year, one of the hotspots in the Atlantic Ocean. For instance, Las Palmas de Gran Canaria gathered almost 700 000 cruise tourists in 2014, boosting ship supply services and events-related business.

The cruise passengers' trend between 2044 and 2012 is showed in the following figure:

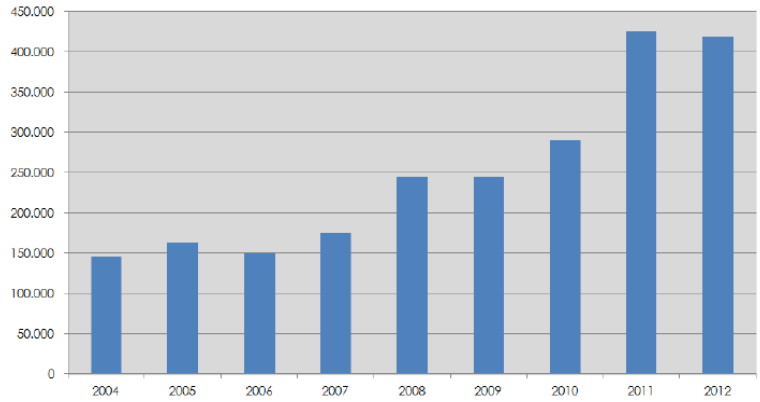


Figure 26: Cruise passengers at the Port of Las Palmas de Gran Canaria. Period 2004-2012

In fact, the Port of Las Palmas de Gran Canaria doubled its number of cruise passengers in the past 20 years:

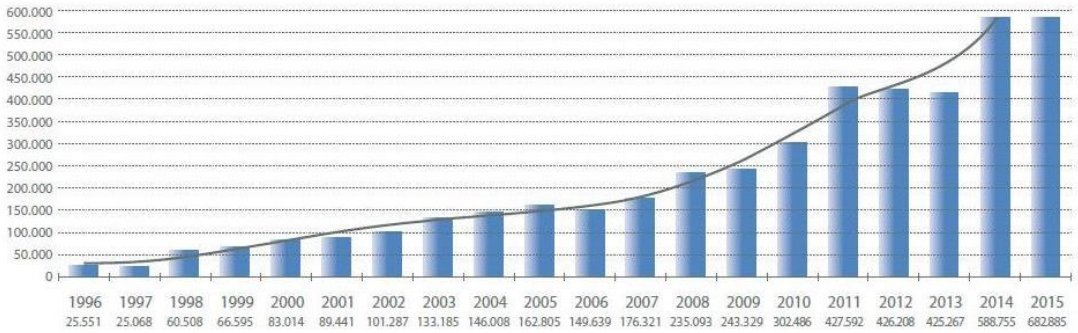


Figure 27: Cruise passengers at the Port of Las Palmas de Gran Canaria. Period 1996-2015

The increase in the number of cruise passengers in the Port of Las Palmas de Gran Canaria is aligned with the trend that experienced other ports in Spain:

Port	2005	2006	2007	2008	2009	2005-2009 (%)
Barcelona	1.224.575	1.402.643	1.765.838	2.074.554	2.151.465	76%
Baleares	1.056.675	1.060.060	1.219.886	1.314.074	1.237.362	17%
Las Palmas de Gran Canaria	**423.105**	**362.305**	**439.493**	**576.412**	**611.249**	**44%**
Santa Cruz de Tenerife	503.518	446.355	521.293	557.371	582.115	16%
Málaga	204.535	222.280	292.567	352.993	487.955	139%
Bahía de Cádiz	128.680	171.938	187.164	224.905	237.066	84%
Vigo	131.536	129.268	150.478	216.333	222.948	69%
Valencia	106.724	88.170	179.209	199.335	184.909	73%
Alicante	36.253	51.527	72.063	82.487	96.615	167%
Cartagena	29.073	29.337	39.922	35.374	67.916	134%

Table 11: Cruise passengers at the top ports in Spain. Period 2005-2009

Tourism is one of the top priorities for the city. It is an opportunity to encourage the development of the area, leading to an economic recovery under the premises of sustainability and new technologies.

Local authorities are well aware of the importance that the tourism sector has and its influence on all municipal areas. In fact, one of our objectives is to consider the tourist as a local citizen and user of local services and infrastructures. Thus, understanding and taking care of tourists' needs is a key variable to consider in the decision making process of each policy area.

2.4.1.2. Mobility and traffic

Despite Las Palmas de Gran Canaria approved its Sustainable Urban Mobility Plan (SUMP) in 2012 there are still some important barriers to reach a sustainable mobility system in the city:

- There is a lack of an integrated approach in all the mobility policies.
- There is a lack of social awareness about the benefits of sustainable mobility, instead of over-using of cars (and car-rental for tourists).
- Some issues were not addressed in the SUMP, such as walking, urban freight management, scholars' mobility and tourists' mobility.

The current modal split of Las Palmas the Gran Canaria is the following:

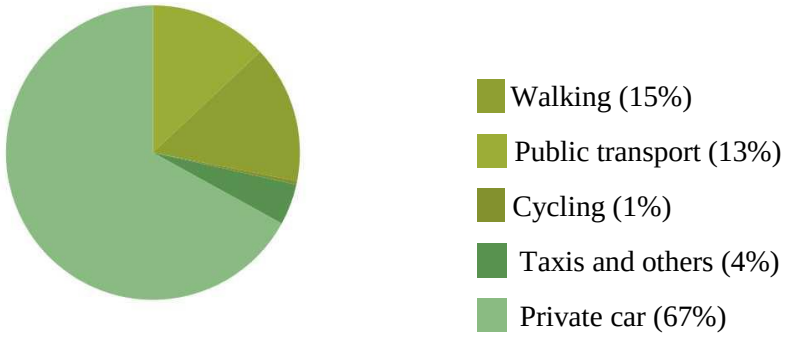


Figure 28: Modal split in Las Palmas de Gran Canaria

The modal split of Las Palmas de Gran Canaria shows a high rate of use of cars in the city: over 67% of the daily trips are made by car. The second modal choice of the residents is walking (15%) and the third one is the public transport (13%).

The following table shows data about the number of vehicles per body type in 2016:

Vehicles per body type	2016	%
Trucks & vans	45.502	18,5%
Buses & coaches	1.282	0,5%
Cars	172.709	70,1%
Motorcycles	23.186	9,4%
Tractors	781	0,3%
Trailers	2.656	1,1%
Other vehicles	224	0,1%
Total	**246.340**	**100,0%**

Table 12: Vehicles per body type in Las Palmas de Gran Canaria (2016)

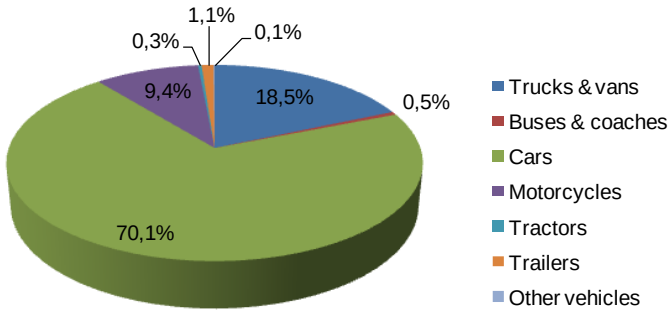


Figure 29: Vehicles per body type in Las Palmas de Gran Canaria (2016)

Following this trend, the number of cars in Las Palmas de Gran Canaria has increased a 9% while the number of motorcycles increased a 58% between 2006 and 2016:

Year	Trucks & vans	Buses & coaches	Cars	Motorcycles	Tractors	Trailers	Other vehicles
2016	45.502	1.282	172.709	23.186	781	2.656	2.234
2015	45.065	1.227	167.318	22.288	772	2.633	2.186
2014	45.025	1.185	164.210	21.528	754	2.612	2.189
2013	45.678	1.196	164.196	20.975	740	2.624	2.167
2012	47.057	1.192	165.989	20.969	766	2.638	2.220
2011	47.961	1.202	166.820	20.682	813	2.625	2.290
2010	48.633	1.204	166.297	20.224	832	2.661	2.311
2009	49.496	1.224	165.019	19.600	839	2.715	2.431
2008	50.231	1.200	165.864	19.067	871	2.745	2.415
2007	50.325	1.247	163.572	17.190	881	2.709	2.410
2006	47.528	1.196	157.871	14.707	869	2.660	2.254

Table 13: Vehicles per body type in Las Palmas de Gran Canaria (2006-2016)

The motorization rate in Las Palmas de Gran Canaria is 655,3 vehicles per 1.000 inhabitants (455,3 cars per 1.000 inhabitants), lower than the average in all the island of Gran Canaria. The following table shows the motorization rate in the city of Las Palmas de Gran Canaria and the overall island of Gran Canaria.

Year 2016	Gran Canaria island	Las Palmas
Vehicles per 1.000 inhabitants	716,7	655,3
Cars per 1.000 inhabitants	492,6	455,7

Table 14: Vehicles and cars per 1.000 inhabitants (2016)

The motorization rate in both Las Palmas de Gran Canaria and the island of Gran Canaria increased in the past 10 years (2006-2016):

Year	Vehicles per 1.000 inhabitants		Cars per 1.000 inhabitants	
	Gran Canaria (Island)	Las Palmas de Gran Canaria	Gran Canaria (Island)	Las Palmas de Gran Canaria
2016	752,9	655,3	508,3	455,7
2015	730,3	635,9	491,9	440,6
2014	713,4	621,3	479,1	429,6
2013	701,9	620,2	470,1	428,7
2012	705,9	630,0	471,9	434,2
2011	702,3	632,3	468,4	435,2
2010	698,5	631,8	463,9	433,8
2009	698,3	632,0	463,4	432,2
2008	709,2	636,0	471,9	435,2
2007	715,1	631,8	477,6	433,6
2006	693,0	602,3	467,2	418,7

Table 15: Vehicles and cars per 1 000 inhabitants (2006-2016)

In the framework of the CIVITAS DESTINATIONS project, mobility strategies and relevant technical measures will be developed & carried out in order to encourage and allow the use of alternative sustainable modes of transport by tourists and citizens.

2.4.1.3. Energy consumption and CO_2 emissions in the transport sector

The regional government of the Canary Islands monitors and evaluates air quality (greenhouse gas emissions, pollution, particulates, etc.) with a network of outdoor stations (*Red de Control y Vigilancia de la Calidad del Aire de Canarias in Spanish*). The pollutants that are monitored are the following: SO_2, NO_2, NOx, PM10, benzene, CO and O_3.

The areas where air quality control is monitored were defined according to some specific features, such as the population and ecosystems, the different emission sources, climate and topographic characteristics, etc.

The air quality of the metropolitan area of Las Palmas de Gran Canaria is monitored by the following stations: Mercado Central, Jinámar fase 3 and Néstor Álamo.

Figure 30: Air quality control in Las Palmas de Gran Canaria

The Air Quality Index (AQI) is an indicator for reporting daily air quality. It tells you how clean or unhealthy your air is, and what associated health effects might be a concern. The AQI focuses on health effects you may experience within a few hours or days after breathing unhealthy air. The AQI is calculated for four major air pollutants: ground level ozone, particle pollution, carbon monoxide, and sulfur dioxide. For each of these pollutants, the regional government has established national air quality standards to protect public health. To calculate the ICA takes into account the last time data of each pollutant in each station.

The AQI is divided into three levels of health concern:

- Good: the concentration of the pollutant is below the 50% of the value limit.
- Regulate: the concentration of the pollutant is between the 50-100% of the value limit.
- Bad: the concentration of the pollutant is above the value limit.

The following figures show the monthly data of the air quality station of the metropolitan area of Las Palmas de Gran Canaria:

Pollutant	January	February	March	April	May	June	July	August	September	October	November	December
O3	61	66	71	64	64	59	61	59	60		57	46
PM2,5	13	11	14	11	5	8	9	12	14		13	11
SO2	5	3	3	4	3	3	4	3	3		3	3
NO	6	4	5	5	3	3	2	2	3		7	7
NO2	18	14	16	14	12	11	10	10	9		23	26
NOX	25	19	23	21	16	15	11	11	11		33	35
PM2,5	13	11	14	11	5	8	9	12	14		13	11

Table 16: Air monitoring network (Jinámar Fase 3 station). Year 2017

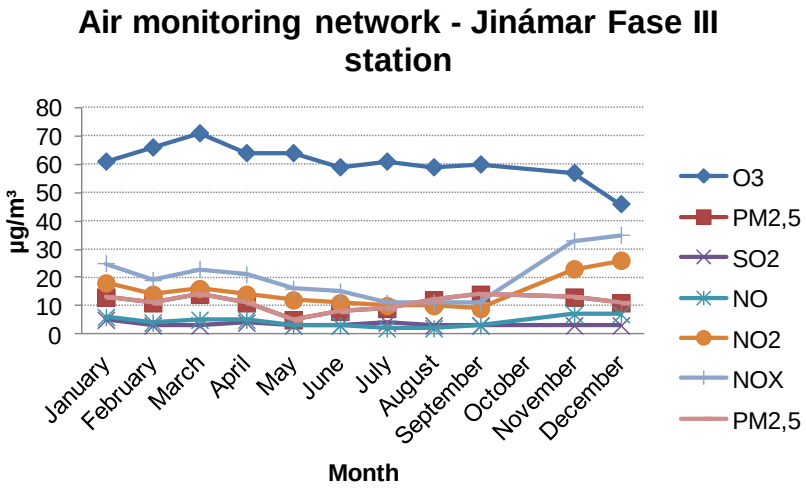


Figure 31: Air monitoring network (Jinámar Fase 3 station). Period: 2017

Pollutant	January	February	March	April	May	June	July	August	September	October	November	December
O3		56	61	53		43		49	50	44	42	49
PM2,5	15	13	15	13				13	14	18	14	13
SO2	7	5	5	6		6		3		5	6	6
NO	9	10	9	7		8		7	8	11	8	11
NO2	32	34	33	24		14		14	20	26		31
NOX	45	48	45	34		25		24	32	42		49
PM10		33	37	28		28		34	36	50	36	33

Table 17: Air monitoring network (Mercado Central station). Period: 2017

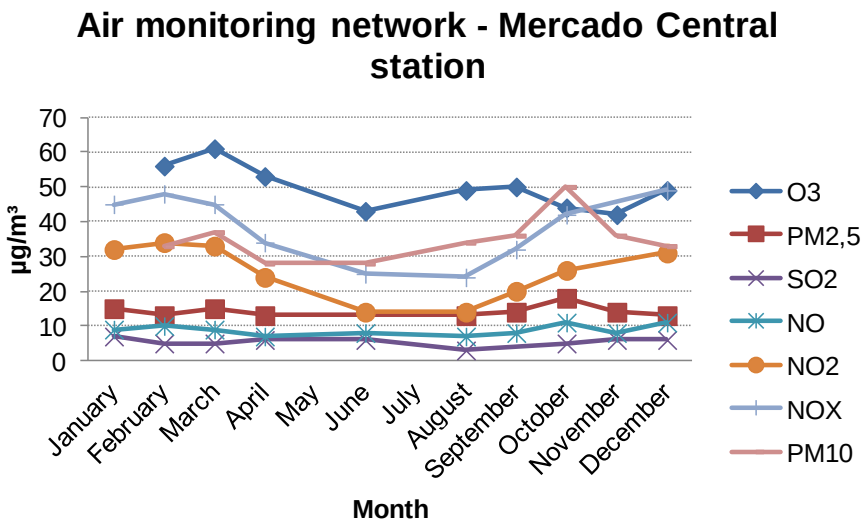


Figure 32: Air monitoring network (Mercado Central station). Period: 2017

Pollutant	January	February	March	April	May	June	July	August	September	October	November	December
O3	63	67	74	65	64		58	60	63	55	58	63
SO2	6	3	2	2	3		5	5	5	4	4	3
NO	5	4	4	5	4		4	4	4	7	7	5
NO2	9	7	8	8	6		5	7	10	15	18	17
NOX	16	13	14	16	11		11	14	16	25	28	24
PM10		27	33	24	15		22	27	29	46	32	23

Table 18: Air monitoring network (Néstor Álamo station). Period: 2017

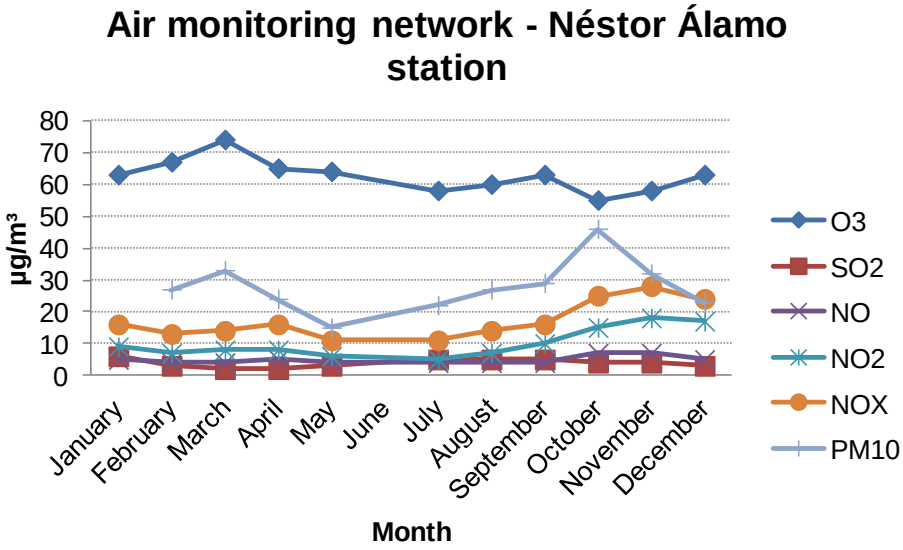


Figure 33: Air monitoring network (Néstor Álamo station). Period: 2017

2.4.1.4. Policies and regulation framework in logistics

Transport regulation

The Sustainable Urban Logistics Plan (SULP) is embedded in a wider local and regional planning framework on urban mobility. This depends on many internal and external factors that provide an overall framework for the planning process and plan implementation.

The Article 149.1 of the Spanish Constitution establishes that the State holds exclusive competence over the following matters: railways and land transport passing through the territory of more than one Autonomous Community, the general system of communications and motor vehicle traffic.

The *Ley 16/1987, de 30 de julio, de Ordenación de Transporte Terrestre* (LOTT) regulates road freight, as well as railway goods and passengers transport in Spain. The last amendment of this law was at the beginning of 2016 when it was adapted to the European Trade Code, making it more operational.

The main feature of the LOTT is the fact that the transport company has not necessarily to be the owner of the vehicle units.

Regarding the international traffic Spain has joined international conventions as the CMR of 1956, the “Geneva UN convention to multimodal international freight traffic” of 1980, and the “Customs convention on the international transport of Goods" (Transport Internationaux Routiers = TIR).

Tax regulation

Tax regulation has a high impact over logistics in the Canary Islands. The tax regime of the Canary Islands is called Canary Islands Special Zone (*Zona Especial Canaria in Spanish*). It was created with the purpose of encouraging the economic and social development of the islands and the diversification of their manufacturing and service sectors.

The title of the regime is somehow misleading, because the tax status is not restricted to any particular geographical location, but applicable to all the companies established in the whole Canary Islands territory. In other words, the Canary Special Zone is equivalent to the Canary Islands.

Although mainland tax regulations do apply in the Canary Islands, companies operating there are also eligible for special tax incentives (the Special Tax Regime or REF). Key features of the REF are as follows:

- VAT is not applied in the Canary Islands; instead there is a specific Sales Tax (IGIC) which has a general rate of 5%. In addition to increased and reduced rates of IGIC, there is a zero tax rate for certain basic need products and services (eg telecommunications).
- Exemptions from duty on capital increases.
- The use of undistributed profits to reduce the taxable base provided that the amounts concerned are invested within three years in certain qualifying fixed assets or public stock.
- Enhanced tax credits for various types of investment.

2.4.1.5. Main infrastructures for logistics

Definitely, the main infrastructures for logistics in Gran Canaria are determined by the internal and external logistic flows. Besides this, the tax regulations have also an influence on the location of these main infrastructures because certain companies (those dedicated to production, processing, handling and distributive activities) must be located in certain areas in order to benefit from the ZEC. In Gran Canaria these designated areas are the Port of Las Palmas, the airport of Gran Canaria and the Arinaga Business Park.

Therefore, the main infrastructures for logistics in Gran Canaria are located in the locations mentioned above – the Port of Las Palmas, the airport of Gran Canaria and the Business Parks of *Arinaga* (Agüimes) – and also in the Business Parks of *El Goro* (Telde), *Salinetas* (Telde) and *El Sebadal* (Las Palmas).

The free port of Gran Canaria (*Zona Franca de Gran Canaria in Spanish*) facilities are located both in the Port of Las Palmas and the *Arinaga* Business Park (http://www.zonaindustrialarinaga.com/). The companies located at the free port of Gran Canaria are endowed with favourable customs regulations and other economic benefits such as fewer taxes.

The logistics areas within the free port have a surface of 50 000 m^2 in the Port of Las Palmas and 250 000 m^2 in the Arinaga Business Park.

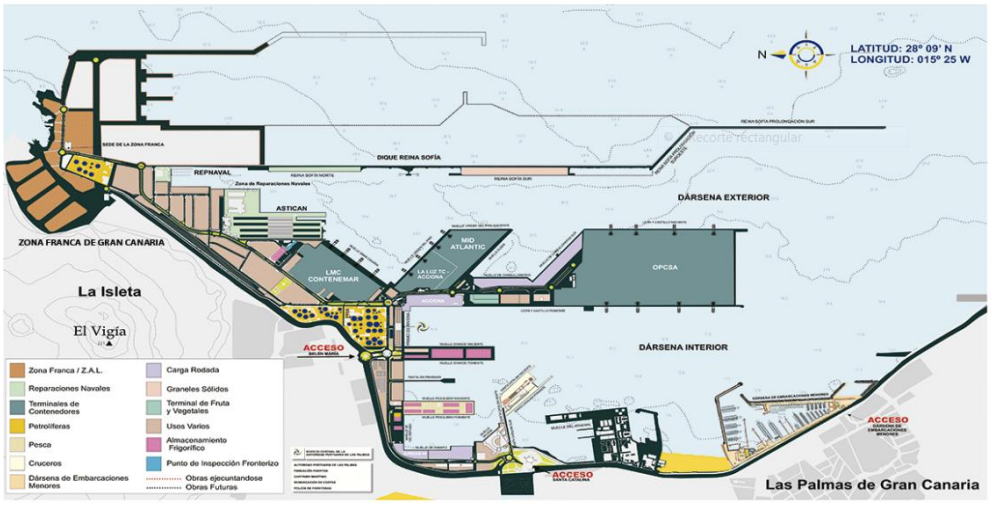


Figure 34: Gran Canaria free port (highlighted in brown) in the Port of Las Palmas

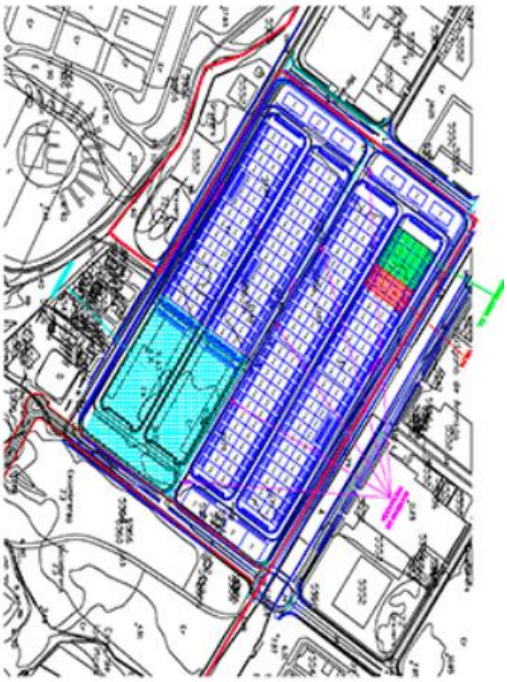


Figure 35: Gran Canaria free port (highlighted in blue) in the Arinaga business park

Two of these main infrastructures for logistics in Gran Canaria are located in Las Palmas de Gran Canaria: the Port of Las Palmas and the *El Sebadal* Business Park.

On the one hand, the Port of Las Palmas de Gran Canaria is ranked in the top 5 of all Spanish ports thanks to its main characteristics:

- Its strategic position between Europe, Africa and America.
- The good air and maritime connections.
- The steady and continuous improvement of its infrastructures.

The main characteristics of the Port of Las Palmas are summarized below:

- Waterline area: 536.79 ha.
- Mainland area: 365.78 ha.
- Docks and berths length: 16,617 m.
- 3 passenger terminals: 6,039 m^2.
- Cod storage facilities: 158,544 m^3.
- Fishing port: 14,420 m^2.
- 8 jetty harbours: 9,333 m.

The following table gathers data about TEU (Twenty-foot Equivalent Unit) movements in the Port of Las Palmas between 2000 and 2012:

Year	Total		Goods for temporary admission		Gran Canaria	
	TEU	Tons	TEU	Tons	TEU	Tons
2000	378.288	4.888.779	138.769	2.292.143	239.519	2.596.636
2001	412.702	5.685.177	165.167	2.842.447	247.535	2.842.730
2002	471.510	6.393.024	206.537	3.314.289	264.973	3.078.735
2003	630.649	9.043.055	371.894	6.153.500	258.755	2.889.555
2004	707.096	10.886.018	450.335	8.000.390	256.761	2.885.628
2005	757.921	11.856.466	490.293	8.861.947	267.628	2.994.519
2006	831.056	12.869.372	552.537	9.762.437	278.519	3.106.935
2007	819.284	13.981.936	552.560	10.863.528	266.724	3.118.408
2008	845.149	14.188.627	596.276	11.294.379	248.873	2.894.248
2009	632.338	10.508.142	417.163	7.888.564	215.175	2.619.578
2010	706.778	11.878.914	477.438	9.113.818	229.340	2.765.096
2011	844.531	13.766.038	614.076	10.967.433	230.455	2.798.605
2012	792.640	13.744.676	579.125	11.092.722	213.515	2.651.954

Table 19: TEU movements in the Port of Las Palmas. Period 2000-2012

The Port of Las Palmas doubled its freight traffic (in TEU) in the past 20 years:

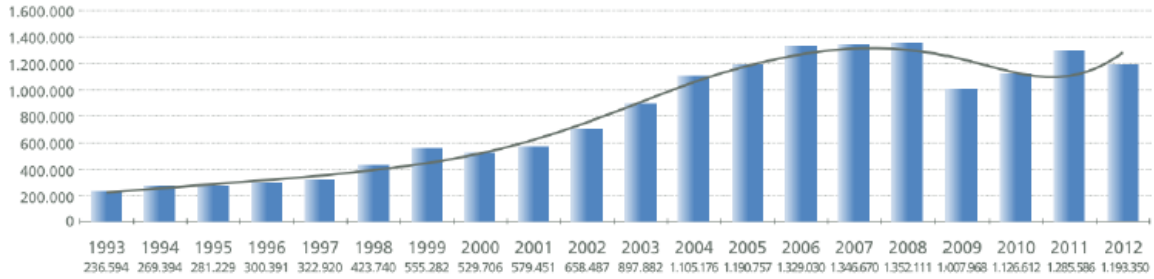


Figure 36: TEU movements in the Port of Las Palmas. Period 1993-2012

On the other hand, *El Sebadal* Business Park offers wonderful conditions for logistics because of its proximity to the Port of Las Palmas and the most important highway of the island (GC-1). *El Sebadal* is only 2 km away from the Port of Las Palmas, 30 km from the airport of Gran Canaria and 5 km from Las Palmas de Gran Canaria downtown.

The main features of El Sebadal Business Park are listed below:

- Total area: 562,359 m^2
- Industrial area: 290,000 m^2
- Number of plots: 186
- Number of companies: 367

There are other seven Industrial parks in Las Palmas de Gran Canaria besides *El Sebadal: Barranco Seco, Díaz Casanova, Escaleritas, La Cazuela, Las Torres-Lomo Blanco, Los Tarahales and Miller Industrial*. The most important logistic operators of the island have their distribution centres and warehouses in these Industrial Parks.

2.4.1.6. Stakeholders and roles in the logistics sector

The Municipality of Las Palmas and CINESI organized a series of meetings and workshops with the key local stakeholders regarding freight transport and last mile distribution to achieve a productive and open dialogue.

- El Sebadal Industrial Park.
- Port Authority representatives.
- Autoridad Portuaria de Las Palmas (Port Authority).
- Federación de Empresarios del Transporte (freight transport companies' association; FET).
- El Sebadal Industrial Park.

These events saw a participatory approach and active involvement of the stakeholders who exchanged views which helped to better understand the urban freight issues of Las Palmas and the possible effectiveness of some proposed solutions. Other similar events will be organized during the project lifetime with the following.

The below list of stakeholders that have been identified for consultation:

- Cabildo de Gran Canaria (Regional Government).
- Federación de empresarios de Hostelería y Turismo de Las Palmas (Business Federation of Hotels and Tourism of Las Palmas).
- Clúster Canario de Transporte y Logística.
- Cámara de comercio (Chamber of commerce).
- Other business associations.
- Delivery companies.

The freight transport companies' association (Federación de Empresarios del Transporte) requested their associates to fill in a questionnaire to get information about qualitative and quantitative topics related to freight transport in Gran Canaria.

The questionnaire, among the others, was focused on assessing:

- Qualitative aspects, such as the incidence of own account transport (including self-supply processes), the type of vehicle used, the category of products usually transported, the frequency of travel, the variations between winter and summer and origin-destination logistic flows
- Quantitative aspects, such as the quantification (weight and/or volume) of the transported goods, the level (%) of vehicle load capacity, the number of deliveries per trip, etc.

The following is the questionnaire that has been distributed amongst the FET members:

Plan de Logística Urbana de Las Palmas de Gran Canaria

Cuestionario para Operadores de Transporte

A-INFORMACIÓN GENERAL

Nombre de la compañía _____

Persona de contacto _____

Cargo _____

Sector de actividad:

- 1PL-Transporte (first party logistics) ☐
- 2PL-Transporte y almacenamiento (second party logistics) ☐
- 3PL-Prestación de servicios relacionados con el abastecimiento, la producción, el almacenaje, la manipulación y la distribución de mercancías (third party logistics) ☐
- 4PL-Aporta la resolución de todos los procesos logísticos y hace de enlace entre el cliente y los servicios del prestatario 3PL (fourth pary logistics) ☐
- Otro: _____

Grado de integración con clientes:

- Alto ☐
- Medio ☐
- Bajo ☐

¿Su empresa realiza servicios de Logística inversa?

- Logística devoluciones (eCommerce, etc.) ☐
- Logística de residuos ☐

Otros servicios que ofrece su empresa: _____

B-ALMACENAMIENTO

Superfice de almacenamiento disponible (m^2): _____

Número de almacenes: _____

Actividades de valor añadido:

- Almacenamiento ☐
- Manipulación de mercancías ☐
- Consolidación/disgregación de cargas ☐
- Gestión de pedidos ☐
- Despacho de aduana ☐
- Control de calidad ☐
- Etiquetado o colocación de precios ☐
- Recepción de pedidos ☐
- Otros: _____

C-FLOTA DE VEHÍCULOS

Información sobre su flota de vehículos (número de vehículos):

- Camión MMA ≤3.500 ___
- Camión 3.500 kg. < MMA ≤ 12.500 kg. ___
- Camión MMA > 12.000 kg. ___
- Tracto-camión (cabezas tractoras) ___
- Furgón/furgoneta MMA ≤ 3.500 kg. ___
- Furgón MMA > 12.000 kg. ___

D-FLUJOS LOGÍSTICOS

¿Qué productos transporta a/desde Las Palmas de Gran Canaria?

- Minerales y materiales de construcción ☐
- Productos petrolíferos ☐
- Productos alimenticios y forrajes ☐
- Productos agrícolas y animales vivos ☐
- Máquinas, vehículos, objetos manufacturados y transacciones especiales ☐
- Otros: _____

Indique en cuales de los siguientes centros desarrolla su actividad su empresa en función de los canales de distribución principales *(puede marcar todas más de una opción)*:

Zonas Industriales:

Las Palmas de Gran Canaria

- Puerto de Las Palmas de Gran Canaria ☐
- Pol.Ind. El Sebadal ☐
- Pol.Ind. Barranco Seco ☐
- Pol.Ind. Díaz Casanova ☐
- Pol.Ind. Escaleritas ☐
- Pol.Ind. La Cazuela ☐
- Pol.Ind. Las Torres-Lomo Blanco ☐
- Pol.Ind. Los Tarahales ☐
- Pol.Ind. Miller Industrial ☐

Resto de Gran Canaria:

- Puerto de Agaete ☐
- Polígono Industrial de Arinaga ☐
- Polígono Industrial Melenara ☐
- Polígono Industrial Ajimar ☐

Otros: _____

Canal HO.RE.CA (Hostelería-Restauración-Cafeterías)

Las Palmas de Gran Canaria		Resto de Gran Canaria:	
Zona de Las Canteras	☐	Mogán turístico *(i)*	☐
Zona de Vegueta	☐	Maspalomas *(ii)*	☐
		Playa del Inglés *(iii)*	☐

Otros: _____

(i) Puerto de Mogán, Taurito, Tauro- Playa El Cura, Amadores, Puerto Rico y Patalavaca- Arguineguin.
(ii) Meloneras, Sonnenland y Campo Internacional.
(iii) Playa del Inglés, El Veril- Las Burras, San Agustín y Bahía Feliz.

Canal Alimentación:

Mercado de Vegueta	☐	Mercado de Altavista	☐
Mercado del Puerto	☐	Mercado Central	☐

Otros: _____

Canal Gran Distribución:

Zona Comercial TRIANA	☐	Centro Comercial MONOPOL	☐
Zona Comercial MESA Y LÓPEZ	☐	Centro Comercial EL MUELLE	☐
El Corte Inglés	☐	Centro Comercial 7 PALMAS	☐
Zona Comercial PEDRO INFINITO	☐	Centro Comercial SOTAVENTO	☐
Centro Comercial LOS ALISIOS	☐	Centro Comercial TAMARANA	☐
Centro Comercial LAS ARENAS	☐	Centro Comercial LAS TERRAZAS	☐
Centro Comercial LA BALLENA	☐	Centro Comercial PARQUE ATLÁNTICO	☐

Otros: _____

Canal Retail / Moda:

Zona Comercial TRIANA	☐	Centro Comercial MONOPOL	☐
Zona Comercial MESA Y LÓPEZ	☐	Centro Comercial EL MUELLE	☐
El Corte Inglés	☐	Centro Comercial 7 PALMAS	☐
Zona Comercial PEDRO INFINITO	☐	Centro Comercial SOTAVENTO	☐
Centro Comercial LOS ALISIOS	☐	Centro Comercial TAMARANA	☐
Centro Comercial LAS ARENAS	☐	Centro Comercial LAS TERRAZAS	☐
Centro Comercial LA BALLENA	☐	Centro Comercial PARQUE ATLÁNTICO	☐

Otros: _____

Indique los principales flujos logísticos de su empresa:
(por ejemplo, del Puerto de Las Palmas al Pol.Ind. Arinaga)

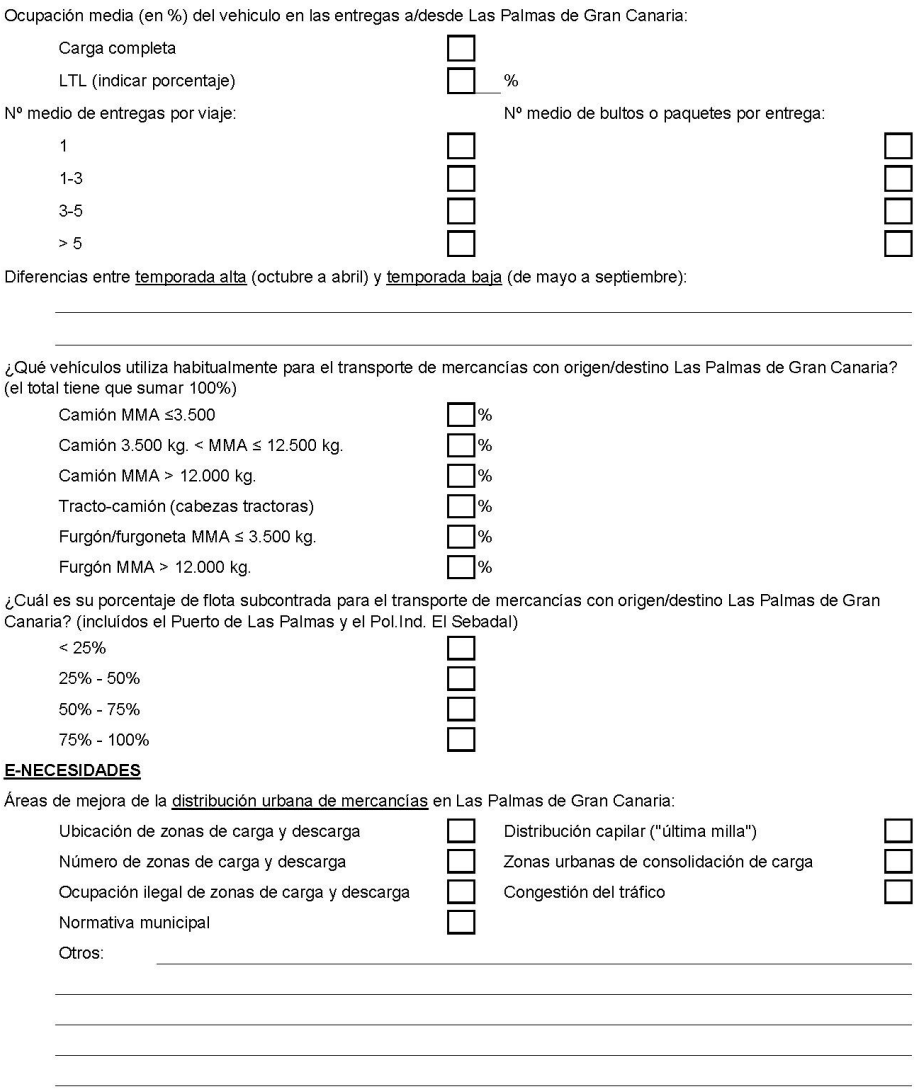
_____
_____
_____
_____
_____

Número de entregas en Las Palmas de Gran Canaria por semana y por canal de distribución:

Zonas Industriales	☐	entregas / semana
HO.RE.CA	☐	entregas / semana
Alimentación	☐	entregas / semana
Gran Distribución	☐	entregas / semana
Retail / Moda	☐	entregas / semana

Carga media semanal a/desde Las Palmas de Gran Canaria (en volumen o peso):

< 10 Tn	☐	< 10 m^3	☐
10-50 Tn	☐	10-50 m^3	☐
50-100 Tn	☐	50-100 m^3	☐
>100 Tn	☐	>100 m^3	☐



Ocupación media (en %) del vehiculo en las entregas a/desde Las Palmas de Gran Canaria:

- Carga completa ☐
- LTL (indicar porcentaje) ☐ ___ %

Nº medio de entregas por viaje:

- 1 ☐
- 1-3 ☐
- 3-5 ☐
- > 5 ☐

Nº medio de bultos o paquetes por entrega:

- ☐
- ☐
- ☐
- ☐

Diferencias entre temporada alta (octubre a abril) y temporada baja (de mayo a septiembre):

¿Qué vehículos utiliza habitualmente para el transporte de mercancías con origen/destino Las Palmas de Gran Canaria? (el total tiene que sumar 100%)

- Camión MMA ≤3.500 ☐ %
- Camión 3.500 kg. < MMA ≤ 12.500 kg. ☐ %
- Camión MMA > 12.000 kg. ☐ %
- Tracto-camión (cabezas tractoras) ☐ %
- Furgón/furgoneta MMA ≤ 3.500 kg. ☐ %
- Furgón MMA > 12.000 kg. ☐ %

¿Cuál es su porcentaje de flota subcontrada para el transporte de mercancías con origen/destino Las Palmas de Gran Canaria? (incluídos el Puerto de Las Palmas y el Pol.Ind. El Sebadal)

- < 25% ☐
- 25% - 50% ☐
- 50% - 75% ☐
- 75% - 100% ☐

E-NECESIDADES

Áreas de mejora de la distribución urbana de mercancías en Las Palmas de Gran Canaria:

- Ubicación de zonas de carga y descarga ☐
- Número de zonas de carga y descarga ☐
- Ocupación ilegal de zonas de carga y descarga ☐
- Normativa municipal ☐
- Distribución capilar ("última milla") ☐
- Zonas urbanas de consolidación de carga ☐
- Congestión del tráfico ☐

Otros: ___

Figure 37: Questionnaire about freight transport in Gran Canaria.

On the one hand, the qualitative information gathered by the surveys helped to identify the needs and goals of the different target users groups and stakeholders. On the other hand, the quantitative data gathered by the surveys is still under review in order to properly estimate many others parameters of interest for the SULP development.

2.4.2. Study area characterisation

2.4.2.1. Selection of study area

The study area for the SULP of Las Palmas de Gran Canaria is the **whole city**. For the characterisation of the study area there have been identified the most important freight and logistic iinfrastructures of the city:

- **Industrial Parks** (Polígono Industrial Barranco Seco, Polígono Industrial Díaz Casanova, Polígono Industrial El Sebadal, Polígono Industrial Escaleritas, Polígono

Industrial La Cazuela, Polígono Industrial Las Torres-Lomo Blanco, Polígono Industrial Los Tarahales and Polígono Industrial Miller Industrial).

- **Port of Las Palmas**.

2.4.2.2. Economic activities

According to the *Clúster Canario de Transporte y Logística* the main figures about logistic flows in the Canary Islands are the following:

Figure 38: Main logistic figures of the Canary Islands

Las Palmas de Gran Canaria is the most important economic activity pool of the island of Gran Canaria.

The following table shows data about the economic activities – split up by agriculture, industry, construction and services activities - both for the city of Las Palmas and the overall island of Gran Canaria:

Year	Period	Economic activities									
		Agriculture		Industry		Construction		Services		TOTAL	
		Gran Canaria island	Las Palmas	Gran Canaria island	Las Palmas	Gran Canaria island	Las Palmas	Gran Canaria island	Las Palmas	Gran Canaria island	Las Palmas
2017	4T	-	-	-	-	-	-	-	-	-	-
	3T	-	-	-	-	-	-	-	-	-	-
	2T	2.311	111	2.876	527	4.909	841	49.998	10.106	**60.094**	**11.585**
	1T	2.372	107	2.871	530	4.694	786	50.380	10.148	**60.317**	**11.571**
2016	4T	2.345	111	2.879	539	4.581	794	50.629	10.167	**60.434**	**11.611**
	3T	2.328	111	2.846	537	4.605	810	49.173	9.932	**58.952**	**11.390**
	2T	2.252	112	2.823	528	4.568	797	48.769	9.946	**58.412**	**11.383**
	1T	2.324	116	2.764	523	4.365	768	48.919	9.895	**58.372**	**11.302**
2015	4T	2.270	114	2.722	522	4.286	759	49.063	9.973	**58.341**	**11.368**
	3T	2.263	116	2.724	513	4.400	762	47.959	9.819	**57.346**	**11.210**
	2T	2.218	115	2.710	519	4.341	760	47.704	9.788	**56.973**	**11.182**
	1T	2.306	117	2.694	510	4.187	745	47.985	9.793	**57.172**	**11.165**
2014	4T	2.266	114	2.712	518	4.097	732	48.403	9.913	**57.478**	**11.277**
	3T	2.263	119	2.692	526	4.221	747	47.505	9.783	**56.681**	**11.175**
	2T	2.215	118	2.688	535	4.151	738	47.310	9.789	**56.364**	**11.180**
	1T	2.261	122	2.667	538	3.957	714	47.600	9.834	**56.485**	**11.208**
2013	4T	2.250	121	2.652	531	3.871	725	47.931	9.950	**56.704**	**11.327**
	3T	2.198	129	2.654	534	4.022	725	47.203	9.849	**56.077**	**11.237**
	2T	2.181	123	2.644	533	4.090	729	47.035	9.906	**55.950**	**11.291**
	1T	2.224	122	2.671	523	4.045	740	47.485	9.968	**56.425**	**11.353**

Table 20: Economic activities (number of companies). Period 2013-2017

The land use occupation is shown in the following map:

Figure 39: Land use in Las Palmas de Gran Canaria

2.4.2.3. Freight and logistics regulation

Since the uptake of its current SUMP in 2012, the Municipality of Las Palmas has continuously enlarged the traffic calming zones in the city by implementing the following typologies:

- Zone 30.
- Living streets / Shared spaces.
- Pedestrian zones.

The neighbourhoods with living streets and pedestrian zones foresee specific access and parking regulations for commercial vehicles (time windows, typology of vehicles, Loading/Unloading parking lots, etc.).

The road traffic regulations of the city of Las Palmas also rule for urban freight. For instance, these regulations set the following restrictions for heavy commercial vehicles:

- It is forbidden to circulate with vehicles which length is over 5 meters and its load exceeds 2 meters in the front or 3 meters in the rear.
- It is forbidden to circulate with vehicles which length is less than 5 meters and its load exceeds a third of its overall length.
- It is forbidden to circulate with vehicles carrying dangerous / hazardous goods.

Moreover, the road traffic regulations also define the following time windows for the loading/unloading operations:

- At general streets: between 8 am to 8 pm from Monday to Saturday.
- At pedestrian zones: between 7 am and 11 am from Monday to Saturday.

2.4.2.4. Logistics services

The tax regulations and customs are a key issue regarding logistics in the Canary Islands and the logistic services should ensure a smooth flow in the different supply chains.

Therefore, Canarian logistic companies offer a wide range of services including: import/export clearance; customs clearance; cargo security; document preparation; regulatory compliance and reporting; customs warehousing; duty management; and advice on tariff quotas and classifications.

There are just a small handful of clearing agents in the Canary Islands, but local VAT (IGIC) and duty charges are usually payable by the consignee.

2.4.2.5. Characterization of logistics flows

As regards of Gran Canaria, the logistic flows in the island should be analyzed separately according to its origin-destination features.

On the one hand, the first groups are the logistic flows with no origin / destination in Gran Canaria. As explained before the Canary Islands enjoy a privileged geo-strategic position to operate efficiently in Europe, Africa and Latin America. The Canary Islands are an excellent platform for trade, logistics and transferring services and technology between continents as they are on the main international trading routes. These external flows are

quite important for the economy of Gran Canaria but they have a limited impact in terms of mobility in the island.

Historically and culturally, the Canary Islands have close ties with Latin America and they also have strong trading and institutional links with West Africa. This enables investors to use the Canary Islands for tackling strategic projects in West Africa and Latin America, with all the legal security implicit in basing their business in Europe.

Canary Islands assist US and EU businesses in reducing their risks and costs for operating in Africa (providing local partners in West Africa, distribution partners, logistic solutions, better access to multiple African domestic markets).

On the other hand, the second groups are the logistic flows with origin / destination in Gran Canaria. Most of these logistic flows are connections with the Iberian Peninsula and other European countries. There are two shipping options available to Gran Canaria for this kind of logistic flows: air or maritime transport. Air transport is faster, but a more expensive option, and maritime transport takes approximately 4 working days, but it is cheaper than air transport. Then, last mile deliveries usually increase shipping times to over 24 hours in many logistic flows. Therefore, the best option to improve shipping times and avoid stock outs is to implement distribution warehouses in Gran Canaria.

The distance between the Canary Islands and the Iberian Peninsula requires complex logistics processes. Those companies based in the peninsula who want to send their products to the Canary Islands are faced with numerous problems such as long transit times, shipping costs, customs clearance works or reverse logistics.

The high shipping costs have a direct impact in some economic activities such as e-commerce. For instance, over 40% of Spanish e-commerce companies do not operate in the Canary Islands. Moreover, customs clearance can cause significant delays to shipments.

As regards of Las Palmas de Gran Canaria, limited data on freight movement patterns across the city is available. In Las Palmas de Gran Canaria, as well as in most of the urban and metropolitan areas, it is difficult to identify the logistic flows and the underlying demand because transport is mainly related to the distribution of final products from wholesalers and restocking centres to the economic activities located in the area.

However, it has been possible to identify the main logistic flows across the city thanks to the interviews with key local stakeholders.

A description of the most important logistic flows in Las Palmas de Gran Canaria is listed below:

Tourism

Tourism accounts for the 70% of the Canary Islands GDP and Gran Canaria is a primary holiday destinations for Center and Northern European tourists.

Most the goods to supply the touristic resorts arrive to Gran Canaria via the Port of Las Palmas and are stored at the distribution warehouses located at the main business parks of the island *(Arinaga, El Goro, Salinetas* and *El Sebadal*). Therefore, the logistic flows to

supply these touristic resorts connect these distribution warehouses and the south of the island (*Maspalomas, Playa del Inglés*, etc.). These logistics flows have a limited impact in Las Palmas de Gran Canaria traffic network because they mainly pass through the GC-1 highway and not through the streets network.

Tourism is not as important in Las Palmas de Gran Canaria as in other parts of Gran Canaria so its impact in terms of logistic flows is also significantly lower. Almost all hotels and restaurants in the city are located in Las Canteras and Santa Catalina neighborhoods so most of the logistic flows connect the distribution warehouses with these urban areas. These flows are rarely direct deliveries to the final destinations from the Port of Las Palmas and they are mainly from big wholesalers. These freight transport operations are mainly carried out by light trucks and loading / unloading operations are usually done at designated on street parking areas.

HORECA and urban retail

Most hotels, restaurants and bars are located at Vegueta, Las Canteras and Santa Catalina neighbourhoods. As explained before, these logistic flows connect the distribution warehouses of big wholesalers with these urban areas.

These logistic flows are mainly carried out by light trucks and loading / unloading operations are usually done at designated on street parking areas.

Shopping malls and food markets

Las Palmas de Gran Canaria is one of the Spanish cities with a higher number of shopping malls (“El Corte Inglés”, “7 Palmas”, “El Muelle”, “La Ballena”, “La Minilla”, “El Mirador”, “Las Ramblas” and “Las Arenas”). Besides these shopping malls there are also four important Food Markets (Vegueta, Puerto, Altavista and Central).

These shopping malls and food markets are spread all over the city and their logistic flows connect them with the distribution warehouses of big wholesalers. These logistic flows are mainly carried out by heavy trucks and loading / unloading operations are usually done at their own premises.

Industrial parks

There are several industrial parks in Las Palmas de Gran Canaria (*El Sebadal, Barranco Seco, Díaz Casanova, Escaleritas, La Cazuela, Las Torres-Lomo Blanco, Los Tarahales and Miller Industrial*). Their main thread to urban mobility is heavy trucks movements along the streets network of the city.

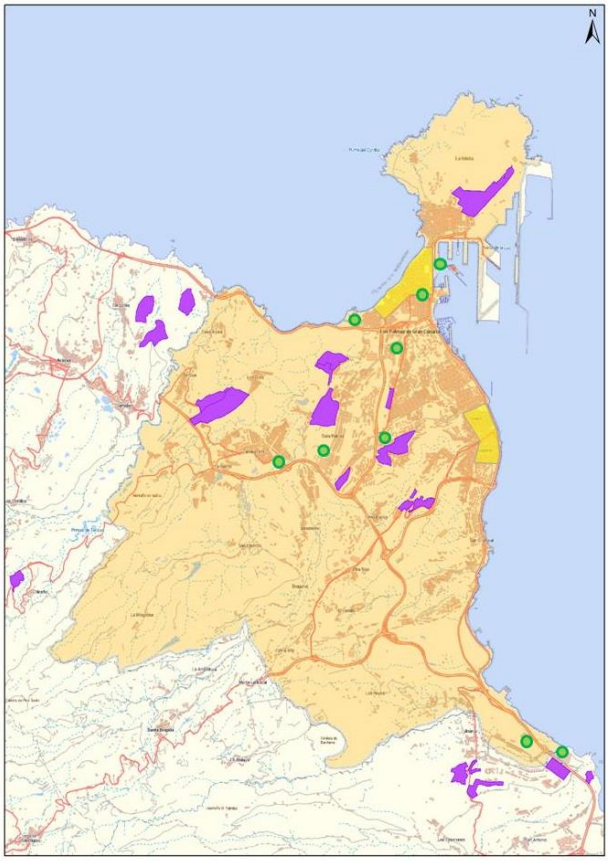


Figure 40: Industrial parks (lilac), shopping malls (green) and main touristic and commercial areas (yellow) of Las Palmas de Gran Canaria

Finally, it is important to highlight that heavy trucks from / to the Port of Las Palmas for long-distance freight use the main highways that pass along Las Palmas de Gran Canaria (GC-1, GC2, GC-3 and GC-23). These trucks traffic causes several congestion problems in the highway network but has a limited impact over the streets network.

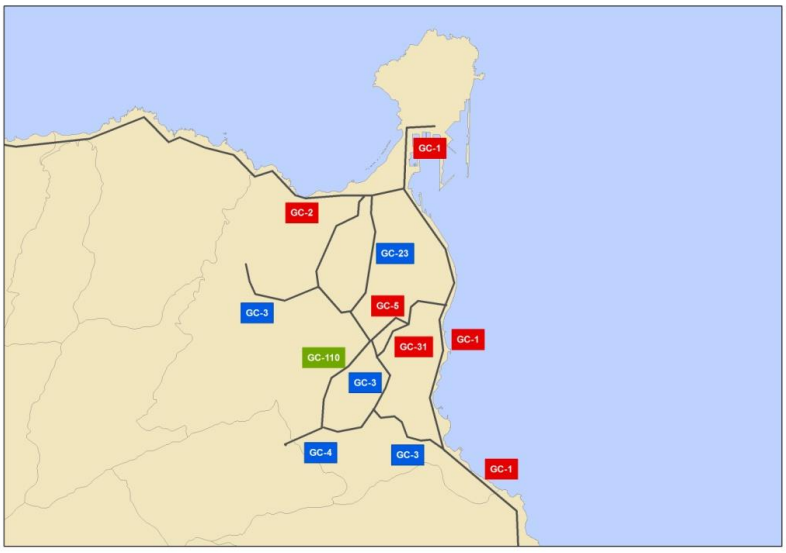


Figure 41: Highways in Las Palmas de Gran Canaria

2.4.2.6. Energy and environment aspects

As explained in previous chapters, there is no data regarding pollution caused by the transport sector.

However, there is a clear energy and environmental aspect related to the traffic of light commercial vehicles (vans, etc.) in the narrow streets of the two most important urban shopping areas: *Las Canteras and Triana*.

These vehicles cause traffic congestion along with noise and air pollution in these areas. Moreover, the parking violations of some of these vehicles are a safety problem for pedestrians and cyclists.

2.4.2.7. Main needs and problems in Logistics

The main challenges in logistics in Las Palmas de Gran Canaria are the following:

- Capacity of urban freight transport systems (congestion).
- Lower driving speeds and frequent disruptions (reliability).
- Distribution sprawl (space consumption).
- Smaller volumes and time-sensitive freight (frequency and repetitiveness).
- Cold chain (shipment integrity).
- E-commerce (home deliveries).
- Mitigate environmental externalities (emissions, noise).
- Growing demand for reverse logistic flows (waste and recycling).
- Mitigate social disturbances (safety and health).
- Access (allowable vehicles, streets and time windows).
- Land use (land use, freight distribution clusters, and urban consolidation platforms).

In Las Palmas de Gran Canaria the rise of freight related activities and the growing intensity of urban freight movements can be a source of competition for the usage of scarce urban land and of conflicts between freight and non-freight stakeholders.

Therefore, it is necessary to improve the local regulations in order to deal with the new challenges of urban freight.

Furthermore, there have been identified the main needs of the key stakeholders and user groups in Las Palmas de Gran Canaria regarding urban freight:

Urban freight companies

- Fleet management software.
- Delivery optimisation.
- Real time traffic information.
- Information about scheduled events (streets interruption).
- Real time information about on-street loading/unloading bays availability.
- Information about on-street bays size.
- Energy-efficient vehicles for urban freight operations (e-vehicles, e-bikes, etc.).

Citizens

- Enhanced street attractiveness.

- On-time deliveries.
- Less greenhouse gas emissions and noise pollution.

Shopkeepers (retail, HORECA, etc.): Despite these kind of local organisations are generally not interested in freight and delivery issues, they may greatly benefit from improved policies. However, the following are the shopkeeper needs regarding urban freight:

- Enhanced street attractiveness.
- To have access to technologies that may not be affordable to individual firms.
- Added value services:
    - Short or medium term storage space.
    - Collection and sorting of palettes and cardboards from shops.
    - Reverse logistics.
    - Other.
- To avoid stock-outs.
- To ensure a customer satisfaction oriented supply chain management strategy.

Finally, all stakeholders and user groups' representatives agreed on the main goals of the SULP of Las Palmas de Gran Canaria:

- Integrate logistics operations within the overall urban mobility system.
- Improve the efficiency and cost-effectiveness of the transportation of goods (e.g. increase load factor, decrease the number of trips, less mileage, less delays, empty runs reductions, etc.).
- Enhancing local economic development by promoting new business opportunities.
- Better urban environment and better living conditions (city attractiveness, etc.).
- Improve city access regulations.

2.5. Malta/Valletta

2.5.1. Regional and city overview

2.5.1.1. Geography and population

Malta is the main island in the Maltese Archipelago which is made up of 5 islands, covering an area of approximately 316km^2. The Island is often considered a city-state with one principal urban agglomeration being the Northern and Southern Harbour Districts. This area currently houses around 60% of the population and more than 66% of the country's total national employment provision[2].

The SULP shall be developed for the city of Valletta and its approach roads. Valletta is the capital city of Malta and it is found at the centre of the urban agglomeration, right in between the Northern and Southern harbour districts. It is a walled city built in the 17th century. Its

[2] Transport Malta 2014; Development of a National Transport Model Supporting Strategy Development in Malta – Existing Conditions and Data Diagnostic Report, p.13.

main purpose was that of defence, therefore access in and out of the city is very limited. Three access points allow entrance and exit within the city walls; St Mark's Street, St Paul's street and Marsamxett street.

The city is built in a grid-like manner constituting of straight perpendicular roads of differing widths. Much of the city is pedestrianised including long sections of Republic Street and Merchant Street. These two streets host the main retail outlets within the city as well as a number of boutique hotels, Government administration buildings, the law courts and office buildings.

In terms of vehicular traffic, access within the pedestrianised zone is only allowed to delivery of goods vehicles and waste collection vehicles and only at certain times of the day. Small electric city cabs are also allowed access. Large Heavy Goods vehicles, coaches and buses are not allowed within the city at all. A major public bus interchange is located right outside the city's main gate (through which all vehicular traffic is prohibited access), while coaches disembark their passengers beyond the confines of Valletta at Sarria Road.

Figure 42: Map of Valletta (top); District Map; the Valletta Region is indicated in the pink and orange sections

Resident and visitor population

Valletta's resident population amounts to 5,748 as of last census (2011). The table below shows the change in population over the past 10 years for Valletta and its surrounding towns. It is to be noted that while the number of visitors to Valletta increases year on year, the number of residents is increasingly diminishing.

District and locality	1901	1911	1921	1931	1948	1957	1967	1985	1995	2005	2011
MALTA	**184,742**	**211,564**	**212,258**	**241,621**	**305,991**	**319,620**	**314,216**	**345,418**	**378,132**	**404,962**	**417,432**
Malta	**164,952**	**188,869**	**189,697**	**217,784**	**278,311**	**292,019**	**288,238**	**319,736**	**349,106**	**373,955**	**386,057**
Gozo and Comino	**19,790**	**22,695**	**22,561**	**23,837**	**27,680**	**27,601**	**25,978**	**25,682**	**29,026**	**31,007**	**31,375**
Southern Harbour	**70,244**	**74,955**	**79,001**	**87,811**	**84,206**	**90,705**	**87,879**	**86,843**	**83,234**	**81,047**	**79,438**
Cospicua	12,148	12,164	11,536	12,163	4,822	9,095	9,123	7,731	6,085	5,657	5,249
Fgura	-	-	-	-	-	-	2,737	8,254	11,042	11,258	11,449
Floriana	5,687	5,811	5,907	6,241	5,074	5,811	4,944	3,327	2,701	2,240	2,014
Ħal Luqa	3,670	3,945	3,607	4,059	4,318	5,382	5,413	5,585	6,150	6,072	5,911
Ħal Tarxien	2,065	2,820	2,876	3,247	4,607	7,706	7,989	7,016	7,412	7,597	8,380
Ħaż-Żabbar	5,750	7,012	7,044	8,003	11,726	11,005	10,167	12,869	14,138	14,671	14,916
Kalkara	1,158	1,491	1,698	1,899	2,068	2,101	1,945	2,086	2,833	2,882	2,946
Marsa	-	-	4,838	7,867	11,560	10,672	9,722	7,953	5,324	5,344	4,788
Paola	2,812	4,319	5,475	7,297	14,793	11,424	11,794	11,744	9,400	8,822	8,267
Santa Luċija	-	-	-	-	-	-	-	3,208	3,605	3,186	2,970
Senglea	8,093	8,205	7,741	7,683	2,756	5,065	4,749	4,158	3,528	3,074	2,740
Valletta	22,768	23,006	22,392	22,779	18,666	18,202	15,279	9,340	7,262	6,300	5,748
Vittoriosa	6,093	6,182	5,887	6,573	3,816	4,242	4,017	3,572	3,069	2,701	2,489
Xgħajra	-	-	-	-	-	-	-	-	685	1,243	1,571
Northern Harbour	**42,774**	**53,746**	**52,347**	**63,941**	**101,526**	**104,889**	**105,060**	**113,730**	**118,409**	**119,332**	**120,449**
Birkirkara	8,417	9,573	8,565	10,345	16,070	16,987	17,213	20,385	21,281	21,858	21,749
Gżira	-	-	-	-	6,295	8,545	9,575	8,471	7,872	7,090	7,055
Ħal Qormi	8,187	9,404	9,286	10,165	14,396	14,869	15,398	18,256	17,694	16,559	16,394
Ħamrun	10,393	14,601	10,434	11,580	17,124	16,895	14,787	13,682	11,195	9,541	9,043
Msida	2,893	3,627	3,373	3,990	6,064	6,587	11,437	6,219	6,942	7,629	7,748
Pembroke	-	-	-	-	-	-	-	-	2,213	2,935	3,488
San Ġwann	-	-	-	-	-	-	2,122	8,179	12,011	12,737	12,152
Santa Venera	-	-	1,910	2,639	4,535	5,246	6,134	7,827	6,183	6,075	6,789
St Julian's	1,444	2,164	2,594	3,998	9,122	8,285	7,394	10,239	7,352	7,752	8,067
Swieqi	-	-	-	-	-	-	-	-	6,721	8,208	8,755
Ta' Xbiex	-	-	-	-	-	-	-	1,955	1,732	1,860	1,556
Tal-Pietà	933	1,205	1,823	2,344	3,626	4,076	-	4,380	4,307	3,846	4,032
Tas-Sliema	10,507	13,172	14,362	18,880	24,294	23,399	21,000	14,137	12,906	13,242	13,621

Table 21: Population in the Southern and Northern Harbour Districts (Valletta Region), by gender and age (Source: NSO; Census of Population and Housing 2011)

However, being the capital city, Valletta is also the main governmental administrative centre as well as a major tourist and shopping centre in its own right. Due to this, the number of daily visitors to Valletta amount to five-times the resident population. Apart from commuters who travel into Valletta daily to work, it has been recorded that 90% of all tourists who visit Malta, also visit Valletta, making Valletta the most popular tourist attraction on the island.

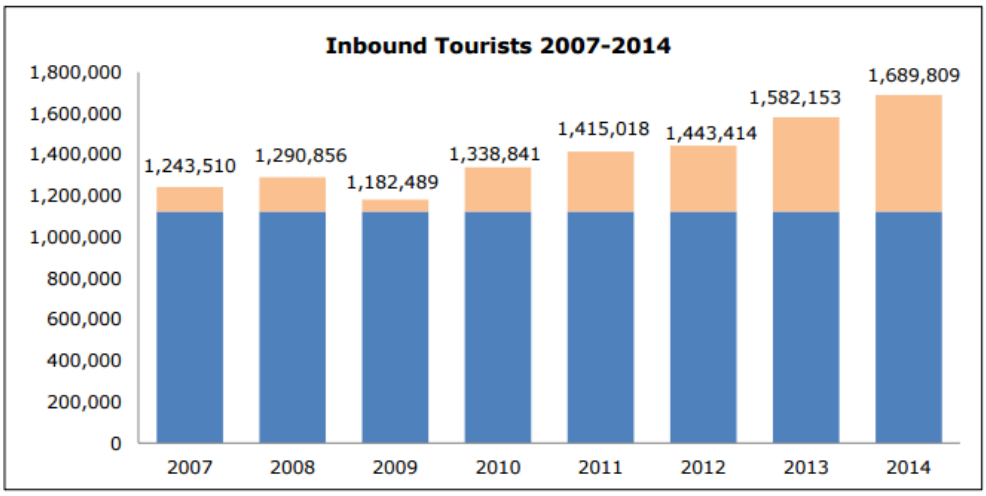


Figure 43: Increase in the tourists between 2007 and 2017 (Source: MTA, Market Profile Analysis, 2014)

Moreover, in recent years, cruise tourism in the Grand Harbour has increased. The cruise port is found within the Grand Harbour which is located along the Southern Coast of Valletta. In 2014, 471 554 passengers passed through the Valletta Cruise Port which increased to 600 156 in 2015 and increased again to 626 082 in 20163; thus also increasing the number of tourists who directly land in Valletta and also the daily trippers to the city.

Year	Month												Total
	January	February	March	April	May	June	July	August	September	October	November	December	
2007	1	3	11	35	45	40	32	41	48	62	48	3	369
2008	1	1	4	47	52	50	42	45	61	55	31	8	397
2009	5	7	3	31	25	23	21	26	35	43	33	9	261
2010	4	5	10	33	34	25	24	22	33	42	31	12	275
2011	4	3	7	29	33	37	30	30	37	61	32	8	311
2012	5	1	6	34	42	37	25	43	45	49	25	10	322
2013	3	2	8	17	34	29	27	34	40	53	28	11	286
2014	11	5	7	35	28	26	23	22	46	56	35	9	303
2015	5	1	3	40	39	29	24	29	49	53	28	7	307

Table 22: Cruise Liner visits in Malta, by month and year (Source: NSO; Transport Statistics 2015)

2.5.1.2. Mobility and traffic

The National Household Travel Survey is carried out every ten years, with the latest being published in 2010. In the period prior to the survey - between 1998 and 2010 - a significant transport-related change was carried out in Valletta, namely the introduction of the Controlled Vehicular Access (CVA), together with other initiatives, such as the introduction of a park-and-ride scheme on the approach road to Valletta and the pedestrianization of a number of streets within the capital city. These were all aimed at reducing the dependency of the car, especially on trips going into Valletta.

CVA Zone:

The system, which was launched in May 2007, uses Automatic Number Plate Reading (ANPR) technology and dedicated camera systems to monitor and photograph vehicles entering and exiting the CVA boundary. The system then automatically calculates the time the vehicle stayed inside the Valletta CVA boundary and finally computes the fee due for access and parking based on the tariffs issued by Transport Malta. Bills are then sent by post to the vehicle owners and payment can be effected by post, online or via an authorised bank standing order.

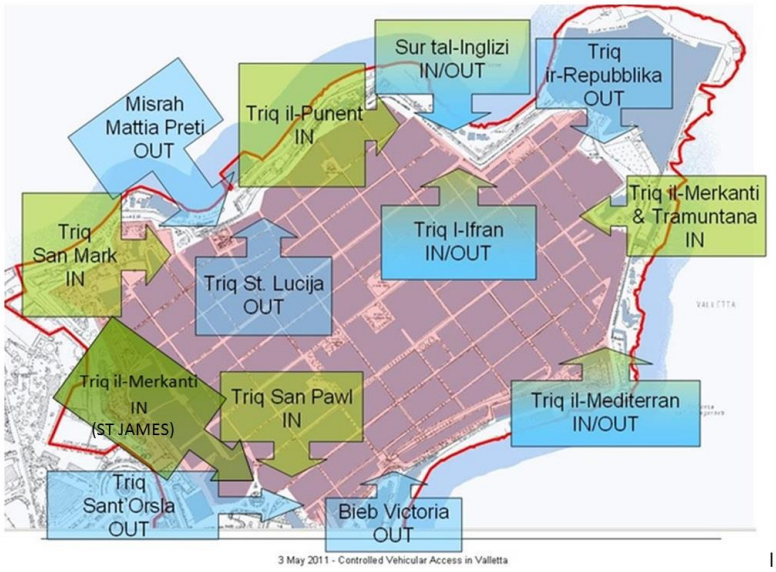


Figure 44: The CVA boundary map showing the entry and exit points of the Valletta CVA boundary

Parking within the City:

On-street parking in Valletta is split in three categories; white spaces are available for everyone, irrespective of the time, green spaces are reserved for Valletta residents and blue spaces are reserved for residents between 18:00 and 06:00; the latter amounts to over 400 parking spaces which are made available to commuters during the day (between 06:00 and 18:00). Additionally, there are 510 on-street parking spaces (white spaces) available for visitors. There is also a large multi-storey car park (MCP) situated just outside Valletta.

There are limited off-street parking facilities inside Valletta. This is problematic mostly for lower Valletta because of the distance from the Floriana car parks. This creates intense parking pressures on the streets in lower Valletta and also on the shoreline. Despite positive developments on access including CVA, park and ride, new car park in Floriana, Upper Barrakka lift and ferry services, these might not be enough to satisfy the increase in demand resulting from the regeneration of Valletta.

Park and Ride:

The Floriana Park and Ride facility is situated on the approach road to the capital city. It offers a quick and low-cost solution to parking in Valletta and Floriana with over 750 parking

spaces available. The fee is of €0.40 per day and includes a shuttle service to and from Valletta and Floriana. The service is available every day between 06:00 and 21:00.

Despite the above-mentioned initiatives, dependence on the private car is still quite high. The table below indicates the modal split and modes of transport used for trips ending in Valletta as of 2010:

Mode of transport	% share
Car driver	30.9%
Car passenger	9.8%
Motorbike	0.1%
Bus	53.0%
On foot	2.0%
Other	0.2%

Table 23: Modal split of trips ending in Valletta, NHTS 2010

It is imperative however to compare these figures with the modal split existent (at the time) at national. The table below shows the national Modal Split as at 2010.

Mode of transport	% share
Car driver	59.9%
Car passenger	15.2%
Motorbike	1.1%
Bus	11.3%
On foot	7.6%
Other	1.7%

Table 24: National modal split, NHTS 2010

Unfortunately, a more recent detailed study focusing specifically on Valletta is not available. However, some information can be attained from the National Transport Strategy. Taking 2014 as the base year, the Strategy assessed the frequency of trips generated in Valletta, the Northern and Southern Harbour Regions. The table below shows data on trip frequency, however the mode chosen to conduct the trip is not available.

	Inbound number of trips/hour	Outbound number of trips/hour	Intrazonal number of trips/hour
Northern Inner Harbour Region	12,709	10,989	3,662
Northern Other Harbour Region	16,801	16,810	6,210
Southern Inner Harbour Region	6,728	4,035	867
Southern Outer Harbour Region	7,952	7,496	3,512
Valletta	2,768	1,374	803

Table 25: Trips generated in the Northern and Southern Harbour Regions during the AM Peak

Main mobility problems in the city

As is the trend at national level, motorisation rates are very high in comparison to per capita population. As at 2015, the rate of national motorisation stood at 799 motor vehicles/1000 residents (NSO, 2016). This represents one of the highest per capita rates of the 28 EU member states.

The increasing volume of traffic on the roads is closely associated with this growth in private car ownership and usage. Nationally, private cars account for over 83% of the vehicular traffic composition on Maltese roads during a typical weekday[4].

A direct comparison between vehicle ownership growth and demographic trend shows that the number of passenger cars has been increasing at a rate that exceeds population growth.

While statistics are not available specifically for Valletta, rates at regional level are available. The table below shows the newly registered vehicles for the Northern and Southern Harbour regions.

Year	District	Agricultural	Coach and private bus	Minibus	Route bus	Motorcycle	Passenger car	Goods carrying vehicle	Special purpose vehicle	Road tractor	Total
2012	Southern Harbour	7	4	11	0	155	2,048	195	17	7	2,444
	Northern Harbour	2	6	18	17	365	4,065	392	22	9	4,896
2013	Southern Harbour	3	1	4	0	206	1,924	194	17	10	2,359
	Northern Harbour	3	2	15	8	492	4,148	376	29	17	5,090
2014	Southern Harbour	2	8	3	0	224	2,415	213	19	8	2,892
	Northern Harbour	6	4	11	0	573	4,704	395	19	21	5,733
2015	Southern Harbour	3	0	18	32	292	2,521	198	13	10	3,087
	Northern Harbour	2	4	20	143	687	5,082	521	17	13	6,489

Table 26: Newly registered vehicles, by district, between 2012 and 2015 (Source: NSO; Transport Statistics 2016)

The problem of congestion within the city of Valletta is not as acute as in other towns and villages around Malta; particularly due to the pedestrianised zones, the access charge applicable to most vehicles, the high accessibility to the city by public transport as well as the parking availability outside the city gates. However, parking provision within the city is at saturation level, and a high incidence of rat-running within the city in search of parking is present; albeit this cannot be proven.

The narrow streets are inaccessible to heavy goods vehicles and coaches which has led to their prohibition from entering the city. Waste collection vehicles do enter the city however.

[4] Transport Malta 2016; National Transport Master Plan 2025, p.7

2.5.1.3. Energy consumption and CO_2 emissions in the transport sector

As mentioned in previous sections of the document, the Northern and Southern Harbour districts represent the most densely populated region of the island. This region hosts the highest concentration of industry, employment nodes, tourist attractions, entertainment districts, retail outlets, etc. In this regard, it also hosts the highest concentration of traffic congestion and therefore also the highest concentration of traffic generated emissions. Valletta (SULP study area) is found at the heart of this region. Emissions in and around the city are compounded by the fact that flanking both sides of the city are found two harbours. While on the northern coast, the Marsamxett harbour hosts mainly yacht marinas and pleasure trips, the Grand Harbour (on the Southern Coast) hosts the main cruise ship berths, certain cargo vessels and the Malta-Sicily Ro-Ro service among others. The Valletta Grand Harbour forms part of the TEN-T Comprehensive network.

In mapping NOx emissions around the island, it is evident that Valletta and its surrounding region are the most polluted localities in the island. The map below shows NOx emissions as mapped by the Malta Environment and Planning Agency.

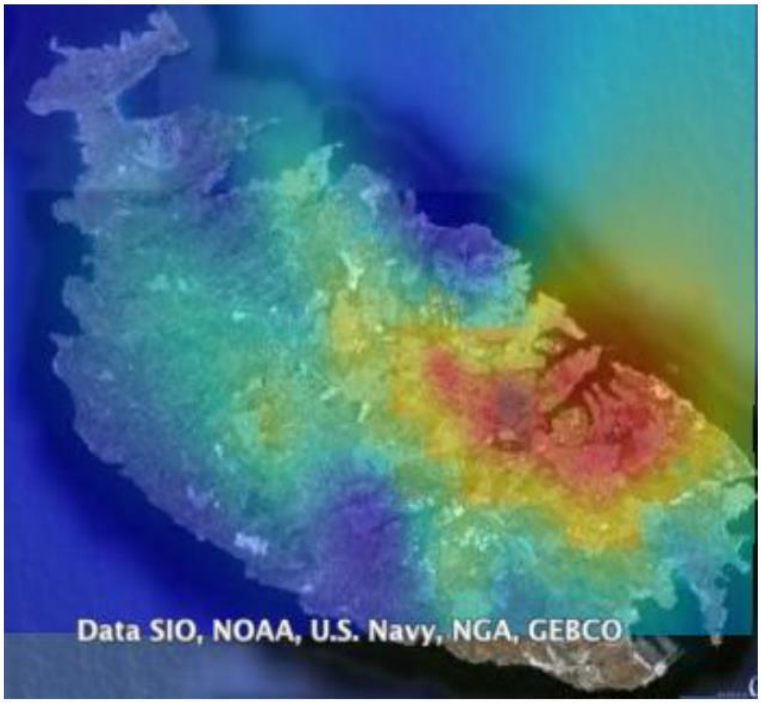


Figure 45: The spatial trends of Nox between 2008 and 2011 (Air Quality Trends, MEPA)

Again, for fuel consumption levels, data specifically for Valletta is not available. However, the Table below represents the fuel consumption levels for Malta, divided by type and use.

TONNES OF OIL EQUIVALENT	Petrol	Diesel	Biodiesel	Jet A1	Aviation Gasoline	Kerosene	Gasoil	Heavy Fuel Oil	Thin Fuel Oil	Liquefied Petroleum Gas	Propane
Imports	87,578	99,378	1,269	111,769	60	-	327,081	1,640,353	325	23,730	288
International Air Transport	-	-	-	107,993	58	-	-	-	-	-	-
International Navigation							227,890	1,083,676			
Gross Inland Consumption	78,102	98,657	2,024	(0)	0	559	88,502	542,412	3,489	23,698	288
Utilities	-	-	-	-	-	-	65,541	530,872	-	-	-
National Navigation	114	-	-	-	-	-	11,503	-	-	-	-
Domestic Air Transport	-	-	-	200	-	-	-	-	-	-	-
Road Transportation	78,588	91,590	679	-	-	-	-	-	-	-	-
Agriculture, Forestry & Fisheries	-	888	-	-	-	11	2,050	-	-	-	-
Residential	-	-	-	-	-	349	310	-	-	19,670	-
Manufacturing & Construction	-	6,814	76	-	-	125	3,386	-	938	4,029	288
Commercial & Institutional	-	2,515	-	-	-	55	5,711	470	495	-	-
Statistical Difference	600	3,149	(1,269)	200	(0)	(18)	-	(11,070)	(2,056)	-	-

Table 27: Fuel consumption by type and use

Legend: Nitrogen Dioxide Maximum. Source: Compiled from MEPA (2010). Data Units: µg/m-3

The above data is more clearly detailed for the different emitting groups and economic sectors in the chart below:

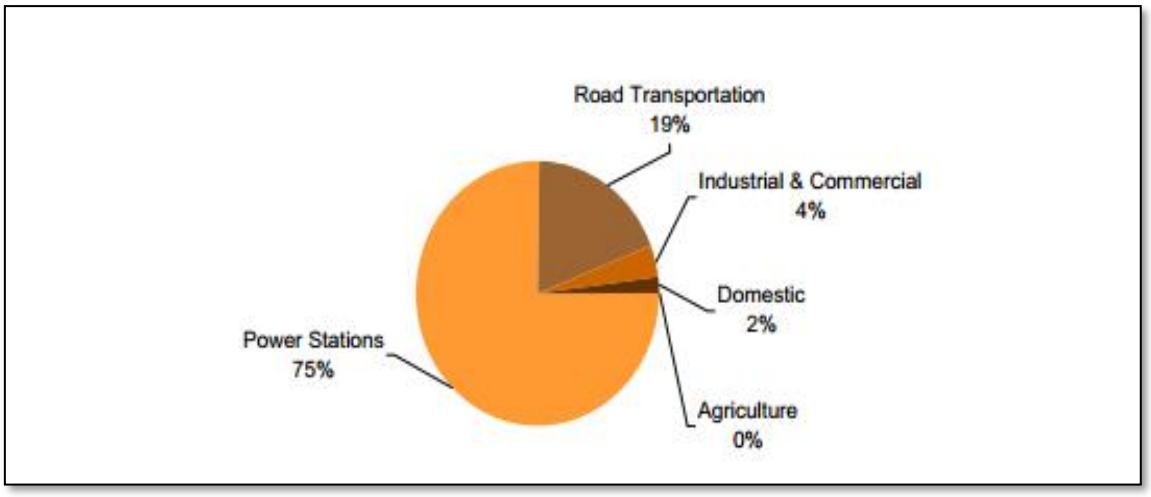


Figure 46: Fuel consumption, by sector (2011)

2.5.1.4. Policies and regulation framework in logistics

The main target which the SULP should strive to achieve is that which is defined as parted of the 2020 EU Effort Sharing Decision. Malta is committed to limit its CO_2 emissions to no more than a 5% increase as compared to 2005 levels.

The Alternative Fuels Directive is also to be kept into account; as part of this Directive, Malta is to ensure that 5,000 electric vehicles are deployed on the road by 2020 as well as 500 charging points to be made available to the public.

However, when it comes to political objectives specifically relating to the field of transport, these are best represented in the National Transport Strategy published by the Authority of Transport in Malta in 2016. The Strategy prioritises the following measures for short to medium term implementation.

a. Development of an action plan for the management and regulation of freight transport and 'last mile' urban logistics

In this regard, the Strategy acknowledges that "Urban centres commonly experience traffic problems as a direct result of inefficiencies in goods delivery operations, illegal parking and the use of unsuitably large and high polluting vehicles which negatively impact on the urban fabric and public health." To counteract this, the Strategy proposes that, "Clearer regulation of freight transport operation in urban areas is needed at a national level to protect the urban environment, to reduce air pollution, to reduce the incidences of traffic infringements and to reduce congestion on Maltese roads (particularly during peak hours)." On the other hand, opportunities do currently exist "through the better application of freight logistics to improve the efficiency of road freight operation, to reduce the number of empty runs and therefore to make significant operational cost savings." To put this measure into practice, the Strategy suggest the compilation of studies which focus on "the potential to use smaller green freight vehicles and cargo/e-cargo bikes for ´last mile´ urban logistics." More broadly, the Strategy pushes for the "development of an Action Plan in collaboration with stakeholders involved in road freight operation for the management and regulation of freight transport and 'last mile' urban logistics." It is to be noted here that the SULP for Valletta shall partly address this need, considering that through this action, an Sustainable Urban Logistics Plan shall be compiled specifically for Valletta to study the problems, opportunities and propose actions which can improve logistics within the city. Moreover, the Strategy also clearly states that; "A pilot project for Valletta will be developed to test the concept of sustainable last mile delivery of goods within Valletta." This too shall be deployed as part of MAL 5.1.

b. Improvement of the management and regulation of freight transport and urban logistics

The Strategy promotes an approach which aims at reducing "the overall number of freight deliveries" this will in turn "reduce the number of commercial vehicles on Maltese roads." A better time management and organisation of freight deliveries within busy centres can also "effectively reduce their impact during peak travel times". Finally, the resultant better fleet management and more efficient usage of delivery vehicles "can lead to the lowering of operational costs (less fuel used, less driving time, shortened waiting periods etc.)". Options to improve the last mile delivery of goods, such as night-time delivery using low-noise vehicles and a coordination system for optimal scheduling can be further explored through direct stakeholder consultation which is planned to take place as part of the formulation of the SULP.

c. Set up a national freight forum to improve urban logistics

Stakeholder participation is high on the Strategy's agenda, in fact, it promotes the "development of a national freight forum" aimed bringing together stakeholders and interested parties with the aim of further improving urban logistics. "These forums could consider the potential of logistics hubs or co-ordinated distribution in urban centres to

increase the effectiveness and efficiency of urban distribution." Exploring the concept of a logistics hub for distribution of goods within Valletta, is one of the main deliverables within the scope of the SULP to be compiled as part of DESTINATIONS.

2.5.1.5. Main infrastructures for logistics

Figure 47: Valletta Municipality, Loading bays, Freight and Logistics survey points

The access to deliver goods to the Municipality of Valletta is made through road only, with the main access streets passing through the Municipality of Fioriana.

There are three main street traffic entrance points to the city of Valletta, one in the North (1), one in the South (2), and one central (3) with a roundabout near Castille Hotel.

To provide a first set of observation data, traffic counts were performed in November and December 2017 on these three main road entrance points (red dots in the figure).

To complement this data, observation of loading and unloading activities were made in the pedestrian area, and at the location of several loading bays in city centre.

The existing loading bays are mapped and represented with red lines in figure.

Currently, as of November and December 2017, only a total of 7 loading bays for freight deliveries could be identified with vertical signage and street or pavement marks in Valletta.

The traffic count and the loading bay delivery data are presented in Tables below.

Currently, the infrastructure in Valletta does not adequately support the logistic requirements of the City.

2.5.1.6. Stakeholders and roles in the logistics sector

The following table summarises the main stakeholders (public and private) who have direct or indirect influence on logistics within the study area.

Stakeholder	Role
Valletta Local Council	Main Stakeholder for this Measure
Transport Malta	National regulator of road transport
General Retailers and Traders Union	Representative of small retail outlets Nationally (including in Valletta)
Malta Hotels and Restaurants Association	Representative of Hotels and Restaurants Nationally (including in Valletta)
Chamber of Commerce; Logistics Sub-group	Representative of large businesses in Malta including major delivery companies
Ministry for Finance	
Ministry for Transport, Infrastructure and Capital Projects	Remit includes both transport and planning
Ministry for Energy and Water Management	Remit includes sustainable energy

Table 28: Main stakeholders in Malta Sustainable Urban Logistics Plan

Besides these specific stakeholders, several general freight stakeholder groups are actively influencing traffic and goods transport activities in the Valletta Region, and participate in the public consultations and events.

Authorities

- Facilitation and buildings
- Operation and maintenance
- Public Roads Administration
- Parking managers
- Food Safety
- Customs
- Labour Inspection

Carriers

- MaltaPost
- Private freight forwarders (e.g. TNT, DHL, UPS, etc)
- Transport companies
- Construction industry
- Independent retailers and goods vehicle owners

End-receivers

- Stores, shopping malls, groceries
- Hotels, restaurants, catering
- Public institutions, offices
- Industrial and construction sites
- Residents

2.5.1.7. Systems and tools for logistics management

The table below indicates the intelligent transport system (ITS) technologies which are currently used within the SULP study area which may be used to collect data useful to this study. At a public level, no system is available which supports the management of logistics at either local or regional level.

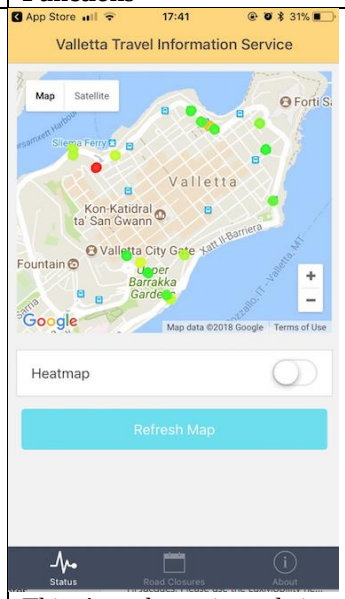
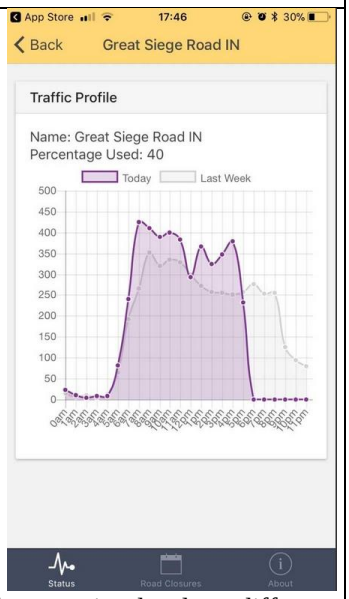
Tools	Functions
VATIS – Valletta Travel Information Service	  This App shows in real time traffic and congestion levels at different entrance points and within the city of Valletta. The examples of the app information were taken on 12 January 2018, at 17:41 and 17:46.
 Controlled Vehicle Access Zone	Through cameras located at all access points to the city, this system allows the provision of data on the number and type of cars visiting the city and their duration within the city 

Table 29: Traffic tools and IT systems in use in Valletta

2.5.2. Study area characterisation

2.5.2.1. Selection of study area

The study area for the SULP shall be the city of Valletta which hosts a major conglomeration of commercial establishments in terms of retail, entertainment, administrative as well as hospitality. The approach roads immediately leading to Valletta will also be taken into consideration (St Anne Street, Sa Maison Road and Triq L-Ghassara ta' l-Gheneb) in terms of accessibility to and from Valletta.

The specificities of Valletta are unlike those of other cities in Malta. Despite its size and low resident population levels, Valletta hosts a disproportionate number of retail outlets, hotels,

bars and restaurants, corporate buildings, government buildings and tourist attractions resulting in a very high number of daily visitors and demand for goods transport. Moreover, the pedestrian zones, the access charge, the limited physical access in and out of the city (as well as within) and the fact that certain vehicles are barred from entering the city, further complicates matters when it comes to delivering goods and making use of any large vehicles.

Moreover, on days when there are cruise liner calls the number of visitors to the city spikes. On such days, thousands of tourists flow through places of interest, especially the city of Valletta, adding to the already high number of daily visitors to the city.

Identification of the road network and main access axis

Valletta's morphology provides challenges to both pedestrian accessibility and to vehicular mobility. The city was built by the Order of the Knights of St. John in the 17th century. The Order's original plans for Valletta were to flatten the terrain of Mount Sceberras. However, the costs were too high and instead the City was planned around the existing topography with the middle part of Valletta, mainly around Republic Street, constructed on the flat part of the terrain with steps and narrow streets emerging from either side leading towards the harbours. Moreover, the main aim for the city was that of defence; it is for this reason that physical accessibility is highly restricted.

Nowadays, the central commercial areas around Republic Street are pedestrianised and relatively free of vehicles, which is important to cater for the high increase of pedestrian mobility within the City during the day time. However, within the outer residential areas of Valletta, mobility is hampered by narrow and stepped pavements.

The public transport system has very limited access to the inner part of the City although the main bus terminus is located just outside the main entrance to the Valletta. The restrictions in terms of vehicular mobility and access favour pedestrian circulation within the City particularly in the central core where most of the commercial outlets and offices are located.

The below map shows the access points for vehicles to Valletta:

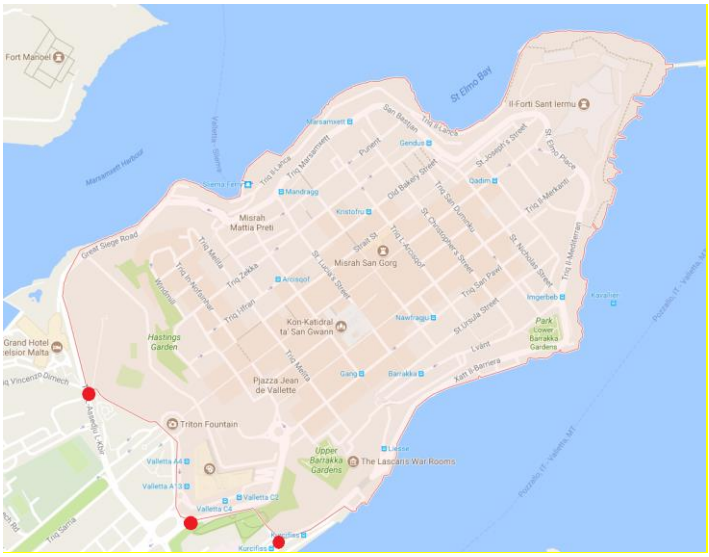


Figure 48: Main access points for vehicles to Valletta

2.5.2.2. Economic activities

The table below represents the main sectors driving the local economic activity and how much of these are present in Valletta.

Type of establishment	Number
Antiques	3
Bakery & confectionary	22
Bazaar	5
Book-keeping, business & management consultancy	17
Cargo handling, transport agencies & movers	8
Clothing & wearing apparel	159
Cosmetics and toiletries	9
Drapery & carpets	23
Electrical & Plumbing supplies	2
Events organisers & halls	3
Factories & Farms	1
Fishmonger	1
Footwear & leatherwear	28
Furniture , carpentry & upholstery.	12
Games and toys	1
Grocers & green grocers (including wholesale of food & beverage)	16
Hair & beauty Salons	15
Household goods, appliance & furniture	60
Importers and wholesalers	30
Ironmongery	13
Jewellery , watches & clocks .	89
Manufacture of base metal, blacksmith, tinsmith, taylor and shoemaker	5
Manufacture of food products and beverages	1
Meat Sellers	5
Motion picture and video activities	3
Motor vehicle repairs, sprayers, workshop & garages	5
Non-specialised stores with food, beverages and tobacco predominating	20
Office equipment, computer services & equipment	4
Other non-food retail	38
Other offices	5
Other wholesale & manufacturing activities	12
Pet shop, farming & fishing equipment.	5
Photographic services, equipment and spare parts	16
Places of public entertainment, library, archives, museums and other cultural activities	7
Publishers, printing presses, stationers & book sellers	41
Real Estate agents and other agencies.	24
Souvenirs, craftwork & religous articles	34
Stationers and booksellers	17
Storage and warehousing as a commercial service (excluding food and beverages)	2
Telecommunications, electrical & mechanical equipment	7

Table 30: Business establishments in Valletta based on the effective licences on 31/12/2016 (Source: Commerce Department)

Main generators of freight demand in Valletta

- Trade and retail shops
    - In the pedestrian area of Valletta, there are several shopping streets with independent retailers and franchises of international brands
    - Two small shopping centres are run in Valletta pedestrian area
    - There is no supermarket in Valletta, only small grocery stores.
- Tourism and leisure, hotels, restaurants and catering sector
    - There is a large number of tourism activities and businesses in Valletta, with hotels, restaurants and catering facilities, accommodating about 2 mio visitors per year. There are currently more than 200 bars and restaurants listed (Figure 9)
- Services (transportation, waste, building services, etc.)
    - Besides transport operators themselves, such as Malta Post, the service sector and especially the building services and repairs are generating a high amount of goods transport activities in Valletta
- Construction industry
    - The multiple small and big construction sites in buildings and infrastructures generate a high amount of deliveries of construction material in Valletta.
- Offices, households and residents
    - Parcels and e-commerce products are delivered to offices and residents of Valletta through home deliveries and locker boxes

A detailed map showing the location of all the identified commercial establishments would be too much overloaded with information. For simplification and clarity purpose, following is being provided as a rough indication.

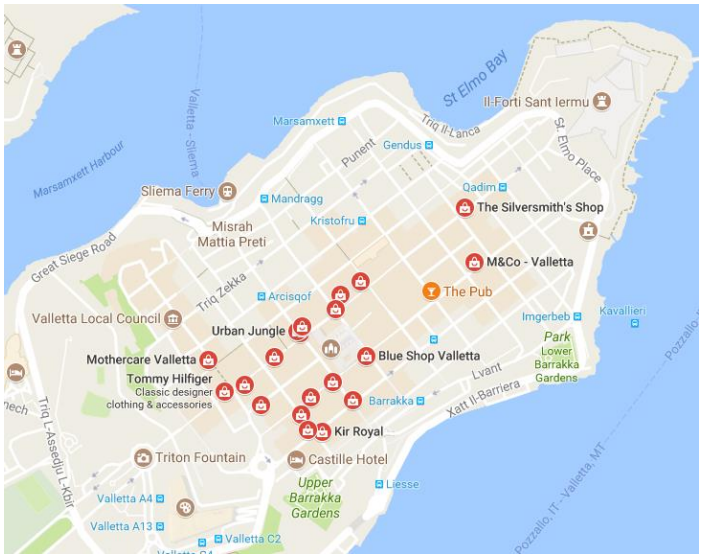


Figure 49: Main Retail Outlets in Valletta

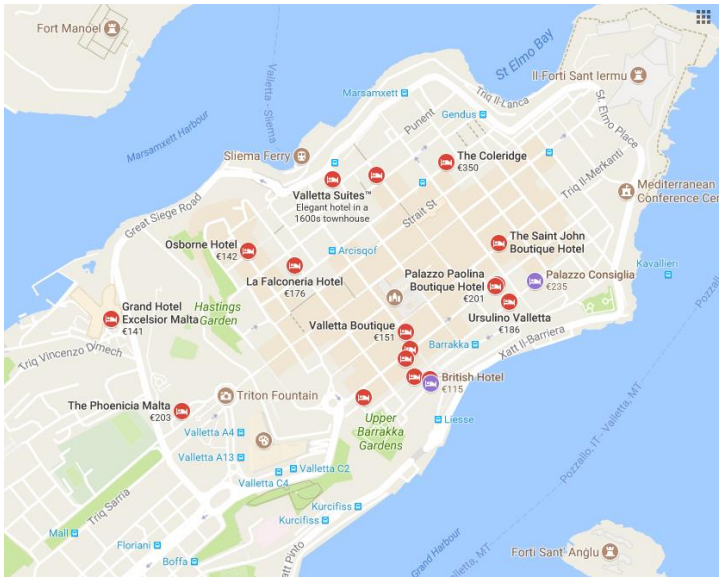


Figure 50: Main hotels in Valletta

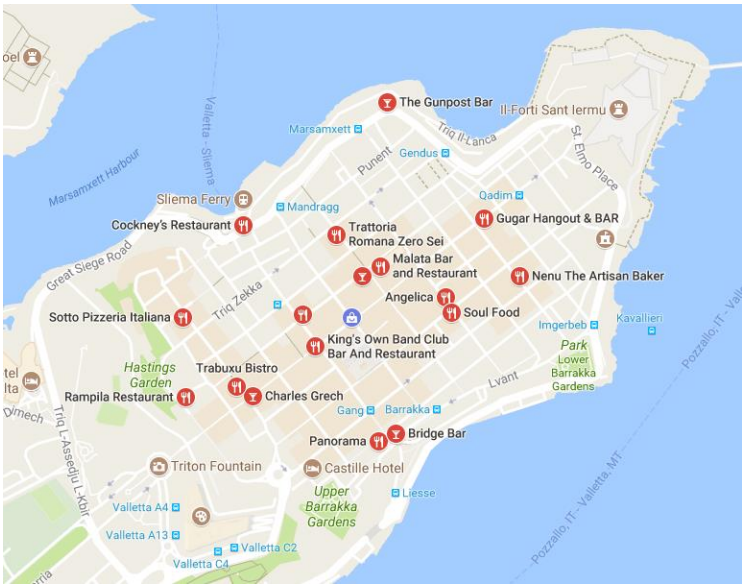


Figure 51: Main Bars and Restaurants in Valletta

2.5.2.3. Freight and logistics regulation

Currently, businesses within Valletta coordinate their own deliveries, therefore several distributors, importers and delivery companies operate within the city. The City Council however established specific times when deliveries can take place. Goods vehicles are allowed to provide services between midnight and 9:30 and between 19:30 and 20:30 from Monday to Friday; Mondays, Thursdays and Saturdays deliveries are also allowed between 14:30 and 16:30. These service times ensure that Valletta is free from trucks and vans during the peak hours for pedestrians and tourists.

Since many streets in Valletta are rather narrow, and to avoid congestion, it is common practice for delivery vans to park on the curb while loading and unloading. This poses a great risk to the health and safety of the other users especially pedestrians and causes damage to street infrastructure and adjacent building quoins.

Parking and access to Valletta has been a constant point of discussion amongst stakeholders since it affects all residents and visitors to Valletta. Parking within the city is currently at saturation levels, therefore, while some loading and unloading bays do exist, their number – compared with other urban centres around the island – is limited.

Goods distribution vehicles that deliver regularly to retailers in the charging zone within Valletta are allowed limited free access in all of the charging zones at the times defined below. The vehicle must be registered to deliver and must not be left unattended.

Day	Free Access Charging Zone	Access in Pedestrian Zone
Monday	Midnight – 09:30 hrs	Midnight – 09:30 hrs
	14:30 hrs – 16:30 hrs	14:30 hrs – 16:30 hrs
	18:00 hrs – Midnight	19:00 hrs – 20:00 hrs
Tuesday, Wednesday & Friday	Midnight – 09:30 hrs	Midnight – 09:30 hrs
	13:00 hrs – 16:00 hrs	19:00 hrs – 20:00 hrs
	18:00 hrs – Midnight	
Thursday	Midnight – 09:30 hrs	Midnight – 09:30 hrs
	13:00 hrs – 16:00 hrs	14:30 hrs – 16:30 hrs
	18:00 hrs – Midnight	19:00 hrs – 20:00 hrs
Saturday	All Day	Midnight – 09:30 hrs
		14:30 hrs – 16:30 hrs
		19:00 hrs – 20:00 hrs
Sunday	All Day	Midnight – 09:30 hrs

Table 31: Access to Valletta for goods distribution vehicles

The waste collection system further exacerbates the problem of congestion caused by logistics within Valletta. Mixed waste from homes (black bags) is collected door-to-door between Monday and Friday at 15:00 and on Saturdays at 13:00. On Mondays and Wednesdays there is an extra collection at 07:00. The collection of co-mingled dry recyclable (green/grey bag containing paper, plastic and metal) is done once a week on Tuesdays at 07:00.

More recently the door-to-door collection of glass was introduced and this is collected on the first and third Friday of the month. This system brings to Valletta large, high polluting vehicles which moves around the City at a very low speed. It is also a major contributor to traffic within the City since vehicles have to trail behind the truck in streets which are too narrow for overtaking. Garbage collection services also have access to pedestrian zones at certain times, this encumbers the street and creates a very unpleasant experience to diners sitting along the pedestrian zones.

2.5.2.4. Logistics services

Currently there is no collective system for deliveries in place and each business coordinates its own deliveries from multiple suppliers. Moreover, several suppliers offer their own delivery services. Therefore, it is the case that a single shop is serviced by several vans, each loading/unloading a specific type of good.

As has been mentioned earlier, this causes congestion by vans and trucks making trips to Valletta, especially when stopping at the curb to unload goods.

2.5.2.5. Characterization of logistics flows

Limited data on freight movement patterns across the Maltese islands is available. However, as part of the compilation of the National Transport Strategy published in 2016, some studies on the logistics patterns in Malta were conducted, albeit not specific to the SULP study area.

Road freight movements in Malta are mainly related to short-medium range deliveries across the Maltese territory. Traffic with industrial estates/ports/airport, and the transportation of goods between Malta and Gozo accounts for small shares of total freight movement (<10%).

Freight movements are largely concentrated around the central sections of the Maltese TEN-T network, especially across the critical road system of Marsa, Hamrun and Santa Venera (as shown in the figure below). These movements are higher during the AM peak hour. The Figure below shows the road freight trips conducted at the AM peak hour.

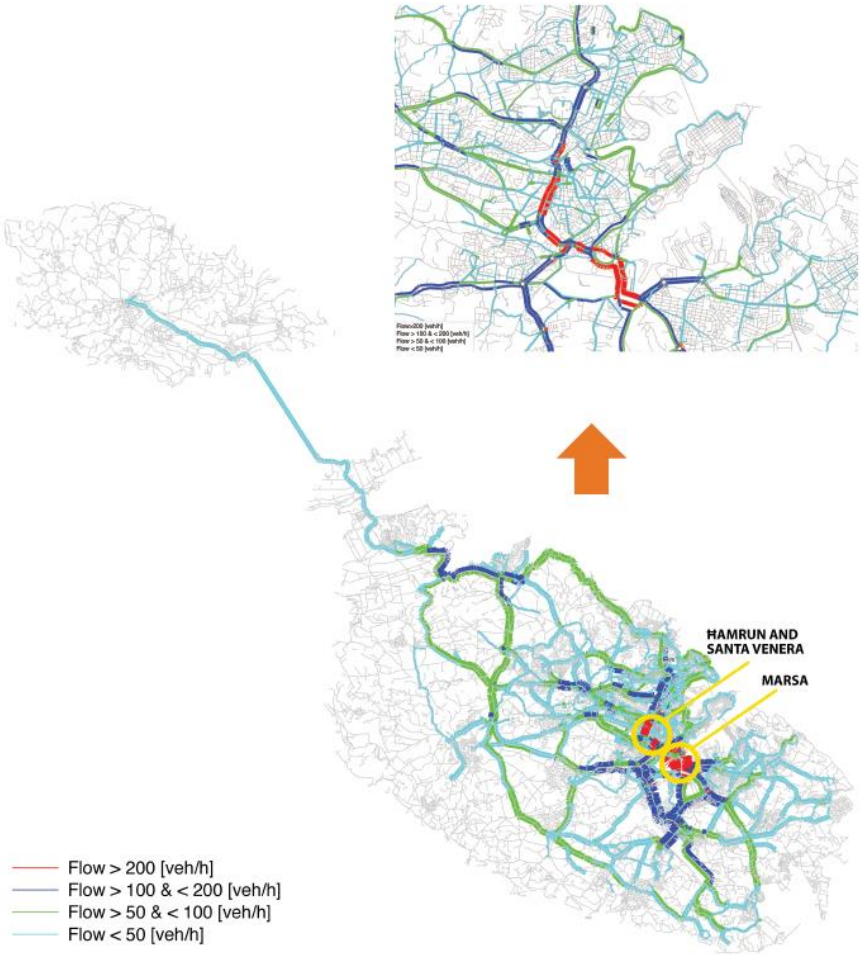


Figure 52: Road freight trips during the AM peak period (Source: TM; National Transport Strategy 2050)

The table below shows the key mobility statistics in terms of the share of trips conducted by type of vehicles during the AM and PM peak hours:

	NTM Key Statistics	AM	PM	Weekday	Year	Modal Split	
						AM	PM
Person trips	Private Car	85,422	69,302	840,625	274,490,805	72.7%	79.1%
	Public Transport	19,278	13,135	173,722	56,725,868 (*)	16.4%	15.0%
	Other Modes	12,825	5,220	93,110	30,403,443	10.9%	6.0%
	Total (All Modes)	117,527	87,659	1,107,473	361,625,043	100%	100%
Vehicular Trips	Private Car	70,772	57,417	696,458	227,415,745		
	Freight (LGVs + HGVs)	8,991	3,997	67,426	22,016,707		
	Total	97,746	69,406	898,736	293,465,865		

Table 32: Share of trips conducted by type of vehicles during the AM and PM peak hours

Goods carrying vehicles represent around 5% of national traffic on a typical weekday. However, during the morning peak hour, the proportion of these vehicles increases significantly to represent almost 11% of the total traffic composition. The longest and heaviest goods carrying vehicles are generally engaged in the transport of goods being imported or exported through Malta's external maritime ports. Distances between ports and the freight operators' warehouses and stores in the hinterland are generally quite short.

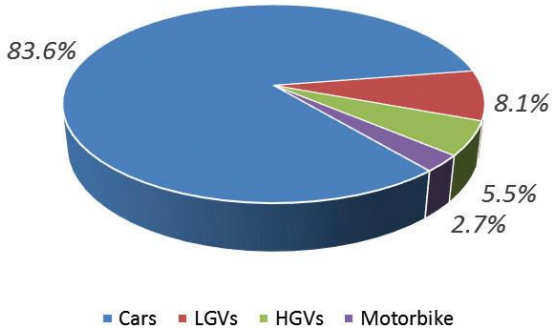


Figure 53: Traffic composition during AM peak hour

Passenger and freight volumes have been steadily increasing in recent years and are expected to continue to do so.

Freight vehicles and delivery activity

In Valletta, mostly smaller trucks <7.5t Gross Vehicle Weight, and small delivery vans <2.5t are used for goods deliveries. Following categories of vehicles are presented with pictures of typical vehicle activity on representative streets in Valletta, Malta. The observations were made in Nov and Dec 2017.

Large rigid and articulated trucks

Figure 54: Use of large rigid truck for concrete delivery on construction site

Small rigid trucks >3.5t with 2 or 3 axles

Figure 55: Use of rigid trucks for shop and retail deliveries

Large vans <3.5t

Figure 56: Use of large van for retail delivery

Small vans <2.5t

Figure 57: Use of small vans for market retail deliveries

Figure 58: Use of small van for parcels delivery to offices and residents

Cars

The use of cars is both passengers and goods transport. Here the share of goods transport trips among all car trips is unknown. It can be assumed that about the same percentage of all car trips are exclusively for shopping. This type of shopping trip amount for less than 10 % of all trips. In the Valletta survey of the pedestrian zone, during one hour between 07:00 and 08:00, only 2 deliveries were made by cars, out of 24 cars and 32 deliveries observed.

Figure 59: Private cars are also used by independent retailers and residents for their goods deliveries

Motorised cycles

Only few motorcycles are used for letters and small parcels transport in Valletta. MaltaPost is using one motorcycle for urgent parcels and letters deliveries in Valletta.

Walking and pedestrian deliveries

It is often underestimated that a lot of logistics working time is spent walking between vehicle and final customer. Observations in London and Paris give about 75 to 80% of total working time spent walking between vehicle stopping point and final customer destination.

Figure 60: Pedestrian logistics in Valletta centre

Clean electric vehicles

The only electric freight vehicles used in Valletta are Renault Kangoo ZE vehicles, with a load capacity of about 800 kg, 4.5m3 volume, and a maximum gross vehicle weight of 2.5t. These 4 vans are used mainly by Transport Malta for servicing purpose.

Figure 61: Electric Renault Kangoo ZE used by Transport Malta as servicing van

MaltaPost is currently testing eight parcels and letter delivery quadricycles in Malta, outside Valletta. If the test is considered successful, this type of clean vehicle is intended to replace the currently existing system of postal distribution in Valletta. The load capacity is 200 kg and 0.84 m^3. Maximum speed is 45 kmh. Driver acceptance is high due to rain protection and locks.

Figure 62: Paxster quadricycles used by MaltaPost for a parcels and letters delivery trial in Malta

Vehicle traffic count data

Traffic counts were performed in Nov and Dec 2017 in Valletta. Locations are shown on the map above. The first Table shows the entrance access streets of Valletta, with a total sample of 2284 vehicles. Each column shows the data for about one hour of traffic count.

Location Valletta entrance **Vehicle types**	Entrance (1)	Entrance (2)	Entrance (3)	Entrance (3)
Motorcycle	44	29	9	8
Cars	730	509	218	246
Small vans	145	120	22	23
Large vans, small rigid trucks	32	29	6	5
Large trucks	1	1		
Electric vehicles	7	1	6	1
Horse, taxi	18	9		2
Bus, coach, minibus	26	14	10	12
Total	1003	712	271	298
Total veh/hour	955	712	271	298
Total delivery vehicles/hour	169	150	28	28

Table 33: Valletta access streets, traffic count including delivery vehicles

The percentage of delivery vehicle to the total traffic is very similar to London or Paris data, with 17% for entrance 1, and a variation between 10% and 21% depending on the observation day and time for the other streets.

For Valletta, it can be assumed that the average of about 16% of the total traffic on the main access streets are for delivery vehicles. This is assuming that car traffic is not accounted for goods deliveries.

This number of an average of 16% delivery vehicles seems rather realistic for the traffic situation, because it is calculated out of a small sample of 2284 vehicles on a random day, assumed to be a typical week day in a typical season, not a peak tourism season.

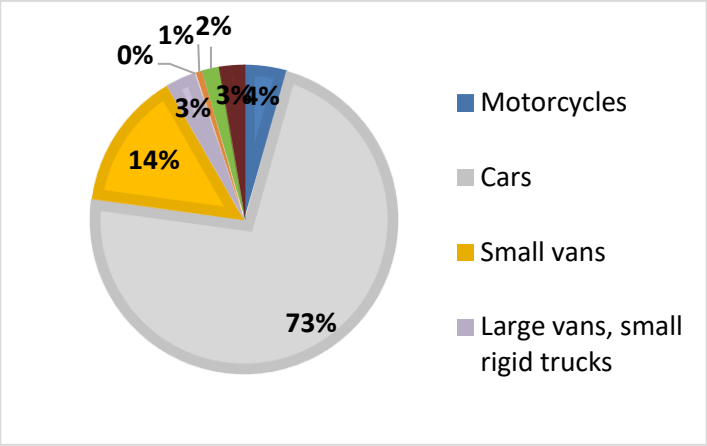


Figure 63: Traffic at Valletta entrance, in and out, according to vehicle types breakdown

Urban logistics traffic and delivery characteristics: observations in pedestrian zone of Valletta

To observe the delivery activity in the pedestrian zone, and better understand the needs for urban logistics activities from the point of view of the retailers and restaurants businesses in Valletta, a random sample was observed during one hour, from 07:00 to 08:00, on a morning of a week day. Out of 98 vehicles arriving or departing from the Republic Street location observed, 32 deliveries were made.

Metadata	
Observations by	JL, LuxMobility
Location ID	15
Street name	Republic Street
Parking description	Legal On Street parking
Date	20-Dec-18
Time start	07:00
Time end	08:00
Vehicles	
Motorcycles	2
Cars	24
Small vans	40
Rigid trucks	29
Electric taxi	2
Minibus	1
Characteristics	
Mean stop duration in min	6.5
Car length in metres	3
Van/truck length in metres	5
Vehicle stats	
All vehicles	98
Veh/hour	98
Delivery vehicles (vans and trucks)	69
Del Veh/hour	69

Road Space Occupancy	
Parking space in m2/truck	14
Parking space in m2/car	8
Total all vans & trucks parking space requirement in m2*min	966
Total all cars parking space requirement in m2*min	194

Table 34: Urban Logistics Pedestrian Zone Observation data Republic Street

Type of goods, units	
Parcels excl food	6
Food and drinks	18
Rollcages	2
Bulk (construction materials)	3
Waste & recycling	3
Type of deliveries	
Single delivery	17
Multiple deliveries	2
Through traffic	76
Collection	4
Operators, carriers	
Grocery, food supply	18
Other retail	3
Construction	4
Waste & recycling	3
Other, unknown	4
Recipients	
Retail, shop	8
Offices	3
Restaurants, bars	11
Unclear	10

Table 35: Urban Logistics Observations Republic Street, 20 Dec 2018

The vehicle count was including delivery vehicles and through traffic. The Figures below present the same observation data, but instead of total values, the data are presented as percentages.

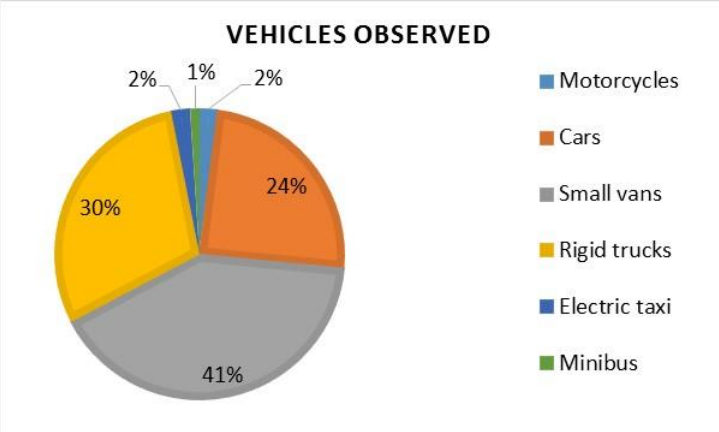


Figure 64: Vehicles observed

To assess the needs for street space, we use the surface of the vehicle in square metres (m^2), and multiply by the average time spent by one vehicle and the number of vehicles observed. The surface of a delivery vehicle is calculated out of the length of the average vehicle observed (5 metres), its width (2 metres) plus 2 metres in the back of the truck for unloading activity.

The result show that cars use much less street space than delivery vehicles in the morning hours.

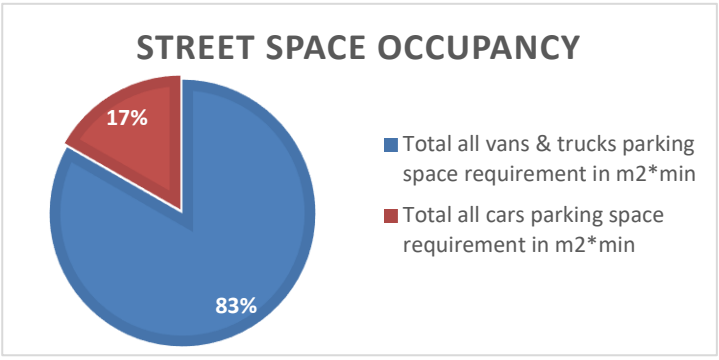


Figure 65: Street space occupancy, in square metres x minutes, for morning deliveries in the Valletta pedestrian zone

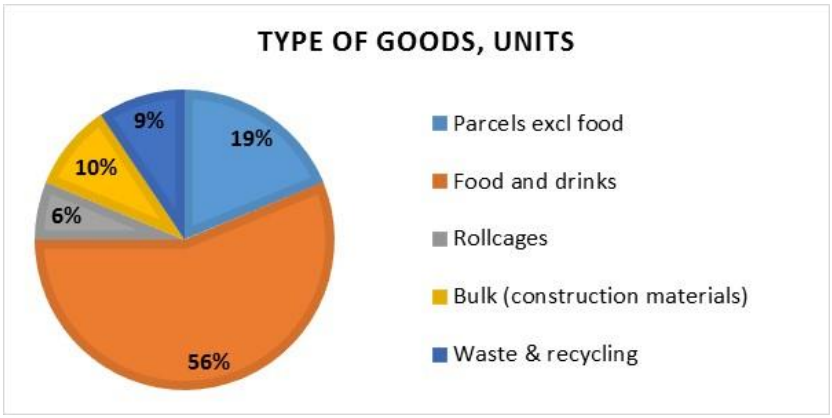


Figure 66: Type of goods delivered, measured in number of deliveries

The main type of delivery is single delivery.

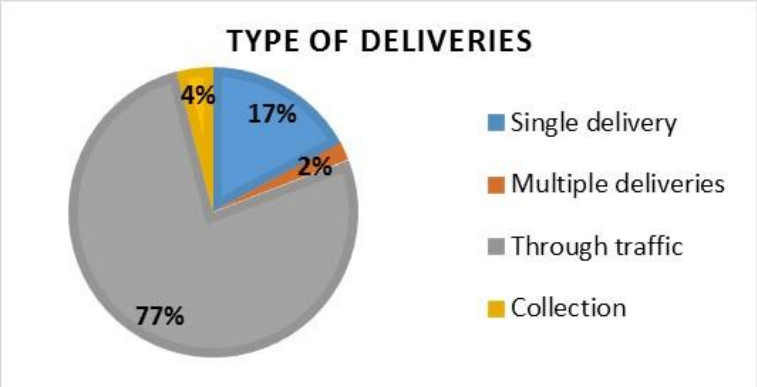


Figure 67: Type of deliveries, measured in number of deliveries

The main type of operator is grocery and food supply service provider.

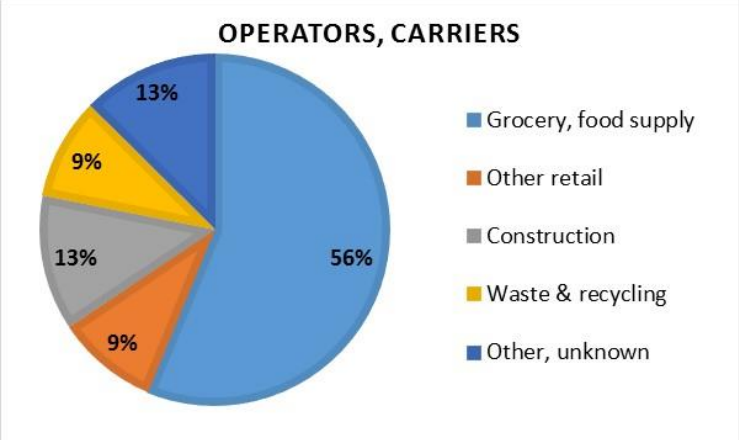


Figure 68: Type of operators, measured in number of deliveries

The recipients were mostly restaurants and retailers. Note that for a high amount of construction and unspecified parcels deliveries, the recipient could not be specified.

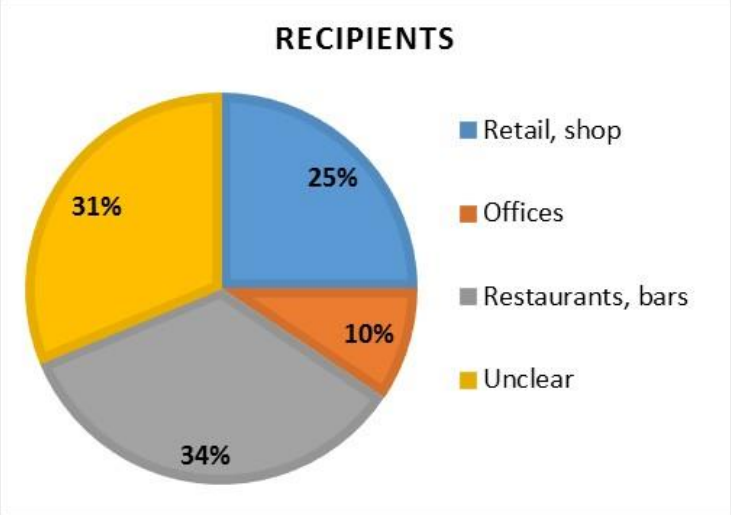


Figure 69: Recipients of deliveries

2.5.2.6. Energy and environment aspects

The table below represents the stock of licensed transport equipment vehicles by fuel type and age. As can be seen from the table, the majority of transport equipment vehicles are over 10 years old, thus all lower that the Euro 3 standard. Diesel is also, by far, the most common fuel type used by these vehicles.

This table is also evidence of the fact that the percentage of clean vehicles used within the distribution of goods sector is very low despite government grants which directly subsidise private companies to invest in N1 and N2 full electric vehicles.

	Goods-carrying vehicles (GCV), special purpose vehicles (SPV) and road tractors									
Year	licensed in the Country			By fuel Type			By age group			
	Vehicle type		Tot.	Petrol	Diesel	Alternative source & unknown	<2 years	>= 2 but < 5years	>=5 but < 10 years	>= 10 years
2013	GCV & SPV	45,404	46,500	1,403	43,923	78	1,030	1,368	6,078	36,928
	Rd. tractors	1,096		0	1,096	-	15	26	191	864
2012	GCV & SPV	44,592	45,650	1,420	43,111	61	864	1,801	5,110	36,817
	Rd. tractors	1,058		0	1,058	-	14	35	169	840
2011	GCV & SPV	44,476	45,624	1,523	42,884	69	699	2,070	4,261	37,446

Table 36: Stock of licensed transport equipment vehicles by fuel type and age group

No data is available which indicates the CO_2 emissions for which logistics transport is directly responsible, however, below is a breakdown of the CO_2 emissions for which road transport as a whole is responsible for and subdivided per fuel type.

	2008		2009	
	Implied Emission Factor	Emissions	Implied Emission Factor	Emissions
	CO_2 (t/TJ)	CO_2 (Gg)	CO_2 (t/TJ)	CO_2 (Gg)
Road Transport		**485.22**		**496.27**
Gasoline	69.30	215.75		225.06
Diesel Oil	74.10	269.47	69.30	271.21
Liquefied Petroleum Gases (LPG)	NO	NO	74.10	NO
Other Liquid Fuels		NA	NO	NA
Gaseous Fuels	NO	NO		NO
Biomass	70.80	1.96	NO	1.92
Other Fuels		NA	70.80	NA

Table 37: Breakdown of rod transport CO_2 emissions by fuel type

Legend: NO – Not Occuring; NA – Not Applicable

Logistics impacts in urban landscape environment, in traffic planning and organization, and in quality of life and well-being of citizens and visitors

Not data specific to the SULP area is available, however, referring to the National level, the freight sector requires further regulatory and policy development in the training of Dangerous Goods Safety Advisers, urban logistics managers, freight distribution and carriage of perishable goods. Authorities currently do not have sufficient capacity and lack certain modern inspection equipment needed to effectively monitor and enforce the operation of this sector.

Particular problems are experienced in enforcing the compliance of goods carrying vehicles with the maximum permissible weights and dimensions regulations. Overloaded or oversized vehicles damage the road network and reduce its lifespan.

The general shortage of safe, dedicated off-road parking areas for goods carrying vehicles and the lack of provision for loading and unloading in commercial areas often results in goods vehicles stopping or parking illegally thus compounding the problem of traffic congestion during busy times as well as negatively affecting road safety.

The problem of congestion is evident and affects all types of road transport. The table below represents the average travel time per kilometer per mode of transport. The difference between the travel times during peak periods compared to that of off-peak periods shows an evident journey delay experienced during peak hours.

Typical Weekday	Congested Condition			Free Flow Condition			Delta (congested - free flow)		
Average Journey Time per km [min/km]	Passenger Vehicles	Freight Vehicles	Public Transport	Passenger Vehicles	Freight Vehicles	Public Transport	Passenger Vehicles	Freight Vehicles	Public Transport
AM	2.67	2.71	8.45	1.30	1.31	6.16	1.38	1.40	2.29
PM	2.41	2.38	7.59	1.28	1.31	6.16	1.14	1.07	1.43
Off-Peak	2.00	1.76	7.15	1.29	1.31	6.16	0.72	0.45	0.99
Night	1.29	1.31	6.16	1.29	1.31	6.16	0.00	0.00	0.00

Table 38: Average travel time per kilometre, per mode of transport on a typical weekday

2.5.2.7. Main needs and problems in Logistics

Challenges

Besides the medium to long term challenges of air pollution, old fleet, access difficulties and congestion, which are very similar to most European cities, Valletta experiences specific challenges that could be potentially addressed in short term.

Challenge 1: In Valletta, multiple rules and signage influence access to pedestrian zone and to street parking locations.

Figure 70: Multiple signage for loading bays in Valletta

Potential solution: simplification of rules.

Challenge 2: Loading bays and parking space is not available, leading to unloading in double lane.

Figure 71: Unloading in double lane when all parking space is occupied

Potential solution: More reserved loading bays.

Challenge 3: Long walking distance and long time between vehicle unloading place and final customer entrance door.

Figure 72: Pedestrian delivery in the main shopping and restaurant area in Valletta, replenishing stocks during the day

Potential solution: Higher number of loading bay located from 50 up to 100 metre maximum distance to the furthest entrance door.

Available potential solutions considered for the Valletta Sustainable Urban Logistics Plan

A short expert survey was performed, asking for first estimates on the feasibility of potential solutions for a future Sustainable Urban Logistics Plan in Valletta. Due to the very limited availability of experts in transport and logistics in Malta, only three usable responses were received.

All actions proposed were already successfully implemented in other European cities in the previous year, and have a proven record and documentation of good practice available to facilitating replication.

Few responses show a broad consensus about the feasibility of most possible actions. Some actions however, such as urban toll, multifunctional lanes, or UCC for single user seem unlikely and will probably be excluded from further considerations.

Respondents Actions	1	2	3	Average
Loading bays: design, loading bay rules	4	4	4	4
Urban Consolidation Centre (UCC) for single user	3	3	1	2
UCC for multiple users	5	4	4	4
Cargo bikes: cycle lanes, cycle parking, access rules for cargo bikes	4	3		4
Electric vehicles: funding for electric vehicles	5	5	3	4
Gas powered (LPG/CNG) vehicles	3	5	4	4
Purchasing of clean delivery services	3	4	4	4
Spatial planning for urban logistics	3	4	4	4
Access restriction by weight, size or vehicle type	5	5	4	5
Access restriction by emission class (e.g. EURO VI)	5	3	4	4
Congestion charge, urban toll for trucks	5	3	1	3
Enforcement, police, control: traffic, congestion, speed, access, parking and loading bay control	5	4	4	4
Delivery and Servicing Plans for large receivers	5	4		5
Mobile depots	4	4	3	4
Load pooling: Online exchange/offer of free capacity	5	4		5
Parcel locker boxes	5	5	4	5
Off-peak deliveries	4	4	4	4
Multifunctional lanes for private and business transport	2	3	0	2
Boat/waterways deliveries	3	4	5	4
Linking ports and city centre deliveries	4	4	3	4
Cooperation and urban logistics expert network	5	4	3	4
Pilots and tests, monitoring and data collection, impact assessments	5	5	3	4

Table 39: Available potential solutions considered for the Valletta Sustainable Urban Logistics Plan

Concluding remarks on the baseline for the development of the Valletta Sustainable Urban Logistics Plan

The distribution of goods is essential for the prosperity of the inner centres of urban areas but at the same time poses problems related to the environment, safety and accessibility. Goods transport is a major contributor of noise and air pollution, physical hindrance (including congestion) and a decrease in traffic safety.

It is estimated that urban freight distribution vehicles represent 10% of the total traffic in urban areas (Civitas, 2010) but contribute to more than 40% of the pollution and noise generated by local traffic (COST 321, 1998). Furthermore, locally no EURO 5/6 trucks are used by businesses and wholesalers for the distribution of goods.

Despite the fact that heavy goods vehicles are banned from the city, distribution vehicles are still larger and heavier than passenger cars and they experience difficulties in circulating

in Valletta especially when cars are parked on both sides of streets which are already relatively narrow.

Furthermore, adequate infrastructure and loading/unloading bays are lacking in Valletta, hence vans are forced to partly park on the kerb and extending the delivery/pick-up operation to the traffic lanes causing congestion.

In order not to compromise on the safety of pedestrians, the time regimes for goods distribution in Valletta were set to coincide with the least busy periods of the day and when most of the shops in the major commercial area are closed. However, these curfews are not always respected, jeopardising the safety of the other road users.

The delivery of goods in cities such as Valletta is a sensitive subject and regulatory actions must take into consideration the feedback of all stakeholders involved, as should the access of goods be made difficult, the City itself will suffer as businesses might migrate to other areas.

2.6. Crete/Rethymno

2.6.1. Regional and city overview

2.6.1.1. Geography and population

The Municipality of Rethymno is located in Crete, in Southern Greece. The Municipality was expanded in 2011 through the unification of 4 pre-existing municipalities (Rethymno, Lappeon, Nikiforou Foka, Arkadi). Rethymno, the seat of the municipality, is the third largest city in Crete. It lies on the northern coast of the island, between the cities of Heraklion and Chania. It is a small-sized city and a major tourist destination. Municipality of Rethymno has about 63.000 inhabitants (de-facto population according to the 2011 census) and covers an area of 397,48 m^2.

Figure 73: Geographical position of the Municipality of Rethymno

The main touristic entrances of the island are Chania (airport and port, around 60 km to the west of Rethymno) and Heraklion (airport and port, around 80 km to the east). Rethymno has a port mainly used by cargo ships and cruisers and a marina.

Figure 74: Regional Unit of Rethymno and main airports, ports and main bus stations in Crete

The city is linear and lies between mountains and coastline. It consists of the historical centre in the old town and the "new" urban centre, while very close there is a beautiful sandy beach with a length over 2,5 km. Inland there are many attraction points of historical, archaeological and natural interest. The old town is one of the largest and well-maintained historic city centres in Greece.

Figure 75: Map of the city of Rethymno

The next table shows some demographic and administrative data for the population of the Municipality of Rethymno and the Municipal Units included. (Source: Hellenic Statistical Authority, Greek Census 2011).

Demographic data of the Municipal Units (M.U.) of the Municipality of Rethymno					
	Population			Population Change (%)	
	1991	**2001**	**2011**	**1991-2001**	**2001-2011**
M.U. Rethymno	26.560	31.687	37.462	19,30	18,23
M.U. Arkadi	4.745	5.644	6.936	18,95	22,89
M.U. Nikiforou Foka	4.219	6.599	8.911	56,41	35,04
M.U. Lappeon	3.741	2.628	2.216	-29,71	-15,67
Municipality of Rethymno	39.265	46.558	55.525	18,57	19,26

Table 40: Demographic data of the Municipal Units (M.U.) of the Municipality of Rethymno

The tourism sector is one of the main pillars of Rethymno's economy, resulting in a relevant population growth in the settlements near the key tourist destinations. The municipality has approx. 30 000 beds available for the tourists, while the tourist season is mainly from April to October. Tourists visit Rethymno from all over Europe, while the majority is coming from Germany, Scandinavia, UK and also from other parts of Greece. Tourists' orientation also includes visitors from USA, Australia and Canada while currently an increasing rate of incoming Russians and Chinese visitors is observed. Additionally, even more tourists are accommodated just outside of the administrative borders of municipality, using the mobility and logistic services of the Municipality.

Although, there are no available data on the arrivals that are specifically oriented to the Municipality of Rethymno the trends in the total arrivals on the island can also be applied for Rethymno, which due to its central location attracts a lot of visitors, even for a one-day trip.

The following tables present the tourists arrivals in the region through the main entrances of the island (via airplane, ferry and cruises).

International Tourists Arrivals in Crete via airplane (arrivals to the 2 main airports)			
	Heraklion Airport	**Chania Airport**	**Total**
2011	2.160.065	656.791	2.816.856
2012	2.106.255	716.347	2.822.602
2013	2.472.082	849.667	3.321.749
2014	2.606.472	950.316	3.556.788
2015	2.542.914	930.794	3.473.708
2016	2.885.154	1.048.872	3.934.026
2017*	3.040.952 (+5,4%)	1.103.413 (+5,2%)	4.144.365

Table 41: International Tourists Arrivals in Crete via airplane (arrivals to the 2 main airports)

*Estimation. Source: Hellenic Slot Coordination Authority

Arrivals in Ports of Heraklion and Chania (Souda) in 2011 and 2012.				
		2011	**2012**	**Change rate**
Souda (Chania)	Domestic ports	460.032	414.217	-9,96%
	Cruise Ships from abroad	164.543	134.115	-18,49%
	Greek Yachts	343	174	-49,27%
	International Yachts	654	836	27,83%
	Total	625.572	549.342	-12,19%
Heraklion	Domestic ports	892.572	731.840	-18,01%
	Cruise Ships from abroad	223.472	185.467	-17,01%
	Greek Yachts	57	33	-42,11%
	International Yachts	414	495	19,57%
	Total	**1.116.515**	**917.835**	**-17,79%**

Table 42: Arrivals in Ports of Heraklion and Chania (Souda) in 2011 and 2012

Tourists' arrivals via cruise ships						
Destinations	**2015**		**2014**		**2013**	
	Ships	Passengers	Ships	Passengers	Ships	Passengers
Heraklion	170	219.805	160	242.951	177	270.020
Chania (Souda)	59	96.612	38	33.304	47	124.205
Rethymno	11	1.076	18	4.220	5	1.336
Total	**240**	**317.493**	**216**	**280.475**	**229**	**395.561**

Table 43: Tourists' arrivals via cruise ships

2.6.1.2. Mobility and traffic

Municipality of Rethymno incorporates the pillars of sustainability into the core of the mobility and urban development strategies, implementing over the years significant projects in favour of pedestrians and cyclists. Rethymno provides a cycling network of almost 12 km and a 2 km walking route along Rethymno beach, while the historic old city is a car free area during the summer period.

The estimated average modal split indicates the strong preference of the citizens towards private vehicles, according to which the 60% corresponds to car users, following by 20% of walking, 10% of public transport, 5% of cycling and 5% of a taxi. The modal share of trips in the municipal area is depicted below:

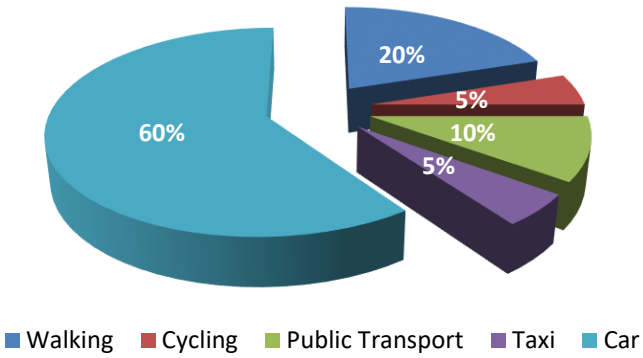


Figure 76: Modal share in the Municipality of Rethymno

The available data concerning the number of registered vehicles in the regional unit of Rethymno are presented in the table below (Source: Hellenic Statistical Authority, 2016).

Number of vehicles in Crete and in each Regional Unit (R.U.), 2016											
	Passenger Cars			Trucks			Buses	Motorcycles			
	Total	Private use	Public use	Total	Private use	Public use	Total	Total	Passenger	Freight private use	Freight public use
Crete	263.517	262.108	1.409	129.294	127.456	1.838	1.177	137.759	136.946	476	337
R.U. Heraklion	141.952	141.179	773	60.597	59.701	896	649	70.619	70.268	219	132
R.U. Lasithi	28.946	28.791	155	22.400	22.126	274	124	17.553	17.424	67	62
R.U. Rethymno	33.899	33.775	124	18.702	18.497	205	104	17.854	17.744	54	56
R.U. Chania	58.720	58.363	357	27.595	27.132	463	300	31.733	31.510	136	87

Figure 77: The number of vehicles in Crete and in each Regional Unit (R.U.), 2016

Cycling's modal share is relatively low, although cycle tracks have been constructed in the city core (green colour), in addition to the pedestrianized routes that are also suitable for cycling in the historic centre (red colour), as depicted in the next figure. Municipality of Rethymno is also connected with the wider area through 22 cycling routes, mainly on existing regional road network, linking the city with touristic attractions.

Figure 78: Cycling Routes in Rethymno

As mentioned above, the city is characterised by high car dependency. Private vehicles and rented cars consist the main preferred option for tourists and residents, as the most reliable and independence mean of transport in order to visit conveniently several destinations.

Public transport service, on the other hand, is not perceived as an attractive option that can sufficiently cover users' needs. Further improvements in the provided services, routes and links between the destinations are required in order to attract more users. Additionally, the available infrastructure for walking and cycling does not fully address the needs of tourists

and residents in terms of connectivity with other transport modes. The challenge is to increase the pedestrian-friendly routes in the city and the bike lanes in order to increase the share of alternative transport modes.

Additionally, goods distribution is responsible for a significant amount of traffic generated air and noise pollution in the centre of the city. The freight movement adds to the traffic congestion in the historic centre of Rethymno but also in the commercial centre of the town. The significant increase of freight distribution during the tourist period has a heavy impact in terms of congestion, delays, environmental pollution and limited parking spaces.

The above mentioned challenges negatively impact the city's accessibility and the quality of life of citizens and tourists.

2.6.1.3. Energy consumption and CO_2 emissions in the transport sector

Municipality of Rethymno, is a member of the Covenant of Mayors' initiative since 2011. The Municipal Sustainable Energy Action Plan (SEAP) was conducted in 2011 and updated in 2015.

Recent data regarding the energy consumption and CO_2 emissions of the transport activities are presented in the municipal SEAP, regarding 2015. The energy consumption in the transport sector per category is presented in the figure 46. The public transport's fuel consumption was increased by 108%, between the years 2011 and 2015, due to the increased distances served by the public buses, while the fuel consumption of the municipal fleet and the private vehicles (including commercial use) was decreased by 5,9% and 33% correspondingly.

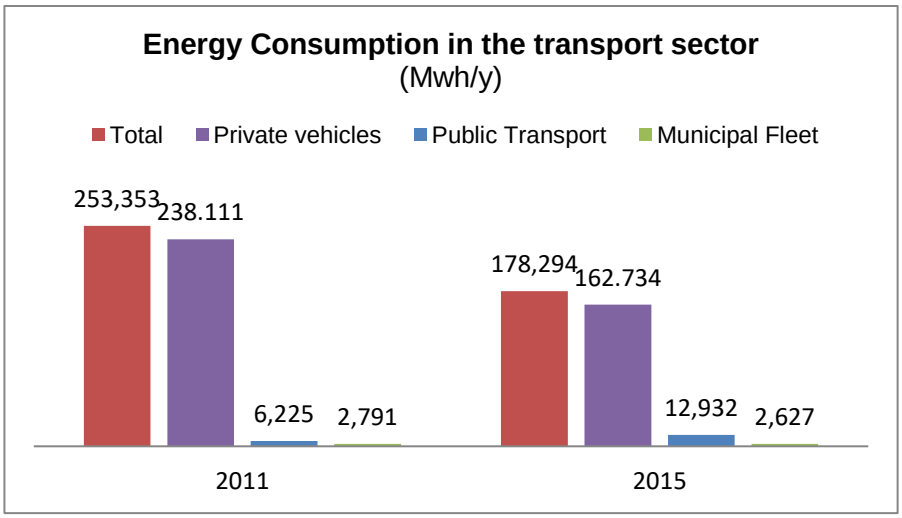


Figure 79: Energy consumption of the transport sector of the Municipality of Rethymno for 2011 and 2015

Additionally, the CO_2 emissions of the transport sector are presented in the next table. Following the energy trends, the total CO_2 emissions of the transportation system in 2011 corresponded to 65 967 t CO_2 while in 2015 the total emissions corresponded to 45 184 t CO_2, demonstrating a significant decrease by 35%.

CO_2 emissions (t) of the transport sector of the Municipality of Rethymno		
CO_2 emissions (t)	**2011**	**2015**
Municipal fleet	743,15	699,82
Public Transport	1.581	3.285
Private vehicles	63.643	41.199

Table 44: CO_2 emissions (t) of the transport sector of the Municipality of Rethymno

2.6.1.4. Policies and regulation framework in logistics

The main regulation framework for freight logistics consists of the local regulative decisions of the local municipal council and the General Urban Plan of Rethymno Municipality that includes the regional spatial planning of Crete. The General Urban Plan defines the permitted type of establishments in every area of the city and the conditions for their legal operation. In addition, the local regulative decisions of the municipal council define the access, circulation and parking regulations for freight vehicles and the loading and unloading of goods. The access and circulation of freight vehicles is allowed in the city of Rethymno with no restrictions applied, including large and heavy vehicles that circulate the city to cover the supply demands. However, there is an exception for the area of the “old city”, where the access and circulation is only allowed for small freight vehicles (less than 3,5 t) in specific roads. Especially during the summer period, access and circulation is allowed from 06:00 until 11:00. Moreover, there are specific parking spaces in the main roads of the city that are dedicated for the loading / unloading of goods.

The main objective of the Municipality of Rethymno is to develop an efficient logistics plan that will ensure an efficient supply system for local retailers to run their business, while organizing better the freight routes in the city to optimise the goods delivery and reduce the environmental and traffic impacts in the city. A sustainable logistics plan will lead to a significant decrease in congestion, air and noise pollution and the improvement of the quality of life, especially for the designated hotel areas. As a result, the attractiveness of the city will be increased for both residents and tourists and their living experience will be improved.

2.6.1.5. Main infrastructures for logistics

The majority of freight is being transported from / to the ports of Heraklion and Chania while only a fraction of the freight is handled in the port of Rethymno, including mainly raw materials for local factories. Overall, there is a significant lack of sufficient logistics infrastructures in the city that would directly or indirectly support the study area.

Currently, there are 8 logistics companies with small warehouse facilities and a few smaller transport companies that operate without warehouse infrastructures. All of them deliver goods to the local commercial businesses, hotels, restaurants and cafes (HORECA) daily. Most of the local transport companies use warehouse facilities near the port of Piraeus and transport the goods to Rethymno through the port of Heraklion or more rarely through the port of Chania. In Rethymno, the products are stored locally in warehouses and are distributed and delivered according to the requests of the local enterprises separately. During the peak season, multiple deliveries to the same retailer might take place in one day.

Given the fact that there aren't any available public logistic infrastructures, the private companies that operate in the city will hold a crucial role in the development of Rethymno's SULP.

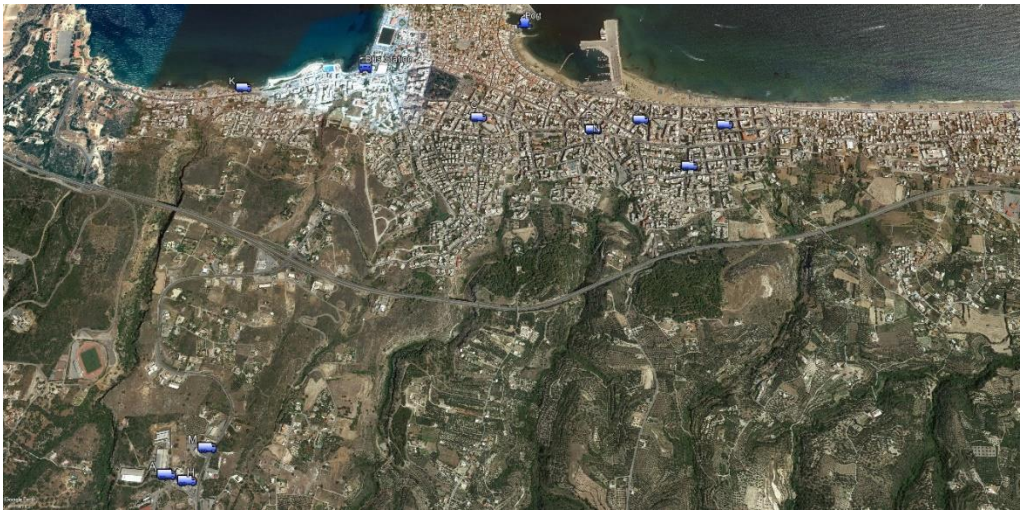


Figure 80: Premises of the logistic companies in the SULP area

Figure 81: Warehouse and facilities of the logistic companies in the SULP area

2.6.1.6. Stakeholders and roles in the logistics sector

The following table summarizes the main stakeholders, public and private, with direct or indirect influence on the logistics sector of Rethymno.

Main Stakeholders and their roles in the logistics sector	
Stakeholder	**Role**
Urban planners - Municipal services **Region of Crete - Directorate of environment and spatial planning**	Support the SULP development, the implementation of the proposed action plan. Define and support new regulations regarding the freight system.
Freight logistic companies / HORECA suppliers	The main providers for freight deliveries. Provide relevant data, contribute to the development of the SULP. Member of the urban logistics advisory group. Participation in the online platform for the optimisation of freight distribution. Participation of freight drivers in the eco driving training.

Chamber of Commerce and Industry	Participation as a member of the urban logistics advisory group. Facilitate all relevant actors' engagement and cooperation in the consultation process.
Retailers, shop and restaurant owners	Participation to the consultation process. Engagement and collaboration, as key actors of the freight distribution chain.
Retailers Association of Rethymno Association of Restaurants, Rethymno Hoteliers Association, Union of Tourist Settlements of Rethymno Prefecture XENIOS ZEYS	Member of the urban logistics advisory group. Facilitate all relevant actors' engagement and cooperation as the main representative of local retailers and traders, local restaurants and hotels owners. Provide relevant data.
Hellenic Institute of Transport (H.I.T.)	Support the development of freight management action plan, as a national transport-related institute. Advise on the new regulations regarding the freight system.
Traffic Police Department	Support during the development of traffic regulations and access restrictions. Responsible for the inspection and the implementation of the traffic regulations regarding freight movement.
Municipal Port Authority Trust of Rethymno	Support the development of freight management action plan, as the municipal department responsible for administering and maintaining the facilities of Rethymno's port and the marina.

Table 45: Main Stakeholders and their roles in the logistics sector

2.6.2. Study area characterisation

2.6.2.1. Selection of study area

The study area for the development of the SULP and the main transport entrances of the area are presented in the following figures.

Figure 82: Rethymno's study area of the SULP

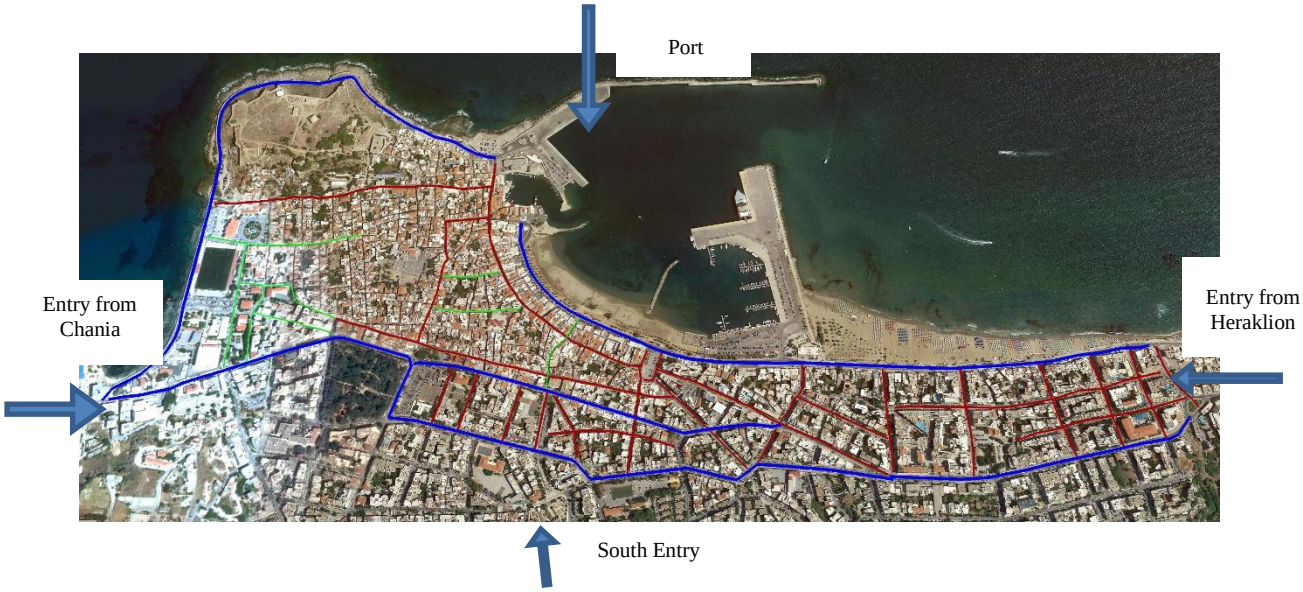


Figure 83: Main entrances of the SULP area - road network

The study area has been carefully selected in order to include the main areas of the city that are highly affected by the freight distribution. The study area covers the north centre of the city and it is divided in three main sub–areas: the historic centre of the city (orange), the main commercial and administrative centre (blue) and the tourist north-east front of the city (pink).

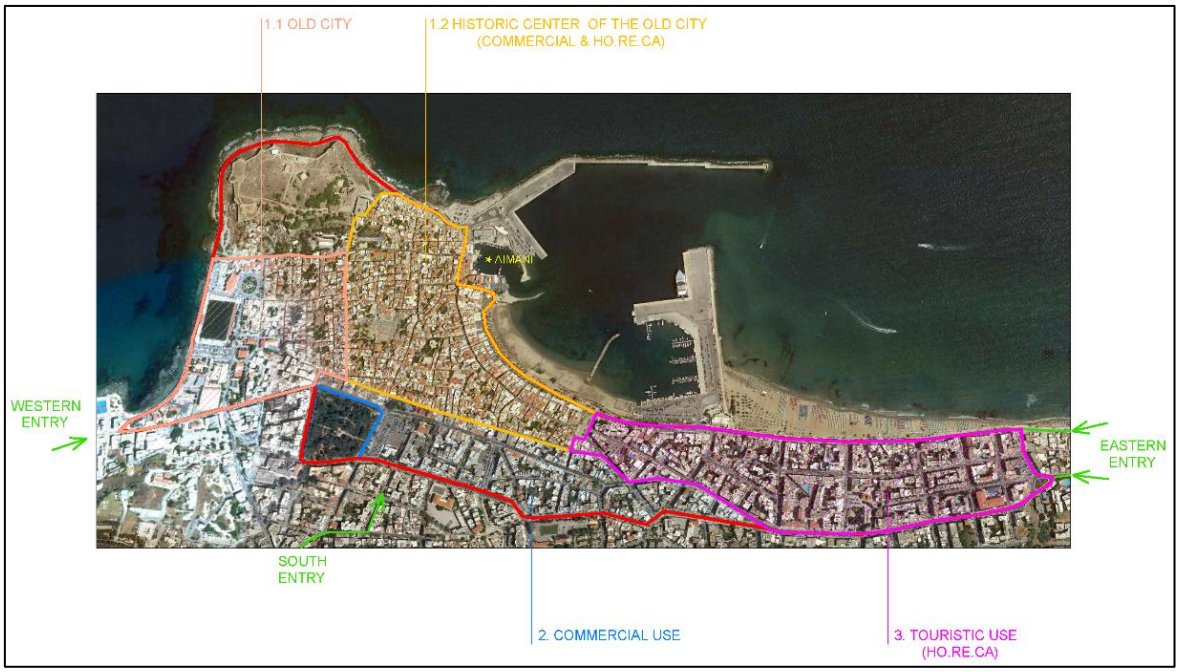


Figure 84: Sub-areas and main entrances of the SULP area

1) Historic Centre of Rethymno

In the historic centre of Rethymno, there are plenty of commercial enterprises, mainly shops and mini – markets that operate all year long. Moreover, there are a lot of touristic enterprises, mainly hotels, rented apartments, restaurants, bars, cafeterias and souvenir shops, that operate mostly during the summer period. The area is characterized by the narrow traditional streets that restrict vehicle circulation and accessibility. Freight distribution adds to the traffic load and affects the accessibility of the city, the noise and pollution levels and the road safety. These impacts are highly increased during the peak season, when the freight movement is increased almost by four times more and the visitors are multiplied, since the historic centre is one of the main tourist attractions of Rethymno. The development of a strategically planned and efficient SULP will address these challenges and improve the traffic circulation and mobility of the area.

Figure 85: Zones in the historic centre of Rethymno

Figure 86: Representative images of the historic centre

2) <u>Commercial and administrative centre.</u>

The commercial and administrative centre of Rethymno lies between the two main streets of the city. In the area, there are mostly administrative and public infrastructures along with several commercial establishments, such as shops and mini- markets/ supermarkets. The freight deliveries in the area are carried out with great difficulty due to the heavy traffic congestion that characterizes the two main streets. The municipal council has defined specific parking spaces for the loading and unloading of goods, but this regulation is often violated and the parking spaces are illegally occupied by private cars.

Figure 87: Commercial & administrative centre

Figure 88: Representative images of the commercial & administrative centre

3) North-east front – Hotel area

In the north-east front of the city, near the long sandy beach of the city, a great number of HORECA enterprises operate mainly during the summer period. The area is characterized by the high density of the establishments, vehicle circulation and a large number of pedestrians, locals and visitors, who walk along and towards the beach. The vehicle circulation and commercial activity in this busy area result in traffic congestion and reduce

the accessibility and the road safety not only for freight vehicles, but also for the residents and tourists that walk through the area.

Figure 89: North-east front of Rethymno – Hotels, restaurants and night life area

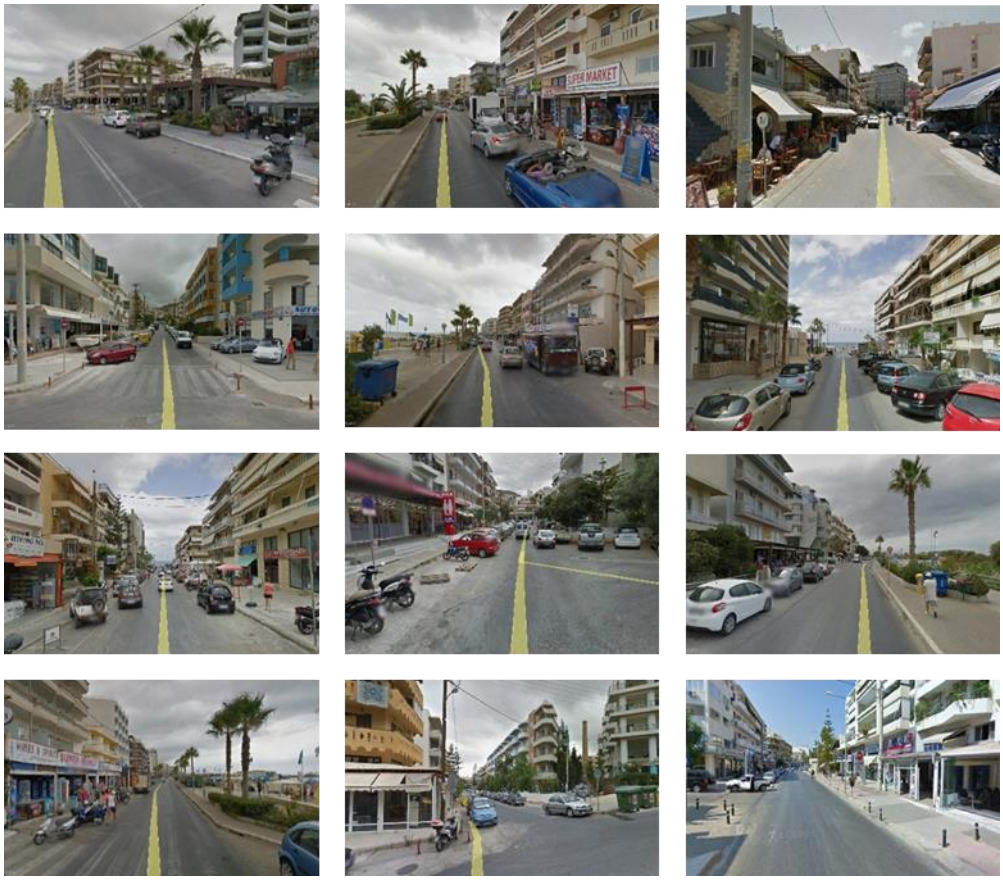


Figure 90: Representative images of the north-east front of Rethymno

2.6.2.2. Economic activities

The tertiary sector is the driving force of the local economy of the Municipality of Rethymno, absorbing 77% of the employed population. Tourism, including the HORECA services, is the most dynamic and evolving sector of economic activity, occupying 21,09% of the total

employees. High employment rates (16,63%) are also recorded in wholesale and retail trade. In total, 5 589 enterprises of the tertiary sector operate in the municipality, accounting for 66% of the total number of establishments.

The secondary sector contributes significantly to the local economy, as well. According to 2011 census, 2 232 enterprises operate within the Municipality of Rethymno, mainly in the construction sector and the food industry.

Main types of establishments	
Type of establishment of the tertiary sector	**Number**
Accommodation	626
Administration	11
Advertising	27
Catering	1 006
Culture	74
Sports	41
Education	52
Healthcare	31
Other Services	1 321
Commerce	2 223
Transport & Logistics	146

Table 46: Main types of establishments

The exact number of the commercial establishments and services operating in the total study area is not yet available, but it will be defined during the development of the local SULP. The main types of establishments and services per sub-area are depicted in the following table:

Types of establishments per sub-area		
Historic centre	**Commercial & administrative centre**	**North-east front – Hotel Area**
Hotels / Apartments / Villas	Shops	Hotels / Apartments
Shops	Mini markets/ Supermarkets	Mini markets/ Supermarkets
Restaurants and bars	Cafe	Cafe
Cafe	Other Services	Restaurant – Bars
Travel agencies	Health centres	Recreation
Pharmacies	Pharmacies	Shops

Table 47: Types of establishments per sub-area

Figure 91: Main streets for freight distribution in SULP area

2.6.2.3. Freight and logistics regulation

Under the current regulatory framework, access and circulation restrictions are applied for the area of the old city, where the access and circulation is only allowed for small freight vehicles (less than 3,5 t).

Specifically, according to the local regulative decision 28/2007 of the municipal council of Rethymno, all vehicles are prohibited in the old city of Rethymno during the touristic season (from 1st of April until the 30th of November) from 11:00 am until 06:00 am. Therefore, access and circulation for loading and unloading of goods in the historic centre of the old city is only allowed from 06:00 a.m. until 11:00 a.m. After 11:00 a.m., the circulation for loading and unloading of goods is only allowed for electric vehicles.

Moreover, in every main road, specific parking spaces are dedicated for the loading / unloading of goods, as defined by the municipal council. Most of the streets in the old city of Rethymno are pedestrianized and, therefore, the access and circulation of vehicles less than 3,5 t is allowed only in the main streets of the old city, as presented in next figure (Source: Local Regulative decision 9/2009).

During the winter season, the access and circulation for loading and unloading of goods is permitted for all vehicles less than 3,5 t. in the historic centre without time restriction.

Figure 92: Main roads for loading / unloading in the historic centre

In the rest areas of the city, access and circulation is allowed freely for freight vehicles under 10 t. and parking spaces for loading and unloading of goods are specified by regulative decisions of the municipal council.

The local municipal police department along with the national traffic police department are responsible for the inspection and the implementation of the traffic arrangements and the local regulative decisions of the Municipal Council of Rethymno.

2.6.2.4. Logistics services

A great variety of enterprises operate in the study area, such as commercial shops, supermarkets, hotels, restaurants and other services. The different types of establishments are served by a mix of logistics services, depending on their size and their suppliers. Local producers and / or wholesalers are the main suppliers of the HORECA sector and deliver the goods directly. Smaller enterprises their everyday needs with their own vehicles.

Commercial enterprises are mostly buying their merchandise from wholesalers, including importers or producers from Athens or other Greek cities that supply them, using local transport companies and / or specialized delivery services by freight transport operators. The under development SULP will better define and describe the existing logistics services for freight transport / delivery in the study area.

2.6.2.5. Characterization of logistics flows

Currently, specific data on the logistics flows of the study area are not available. The SUMP baseline study will provide initial data concerning freight movement within the city in 2018. Tailored surveys will be designed and performed to provide specific data for the characterisation of the freight flows.

Interviews with logistics stakeholders, including freight companies, hotel suppliers, retailers and hotel owners, will begin in March 2018. During the interviews, the participants will complete structured questionnaires and provide the required data for the characterisation of the logistics flow. The data collected will include type of vehicles used, type and schedules of deliveries, deliveries duration, type of containers etc.

2.6.2.6. Energy and environment aspects

More specific energy and environmental data related to the logistics services operation in the study area are not available.

Data on fuel consumption and CO_2 emissions are available for the private transport of Municipality of Rethymno that includes the private freight fleet.

According to the Hellenic Statistical Authority, it is estimated that the CO_2 emissions from private transport in Municipality of Rethymno amount to approximately 40 772 t CO_2 eq, presenting a 32% reduction during the period 2011 - 2015, possibly due to the reduction in vehicle use and the prolonged economic crisis in Greece during the past 9 years.

The CO_2 total emissions from the transport sector for private vehicles are presented in the Table below.

Fuel consumption and CO_2 emissions of the private transport in the Municipality of Rethymno (2011 – 2015)				
Year	**kWh**	**% change 2011 – 2015**	**CO_2 eq t**	**% change 2011-2015**
2011	244.336.881	-78.187.802 KW or -32%	60.203	-19.431 t CO_2eq or -32%
2015	166.149.079		40.772	

Table 48: Fuel consumption and CO_2 emissions of the private transport in the Municipality of Rethymnon (2011 – 2015)

As described above, the initial data collection in March 2018 will provide a clear view of the energy and environmental aspects of logistics movements within the study area. The logistic companies and goods suppliers who will participate in the interviews, will provide additional data concerning energy consumption and GHGs emission regarding their fleet, but if the specific data are not available, estimations will be made based on the logistic flow characteristics (type of vehicle, distances per delivery, type of fuel).

2.6.2.7. Main needs and problems in Logistics

One of the main challenges regarding freight logistics in the study is the lack of compliance to the traffic and access regulations. Although specific parking spaces are dedicated to goods delivery, this regulation is often violated by the illegal parking occupation by private vehicles. As a result, freight vehicles face great challenges during the loading and unloading of goods, especially during the summer period that the traffic load is increased all around the city and the available parking spaces are not sufficient for the increased number of vehicles. The heavy traffic, the narrow streets and the mobility challenges mentioned above affect the freight distribution.

One of the main objectives of the Municipality of Rethymno is the identification of specific solutions for freight distribution that will reduce the circulation of the commercial vehicles in the city road network and mitigate the negative environmental impacts. According to the Sustainable Energy Action Plan (SEAP) of the Municipality of Rethymno, the municipality aims to achieve a substantial reduction of the energy consumption of the transport sector and a decrease of around 25% of the corresponding GHGs emissions. To accomplish this target, a more energy-efficient route scheme is required, as well as the increased use of eco-fuels (biofuels). Overall, the Municipality of Rethymno aims to increase the efficiency of the freight logistics processes and improve the quality of life for residents and tourists.

2.7. Elba/Rio Marina/Portoferraio

2.7.1. Regional and city overview

2.7.1.1. Geography and population

Elba Island (Province of Livorno), conventionally separates the Ligurian Sea from the high Tyrrhenian Sea and is part of the National Park of the Tuscan Archipelago.

With an area of 241 km² it is the largest island of the Tuscan Archipelago and the third largest in Italy.

Figure 93 - Overview of the geographical position of Elba Island and the territory of Tuscan Archipelago National Park

From an administrative point of view, the territory of the island is extremely fragmented, being divided into eight municipalities: Portoferraio, Campo nell'Elba, Capoliveri, Marciana, Marciana Marina, Porto Azzurro, Rio Marina and Rio Elba.

Figure 94: The 8 Municipalities of Elba Island

The table below shows some demographic and administrative data, highlighting how the overall resident population of the island, on December 31st 2015, was more than 32 thousand inhabitants (source: ISTAT - Italian National Institute of Statistics).

Demographic and administrative data of Elba Municipalities				
Municipality	**Population** *31.12.2015*	**%**	**Area** *sq km*	**Pop density** *inh /sq km*
Campo nell'Elba	4.805	15,0	55,79	86,13
Capoliveri	4.033	12,6	35,96	112,15
Marciana	2.186	6,8	45,45	48,10
Marciana Marina	1.977	6,2	5,86	337,37
Porto Azzurro	3.751	11,7	13,33	281,40
Portoferraio	11.992	37,4	48,48	247,36
Rio Marina	2.198	6,8	19,9	110,45
Rio nell'Elba	1.148	3,6	16,62	69,07
	32.090		**241,39**	**132,94**

Table 49: Demographic and administrative data of Elba Municipalities

From the point of view of the population, Portoferraio with its almost 12 000 inhabitants is the main centre of the island, followed by Campo nell'Elba (4,800 inhab), Capoliveri (4 000

inhab.) and Porto Azzurro (3 750), by 3 municipalities between about 2 000 and 2 200 inhab. and by Rio nell'Elba that, with just over 1 100 inhab., represents the smallest community.

By number of inhabitants, Portoferraio is ranked 6th among the municipalities of the Province of Livorno (excluded capital).

At the end of 2015, the Elba Island demographic trend saw a slight increase of residents compared to 2011 (+2.38%), which was the year of the last national census campaign.

Eventually, there is a number of 13 121 family units, with an average number of components of 2.12, with variations between 2.87 in Porto Azzurro and 1.75 in Rio nell'Elba.

Demographic trend of Elba Municipalities				
Municipality	**Population** *31.12.2015*	**Population** *09.10.2011*	**Difference**	**%**
Campo nell'Elba	4.805	4.553	+252	5,53%
Capoliveri	4.033	3.763	+270	7,18%
Marciana	2.186	2.208	-22	-1,00%
Marciana Marina	1.977	1.946	+31	1,59%
Porto Azzurro	3.751	3.826	-75	-1,96%
Portoferraio	11.992	11.641	+351	3,02%
Rio Marina	2.198	2.235	-37	-1,66%
Rio nell'Elba	1.148	1.170	-22	-1,88%
	32.090	**31.342**	**+748**	**+2.38%**

Table 50: Demographic trend of Elba Municipalities

Number of families (31.12.2015)			
Municipality	**N. families**	**%**	Average of components
Campo nell'Elba	2.395	18,25%	2,01
Capoliveri	1,989	0,02%	2,03
Marciana	1.052	8,02%	2,08
Marciana Marina	983	7,49%	2,01
Porto Azzurro	1.305	9,95%	2,87
Portoferraio	5.547	42,28%	2,16
Rio Marina	1.181	9,00%	1,86
Rio nell'Elba	656	5,00%	1,75
	13.121		**2,12**

Table 51: Number of families (31.12.2015)

The following figures shows demographic trend[5] of Portoferraio and Rio Marina Municipality during the last fifteen years.

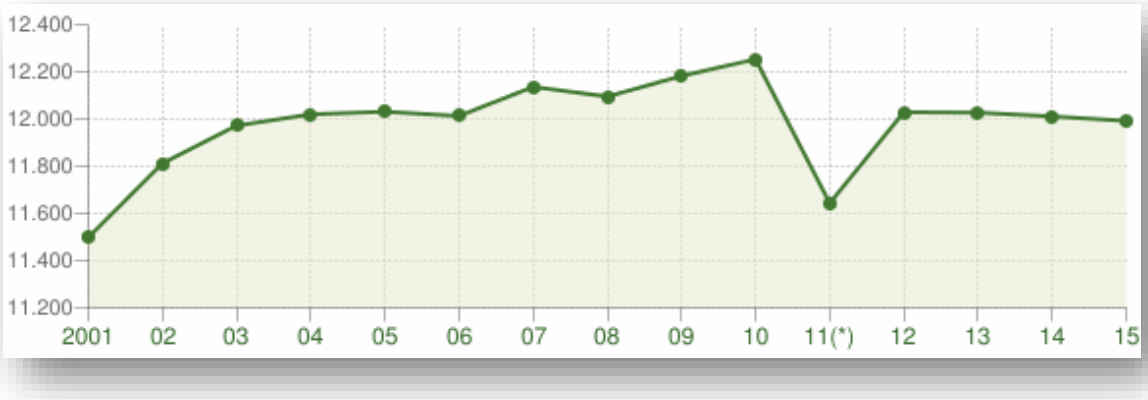


Figure 95: Portoferraio Municipality demographic trend

Figure 96: Rio Marina Municipality demographic trend

From the point of view of the seasonality variations in the needs of freight transport and local distribution it is important to highlight how the knowledge of the tourist flows is fundamental.

Elba Island is, since the '50s, a renowned tourist location, chosen by national and foreigner guests for summer vacation periods. This situation, from an economic point of view, represent a significant wealth source for tour operators and for all those operating in the tourism field but, from the point of view of the services causes severe imbalances with significant seasonal variations in many areas such as: mobility, public transport, water supply, energy needs, etc.

The same it happens for freight supply and distribution: in fact, starting from the spring, and more in the summer high season, there is a significant increase of freight flows toward the Island and of the related needs of their distribution inside the Island.

[5] The peak related to 2011 is due to the data tuning following the last national census campaign.

The highest tourist flow occurs in the summer period from June to September, and in particular, in July and August, when the highest number of daily average presences is recorded. In 2014, the last year with available public data, the daily tourist presence reached 22 203 and 26 405 respectively (*source: Livorno Province – Tourism Monitoring Service*). This means that in these months the number of residents of the island almost doubling.

In general, if there has been a constant numbers presence since 2001 (or a small negative trend), in recent years a slightly positive trend is recorded.

The next table reports the comparison between the two recent tourist seasons recorded (2014-2013) showing a general increase in tourist arrivals (+5,37%) but an almost constant number of presences (+0,02%). This means the average number of days of permanence is slightly decreased, from 6,8 to 6,5 days.

Tourist arrivals and presences (2014 vs 2013)								
Month	Arrivals 2014	Arrivals 2013	Variat.	Diff. %	Presences 2014	Presences 2013	Variat.	Diff. %
January	631	714	-83		4.468	4.916	-448	
February	724	782	-58		3.832	4.429	-597	
March	2.854	3.976	-1.122		8.893	14.012	-5.119	
April	21.452	17.643	+3.809		71.230	64.704	+6.526	
May	43.215	40.706	+2.509		150.939	204.029	-53.090	
June	78.503	74.350	+4.153		468.529	412.878	+55.651	
July	87.551	88.480	-929		688.306	723.999	-35.693	
August	112.539	104.072	+8.467		818.558	809.596	+8.962	
September	61.635	61.011	+624		422.772	412.841	+9.931	
October	12.937	9.021	+3.916		92.154	77.234	+14.920	
November	1.116	913	+203		5.455	5.832	-377	
December	959	819	+140		4.930	5.160	-230	
Total	**424.116**	**402.487**	**+21.629**	**+5,37**	**2.740.066**	**2.739.630**	**436**	**+0,02**

Table 52: Tourist arrivals and presences (2014 vs 2013)

However, the relevant data to estimate the seasonal increase in freight supply/distribution requirements, concerns the trend of daily presences. As a reference, the 2014 situation reported in the table below was taken into account, highlighting an overall number of presences in hotels and other tourist structures (camping, bed&breakfast, residences, etc.) of more than 2,7 Ml.

The figures show that in the four months of the tourist season (June-September), the island has almost 2,4Ml presences, equal to 87,5% of the annual total.

In addition to these official data it is also necessary to consider the unofficial presences of second-home owners, guests of friends or relatives, 1 day tourists, etc. Extrapolations made considering data from ferry companies (total passengers, resident passenger) and

registered arrivals, estimate a "hidden" tourist flow of about 600,000 passengers/years, however affecting demand for freight supply.

For what concern the provenience of tourist, official 2014 the most relevant data are reported in the next tables, where at a glance the percentage of Italian tourist vs foreigners is of 65,89% compared to 34,11% (arrivals).

Arrival and presences by provenience (2014)						
	Italians		Foreigner		Total	
	Arrivals	Presences	Arrivals	Presences	Arrivals	Presences
Hotels	187.063	990.730	74.470	426.320	261.533	1.417.050
Other tourist structures	92.385	722.489	70.198	600.527	162.583	1.323.016
Total	279.448	1.713.219	144.668	1.026.847	424.116	**2.740.066**
%	65,89%	62,52%	34,11%	37,48%	**-**	**-**

Table 53: Arrival and presences by provenience (2014)

Foreigner arrival and presences by country (2014)						
	Hotels		Other tourist structures		Total	
	Arrivals	Presences	Arrivals	Presences	Arrivals	Presences
Germany	21.863	154.734	32.135	286.449	53.998	441.183
Switzerland	16.914	117.059	14.188	127.321	31.102	244.380
Netherlands	2.032	10.499	7.095	65.047	9.127	75.546
Austria	5.174	31.100	2.934	21.980	8.108	53.080
France	10.317	32.962	2.771	16.994	13.088	49.956
Czech Rep.	1.016	5.739	2.496	17.551	3.512	23.290
UK	2.857	14.487	962	8.425	3.819	22.912
Belgium	1.217	5.670	637	5.674	1.854	11.344
Denmark	635	3.106	667	6.179	1.302	9.285
Russia	1.061	6.653	297	2.321	1.358	8.974
Poland	481	2.111	823	5.415	1.304	7.526
Sweden	1.224	5.074	291	2.149	1.515	7.223
Norway	894	3.459	198	1.646	1.092	5.105
USA	1.491	5.079	254	1.304	1.745	6.383
China	305	673	80	282	385	955
Others	31.762	190.989	24.989	205.916	56.751	396.905
	74.470	426.320	701.98	600.527	144.668	**1.026.847**

Table 54: Foreigner arrival and presences by country (2014)

The tourist flows trends in Elba Island (arrivals and presences) are detailed in the following table and figure, where data from 2000 to 2014 are reported.

Trend analysis highlight a significant decrease from 2000 to 2008 (-11,2%) and an almost stable level of tourist during the period 2009-2014. Last unofficial data for 2015 and 2016 reports a good recovery in tourist flows trends, estimated in 4-5% vs 2014.

Trends of tourist flows 2000-2014		
	Arrivals	**Presences**
2000	498.919	3.121.536
2001	505.972	3.221.729
2002	479.547	3.075.987
2003	398.823	3.030.292
2004	456.783	2.717.828
2005	452.302	2.831.158
2006	474.897	3.100.583
2007	466.624	2.980.209
2008	443.541	2.771.310
2009	430.702	2.737.714
2010	401.967	2.722.206
2011	427.958	2.835.791
2012	389.494	2.623.525
2013	402.487	2.739.630
2014	424.116	2.740.066

Table 55: Trends of tourist flows 2000-2014

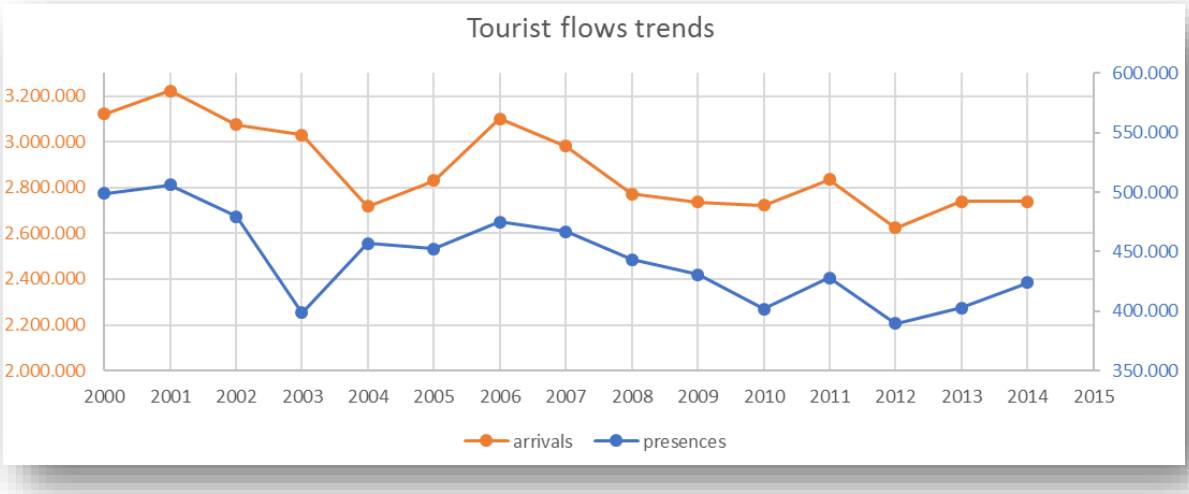


Figure 97: Trends of tourist flows (2000-2014)

Eventually it is important to highlight that all the tourism data above reported are gathered through different sources (Maremma and Tirreno Chamber of Commerce, Livorno Province, Elba Island Associated Tourism Management Board, etc.) and may sometimes be slightly discordant with each other or with other studies.

It should be reminded that these information should be considered not as intended for an in-depth study on the topic of tourist flows, but as a baseline element for the knowledge of the reference context and for the definition of the "dimensions" of seasonal trends of freight flows towards the Island, and the related issues concerning their distribution/delivery.

2.7.1.2. Mobility and traffic

For an overall overview of the traffic pressure on the road network it is useful refer to the diagrams developed under the CIVITAS DESTINATIONS WP2 - Sustainable Urban Mobility Planning for residents and visitors, showing the number cars/km of road (considering a total of 50 Km of main roads) and the number cars/100 residents, circulating on the Island by months (2015).

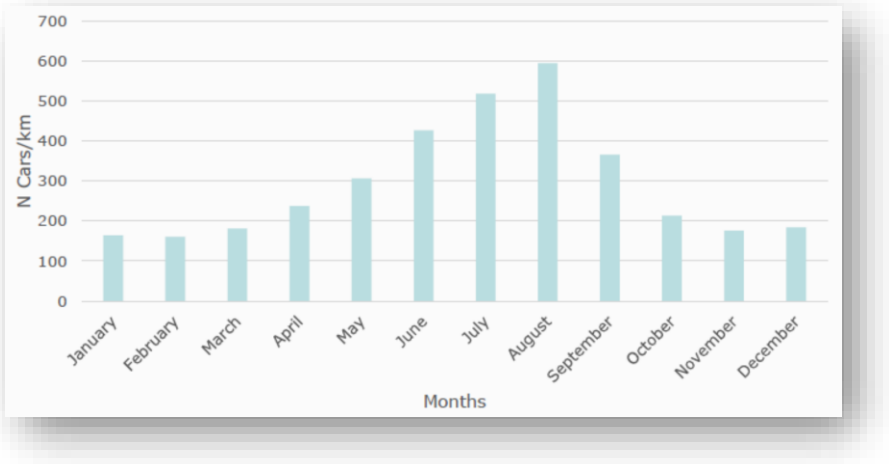


Figure 98: Number of cars per km of road Elba Island (2015)

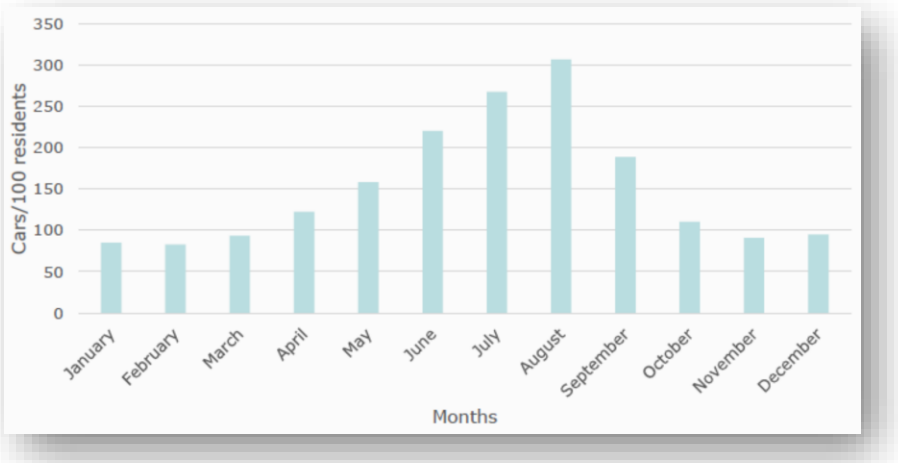


Figure 99: Number cars/100 residents (2015)

Moreover, the following table reports the overall Elba Island residents' car fleet (2015 situation).

The analysis of diagrams and table highlight how, during the summer season peaks, the number of circulating cars is very important with severe pressure on the road network, resulting in high level of traffic and frequent congestions.

Number of resident's cars (2015)			
Municipality	**N. cars**	**Cars/1000 inhab.**	%
Campo nell'Elba	3.096	644	14,8%
Capoliveri	2.524	626	12,1%
Marciana	1.408	644	6,7%
Marciana Marina	1.140	577	5,5%
Porto Azzurro	2.280	610	10,9%
Portoferraio	8.174	682	39,2%
Rio Marina	1.402	638	6,7%
Rio nell'Elba	853	743	4,1%
	20.877	**651**	

Table 56: Number of resident's cars (2015)

The commercial traffic, in particular during tourist season, is a significant component of this critical situation, and therefore its control and optimization represents one of the most important ways to address the overall mobility issues, both in urban and extra-urban areas of the Island.

The following table reports the overall local commercial fleet (2015 situation) highlighting a total of 2.854 vans/small trucks (GVWR <3,5 tons).

Number of local commercial vehicles - GVWR <3,5 tons (2015)		
Municipality	**N. commercial vehicles**	%
Campo nell'Elba	439	15,4%
Capoliveri	409	14,3%
Marciana	180	6,3%
Marciana Marina	121	4,2%
Porto Azzurro	315	11,0%
Portoferraio	1.147	40,2%
Rio Marina	165	5,8%
Rio nell'Elba	78	2,7%
	2.854	

Table 57: Number of local commercial vehicles - GVWR <3,5 tons (2015)

It is important to consider that these numbers include also vans/minivans operating by public authorities, private citizens, artisan businesses, etc. not directly related to freight transport and delivery.

In addition to this local fleet, during tourist season, there is a high number of commercial vehicles that daily coming from the mainland to transport and deliver the freights needed to face the increase of the population.

The commercial vehicles monthly flows (updated to 2016) from mainland (Piombino) to the Island (Portoferraio, Rio Marina, Cavo) are reported in the following table, detailed per Ferry Company, and figure (*source: North Tyrrhenian Sea Port Authority*).

Number of commercial vehicles transported by ferries (Piombino → Elba Island)					
Month	**Toremar**	**Moby Lines**	**Blu Navy**	**Total** (monthly)	**Daily average** (working days)
January	1.366	1.236	0	**2.602**	137
February	2.064	1.455	0	**3.519**	166
March	2.030	1.914	0	**3.944**	179
April	1.623	1.897	209	**3.729**	177
May	1.724	2.574	411	**4.709**	214
June	2.062	2.591	362	**5.015**	239
July	2.281	2.518	367	**5.166**	246
August	1.972	2.298	301	**4.571**	207
September	1.488	2.344	321	**4.153**	188
October	1.160	2.415	150	**3.725**	177
November	1.458	1.429	0	**2.887**	138
December	1.274	1.392	0	**2.666**	133
Total	**20.502**	**24.063**	**2.121**	**46.686**	

Table 58: Number of commercial vehicles transported by ferries (Piombino → Elba Island)

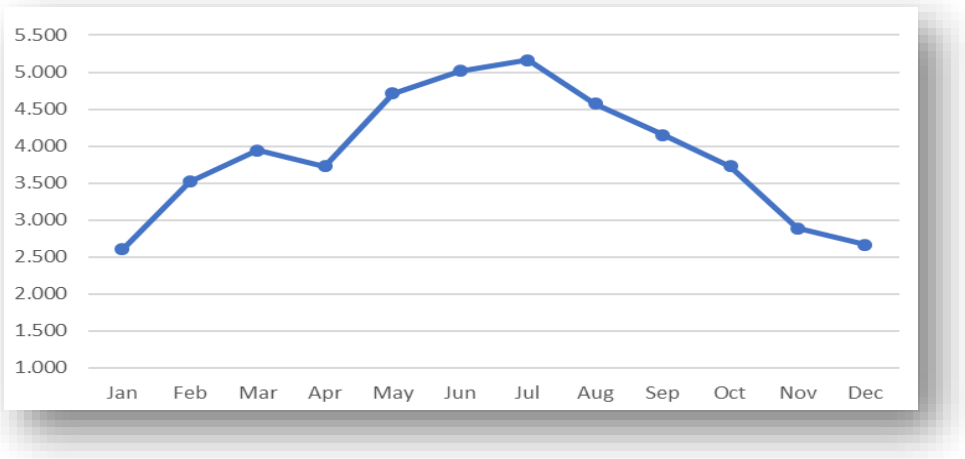


Figure 100: Number of commercial vehicles (2016) transported from mainland

The commercial vehicles transported by ferry company in both the directions (Piombino → Elba Island and Elba Island → Piombino is detailed in table:

Ferry companies used by commercial vehicles (2016)				
	To.Re.Mar	Moby Lines	Blu Navy	**TOTAL**
Piombino → Elba Island	20.502	24.063	2.121	**46.686**
	43,9%	*51,6%*	*4,5%*	
Elba Island → Piombino	23.571	21.565	1.874	**47.010**
	50,1%	*45,9%*	*4,0%*	
TOTAL	**44.073**	**45.628**	**3.995**	**93.696**

Table 59: Ferry companies used by commercial vehicles (2016)

2.7.1.3. Energy consumption and CO_2 emissions in the transport sector

The magnificent natural environment of the Island, stated also by inclusion of its territory in the National Park of the Tuscan Archipelago, is a very delicate ecosystem.

Such an environment offers natural resources, historical towns and villages as well as touristic assets of a priceless value which, more than in other sites, are exposed to the risks and adverse impacts of traffic and transport of people and goods.

While tourism is a primary asset for the economy of Elba Island, at the same time the traffic flows connected to resident population and tourism, when not appropriately dealt with, represent a potential danger for the environment and the quality of life in the Island territory.

Concerning the energy consumption and GHG emissions, related to the overall transport sector, being the eight Elba Municipalities members of the Covenant of Mayors' initiative, in the framework of the Elba Sustainable Energy Action Plan (SEAP) a specific survey conducted in 2011 defined the situation reported in the following tables[6].

Nevertheless, these data are not updated, they provides a clear picture of the energy situation of the island, and the role played by each sector, highlighting how the transport processes are significant in terms of energy consumption and GHG emissions.

Elba Island Energy Consumption by sector – MWh/year (2011)					
	Civil	**Transport**	Agriculture	Industry	TOTAL
Oil	208.192	365.789	8.250	5.785	**588.015**
Gas	0	0	0	0	**0**
Electric Energy	134.662	0	1.174	13.754	**149.590**
Renewable sources	1.860	12.071	10	120	**14.062**
Total	**344.714**	**377.860**	**9.434**	**19.650**	**751.667**

Table 60: Energy Consumption by sector – Year 2011 (MWh/year)

[6] Source: Elba Island SEAP based on EALP, Terna, GSE and Italian Economic Development Ministry,

CO_2 emissions by sector – tons/year (2011)					
	Civil	**Transport**	Agriculture	Industry	TOTAL
Oil	55.412	96155	2.302	1.614	**155.483**
Electric Energy	65.900	0	575	6.731	**73.206**
Renewable sources	-	-	-	-	
Total	**121.312**	**96.155**	**2.877**	**8.345**	**228.689**

Table 61: CO_2 emissions by sector – Year 2011 (tons/year)

2.7.1.4. Policies and regulation framework in logistics

Most of Elba Island urban centres foresee specific normative for Limited Traffic Zones – LTZ (and often for pedestrian areas) with specific access and parking rules for commercial vehicles (time windows, typology of vehicles, L/U parking lots, etc.).

Moreover, such normative changes during tourist peak season, and become more tighten, in order to create new (or expand) ZTLs and/or urban pedestrian zones, for the benefit of tourists and residents. In this sense, during the summer period the commercial traffic in urban areas is more strictly limited by specific access and parking normative which are different in each of the eight Municipalities.

In section 2.7.2.3 a short summary of the current normative of each Municipality for the access/parking of commercial vehicles in the different Island urban centres during low/high seasons is provided.

2.7.1.5. Main infrastructures for logistics

Being the reference study area, for freight transport and delivery, the whole territory of the Elba Island, it is obvious that the primary infrastructures interesting logistics processes are the ports.

The point of embarkation of commercial vehicles on the mainland is the Port of Piombino, the access points on the Island are the Port of Portoferraio and Rio Marina (this mainly for the east part of the Island. All these ports, also including the small pier located in the village of Cavo (Rio Marina Municipality), are under the control of the “Autorità di Sistema Portuale del Mar Tirreno Settentrionale” (*North Tyrrhenian Sea Port Authority*), based in Livorno.

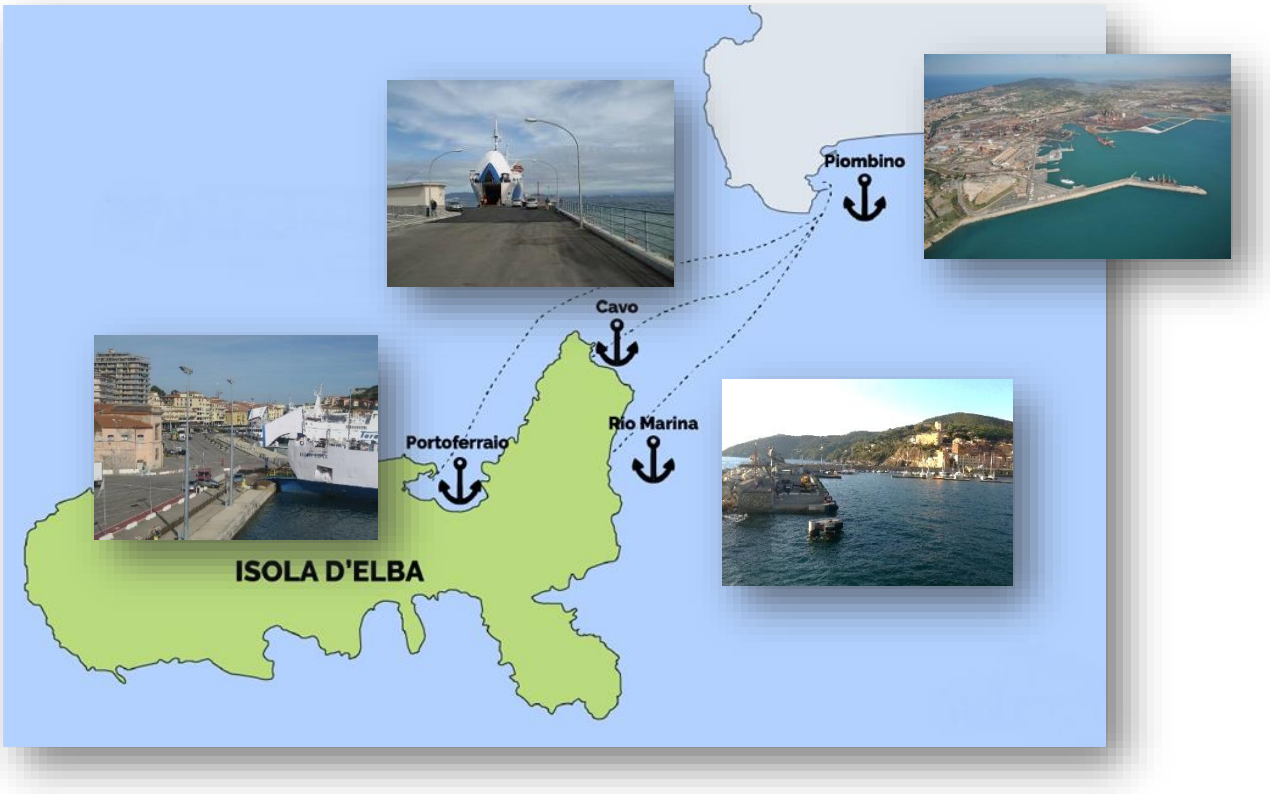


Figure 101: Overview of mainland/Elba Island ports locations

The Port of Piombino is the main gateway to the islands of the Tuscan Archipelago and particularly to the Elba Island. Currently, Moby Lines, Toremar BluNavy and Elba Ferries navigation companies provide connections between the Port of Piombino and those of Portoferraio, Rio Marina/Cavo, using ro/pax ferries for freight and passenger vehicles.

Moby Lines and Toremar companies operates the largest number of daily trips providing the transport service all year round.

In the perspective of the aim of the SULP, to rationalise the logistics processes related to freight distribution on the island, the area of Piombino represents the optimal location for a logistic centre for collection, consolidation and subsequent goods delivery.

Referring to logistics processes related to freight delivery on Elba territory (mainly from Portoferraio to the other urban/tourist centres), no specific infrastructures are currently present, beside the few warehouses of the courier actives on the island.

2.7.1.6. Stakeholders and roles in the logistics sector

To achieve a productive and open dialogue with interested stakeholders on Elba Island freight transport and last mile distribution and how to possibly reach a more optimized logistics scenario, local partners have organised a series of workshops, in the framework of DESTINATIONS WP02 SUMP development.

Three events already took place in the Municipalities of Portoferraio and Rio Marina, namely:

- Elba Sharing Laboratory n. 1, which took place on the 27th February 2017 in Rio Marina with the participation of 17 external people coming from five different Elba Island Municipalities;
- Elba Sharing Laboratory n. 2, on the 27th March 2017 in Portoferraio with the participation of 17 external people coming from 6 different Elba Island Municipalities;
- Future Search Laboratory, a two days event, which took place on the 10th – 11th May 2017 in Portoferraio with the participation of 43 external participants.

These events saw a participatory approach and active involvement of the stakeholders, who exchanged views and ideas which helped to better understand, among the others, Elba Island freight logistics issues and the possible effectiveness of some proposed solutions. Other similar events will be organized during the project lifetime.

The next table provides a short list of identified/involved stakeholders and their role in the logistics sector.

Stakeholders and roles in the logistics sector	
Stakeholder	**Role**
Ferry Companies	Guarantee the territorial continuity. This a European legislative instrument whose purpose is to provide transport services to citizens of the disadvantaged regions (mainly islands) of the country to which they belong. Responsible for commercial vehicles transport to and from Elba Island.
Transport operators/ Couriers	Provide freight transport from mainland to the Island and their delivery on the Island. They also operate goods collection and consolidation from Elba to the mainland.
Shopkeepers	In general, they represent most of the final destination of the delivered goods.
Ho.Re.Ca. operators	Provide food, beverage and accommodation services (Hotels, Restaurants, Catering) for tourists, including camping, bars, etc. Represent a significant part of the final freight delivery points on the Island, in particular during summer period. Are also involved in some Reverse Logistics processes (i.e. empty card-boxes collection for recycling).
Building Companies	Responsible of transport of construction material and cause of significant part of the of commercial vehicles traffic.
Small business and light industry real estate	In it include plumbers, carpenters and other trades related to buildings maintenance.
Category associations	Represents the different operators and commercial categories involved in the logistics chain, but also the citizens need and rights.
Municipalities	Responsible for the normative concerning the commercial vehicles access and parking in LTZs for freight delivery, in particular during tourist season.

Table 62: Stakeholders and roles in the logistics sector

2.7.2. Study area characterisation

2.7.2.1. Selection of study area

As already highlighted, from a freight logistics point of view, the Elba Island can be considered as a whole "urban area", and therefore the SULP will be designed in a unitary approach with the aims to harmonise, as much as possible, the overall freight distribution process and to define the more suitable logistics solutions, services and infrastructures.

In this sense, the SULP study area corresponds to the whole Island territory, with specific focus for the main urban centres and tourist locations.

The characterization of the area is already fully described in the previous sections, here a short description of the road network is provided.

The Elba Island road network, actually dating back to the Napoleon age, is characterized by a perimeter “circuit” connecting all the main centres, for a total of about 160 km (plus a network of over 80 km of gravel roads) and the urban network of each centre.

Figure 102: Elba Island main roads network

The Island network is characterized by windy paths, narrow road sections, high gradients (due to the morphology of the territory) low running routes and, during summer season, recurrent traffic congestion spots, with negative impact on the mobility, the environment and the quality of the tourist image and services offered.

Moreover, in almost all the urban centres there are narrow roads, sometimes characterized by high gradients (i.e. Capoliveri, Rio Elba and Marciana) which are not easily accessible by commercial vehicles.

As far as the urban road network only Portoferraio and Marina di Campo have a sort of bypass or ring-road to reduce interferences between crossing traffic and the city (historic) centre. In this sense, the new of the Regional Territorial Coordination Plan (PTC) provides indications to improve the road network of the Elba Island, and in particular the implementation of bypasses to some centres such as Portoferraio, Porto Azzurro Rio Marina and Marciana Marina.

2.7.2.2. Economic activities

The economic context of the Elba Island, after a past oriented to mining industry, is currently mainly oriented to tourism-related services. In particular, there has been a considerable development of accommodation and catering activities, accounting for 22.7% of total enterprises (vs a regional figure of 5.6%), and a limited development of manufacturing activities representing the 4.8% (vs 15.3% of the Tuscany Region).

In this sense, for the definition of the SULP baseline it is necessary, among the others, to have a deep knowledge of the economic activities, in particular for a context like the Elba Island one, characterised by seasonality, with many accommodation and catering activities opened only during summer.

The economic information, and in particular the number and typology of activities present in the territory of Elba Island, referred to information gathered by ISTAT (Industry and Commerce Census, 2011) and Maremma and Tirreno Chambre of Commerce – Livorno (Infocamere Research Centre), updated at 31 December 2014. Considering that the economic trends, tourist flows and resident population are quite stable in the last five years, it is reasonable to consider the 2014 data as still valid.

Local units, i.e. physical facilities (factories, laboratories, shops, workshops, accommodations, catering, offices, agencies, warehouses, professional studios, etc.) where the production of goods or the provision of services occurs resulted to be a number of 3.502 (see table where economic activities are reported with the official ATECO categories).

The total data show that there is a concentration of activities in the Municipality of Portoferraio, where almost the 38% of the total (1 323) are located.

For the SULP baseline purposes it is important to have more detailed figures related to Ho.Re.Ca. sector, that consist of 795 Local Units (see table that provides information on Accommodations – i.e. Hotels, Camping, B&Bs, etc.- and Catering – i.e. Restaurants, Bars, etc.).

Eventually it is important to highlight the significant number of retail/wholesale activities (772) and of Construction Companies (503), even if mostly of very small dimension.

Local Units by Municipalities (2014)									
	Campo nell'Elba	Capoliveri	Marciana	Marciana Marina	Porto Azzurro	Portoferraio	Rio Marina	Rio nell'Elba	**TOTAL**
Quarries and Mines	1	0	0	0	1	0	0	0	**2**
Manufacturing activities	31	19	9	18	10	72	7	2	**168**
Energy and gas supply	0	0	0	0	0	1	0	0	**1**
Water supply, garbage management	3	1	0	1	2	8	0	0	**15**
Construction	92	68	48	31	65	140	39	20	**503**
Commerce (retail and wholesale)	105	96	46	63	98	317	35	12	**772**
Transport and warehousing	19	14	9	5	11	47	10	2	**117**
Ho.Re.Ca.	128	190	83	54	102	167	47	24	**795**
Information and communication	2	5	2	1	2	20	2	0	**34**
Financial and insurance activities	6	5	5	4	7	45	1	0	**73**
Real Estate agents	28	25	16	19	18	97	8	3	**214**
Professional and scientific activities	20	30	12	21	15	172	15	10	**295**
Tourist operators, renting, etc.	33	21	23	14	11	85	9	11	**207**
Education	3	4	0	0	3	9	0	3	**22**
Health and social assistance	7	4	3	4	13	56	4	2	**93**
Sports and leisure	17	10	10	6	3	26	3	0	**75**
Other service activities	12	11	2	9	13	61	7	1	**116**
TOTAL	**507**	**503**	**268**	**250**	**374**	**1.323**	**187**	**90**	**3502**

Table 63: Local Units by Municipalities (2014)

Ho.Re.Ca. local units by Municipalities (2014)									
	Campo nell'Elba	Capoliveri	Marciana	Marciana Marina	Porto Azzurro	P.ferraio	Rio Marina	Rio nell'Elba	**TOTAL**
Accommodation	65	98	36	14	34	56	15	8	**326**
Catering	63	92	47	40	68	111	32	16	**469**
Total	128	190	83	54	102	167	47	24	**795**

Table 64: Ho.Re.Ca. local units by Municipalities (2014)

2.7.2.3. Freight and logistics regulation

The description of the normative regulating the access and parking of commercial vehicles to LTZs and pedestrian areas for logistics operations (i.e. last mile freight delivery, transport of construction materials, etc.), in the different urban centres of the Elba Island, is already detailed in section 2.7.1.4.

ZTL access normative for commercial vehicles in L/U operations		
Municipality	**Notes**	Access main time windows
Campo nell'Elba	L/U operations in Marina di Campo LTZ are permitted during the hours of switching off of the video surveillance.	From 15/05 to 30/09 06:00 – 20:00
Capoliveri	Parking for L/U operations in Capoliveri LTZ are permitted max 15’	06:00 – 09:00 15:00 – 16:30
Marciana	Specific L/U normative only for Procchio village	08:00 – 10:00 16:00 – 17:00
Marciana Marina	L/U operations permitted only by dedicated parking lots (n. 7), max 30’	07:00 – 13:00
Porto Azzurro	Access limited only for historic centre	01:00 – 19:30
Portoferraio	L/U operations in Via Carducci/Via Manganaro area by dedicated parking lots (n. 3) Historic centre LTZ and pedestrian area, max 30’	07:00 – 12:00 15:00 – 18:00 From 15/06 to 15/06 07:00 – 09:30 14:00 – 17:00
Rio Marina	L/U operations permitted only by dedicated parking lots (n. 3) in Rio Marina and in Cavo village (n. 3)	08:00 – 20:30
Rio nell'Elba	Access limited only for historic centre	Low season: 08:00 – 17:30 Summer season: 00:00 – 19:30

Table 65: ZTL access normative for commercial vehicles in L/U operations

In some Municipalities, the access time is controlled by video surveillance (ACS - Access Control Systems, i.e. Portoferraio - n. 3 gates, Capoliveri - n. 5 gates, Campo nell'Elba - n. 4 gates), while the duration of the parking on dedicated L/U lots is under the control of the Municipal Police. In the other municipalities, the access and parking is controlled only by the Municipal Police.

The normative, in particular those for summer season, implies some criticalities, from the transport and commercial operators point of view, related to the short durations of time windows in some Municipalities or to the opening hours of the shops. In other words, there is a continuous debate between Municipalities (pushing to extend the LTZ and their restrictions, in order to offer a better urban environment to tourists and residents) and operators (asking for more "easy" rules).

As emerged during the survey campaigns performed for the development of the SULP, the needs of a more homogenous normative in the overall Island is an open issue. The different regulations for commercial vehicles in each of the eight Municipalities represent a great obstacle for optimised deliveries, in particular for those transport operators that aren't frequent to work on the Island.

2.7.2.4. Logistics services

The current situation related to the existing logistics services for freight transport/delivery in the study area (the whole Elba Island) has been analysed distinguishing between the various distribution chains and the relative quantities/typologies of goods (see section 2.7.2.5).

Particular attention has been devoted to the definition of the reference framework in which operators (third parties or own account) perform their activities to understand whether the parameters related to this important aspect are in line (or not) with national data.

A reference scheme of the current exiting logistics process form mainland to Elba Island and inside the Island is provided in the next figure.

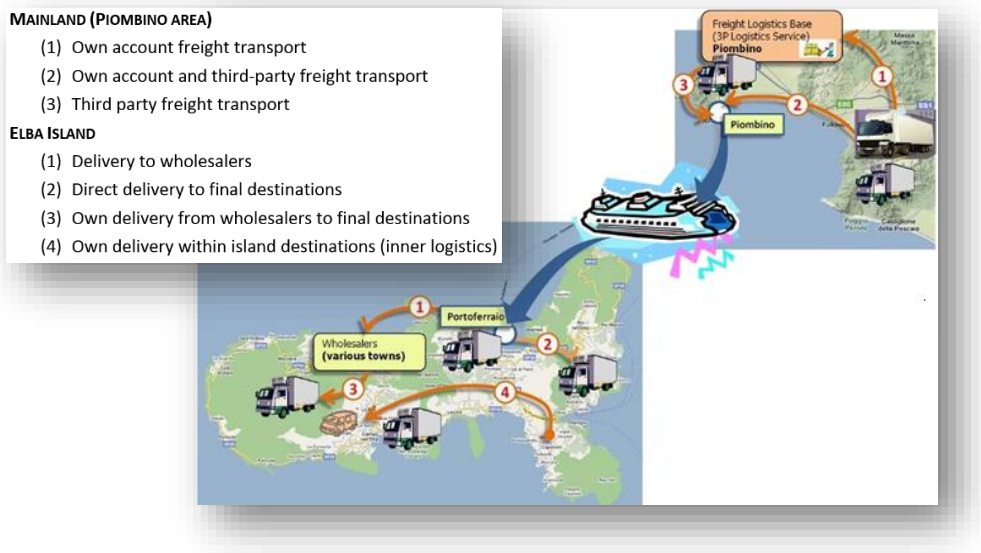


Figure 103: Current logistics processes towards / inside Elba Island

Own account freight transport, including self-supply delivery by shopkeepers, is affected by significant inefficiencies and, in urban areas (we recall that Elba Island could be considered as a unique large urban area), it also generates external costs greater than those of a third party.

National figures show how the share of own account freight transport grows as it approaches urban centres, ranging from 39% of the general data to 55% of the local area and up to 59% at urban area level. This situation needs to be faced in short time, considering that different studies have estimated at national level that about a 9% of own account transport demand can be shifted to 3PL, in a 5-year time horizon.

In order to address these issues, the 3PL category (Third Party Logistics providers), represented by specialized companies that organize, coordinate and carry out the various phases of the logistics process, is growing at international level. Italy still has a significant lag in this process of "integrated" outsourcing logistics, compared to European countries such as France and Germany.

In this sense, the particular freight transport/delivery context of small islands requires high levels of operational efficiency, which can only be provided by 3PL operators in order to foster the welding of the interests of the different logistics actors and end users.

The SULP – Sustainable Urban Logistics Plan for Elba Island, that will be fully developed under Task 5.3.4 of CIVITAS DESTINATION (Measure ELB5.2) is perfectly in line with these current trends.

2.7.2.5. Characterization of logistics flows

The characterization of the different aspects of the Elba Island current logistics situation (in terms of quantity and typology of freight transported, last mile delivery processes, reverse logistics, commercial vehicles fleets, etc.) it is one of the main steps for the SULP baseline definition.

For this reason, a significant data acquisition works has been performed during the seven months of CIVITAS DESTINATION Task 5.2.

The first period was devoted to collect and analyse a large number of already existing studies and information. The main source was represented by the several Deliverables of the LIFE+ ELBA Project (contract LIFE09 ENV/IT/000111 / 01/10/2010 – 31/03/2014), and by the related on-site investigations/surveys, in which two of the local CIVITAS DESTINATIONS Consortium partners were involved (MemEx and Rio Marina).

Additional data/information source was also represented by the Elba Island SEAP (Sustainable Energy Action Plan, signed in 2012 by all the eight Mayors, under the Covenant of Mayors initiative).

Concerning the LIFE+ ELBA Project, to consider the seasonality variations of the freight flow, the investigations/surveys were made in two distinct periods: January/February 2011 (n. 110 interviews) and August 2011 (n. 221 interviews).

Both campaigns were performed through specific interviews addressed to drivers of commercial vehicles awaiting embarkation in the four ports involved, avoiding those related to “mass retail channel” (i.e. Coop, Conad, Crai, etc.) and heavy trucks over 7,5 tons.

The interviews, among the others, were focused on assessing:

- qualitative aspects, such as the incidence of own account transport (including self-supply processes), the type of vehicle used, the category of products usually transported (including construction materials) the ferry company used, the frequency of travel, the variations between winter and summer. In addition, travel origins/destinations were detected;
- quantitative aspects, such as the quantification (weight and/or volume) of the transported goods, the level (%) of vehicle load capacity, n. of deliveries per trip, n. of packages per delivery, n. of trips, frequencies, etc.

In addition, new data on logistics processes have been recently collected (May/June 2017), to update and compare the already existing information. This campaign consists of n. 47 interviews. During the same period (May/June 2017) the investigations involves also the shopkeepers, in order update and compare the already existing information concerning different related aspects (i.e. self-supply freight transport, supply frequencies, winter/summer variations, etc.).

The availability of this great number of information has been very useful for the development of the SULP current baseline considering that, for this phase, the CIVITAS DESTINATION time plan do not allow to take full advantage of investigation/surveys performed in 2017 summer tourist peak (August).

In any case, all the analysed trends (on a 10 year basis) and data/information gathered during the first seven months of CIVITAS DESTINATION Task 5.2 confirm the validity of 2011 surveys/investigation results.

It is important to recall that Elba Island doesn’t have significant local industries and also that the agriculture production is limited (only some vineyards are of relevant extensions, due also to the morphology of the territory), and therefore it is unavoidable that most of the supplies comes from the mainland, transported by ferries.

Starting from this assumption, the knowledge of the freight flows that daily reach the Island and their distribution modality represents the main base data for the definition of the SULP baseline.

In the following, the different tables provide a summary of the main current logistics aspects.

The next table refers to transport operator typologies:

Transport operators typologies					
Own account	TOTAL %	Producer / Wholesaler %	Self-supply %	Artisan %	Other %
	52.9	34.7	8.3	5.9	4.0
Third party account	TOTAL %	Transport operators %		Express Courier %	
	47.1	42.2		4.9	

Table 66: Transport operators typologies

Deliveries by the commercial vehicles disembarked from the ferries address the eight Elba municipalities with the following percentages:

% of deliveries by Municipalities								
	Campo nell'Elba	Capoliveri	Marciana	Marciana Marina	Porto Azzurro	P.ferraio	Rio Marina	Rio nell'Elba
%	11.2	9.6	7.7	9.1	8.8	40.2	8.4	6.1

Table 67: Deliveries by Municipalities

Note: single trips often reach different municipalities.

Using the following ferry companies (for the whole 2016):

Ferry companies used by commercial vehicles (2016)				
	To.Re.Mar	Moby Lines	Blu Navy	**TOTAL**
Piombino – Elba Island	20.502	24.063	2.121	**46.686**
	43,9%	51,6%	4,5%	
Elba Island – Piombino	23.571	21.565	1.874	**47.010**
	50,1%	45,9%	4,0%	
TOTAL	**44.073**	**45.628**	**3.995**	**93.696**

Table 68: Ferry companies used by commercial vehicles (2016)

Concerning the vehicles load factor, the interviews shows a great data variability (from 5% to 100%) with 48.5% of vehicles that operates with less than 50% of the load capacity. It is important to highlight that, during the investigations, often the transport operators tend to over-declare this information. However, in next table a realistic picture of this important parameter is provided.

Commercial vehicles load factor (Piombino → Elba Island)			
Load factor	0% – 40%	41% – 80%	81% – 100%
% of commercial vehicles	35.3	42.6	22.1

Table 69: Commercial vehicles load factor (Piombino Elba Island)

Obviously, on the return trip to mainland from the various ports on the Island, these percentages significantly change, with 76.5% of the vehicles almost empty and only 9.8% with appreciable loading factor.

The information gathered by the surveys and the investigation campaigns allowed to estimate many others parameters of interest for the SULP development, in particular:

- Average weight of each delivery (by commercial categories),
- N. of packages/delivery,
- Delivery frequency,
- Shopkeepers with availability of a storage room.

The information gathered by the interviews have been integrated with the data provided by a sector national study (*source: Study on urban freight distribution - Transport Operator National Board, Italian Transport Ministry*), based on the analysis and processing of data

from more than 5.300 delivery documents made by sector operators in Italian urban centres of a similar size to those of the studied area.

The analysed data allows to estimate an average weight of a single freight delivery, excluding the express parcels, of about 35 kg for the bulk pack and about 75 kg for the palletized goods. The average weight of an express delivery is estimated in 2.5 kg.

These figures (and also the number of packages per each delivery) are closely related to the different macro-categories considered (*source: SEAT*), as detailed in the table for some of these (national average data).

Concerning the frequency of deliveries to a single final destination (i.e. shop, Ho.Re.Ca activity, etc.) the interviews to the drivers of commercial vehicles waiting for a ferry embarkation, and to the Elba Island shopkeepers, showed a very changeable situation depending by the type of business, the type of freight, the size of the premises and the presence or not of a storage room. During the summer season, delivery frequencies for each macro-category directly interested by tourism activities, significantly increase and sometimes even double.

The estimate average n. of deliveries/week has been segmented according to the considered macro-categories.

Deliveries data			
Macro-category	Average N. packages/ delivery	Average weight/delivery (kg)	Average N. of deliveries/week
Clothing	5,7	55,0	2,7
Food and beverages	9,8	95,0	14,3
Furniture	22,5	129,3	6,4
Newspaper	4,2	59,0	5,5
Culture, books	4,0	125,0	7,4
Electric and electronics	4,2	41,0	6,1
Public entities	11,4	78,4	n.a.
Insurances, financial services	8,4	84,0	n.a.
Office furniture	2,5	103,8	6,0
SW, telecommunications	3,7	71,7	6,3
Mechanics	4,1	57,2	8,6
Health, pharmacy and beauty	4,0	34,2	6,9
Watch, jewellery	4,7	65,4	3,9
Professionals, consultants	1,3	22,7	n.a.
Publicity	7,7	99,2	8,5
Sport and leisure	6,8	71,2	9,4
Tourist operators	4,3	41,0	4,0

Table 70: Deliveries data

The investigations performed have identified that almost the 53% of shopkeepers owns a storage room.

Another important parameter considered in the SULP baseline definition is the delivery trips length that, for the specific insular context, changes highly as a consequence of different factors (i.e. trip of transport operator based on Elba Island delivering from his warehouse,

transport operator from mainland performed a single daily trip on the whole Island, urban delivery trip in Portoferraio, etc.).

As an example, surveys and investigations have estimated an average of 10-12 Km for a delivery trip in Portoferraio and its surroundings and of about 80 Km for a daily delivery trip in the whole Elba Island.

2.7.2.6. Energy and environment aspects

The data on freight flows and commercial vehicles circulation, provided in the previous sections, joined with the recent specific surveys and investigations campaign performed, allows to estimate the related greenhouse gases (GHG) and noxious gases emission, and related energy consumptions.

As indicated in section 2.7.1.3, CIVITAS DESTINATIONS local partners already have a significant knowledge of the environmental and energy parameters of Elba Islands (and in particular in the freight transport sector), thanks to the surveys, analysis and assessments performed under the LIFE+ ELBA project in 2014. Considering that in the last year this transport segment could be considered as stable these analyses are still valid.

Moreover, environment and energy data are also made available by the studies for the development of the Elba Island SEAP (Sustainable Energy Action Plan, signed in 2012 by all the eight Mayors, under the Covenant of Mayors initiative) and by ARPAT, the Environmental Protection Agency of Tuscany Region.

The following calculations were also supported by the use of the COPERT III model (COmputer Programme to Calculate Emissions from Road Transport), developed by EEA (European Environment Agency), which concerns emissions from mobile sources for European countries, and that is the method indicated by ANPA for estimating traffic emissions.

The European standard for the definition of emission inventories is the CORINAIR (COordination INformation AIR) project, developed under the CORINE program.

The CORINAIR methodology for estimating road traffic emissions is based on the calculation of emission factors of the main pollutants from the knowledge of different variables: i.e. vehicle type (type of fuel, year of production, weight), average speed; trip length, type of road - urban, extra urban, highway; air temperature, etc.

In defining the Elba Island SULP baseline the emission data provided in the COPERT tables were often used.

Eventually, further tunings were carried out using specific sw applications, such as the micro-simulator TSS Aimsun® Advanced v.7.0 (developed by TSS – Barcelona) made available by MemEx - license No. 1022440288 - at no additional cost for the Project. The use of this micro-simulator required the setup of the road network graph of the whole Elba Island, and in particular of the urban centre of Portoferraio.

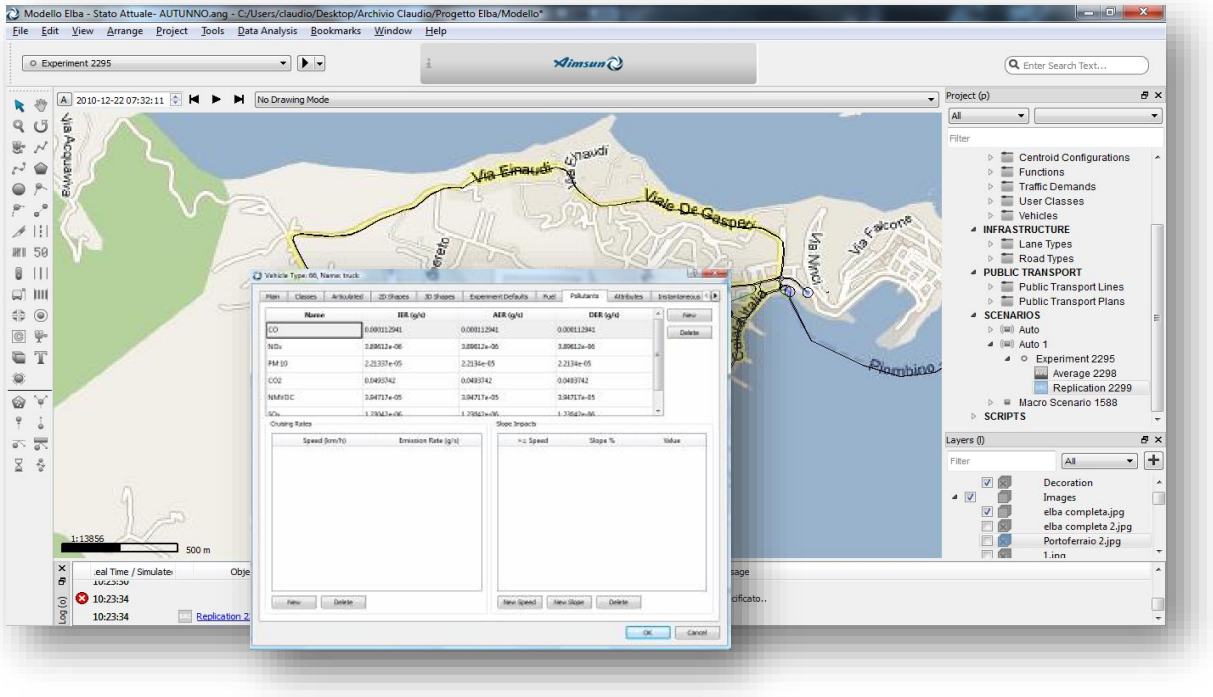


Figure 104: Screenshot of micro-simulator TSS Aimsun® Advanced v.7.0

The first element to be considered in any environment/energy analysis concern the typology of commercial vehicle engine and the related EURO normative. Taking into account that diesel engine represents the 99,4% of the total commercial vehicles (*source: ACI - ANFIA*), the following table shows the average composition of the commercial vehicles fleet from the emission EURO categories point of view (*source: ISPRA*).

% typology of commercial vehicles (2014)							
	EURO 0	EURO I	EURO II	EUROIII	EUROIV	EURO V	EUROVI
Vans/Light trucks	15,1	9,0	17,7	25,0	23,0	10,0	0,2
Trucks	37,6	6,7	15,7	21,0	3,9	14,1	1,0

Table 71: typology of commercial vehicles (2014)

For the development of the Elba Island SULP (Task 5.3.4 – Measure ELB5.2 of CIVITAS DESTINATIONS Project) first baseline estimations of GHG emissions related to freight delivery logistics processes considering a number of circulating commercial vehicles, operating in last mile delivery (and therefore excluding those related to fresh-frozen foodstuffs, medicines, values and those related to “mass retail channels”) ranging from 342 (local) + 100 (by ferries)/day in January to 571 (local) + 197 (by ferries)/day in July, foresee a total CO_2 emissions ranging from 79 tons/month in January to 297 tons/month in July.

In terms of CO_2eq these emissions can be considered as 275 tons CO_2eq/month in January and 1035 tons CO_2eq/month in July, with a total estimated annual emission of 7.259 tons CO_2eq/year.

Eventually, considering the energy consumption (in terms of tons of oil equivalent - toe) these figures lead to a number of 28,2 toe/month in January and 106,0 toe/month in July, with a total estimated annual energy consumption of about 727 toe/year.

Additionally, to the emission/energy consumption generated by the freight delivery processes it is necessary also to consider the commercial vehicles traffic related to construction activities (mainly for buildings maintenance/refurbishment), taking into account that on Elba Island territory are present a number of 503 companies (in general of very small dimension) operating in this sector.

These activities generate traffic flows that are different (in modality and timing) by those related to freight distribution, being mostly concentrated in the spring season, before the summer opening of Hotels, Restaurants and private apartments. Of course, during the rest of the year there are still some construction sites and building maintenance fully operative.

The baseline estimations of GHG emissions generated by logistics processes related to building construction/maintenance/refurbishment, considering a number of circulating commercial vehicles, ranging from 214 (local) + 13 (by ferries)/day in January to 428 (local) + 37 (by ferries)/day in May, foresee a total CO_2 emissions ranging from 41 tons/month in January to 144 tons/month in May.

In terms of CO_2eq these emissions can be considered as 141 tons CO_2eq/month in January and 501 tons CO_2eq/month in May, with a total estimated annual emission of 3.518 tons CO_2eq/year.

Eventually, considering the energy consumption (in terms of tons of oil equivalent - toe) these figures lead to a number of 14,5 toe/month in January and 51,4 toe/month in May, with a total estimated annual energy consumption of about 284 toe/year.

The following table summarise the above information.

Environmental and energy baseline				
	Freight delivery processes		Construction materials transport	
	CO_2eq emissions	Energy consumption	CO_2eq emissions	Energy consumption
Low season	275 tons/month	28,2 toe/month	141,0 tons/month	14,5 toe/month
Peak season	1.035 tons/month	106,0 toe/month	501,0 tons/month	51,4 toe/month
Annual total	7.259 tons/year	727,0 toe/year	3.518 toe/year	284,0 toe/year

Table 72: Environmental and energy baseline

2.7.2.7. Main needs and problems in Logistics

As indicated in the official WP5 work plan of CIVITAS DESTINATIONS Project, and also following the general results of the Elba Island SEAP – Sustainable Energy Action Plan (signed in 2012 by all the Elba Island Mayors, under the Covenant of Mayors initiative) one of the main objectives of the Elba Island Sustainable Urban Logistics Plan (SULP) is the identification of specific solutions for freight consolidation and delivery, in order to achieve a reduction of commercial vehicles circulating on the Island road network and of the environment impacts related, an improvement of the efficiency freight logistics processes; and a better quality of life for residents and tourists.

It is important therefore to focus the attention to the typology of freight potentially involved by such optimised solutions for freight consolidation and last mile delivery, considering that some types of goods, such as fresh-frozen foodstuffs, medicines, values and those related to “mass retail channel” (i.e. Coop, Conad, Crai, etc.) have their specific autonomous “channels”.

Considering the reference framework previously identified, it is estimated from a point of view of goods that might be of interest to the system defined by the SULP, an average of about 1 326 deliveries/day in low season, with increasing variations in summer. In particular, for peak months it is possible to consider a total number of approximately 3 072 deliveries/day.

The potentially "intercepted" quantities of freight delivered mainly in urban areas of the different centres of the island can therefore be estimated at approximately 94 ton / day with summer peak of about 218 ton/day.

Moreover, it is important to recall the presence, even for small quantities, of goods flows related to reverse logistics processes and shipments to the continent of goods produced on the island (e.g. wine products).

Eventually, concerning the SULP, also the logistics processes related to building construction/maintenance/refurbishment could be optimised, even if their peculiarities significantly limits the effectiveness of possible measures.

3. Design for freight logistics pilots

3.1. Madeira/Funchal

3.1.1. Action a) Developing a sustainable urban freight policy – Assessing challenges, relevant stakeholders and setting up a plan (M6-M15)

3.1.1.1. User needs analyses and requirements

The freight logistics implies the concerted efforts of several key stakeholders. Based upon the graph used in D8.1, Stakeholder Maps and Guidelines and the Measure Description Form, below is a table adapted in which the stakeholders are identified and the extent of their role in the measure.

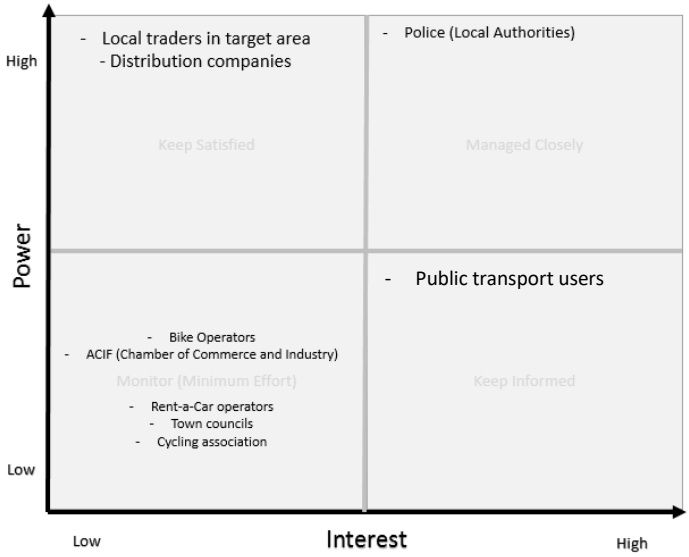


Figure 105: Key stakeholders

Urban policies have omitted the supply process and the loading and unloading regulations. The individualistic view of companies and the difficulty of convergence between public and private interests are responsible for the difficulties in which urban supply has plunged, compromising corporate productivity and, above all, contributing for a reduced attractiveness in the city. Since urban competitiveness is now an imperative condition of territorial strategies, shifting the traditional distribution process towards an innovative logistic solution is extremely important. The transition presupposes a change of attitude, and companies must internalize the territorial component and join new solutions that involve participation in common urban supply platforms.

The Municipality, as the main agent responsible for territory planning and land use can facilitate this process through a communicational plan in order to reach out the stakeholders in order to demonstrate the environmental, economic and social advantages of logistic solutions.

The main targets are indeed geared towards the local traders identified within the targeted area, including catering services, clothing store, bank, tobacco store, and others. Indirectly,

and taking in account the fact that the area in which the measure will be implemented is inserted in the city core with a touristic relevance, other target groups will be indirectly and positively affected by the strategic actions, namely pedestrians and tourists. In addition, other local traders will be reached out in order to instigate a possible replicability of the measure.

Target Group	Category	Activity conducted
Local traders	Vast array of shops (clothing store, bank, catering service stores and others)	Preliminary analysis of needs
Loading and unloading parking spot users	Local Authorities	Meetings focused on load and unloading operations
Population in general	Social media/ press	Meeting to promote the actions within the measure Planning of activities under the Mobility Week 2017
ACIF	Association for Commerce and Industry	- Establishment of contacts for support during the Mobility Week 2017
Distribution companies	*Empresa de Cervejas da Madeira* *Padaria Sésamo* *Papelaria cartonada* Papelaria Condessa Others unidentified distributers	- Draw up of survey to be carried on at traders and companies that operates in the targeted area

Table 73: Main targets in the study area

3.1.1.2. Service (measure) design

The backbone of this measure and the majority of its actions related to improve the logistic process relies heavily in the identification of user needs and the communication process that needs to be tailored for each target group, that ranges from distribution companies, population in general and local traders.

3.1.1.3. Measure ex-ante evaluation

Some patterns were already highlighted in the previous sections. The lack of awareness regarding environmental issues driven by the delivery process, the lack of non-pollutant vehicles used and resistance to change behavioural patterns were the main findings.

3.1.1.4. Implementation phase design

The agents identified above will be addressed during the communicational campaign that will be carried on during M21-M24. The results will be described in M26, following the engagement process.

3.1.2. Action b) Urban Storage: Introducing lockers to save goods

3.1.2.1. User needs analyses and requirements

This measure integrates the development of an action in which the objective is to implement spaces reserved for lockers in strategic areas of the city of Funchal. The purpose of the action is also to increase the public transport service by providing the tourist and the resident with a temporary storage service in which users can keep their belongings. It is an action that is in planning in which a viability survey has already been applied to residents with encouraging results. Considering that this equipment refers to urban furniture, integrated in an external environment, the layout design must be appropriate to the various urbanistic frameworks.

3.1.2.2. Service (measure) design

The implementation of this action will follow the following stages:

- *Test out the feasibility in implementing urban lockers* - This activity consists of analyzing the potential receptivity in the introduction of urban lockers. Targeted to two target audiences (tourists/residents) for a sample of 100 respondents respectively, they will be approached next to the public transportation stops that present greater flow of validations. It should be noted that surveys for residents were collected in the M12. The surveys geared at tourists will be applied in M19;

- *Definition of the spatial location criteria* - The lockers will be inserted into areas that generate pedestrian traffic, next to the stops dedicated to collective public transport, and can also be integrated with the buses that connects the hotel units to the city center;

- *Definition of locker structures* - The morphology of lockers should be conceptualized according to the urban setting and adjusted according to usage patterns and user needs, including different sizes;

- *Operationalization from the point of view of the user* - The operation will consist of two methods, a traditional one, in which users, to access the service, should deposit a coin and define a personalized code, and then, for the return of the goods, the user must dial the code in which the coin will be also returned. Another access system that is currently being studied is through an APP. Security issues will also be safeguarded in which users will have access to a specific service if they forget the code. Defining safety criteria is crucial, given the perceived insecurity expressed by the results obtained in the feasibility survey;

- *Graphic layout* - Being inserted in an intra-urban environment, the layout and graphic design should be adjusted to the urban setting. To do this, a specific layout will be defined;

- *Communication plan* - In order to maximize the use of lockers, a massive promotion campaign will be oriented, consisting of the following:

• Promotional stamping in urban and suburban public transport buses;

• Production of promotional and explanatory brochures (bilingual) oriented to hotel units and tourist offices;

• Information campaigns in the various dissemination tools.

3.1.2.3. Technology, functional and technical characteristics

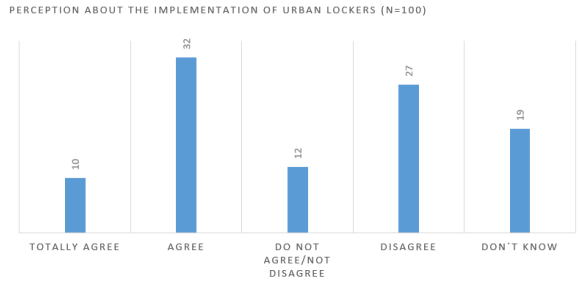
The possibility to undertake an APP to facilitate the use of the service will be researched.

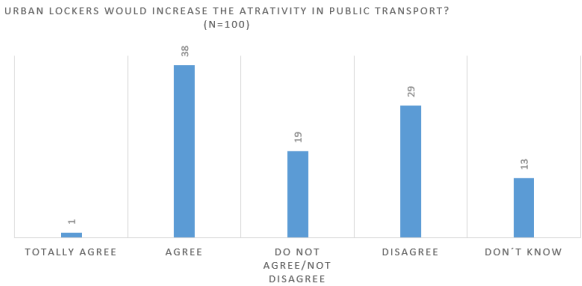
3.1.2.4. Measure ex-ante evaluation

So far, a survey has been conducted for residents that uses the public transport system. The survey comprised of 100 respondents, together with public transport stops, which indicate the main patterns obtained:

• The implementation of urban lockers is encouraged by 32% of the respondents;
• It was found that 38% of the respondents agreed with the statement that the placement of lockers would induce an increase in the attractiveness of public transport;
• Given that the results suggest some distrust on the part of the respondents regarding the security of the lockers, security should be planned in such a way that the service is robust;

• Regarding the possible commercialization of the service, 69% of the respondents indicated that the access to the lockers should not be paid.





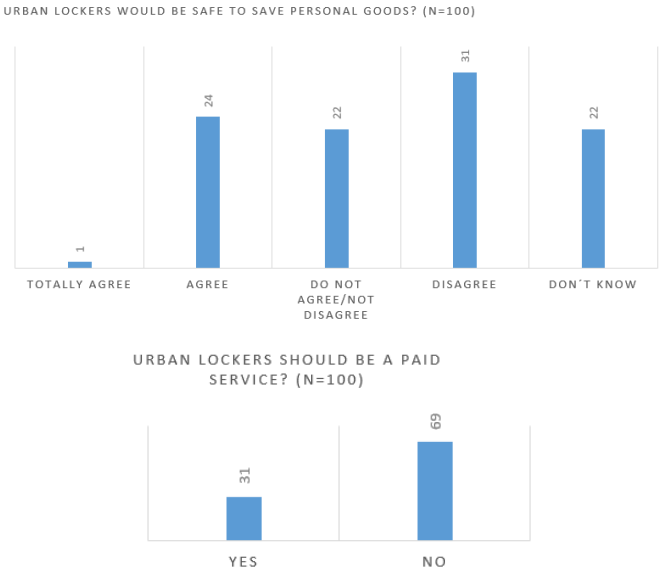


Figure 106: Respondents perception regarding urban lockers (residents that uses the public transport system)

3.1.3. Action c) Planning the communication approach: Mobilizing Civic Participation

3.1.3.1. User needs analyses and requirements

Urban logistics schemes provide opportunities to take a fresh look at existing road infrastructures. Within this activity, a communication plan will be carried on during M22-M24, following the freight logistic analysis. The communication will be comprised of several cornerstones.

3.1.3.2. Service (measure) design

The SULP methodology should follow a participatory approach, based on a strong involvement of the political level (as in SUMP methodology) but maintaining a bottom-up perspective, starting from user needs, operators/associations requirements and following town policy priorities and perspectives. The promotion and communication plan should describe the main strategies in order to spread the necessary information concerning the various activities and actions results, whilst preparing the ground for sustainable results. Dissemination and promotion activities are designated to address and meet the main objectives of promoting sustainable, eco-compatible services and solutions for city freight distribution. For this reason, local dissemination and promotion are crucial for the success of the measures/action to gain interest, involvement and trust of all concerned user and public categories in the towns and in the surrounding territories.

The communication plan should comprise of the following actions:

- Communication tools and actions definition;
- Web presence and social media: publication of papers/publications and articles;
- Audio-visual material;

- Meetings with local stakeholders.

The most important aspect that requires a proper communication activity is the willingness of the local administrations to concretely establish, among the others, commitment of substantial resources in the implementation of infrastructure/measures/regulations towards a more sustainable approach to urban logistics developed through the SULP.

3.1.4. Action d) Introducing legal tools - Regulation for loads and unloads operations

3.1.4.1. User needs analyses and requirements

The regulation will be based on several features. The introduction of a legal tool with particular attention to regulations for commercial and freight vehicles that uses the parking places reserved for load and unload operations is an important step. The regulation will consist of several features such as periodicity, type of vehicles and type of accesses. It is expected that the regulation will be handled during M18-M19.

3.1.4.2. Service (measure) design

The regulations on loading and unloading operations should take into account different scopes and contexts. It should presuppose the definition of the type of distribution allowed, in terms of typology, vehicle size, pollutant emissions and noise levels, hours and spaces reserved for operation and restrictions on access and movement in the city, especially in the more congested arteries. Ideally, loading and unloading operations should be concentrated at a specific time period. If it is not possible to define a specific time, the authorized operating times must be adequate depending on the time of day and the area search. Rush hour distribution should be avoided, but night operation should guard against problems associated with noise. Where loading or unloading times or times such as misuse of the intended areas are disregarded, fines should be imposed.

In order to combine energy efficiency and the promotion of soft modes, the following components will be considered for the establishment of a regulation for urban logistics:

Type of vehicle - Vehicles involved in loading and unloading operations must comply with the European Emissions Standards. In this case, it would be desirable for vehicles authorized to drive in the city centre to comply with at least the Euro 3 standard.

In order to ease down the problems associated with the distribution of goods in dense urban areas, restrictions should be laid down on the tonnage and length of vehicles authorized to carry out loading and unloading operations.

If it is not possible to permanently limit the distribution of goods with vehicles with specific dimensional criteria, it is advisable to interdict them in specific periods, namely rush hour.

It is essential to promote the use of greener vehicles in the distribution of goods. In the case of electric vehicles, since they may have some limitations from the point of view of autonomy and acquisition costs, benefits and advantageous conditions must be granted to operate in an urban context.

Charging - Charging is an efficient technique to improve the problems in the parking system, which includes the loading and unloading operation. Tariffs make it possible to restrict and/or condition traffic by more polluting vehicles and to reduce conflict situations, especially the misuse of loading and unloading areas.

Allocation of allowances - The granting of licenses makes it possible to certify the carriers qualified to supply specific areas. In addition to being able to benefit carriers with greener vehicles, it can serve as a mechanism to control and limit access to specific roads through vehicles that are not qualified to carry out loading and unloading operations.

Exceptions - Urban space management should consider exceptional situations. To that end, certain rules should be made more flexible by means of special requests such as exceptional access permits for loading and unloading vehicles subject to the restrictions contained in the Regulation.

Redefinition of criteria - In order to enable the enforcement of police surveillance, it is necessary to carry on with the process of demarcation of horizontal signalling and implementation of vertical signalling in accordance with the criteria defined in the Traffic Signalling Regulation and with the special recommendations regarding the pavement markings for load and unload parking spaces.

On the other hand, the creation of parking places for load and unload operations should be preceded by a thorough analysis in which various variables should be considered, such as the type of the functional activities that will take place in the surrounding area, structure and characterization of the road board, pedestrian flows and others.

3.1.5. Action e) Technological management of logistic parking places

3.1.5.1. User needs analyses and requirements

To further prevent illegal and abusive parking in the parking spots dedicated to loads and unloads operations, it is being assessed the feasibility of parking sensors. The identification of technological and innovative devices and their viability, from an economic, environmental and energy perspective, highlighting their benefits for the optimization and increase efficiency of operations for loading and unloading will be also assessed.

3.1.5.2. Service (measure) design

Will be further addressed between M19-M21.

3.1.5.3. Technology, functional and technical characteristics

Will be further addressed between M19-M21.

3.1.5.4. Implementation phase design

Will be further addressed between M19-M21.

3.1.6. Action f) Studying the feasibility of using public transport buses to handle delivery goods

3.1.6.1. User needs analyses and requirements

The possibility of using public transport buses to handle the distribution of goods will be assessed.

3.1.6.2. Service (measure) design

Throughout meetings with Horários do Funchal, the main public transport operator will he carried on to further study this measure.

3.1.6.3. Technology, functional and technical characteristics

Will be further addressed between M19-M24.

3.1.6.4. Implementation phase design

Will be further addressed between M19-M24.

3.2. Cyprus/Limassol

3.2.1. LIM5.1 – Limassol City Centre Urban Freight Logistic Action Plan

3.2.1.1. User needs analyses and requirements

Getting in touch with shop owners in Limassol's city centre through interviews and questionnaires. There is the need for an online platform for logistics mobility and distribution management.

3.2.1.2. Service (measure) design

Develop an Urban Freight Logistic Plan for Limassol city centre. This plan will introduce innovative solutions regarding the traffic flow from the freight logistics, the efficient distribution of the goods, the environmental pollution and noise, hazards for the pedestrians due to freight logistic services and road disturbances.

The plan will evolve the city centre of Limassol and it will change the behaviour of the relevant stakeholders and key actors.

The measures that will be implemented will include:

- Study of the economic activities based on commerce, services and tourism sectors within the city centre. It will include the tourist flow of city area and the impacts of freight traffic.
- Organize a logistic plan and implementation on-going access control system for mobility management. This will include type of goods, area and time tables with limitations.

- Development of online platform to manage freight transportation key actors for more efficient freight distribution.
- Set up forums with the participation of local stakeholders (Professional Association, Municipalities, Transport operators, local companies, etc) to define solutions for freight logistics.
- Examine incentives opportunities for transportation companies to renew their fleet with electric vehicle.

3.2.1.3. Technology, functional and technical characteristics

The technologies that will be used are implementation of a going access control system for mobility management (containing time tables with limitations). Development of online platform for managing manage freight transportation key actors for more efficient freight distribution. Contact different providers to find out what's the most suitable APP in the market about reaching our goals and develop our platforms.

3.2.1.4. Measure ex-ante evaluation

Impact Category	Low Season	Peak Season
Transport	Decrease of vehicles in the area	Decrease of vehicles in the area
Society	At least more than 40% of the population to agree with the measure	At least more than 60% of the population to agree with the measure

Table 74: Ex-ante evaluation for LIM5.1

3.2.1.5. Implementation phase design

The plan will not be implemented until April 2018.

3.2.2. LIM5.2 – Promotion and creation of network for collecting of used cooking oil (UCO)

3.2.2.1. User needs analyses and requirements

There is the need for the creation of a network for the collection of used cooking oil. The relevant stakeholders, hotels and restaurants have been identified engaged through an invitation letter to participate in the measure.

3.2.2.2. Service (measure) design

Stratagem Energy Ltd with the co-operation of Limassol Tourist Board and the Cyprus Destination Partnership will create a network for collecting the used cooking oil (UCO) of the hotels and restaurants in Limassol in order to recycle the used cooking oils and used them as a sustainable biodiesel production in the mobility sector. The hotels that implement

this measure will be awarded as green hotels as it is described in another measure. For this measure a feasibility study will carried out first including an analysis of best practices of the oil collection, local potential of the stakeholders and economic aspects of the system. Collaboration with experts in the field will be carried out for the success of the measure. This measure will be also promoted in the eco-driving campaigns of CIVITAS for a further awareness to local people as described in another measure. We expect to introduce 3 hotels and at least 10 restaurants.

3.2.2.3. Measure ex-ante evaluation

Impact Category	Low Season	Peak Season
Transport	At least more than 5 liters collected	At least more than 5 liters collected
Society	At least more than 40% will be aware of the measure	At least more than 60% will be aware of the measure
Society	At least more than 40% of the population to agree with the measure	At least more than 60% of the population to agree with the measure

Table 75: Ex-ante evaluation for LIM5.2

3.2.2.4. Implementation phase design

The measure will not be implemented until February 2018.

3.3. Gran Canary/Las Palmas

3.3.1. LPA5.1 - D4 Service: The Smart Distribution System

3.3.1.1. User needs analyses and requirements

The current system of goods delivery in urban areas limits the freedom of the receivers since they have to stay at the address during a certain time period that is provided to them by the distribution company, without knowing the exact time that the package will be delivered.

Nowadays, goods delivery managing is made in a manual way. D4 Service organizes efficient routes in an automatic way (through the development of a software, gps, and sending information to customer), and indicates to the delivery man the order of delivery. As a result, customer could be informed exactly when the package will be delivered.

D4 service offers the possibility to make the delivery process more efficient for the distribution company and “liberates” the receiving party since he will be informed beforehand about the real delivery time.

The clients do not have to stay at the same location for a long time and will have more time for leisure activities, so tourists could go sightseeing and pick their luggage or purchases directly in their destiny (airport, hotel, port).

Once D4 Service is developed, INELCAN will adapt it to the specific requirements of delivery companies as well as the City of Las Palmas de Gran Canaria.

Within CIVITAS Destinations, INELCAN will introduce the service in the city of Las Palmas de Gran Canaria and INELCAN will involve as many of the local distribution companies as possible. The D4 service will offer them: an automated system for optimizing their distribution process, with communication of realistic delivery times to the clients.

This measure will be in line and with the strategies that will be collected into the SULP that is being developed in a parallel way and will support its implementation. Stakeholders and distribution company engagement will be carried out through meetings.

3.3.1.2. Service (measure) design

D4 Service will be designed as a Mobile APP that allows for a rapid distribution among clients in an urban area. For the distribution companies it is a tool that allows them to organize the distribution process beforehand and react in real time to variations to might occur during the day.

All the data will be into CRM/ERP of the delivery companies. It does not need new infrastructure and optimizes all the resources, making managing and delivering costs cheaper. The business model is to provide pay-per-use service without spending on infrastructure, this way for logistics companies do not have an economic penalty acquiring this option and produce economic returns from first day without repayment periods.

The main partner of Civitas Destinations working in this measure is INELCAN. Furthermore, due to this measure will be integrated into the SULP that will be developed in Las Palmas de Gran Canaria, CINESI and Ayuntamiento de Las Palmas de Gran Canaria will also take part in this measure in an indirect way.

3.3.1.3. Technology, functional and technical characteristics

D4 Service The Smart Distribution System is being designed to be developed as a combination of systems.

- On board location devices for the vehicles and smart phone Apps for the drivers, but it could be simplified using only the smart phone apps (more versatility and less precision).
- A back-end software to communicate with the mobile systems and with the front-end software.
- A front-end software to be used by the controllers.
- Smart phone App to be used by the customers.

The D4 Service will be implemented to work (on smart phones) over Android and IOS as a native App, these Apps will be dedicated only for drivers and final customers. The back-end tools will be developed over .NET and using SQLServer, the front-end system will be developed over GWT. The final deployment will be on cloud servers on AWS.

D4 Service users should be logistic companies and the customers of these companies. The technology will be the same at a global level and will be commercialized as a SaaS. The main advantage of D4Service will be to simplify the logistic company organization and the final customer's information.

The service requirements have already defined, and the first prototype of the platform has already been designed.

3.3.1.4. Measure ex-ante evaluation

For this measure, baseline data will be collected by measurements, estimations and carrying out surveys. Las Palmas de Gran Canaria has identified the following impact indicators that will allow the evaluation of the measure's implementation under the Environment, Energy and Transport categories.

Impact category	Impact indicator	Unit of measure	Baseline	Ex-Ante
Environment	CO_2 emissions	CO_2 toe	139,621 ton of CO_2/year for private cars 2,868 ton of CO_2/year for public transport vehicles (buses)	130,877 ton of CO_2/year for private cars 2,535 ton of CO_2/year for public transport vehicles (buses)
Environment	Noise	Index of people troubled by noise (Likert scale)		
Energy	Vehicle fuel efficiency	Toe	54,757 toe (tonne of oil equivalent) for private cars 11,975 toe (tonne of oil equivalent) for public transport vehicles (buses)	51,328 toe (tonne of oil equivalent) for private cars 10,586 toe (tonne of oil equivalent) for public transport vehicles (buses)
Transport	Freight Movements	Daily number of goods / vehicles moving in the area		
Economy	Operating costs	Average operating costs (per delivery?)		

Table 76: Impact indicators for the evaluation of the measure

3.3.1.5. Implementation phase design

The service requirements have already been defined, and the first prototype of the platform has been designed.

Next year it is expected to have a first functional version to be tested and modified according to stakeholders and Las Palmas de Gran Canaria requirements.

The implementation plan will depend on the development of the SULP.

3.4. Malta/Valletta

3.4.1. MAL 5.1 Last Mile delivery of goods

3.4.1.1. User needs analyses and requirements

Users' needs

Two of the most popular tourist resorts are located within the Valletta Region; Sliema and St Julians. In recent years, the city of Valletta has also seen a rise in the number of boutique hotels. These establishments create a high demand for goods delivery and transport resulting in high congestion and a negative impact on air quality. At the moment, the region of Valletta generates 18,076 trips/km^2/hour inbound and 12,709 trips/km^2/hour outbound during the morning peak only. Congestion within the region is worsened by the fact that deliveries to hotels, shops and restaurants coincides with the peak hours of morning traffic.

Negative effects are felt by commuters who are hampered by heavy goods vehicles on the road, as well as by the distribution chain which is delayed by congestion and lack of parking spaces for unloading. Main distributors have shown interest in the concept of last mile delivery in recent years, however there has yet to be the right opportunity to give impetus to the concept locally, and that is why this measure is of such value.

Last mile delivery using energy-efficient vehicles has never as yet been tested in Malta; nor has the transport of goods been given much attention. In fact, little data exists in the sector of freight transport. The SULP will therefore be a very important tool in understanding the current state of affairs and in proposing new ways to make freight transport more sustainable.

Identified stakeholders

Valletta Local Council is the lead partner for the last mile delivery of goods measure and will see to the overall design and implementation of the measure. Transport Malta will compile the elements related to design and specifications while the University of Malta will act as the local evaluation manager.

Major businesses and the main suppliers who distribute goods within the city will act as the key stakeholders for the SULP development. The below list of Stakeholders have been identified for consultation for MAL 5.1 (Last Mile delivery of goods):

- General retailers and Traders Union
- Malta Hotels and Restaurants Association
- Valletta Local Council
- Lands Department
- Malta Tourism Authority
- Ministry for Transport and Infrastructure

- Ministry for Finance and Investment
- Ministry for Sustainable Development, Environment and Climate Change
- Land Transport Directorate (TM)
- Integrated Transport Strategy Directorate (TM)
- Traffic Management Unit (TM)
- Licensing and Testing Directorate (TM)

3.4.1.2. Service (measure) design

The Valletta Local Council, together with Transport Malta and the University of Malta, will collaborate with LuxMobility to study and implement a Last Mile delivery of goods pilot system for Valletta. The current situation will be detailed and further research will be carried out to understand the processes, analyse drivers, barriers and opportunities that may impact the development of the SULP.

A feasibility study will be compiled to analyse the possibility and propose a methodology on how to implement the concept of last mile delivery of goods in Valletta. The study will identify a warehouse close to the city, which can be used, modified or repurposed to serve as a depot point for the storage of goods until the time of delivery. The optimal system of goods delivery will be studied. This will include whether a time restricted delivery system is to be adopted where goods and returns are delivered and collected during restricted time periods or whether a system of multiple runs is to be adopted. A system of handling payments will need to be developed where payments are kept confidential. The study will also identify the man power needed to operate the service as well as the number and type of transport vehicles to be used for deliveries, depending on the goods to be handled. The potential suppliers and businesses who will benefit and participate in the service will be included at this early stage.

The feasibility study, will elicit the specifications that will be used to design the IT systems needed to manage and monitor the service. The results from the same study will also design the pilot for testing and implementation during the project lifetime. The study will be carried out by an expert or team of experts who will be procured following a call for quotations. Another call will be published for the procurement of a light goods electric van which will be used throughout the pilot phase of at least 12 months. The van will be required to have a data logger for the collection of data which will be analysed as part of the DESTINATIONS Project.

Further data will be collected throughout the piloting period and analysed for the possibility of extending the service beyond the project lifetime. Stakeholders' consultation will be ongoing and feedback from participants will be sought on a regular basis in order to improve the service delivery.

3.4.1.3. Technology, functional and technical characteristics

A call will be issued for interested businesses to participate in the pilot project. Depending on the number of applicants, a system of deliveries using an electric light goods van will be drafted. This might include the rotation of the use, between suppliers, of the van every couple of months.

Surveys will be performed with the businesses carrying out the deliveries and those at the receiving end to elicit feedback which will assist in improving the running of the pilot project. At this point in the project, the details of how the pilot will be operated are still unknown. The initial idea was to focus on one sector (such as hotels within Valletta) and focus on one good (such as the pick-up and delivery of laundry since this is a non-perishable good and does not require specific conditions for transportation).

This measure also includes the design and or identification of an off-the-shelf IT logistics platform to be used to monitor and manage the service. The light goods van will be equipped with a data logger which will record data of the trips carried out.

The last mile delivery of goods is a new concept to Malta and has never been tested as yet, therefore it is important to start with a simple pilot which will give a better understanding of the logistics and management involved. All data and experience collected during the pilot phase will be used to develop the measure in more detail and include it as one of the Action Plans to be proposed in the SUMP which is being drawn for the Region.

3.4.1.4. Measure ex-ante evaluation

Surveys will be carried out at two time points; before (Month 19) and after (Month 31) the piloting phase. The target group will be the business operators and the surveys will measure the level of awareness of the last mile delivery of goods in Valletta. A 20% awareness level is expected.

3.4.1.5. Implementation phase design

Transport Malta compiled a list of Stakeholders that will be impacted by the measure as well as those entities who can assist with baseline data collection; baseline analysis and user needs analysis. In Month 8, meetings with experts were initiated in order to identify the boundary of the area where the last mile delivery of goods service will be piloted. Consultations with stakeholders and meetings with businesses in the city will start around month 12. The initial meeting, which is planned for the beginning of October, will also be the first SUMP stakeholder meeting. This is logistically a very valid combination, since most stakeholders are common for both the SUMP development and the last mile delivery pilot measure.

A call for quotations will be published for the procurement of an expert to carry out the feasibility study on the setting up, management and operation of the last mile delivery of goods in Valletta. The study is planned to be concluded by month 16. In parallel, stakeholders' consultations will be initiated. The feedback from these meetings, together with the outcome from the feasibility study, will provide the guidelines for the design of the pilot to be implemented during the DESTINATIONS Project lifetime.

In Month 18, the specifications of the equipment and software to be used in the pilot project will start to be compiled and used for the drafting of the tender for the procurement of the said IT equipment. By month 28, the light goods van and managing platform will be procured and in month 30 the service of last mile delivery of goods will be launched.

A communication plan will be compiled in month 18. Two press conferences; the first in month 30 and the second in month 42, will be held to announce the launch and end of the pilot project respectively.

Finally, in month 43 a report compiling the results and analysed data from the pilot project monitoring will be presented. This will be fed into the SULP which will be developed and later integrated into the SUMP that is currently also being compiled for the Northern and Southern Harbour regions.

3.5. Crete/Rethymno

3.5.1. RET5.1 - Sustainable Freight Logistics Plan

3.5.1.1. User needs analyses and requirements

The following table describes the target groups of users within the measure RET 5.1 and the identified needs and goals to be achieved for each group.

RET 5.1		
Target group	**Needs**	**Goals**
Retailers, shop owners, hotels and restaurants owners	Demand – responsive goods delivery for local SMEs	Involvement of retailers and HORECA SMEs in the old town and in the main touristic hubs Efficient supplies respecting the environment and well-being of residents and visitors. Attractive environment and competitive business Increased tourist flow and local economic activity
Residents/ visitors of Rethymno and historic Old town	Decrease of noise and air pollution Reduce congestion and car circulation in the old town	Improvement of quality of life for citizens and tourists Improvement of the city accessibility and environment
Freight logistic companies	Management of traffic flow due to freight distribution Decrease of logistics fleet circulating in the city centre	Improvement of freight distribution operation Optimisation of the goods supply in the city centre Increase energy efficiency
Freight Drivers	Reduction of transport related emissions Reduction of road accidents in the city	Promote sustainable transport behaviour Raise awareness and increase capacity on eco and safe driving amongst drivers

Table 77: RET5.1 - Sustainable Freight Logistics Plan

The key stakeholders with high power and high interest with reference to Rethymno's measure RET 5.1 are:

- Region of Crete -Directorate of environment and spatial planning
- Freight logistic companies / Hotel suppliers
- Association of Restaurants
- Retailers and Traders Association of Rethymno
- Hoteliers Association

- Chamber of Commerce and Industry
- Hellenic Institute of Transport (h.i.t.)
- Traffic Police department
- Municipal Port Authority Trust of Rethymno

The measure will promote the collaboration of interested stakeholders in order to improve urban logistics operations and reduce overall negative externalities. To accomplice that, consultation meetings will take place with the participation of local stakeholders, including urban planners, freight logistic companies, transport operators, shop/restaurants/hotels owners. The aim of the meetings is to define the current situation, the supply and demand sides' needs, quantified targets and to design suitable solutions for freight logistics via tailor-made interviews and questionnaires.

The consultation process with the involved stakeholders is planned to start on October 2017.

3.5.1.2. Service (measure) design

Starting Point

Currently, the freight distribution adds to the congestion and increases air and noise pollution in the historic centre due to the unorganized goods distribution from different suppliers. There is a restriction of entry to the historic centre for few hours during the day, only during the summer period, but there is not an appropriate logistic plan that can ensure that shops have an efficient supply system to run their business with respect to the optimisation of the goods delivery and reduction of freight movement.

Detailed Description of Measure

The measure aims to organize better the freight routes in the city centre and optimise the goods delivery in order to reduce environmental and transport impacts in the city.

Within the measure, the development of a Freight Logistic Plan for Rethymno is foreseen, emphasising on the logistics services for hotels, beach commercial areas and the old city centre with the involvement and consensus of stakeholders. A well-managed integrated freight logistic plan will reduce unnecessary trips of goods during peak hour and ultimately contribute to the city's transport management. The innovative element of this feature is that a single operator for all goods transport in the historic centre will be appointed. The implementation of a Pilot Logistics System aims to establish a unified freight system in the historic centre through a single operator for all goods transportations. Additionally, safe and eco-driving training will be offered to freight drivers in order to increase awareness and capacity amongst drivers.

Expected outputs of the measure RET 5.1:

- Urban Freight Logistic Plan for Rethymno approved
- Urban logistics advisory group
- Action plan for a unified freight system in the historic centre, which defines operation and regulations.
- An online platform to coordinate freight operators, hotel suppliers, and retailers. Launch of a 6-month pilot project

- Safe and eco driving training materials and session delivered to freight drivers
- Feasibility study for a cooperative enterprise business case

This measure is expected to lead to significant decrease in congestion, air and noise pollution and improve the quality of life in the city centre, especially during the summer period.

Resources and Costs

In the table below the involved partners, foreseen resources and costs are described.

Partner	Role	MM	Direct Personnel Costs	Equipment	Other goods and services	Sub-contracting
Technical University of Crete	Measure Leader Coordinate the activities, link to SUMP. Cooperation with subcontractors to define baseline, needs, action plan. Business model development.	7,5	38.700	-	2.000	4.000
Municipality of Rethymno	Beneficiary Contribute to SULP development process. Public procurements. Operate the demonstration project. Participate to consultation processes	10,0	30.200	16.000	2.000	56.000
VECTOS	Technical support Technical advice on the development of strategy and delivery of the SULP and methods to reach consensus/cooperation of suppliers. Advice on the development of a business case. Completion of a measure report (MERT)	1,75	13.462,75	-	-	-

Table 78: involved partners, foreseen resources and costs are described

Procurement of services

A call for tender will be prepared by the Municipality of Rethymno for the subcontracting of service for the analysis of the freight system in the city and the development of a sustainable Urban Freight Logistics plan, including a feasibility study for a cooperative enterprise business case. The process is currently ongoing.

A separate call will be published for the development of the IT application that is required to coordinate the freight operators, hotel suppliers and retailers and to plan and manage freight delivery in the old city, including CRM and database management. The call will also include the requirements for the testing, operation and validation of the system.

Procurement of service by TUC is foreseen for the organisation of a capacity building workshop at regional level and the printing of supporting materials. Additional, external service is foreseen for the Municipality of Rethymno for the organisation of working sessions for the stakeholders.

3.5.1.3. Technology, functional and technical characteristics

Within measure 5.1, Rethymno aims to coordinate freight distribution processes among the different actors with an online ITS system. The measure includes the development of an online platform that will manage the schedule of freight delivery according to the demand and supply of goods in the targeted area (historic city centre). The specific details and technical characteristics of the IT platform will be completed on December 2018, in accordance to the input gathered through the stakeholders' consultation process, as described above.

3.5.1.4. Measure ex-ante evaluation

The evaluation of the measure RET 5.1 includes environment, social and transport impact indicators. The data collection for the measure's evaluation is planned in January 2019, August 2019 and June 2020, before, during and after the measure's implementation correspondingly. The initial data collection, completed in January 2019, will provide the baseline for most of the impact indicators.

The impact on the transport system will be measured through:

- the **Freight movement** indicator, in terms of the number of freight vehicles moving within the demonstration area per day. After the measure implementation, the freight movement indicator is expected to decrease by 8% less freight movement daily.

The environmental impacts will be measured through:

- the **pollutants emissions level**, in terms of the average (peak/off-peak) CO_2, CO, NOx, VOC and Particulate matter (PM10 and PM2.5) concentration levels over a full year. The evaluation of these indicators will be performed with the use of monitoring sensors that will be integrated in existing meteorological infrastructure. The baseline value will be obtained in January 2019 and after the measure implementation, the emissions' levels are expected to reduce by 35%.
- the **noise perception** indicator, in terms of the percentage of people troubled by freight movement noise within the demonstration area. The environmental noise will be categorised into levels of satisfaction, as a result of a targeted survey. The baseline data will be obtained in January 2019 and after the measure implementation, the percentage of people troubled by transport noise is expected to reduce by 10%.

The impact on society will be measured through:

- the **level of awareness**, in terms of the percentage of logistic companies that are aware of the optimised logistics system for the coordination of distribution. The expected value after the measure implementations is 50% increase.
- the **level of acceptance**, in terms of the percentage of logistic companies and goods suppliers that are in favour of the Freight Logistic Plan and the optimised logistics system. The expected value after the measure implementation is 50% increase.

3.5.1.5. Implementation phase design

The measure is planned to start on September 2017. The design phase will last from September 2017 until October 2018, while the implementation phase will start on November 2018 and will be completed on October 2019.

The description of measure's milestones and the corresponding dates are presented below:

M1. Defining the baseline - Consultation with stakeholders (March 2018)

M2. Development of strategic action plan (SULP) - Define regulations (October 2018)

M3. Public procurement and development of the IT application (December 2018)

M4. Pilot operation of the defined system and platform (October 2019)

M5. Safe/eco-driving training session for freight drivers (November 2019)

M6. Evaluation of online platform operation - Optimisation of IT application and regulations (December 2019)

M7. Promotion of the pilot project - Communication of results to residents and retailers of the historic city centre (July 2020)

3.5.2. RET 5.2 - Cooperative Mobility - Business case on UCO to Biodiesel chain – Demonstration on an urban waste collection truck

3.5.2.1. User needs analyses and requirements

The following table describes the target groups of users within the measure RET 5.2 and the corresponding needs and goals to be achieved.

RET 5.2		
Target group	**Needs**	**Goals**
Residents of Rethymno	Reduce waste that require demanding management procedures Reduce CO_2 emission Reduce conventional fuel consumption	Raise awareness and change behaviour about the improper disposal of UCO Increase the share of alternative fuel use Improved air quality
School communities / Parents	Expansion of UCO collection points in schools Environment-related educational activities	Increase environmental responsibility in young generation Increase UCO collection
Restaurant and hotels owners	Not enough collection points for potential UCO provides from the HORECA sector Inefficient disposal of UCO by restaurants and hotels	Engagement of hotels and restaurants to participate Increase UCO collection and transformed quantity
Tourists / visitors	Reduce CO_2 emission	Promote sustainable profile of the destination Raise awareness towards alternative fuels and clean transport

Table 79: target groups of users within the measure RET 5.2

The **key stakeholders** with high power and high interest with reference to Rethymno's measure RET 5.2 are presented below:

- Region of Crete - Directorate of Industry, Energy and Natural Resources
- Region of Crete -Directorate of environment and spatial planning
- Hellenic Association of Biofuels producers
- Directorate of Primary Education of Rethymno
- Directorate of Secondary Education of Rethymno
- Municipal Enterprise of Water and Sewage
- Municipal Waste Management and Environment Department
- Hoteliers Association
- Association of Restaurants
- Parents and Students Association of Rethymno Municipality

In the previously launched UCO project in Rethymno, an educational campaign regarding the advantages of UCO collection for biodiesel production was conducted involving the school community showing that, with proper informational campaigns and citizens' motivation, there is a big potential. Following the previous implemented engagement actions for schools and citizens, targeted promotional campaigns will begin in January 2018. Consultation meetings with the Directorate of Primary Education of Rethymno and the Directorate of Secondary Education of Rethymno will be held in advance in November 2017 to ensure support of the education sector.

Additionally, the large number of restaurant per capita in town that serve the visiting masses offers a significant potential of UCO that can be collected and transformed into biodiesel, which could be used to the municipal fleet to the benefit of the municipality and to the benefit of a potential cooperative business. Engagement with hotels and restaurants is important to increase the amounts of UCO collected and, thus, targeted informational meetings will be held in October 2017.

Cooperation with the Municipal Waste Management and Environment Department is already being examined, as a result of informal meeting, for the potential purchase and management of the new collection bins.

3.5.2.2. Service (measure) design

Starting Point

A pilot project for the UCO collection was launched in 2014 with a limited number of collection points in the city centre and an educational campaign regarding the advantages of UCO collection for biodiesel production was conducted involving the school community. Currently, the collected UCO is transferred in the mainland for its transformation, making the full chain not viable. There is an obvious opportunity for a local transformation plan, serving the region, and making the biodiesel transformation and transportation more sustainable.

Detailed Description of Measure

The measure aims to define and set up a cooperative business model on UCO to biodiesel chain, so that the UCO produced locally to be transformed and exploited locally to the benefit of the municipality and to the benefit of the local economy and environment.

The measure involves the expansion of the current collection sites network, including smart collection tanks, a demonstration project on a municipal urban waste collection track using locally produced biodiesel and engagement and behavioural change campaigns with regard to proper UCO disposal addressing both citizens and HORECA SMEs.

One of the main tasks within the measure is the development of a feasibility study for a cooperative business case (private-public–crowdfunding) involving the whole chain, the expanded collection network and transformation plant to feed the municipal fleet. The study will define an operational business model to motivate investment in transformation plant in the island to make feasible the exploitation of this energy source in local level.

The overall goal of the measure is the increased use of alternative fuel in vehicles would be a significant reduction in vehicle emissions improving the air quality for tourists and residents alike, making it a more attractive destination, potentially increase economic uplift.

Expected outputs of the measure RET 5.2:

- Feasibility study for a local cooperative to run the whole chain of UCO to biodiesel. Business case analysis.
- Demonstration project of UCO to biodiesel chain in place, waste collector truck using locally produced biodiesel, labelled with full cover sticker to promote the UCO collection
- Expansion of the collection points network/system: 50 new UCO collection containers including 25 smart ones.
- Promotional campaign towards schools and HORECA, promotional materials, leaflets and ads.

Resources and Costs

In the table below the foreseen resources and costs are described.

Partner	Role	MM	Direct Personnel Costs	Equipment	Other goods and services	Sub-contracting
Municipality of Rethymno	Beneficiary Setting the collection points network, monitoring and maintain. Operate the demonstration project. Engagement of local stakeholders. Showcasing to other regions/municipalities.	2,0	6.040	16.000	5.000	-
Technical University of Crete	Measure Leader Development of the feasibility study, set up the pilot transformation plant, quality control, educational and promotional campaign	5,5	28.380	42.000	7.000	-

Table 80: Involved partners, foreseen resources and costs

Procurement of services

Procurement of service is foreseen for the implementation of a promotional campaign to increase the UCO collection rate from HORECA along with the development of promotional materials.

Additionally, procurement of service is required for the development of a targeted campaign towards schools to foster behaviour change of households towards UCO recycling, including training materials for the school communities.

3.5.2.3. Technology, functional and technical characteristics

The measure includes smart sensors embedded to the UCO collection containers for remote and real time monitoring and safety reasons.

More specifically, new infrastructure for the network is foreseen in order to introduce 50 new collection points and an operational system in order to access directly data from the sensors regarding the UCO collected. The new PVC containers will include 25 “smart” bins with integrated sensors that will monitor the level of UCO in the container (capacity level control) and transmit data via software to the managing service.

This process will facilitate inventory management and the creation of the optimal schedule for collection. The exact delivery routes will be scheduled only when the tanks are full. The data transmitted from the sensors will also facilitate the prevention of thefts and detection of possible leaks.

Additionally, a small scale reactor and complementary analysis equipment will be operated for the full implementation of the UCO-to-biodiesel chain. The reactor will receive the collected oil, in order to be filtered and heated. Initially, quality control of oil takes place, as an essential step to determine the appropriate quantity of catalyst that will be used in the transformation process. The reactor completes the conversion of UCO into biodiesel after a few hours by cleaning and drying the product that will be stored to be used in a later stage as fuel.

3.5.2.4. Measure ex-ante evaluation

The evaluation of the measure RET 5.2 includes mainly energy, social and economy impact indicators. The data collection for the measure’s evaluation is planned in October 2018, August 2019 and June 2020, before, during and after the measure’s implementation correspondingly. The initial data collection in October 2018 will provide the baseline for most of the impact indicators.

The impact on the energy will be measured through:

- **the used cooking oil collection,** as the quantity of UCO collected in m^3 per year. The indicator’s baseline will be obtained in October 2018. After the measure’s implementation, it is expected that the collected amount of UCO will reach the 54 m^3/year.

The impact on society will be measured through:

- **the level of awareness**, in terms of the percentage of residents and schools and HORECA communities that are aware of the new UCO collection points. The

expected value after the measure implementation is 30%.

- **the level of acceptance**, in terms of the percentage of resident, restaurants and hotel owners that are in favour of the expanded UCO collection system and the use of locally produced biodiesel in the municipal fleet**.** The expected value after the measure implementation is 20%.

The economic impact will be measured through:

- The **capital costs** of the transformation plant and UCO collection containers, the **average operating revenues** and the **average operating costs** of the whole UCO-to Biodiesel chain will be examined in order to present the profit of the local transformation process instead of the transfer of UCO to biodiesel producer outside the island. The economic indicators will be defined at the end of the implementation of the measure.

3.5.2.5. Implementation phase design

The measure started in July 2017, with preliminary collection of data. The design phase will last from July 2017 until September 2018, while the implementation phase of the pilot demonstration will start in October 2018, to be completed at the end of project.

The description of measure's milestones and the dates are presented below:

M1. Defining the baseline and specifications (December 2017)

M2. Feasibility study (June 2018)

M3. Designing the transformation plant - Defining the collection system specifications and locations (October 2018)

M4. Procurement of appropriate containers - Implement the UCO collection network expansion (December 2018)

M5. Set up and operation of the transformation process (February 2019)

M6. Pilot operation of waste collection truck using produced biodiesel (March 2019)

M7. Promotional campaign towards citizens and schools - Motivation campaign towards HORECA (June 2018 – July 2020)

3.6. Elba/Rio Marina/Portoferraio

CIVITAS DESTINATIONS WP5 foresee the study, design and implementation of freight logistics pilot measures in the different sites and, in particular for Elba Island, the realization of freight distribution services for improving the overall logistics processes.

Starting from the specific good distribution services already tested in the former LIFE+ ELBA project, some different services has been analysed and designed in order to proceed with their operation organization (from M11 to M24) and demonstration (from M25 to M48).

The analysis performed identified the "Optimized freight distribution of the Ho.Re,Ca. tourist sector" - Measure 1, as the most suitable logistics pilot measure.

Moreover, a second logistics Measure “Optimized freight delivery to tourist boats (at mooring post or in the harbour)” has been identified as possible pilot.

These measures replace the “On-demand service for transferring tourists luggage from the ferry to the hotel at arrival” that was hypothesized in the Project proposal. In fact, the surveys performed in the study phase have revealed that this kind of service, requested in the past by the tourist, is now considered not interesting due the change of tourist flows behaviours.

3.6.1. Optimized freight distribution of the Ho.Re,Ca. tourist sector

3.6.1.1. User needs analyses and requirements

The activities developed for the definition of Elba Island SULP baseline, and in particular the survey/investigations and the stakeholder involvement, allows to have a clear knowledge of the needs of the different stakeholder involved in the logistics processes and in particular in the freight transport and last mile delivery.

The strong involvement of stakeholder (see section 2.7.1.6.) provided a significant contribution in the development of the overall SULP and in the definition of strategies and measures, considering also the lack of best practices for similar contexts (small island located close to the mainland with high seasonal tourist flows), both at European and national level.

It is important to outline that the Measure 1 – “Optimized freight distribution of the Ho.Re,Ca. tourist sector” has no the ambition to intercept all (or a large part) of the freight flows towards the island, but is mainly aimed at: a) reducing the needs of use the ferry for direct delivery to the final destinations (reducing direct and external costs, see below), b) shifting to own account transport in favour of optimized third-party transport.

This objective, that in general is of high relevance for small and medium-sized urban realities, characterized by historic centres with a strong tourist and commercial vocation, becomes mandatory for an insular context like Elba, where direct costs (ferry, fuel, etc.), indirect costs (waiting/boarding time, time to move from one centre to another, delivery times, etc.) and external costs (traffic congestion, accidents, pollution) requires that freight transport and delivery is entrusted to professional operators, capable of optimizing logistics processes and available infrastructures at its best.

In the framework of CIVITAS DESTINATION measure ELB5.1, considering the dimension of the problem and its significant seasonal fluctuations, the defined Measure 1 was developed with a "light" approach, avoiding to “overload” the system with infrastructures and human resources costs. In other words, Measure 1 is also designed to achieve the best possible use of already existing logistics resources both on mainland and on the island (fleets of vehicles, logistics bases, warehouses, etc.).

3.6.1.2. Service (measure) design

The design of the Measure 1 – “Optimized freight distribution of the Ho.Re,Ca. tourist sector” concerns:

- the collection and consolidation of goods in logistics bases located in Piombino area and its surroundings (mainland);
- the consolidated transport by ferry through the use of big trucks;
- the unload and sorting in logistics bases located the Portoferraio area;
- the "last mile" distribution optimized for HO.RE.CA. destinations, possibly with adoption of eco-compatible low emission vans.

The above designed logistics scheme is graphically summarised in the following figure (to be compared with figure of current situation).

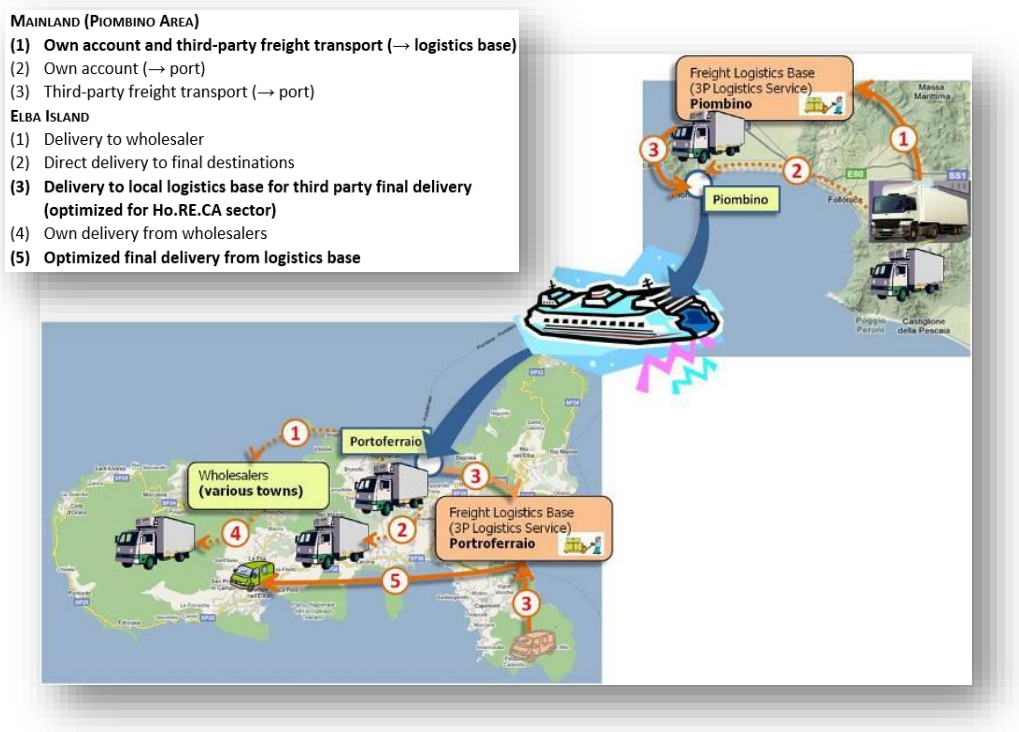


Figure 107: ELB 5.1 Measure 1 designed logistics scheme

During the stakeholder involvement activities, performed in the first year of CIVITAS DESTINATIONS Project ("Elba Sharing local Project"), it was possible to verify the interest of some main local couriers, who have logistics infrastructures both on the mainland and on the island (Portoferraio), in collaborate to the organization and demonstration of the planned Measure 1.

In any case, during the site preparation phase (Task 5.5, M11-M24), a specific call for expressions of interest will be issued by the partner Municipalities, in order to set up a list of available transport operators (having the needed "mainland/island" infrastructures) to involve in this pilot measure.

In order to have a reference dimension of the freight flows potentially intercepted by the logistics services of Measure 1, throughout the survey/investigations campaign performed in the past and in May/June 2017 for the SULP baseline, specific interviews were addressed to transport operators. The investigations highlight that in general the potentially involved

transport operators (selected by the call for expressions of interest) carries all types of goods, excluding: fresh food, frozen food, pharmaceuticals, jewellery, etc.

For a local transport operator that consolidate the freights in its warehouse on mainland it is reasonable to estimate, on Elba Island side, an average of about n. 100/110 deliveries/day in summer (6 days a week), for a total of 13/14 tons/day, and n. 30/40 deliveries/day in the winter (5 days a week) for a total of 4/5 tons/day.

Concerning the specific HO.RE.CA. freight sector, the surveys and investigations performed allows to estimate, at this stage, an average of about 6 tons/day (6 days a week) to be delivered by a single operator.

The design of Measure 1 foresees, during summer season, the selection (in the Portoferraio warehouses) of the HO.RE.CA. sector freights in order to organize specific optimized delivery trips.

The design of the Measure 1 operating procedures can be summarized as follows[7]:

- Delivery of goods (all typologies) in Piombino area (and its surroundings) logistics base transported by national/regional couriers, manufacturers, wholesalers or even private people. The freights travels with accompanying documents (i.e. waybill, delivery note, etc) and are labelled with bar code.
- Unload and takeover is carried out on a trusted basis or through an inspection report, signed between the parties. If needed (i.e. for private people freights) a bar code is generated.
- The goods are loaded on trucks, taking into account the optimization of the maximum loading factor. In summer period it is estimated that 1 vehicle 16 tons GVM[8] and 1 vehicle 12 tons GVM are needed, while in low season only one truck is sufficient.
- The trucks are boarded at lunch time (i.e. 13:00) on a ferry to Portoferraio. Investigations have highlighted the preference of transport operators for Moby Lines company, that guarantees the truck embarkation all the year for these daily clients.
- Trucks arrive at Portoferraio logistics base (i.e. at 14:20), are unloaded and the freights stored according to the destination (by dedicated sorting bays). Specific section of the sorting bays are reserved for the HO.RE.CA. sector.
- Once the unloading is completed, the empty trucks returns to the mainland logistics base by ferry.
- The HO.RE.CA. freight for Portoferraio area (including Bagnaia and Lacona, where many tourist facilities, in particular residences and camping, are located) are loaded on n. 2 3,5 tons GVM vans. The total weight of HO.RE.CA. freight is about 3 tons (2x1,5 tons), with an average of 12/16 deliveries/trip. For the historic city centre an additional small van could be used if needed (and if available).

[7] The operating procedures described in this section are intended for a single transport operator, but they are replicated for each involved courier.

[8] Gross Vehicle Mass (GVM) is the maximum operating weight/mass of a vehicle as specified by the manufacturer including the vehicle's chassis, body, engine, engine fluids, fuel, accessories, driver, passengers and cargo.

- The HO.RE.CA. freight for Portoferraio area delivered in the same afternoon of the arrival. Drivers perform deliveries and also handles any returns or missed deliveries, according to the reverse logistics operations.
- In the evening, the same 2 vans are again loaded with the HO.RE.CA. freight for all the other locations on the island, to be delivered in the following morning in two main zones: a) Elba Island West (Marciana, Campo; b) Elba Island East (P. Azzurro, Rio, Capoliveri). Even for these deliveries the total weight of HO.RE.CA. freight is about 3 tons (2x1,5 tons).
- Delivery procedures follow those described for deliveries in the Portoferraio area.

Figure 108: Example of logistics base on mainland (Piombino area)

Figure 109: Truck boarding in Piombino Port

Figure 110: Example of 3,5 tons vans

3.6.1.3. Technology, functional and technical characteristics

The Measure 1 – "Optimized freight distribution of the Ho.Re,Ca. tourist sector", is designed with the aim, among the others, to avoid as much as possible additional costs to the logistics processes.

In this sense, it was developed with a "light" approach that entail the best possible use of existing logistics resources both on mainland and on the island (fleets of vehicles, logistics bases, warehouses, etc.).

For these reasons, no specific new technologies are foreseen beside the common adopted in logistics to support operational procedures (i.e, bar code generators and readers, sw for administrative issues, track & tracing technologies, etc.).

3.6.1.4. Measure ex-ante evaluation

The ex-ante evaluation of the measures was developed with WP9 activities. In the following a short summary of the contents of the specific xls tables realized is provided:

- Impacts Category: *Society*
- Impact Indicators: *Awareness level, CIVITAS code 39*
- Unit of Measure: *Citizens/Tourists awareness index*
- Ex-Ante: *60%* to achieve
- Target group: *Citizens/Tourist*
- Area of demonstration; *Elba Island*
- Impacts Category: *Society*
- Impact Indicators: *Acceptance level, CIVITAS code 40*
- Unit of Measure: *Citizens/Tourists satisfaction index*
- Ex-Ante: *80%* to achieve
- Target group: *Citizens/Tourist*
- Area of demonstration; *Elba Island*

Moreover a preliminary measure evaluation, in terms of CO_2eq emission reduction and of energy consumption reduction was performed, taking into account a conservative estimation approach.

In particular, considering that this measure allows a reduction of non-optimised circulating vans on the Island, in the hypothesis that at least two transport operators collaborates to the pilot service demonstration, there will be a total reduction of about 145 000 Km/year,

with an emission reduction of about 152 tons of CO_2eq/year and an energy consumption reduction of about 15 toe/year.

3.6.1.5. Implementation phase design

According the official project time plan, after the conclusion of the design phase (M8-M12) the roadmap for the implementation of this demo service will be the following:

M11-M24: Site preparation.

This phase (Task 5.5) covers all the activities to make the measure ready-to-start at M25 and, in particular, the further development of detailed operational procedures, already outlined in the design phase.

This phase also includes the issue, by Portoferraio Municipality, of a specific call for expressions of interest in order define a list of available transport operators (having the needed “mainland/island” infrastructures) to involve in the demo phase.

In addition, both commercial vehicles and involved transport operator sites will be set up according the CIVITAS specifications for promotion and dissemination.

Eventually, all reporting methods and procedures, required for collecting and providing the data needed for the monitoring and evaluation phases, will be developed.

M25-M48: Pilot Measure Demonstration.

This phase (Task 5.6) will develop the full operational demonstration of the Measure M1, and includes also the monitoring of the demo activities and the data collection during demonstration.

Local partners (Portoferraio and Rio Marina Municipalities, MemEx) are working to anticipate the start of the demo phase at M22 in order to cover even the full 2018 summer season. This means that the demonstration will include three peak periods (2018, 2019 and 2020) extending its effectiveness within the project and allowing a more significant data acquisition.

3.6.2. Optimized freight delivery to tourist boats (at mooring post or in the harbour)

3.6.2.1. User needs analyses and requirements

During the activities for the definition of Elba Island SULP baseline, and in particular during the survey/investigations phase, it is emerged by the stakeholders (shopkeepers, supermarket managers, tourist boat owners, etc.) the interest to a possible implementation of a specific logistics tourist service for the delivery of the purchased goods to the boats, at mooring post or in the harbour.

This practical and innovative galley supplies service, with direct delivery to the tourist boats, will be initially implemented for the “Darsena Medicea” Portoferraio and, on the basis of the first demonstration results, could be replicated in other island Marinas (e.g. Rio Marina, Cavo, Porto Azzurro, Marciana Marina, Marina di campo, etc.).

Figure 111: Portoferraio "Darsena Medicea" tourist port (*photo: Cosimo de Medici Srl*)

It is important to highlight that Elba Island (and in particular Portoferraio), during summer, beside to be a destination for a great number of tourist boats, it is an optimal intermediate logistic base for those, coming from France or from Italy mainland, who wish to sail toward Corsica or Sardegna and the South of the Mediterranean Sea.

This means that many boats stop in the Elba Island marinas to refuelling and to buy large quantities of food, mineral water, etc., in order to re-stock the galley, allowing to have supplies for many days of sailing, also considering the prices cheaper than e.g. Corsica/Sardegna.

In this simple logistics process the bottleneck is representing by the difficulty to transport the purchased heavy goods (e.g. mineral water, canned foods, cleaning products, etc.) from the shop/supermarket to the boat, both at mooring post or in the harbour.

3.6.2.2. Service (measure) design

The design of the Measure 2 – "Optimized freight delivery to tourist boats (at mooring post or in the harbour)" concerns:

- the collection of heavy goods purchased by the tourist boat owners in the shops/supermarket located in Portoferraio (mainly in the surroundings of "Darsena Medicea" marina);
- the transport and delivery of the goods directly to the boat posts, if moored at the pier, by shopkeepers or supermarkets;

or

- the transport and delivery of the goods, by shopkeepers or supermarkets, to a specific logistics point located at "Molo Gallo" (at the entrance of the port), for those boats which are moored in the harbour.
- In this second case, the transport from "Molo Gallo" to the boats could be carry out by the boat owner himself with his tender or by a transport service by boat, managed by the operator that currently is the only authorized to provide nautical logistics services in the whole "Darsena Medicea" marina area. This company (Cosimo de' Medici Srl) is 100% owned by Portoferraio Municipality, and therefore could easily be involved in the Measure 2 demonstration activities.

A general overview of the “Darsena Medicea” marina area, in the overall Portoferraio port context, is provided in the following figure.

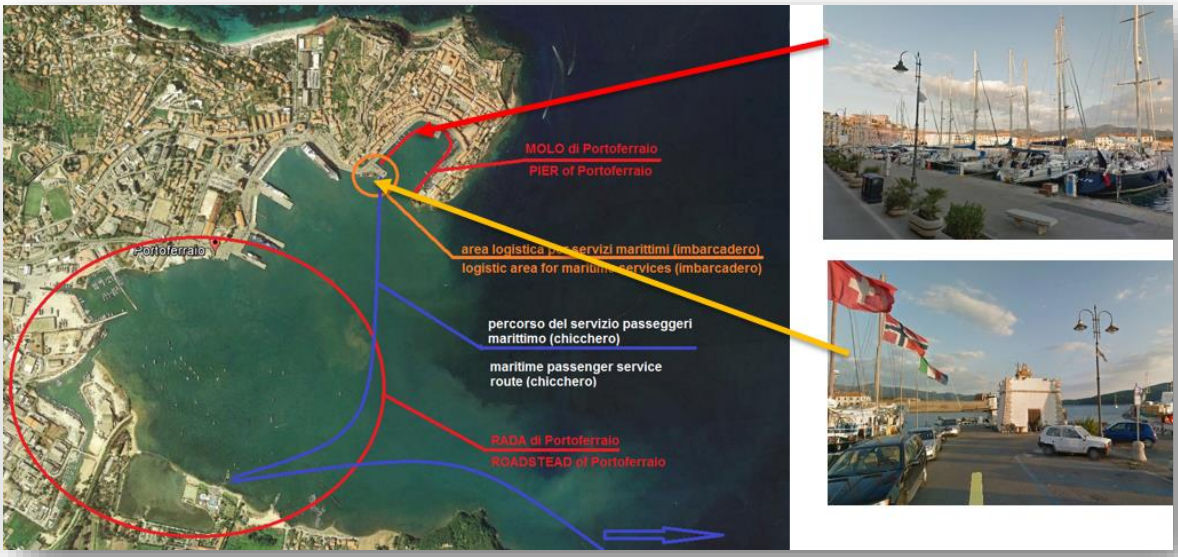


Figure 112: Overview of overall port of Portoferraio with main points interested by Measure 2

As already mentioned, during the stakeholder involvement activities performed in the first year of CIVITAS DESTINATIONS Project (“Elba Sharing local Project”), it was verified the interest of some shopkeepers/supermarket managers, usually visited by boat owners for shopping, to collaborate to the organization and demonstration of the planned Measure 2.

In any case, during the site preparation phase (Task 5.5, M11-M24), a specific call for expressions of interest will be issued by the partner Municipalities, in order to set up a list of available retailers/supermarkets.

The design of the Measure 2 operating procedures can be summarized as follows[9]:

- *Case 2.a – Boat moored at “Darsena Medicea” pier:*
  - The tourist boat owner goes directly to the shop/supermarket involved in the demonstration (identified by specific notice boards/decals with the CIVITAS DESTINATIONS logo) and purchase the needed goods. The possibility of allowing a purchase order by phone belongs to the shopkeeper;
  - He asks for the transport/delivery service to the boat;
  - The shopkeeper asks information to clarify where the boat is moored;
  - If the boat is moored at the pier, the boat owner gives the name of the boat and the rough location along the pier, and make an agreement with the shopkeeper about the expected time of delivery.

[9] The operating procedures described in this section are intended for a single shop/supermarket, but they are replicated for each involved retailer.

- The shopkeeper/supermarket manager organizes the delivery (by van) at agreed time.

The above described logistics scheme is graphically summarised in the figure.

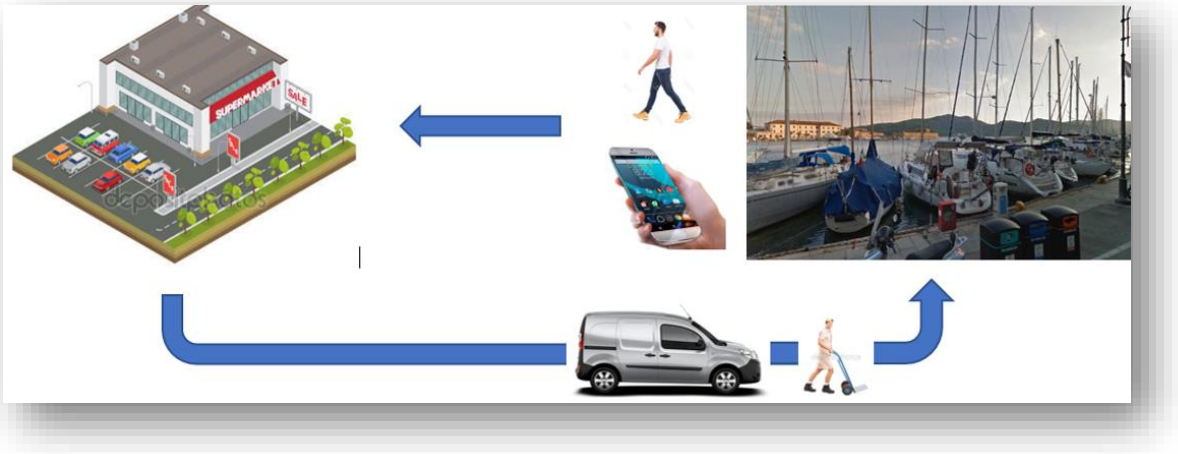


Figure 113: ELB 5.1 Measure 2.a designed logistics scheme

- *Case 2.b – The boat is moored in the harbour:*
  - The tourist boat owner goes directly (tender+walking) to the shop/supermarket involved in the demonstration (identified by specific notice boards/decals with the CIVITAS DESTINATIONS logo) and purchase the needed goods. The possibility of allowing a purchase order by phone belongs to the shopkeeper;
  - He asks for the transport/delivery service to the boat;
  - The shopkeeper asks information to clarify where the boat is moored;
  - If the boat is moored in the harbour, the shopkeeper informs the boat owner about the delivery point located at Molo Gallo. Moreover, he asks how the boat owner boat plans to transport the goods on board, informing him about the availability of a specific transport service boat, from Molo Gallo to his boat.
  - At this point there are two options:
    - The client prefers to transport the purchased goods from the Delivery Point (Molo Gallo) to the boat by its tender, therefore he make an agreement with the shopkeeper about the time of delivery at Molo Gallo.
    - The shopkeeper/supermarket manager organizes the transport/delivery of the goods at Molo Gallo at the agreed time.

or

    - The client decides to take advantage of the transport service by boat, the shopkeeper calls the authorized transport operator and organise the delivery at Molo Gallo at the agreed (among client, shopkeeper and transport service company) time;
    - The shopkeepers provide also the transport company with the name of the boat and its position in the harbour (if possible by coordinates – GPS), having preliminarily requests these information to the client.

- The shopkeeper/supermarket manager organizes the transport/delivery of the goods at Molo Gallo at the agreed time.
- The transport service company operate (by boat) the final delivery to the boat at the agreed time.

The above described logistics scheme is graphically summarised in the figure.

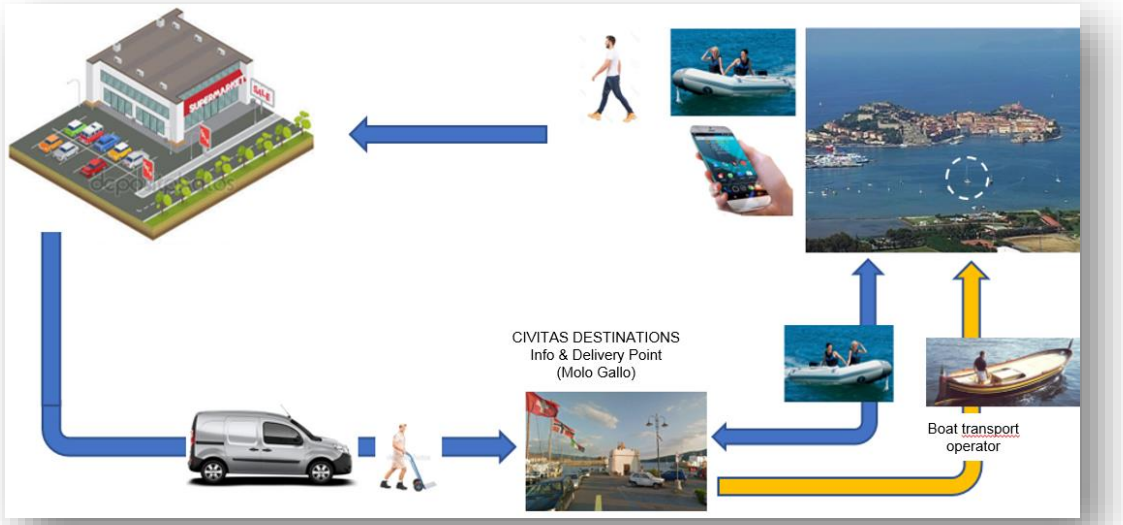


Figure 114: ELB 5.1 Measure 2.b designed logistics scheme

3.6.2.3. Technology, functional and technical characteristics

The Measure 2 – " Optimized freight delivery to tourist boats (at mooring post or in the harbour)", is designed with the aim, among the others, to avoid as much as possible additional costs to the logistics processes.

In this sense, it was developed with a "light" approach and therefore no specific new technologies or infrastructures are foreseen.

In fact, at least in the initial demonstration phase, the only technology involved (but not mandatory) concern the use of a GPS devices by the service transport company operator, during the delivery navigation in the harbour, in order to easily locate the final destination (tourist boat) of the purchased goods.

3.6.2.4. Measure ex-ante evaluation

The ex-ante evaluation of the ELB 5.1 measures was developed with WP9 activities (see section 3.6.1.4).

It is worth mentioning that the Measure 2 is highly tourist oriented (to a specific sector of tourist: sailing and yachting) and therefore it is not relevant to consider the ex-ante evaluation in terms of CO_2eq emission reduction and of energy consumption reduction.

The ex-ante evaluation is therefore focused on the number of freight deliveries to tourist boats that will be carried out, compared with current baseline where a sort of this service already exists but is not-optimised, at a very low profile and on a voluntary basis.

Beside the number of commercial operators (shopkeepers/supermarkets managers) involved in the demonstration phase, the effectiveness of the Measure 2 will mainly depend on the level of awareness of this service by the tourist boat owners.

In this sense the promotion activities will play a fundamental role for the success of this initiative, and must be addressed not only to those already moored in the harbour (by advertising at piers and supermarkets, local press, etc.), but also to the sailors before their arrival in Elba Island, in the trip planning phase (e.g. specific website, banner on the most visited tourist and sail websites, when booking the mooring post by Internet/phone, etc.).

3.6.2.5. Implementation phase design

According the official project time plan, after the conclusion of the design phase (M8-M12) the roadmap for the implementation of this demo service will be the following:

M11-M24: Site preparation.

This phase (Task 5.5) covers all the activities to make the measure ready-to-start at M25 and, in particular, the further development of detailed operational procedures, already outlined in the design phase.

This phase also includes the issue, by Portoferraio Municipality (and later by Rio Marina Municipality if the partners will decide to extend the service to Rio Marina and Cavo ports), of a specific call for expressions of interest in order define a list of available shops/supermarkets (having the needed infrastructures, e.g. van) to involve in the demo phase.

In addition, the involved transport operator sites, vans and infrastructures will be set up according the CIVITAS specifications for promotion and dissemination.

Eventually, all reporting methods and procedures, required for collecting and providing the data needed for the monitoring and evaluation phases, will be developed.

M25-M48: Pilot Measure Demonstration.

This phase (Task 5.6) will develop the full demonstration of the Measure M1, and includes also the monitoring of the demo activities and the data collection during demonstration.

Local partners (Portoferraio and Rio Marina Municipalities, MemEx) are working to anticipate the start of the demo phase at M22 in order to cover even the full 2018 summer season. This means that the demonstration will include three peak periods (2018, 2019 and 2020) extending its effectiveness within the project and allowing a more significant data acquisition.