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LUCCA

SUSTAINABLE URBAN LOGISTICS PLAN

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SULP “Sustainable Urban Logistics Plan”

**WP3 - T3.3 Local assessment of mobility and energy benefits:
development of Sustainable Urban Logistics Plans
in the 9 ENCLOSE towns**

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Città di Lucca

LUCCA

**SUSTAINABLE URBAN
LOGISTICS PLAN**



FOREWORD

EU confers to urban areas an important role in achieving the objectives of the EU strategy for sustainable development. Indeed, it is in urban areas that environmental, economic and social issues are more interconnected. Urban areas' environmental condition is even more important considering that, on the average, about 80% of European citizens live in urban areas. A high quality urban environment is a priority goal in the context of the Lisbon strategy, including the objective of "making Europe a more attractive place to invest and work." Once more, attractive European cities will enhance their potential for growth and creation of jobs; they are therefore central to the achievement of the Lisbon Agenda ("Communication from the Commission to the Council and the European Parliament, the European Economic and Social Committee and the Committee of the Regions: Towards a Thematic Strategy on the Urban Environment. Brussels, 2004). Moreover these objectives are in line with Europe 2020 objectives, wherein urban accessibility issues are defined as a "set of spatial, distributive, organizational and managerial characteristics able to allow the mobility and easy use, within conditions of security and autonomy, of urban spaces and infrastructure by any person" and now central in the planning of the mobility system. The system of urban mobility, including goods mobility, should enable citizens and organisations to exercise their right to move, without burdening to the greatest extent possible

on the community, in terms of air pollution, noise, congestion and accidents, while promoting a reduction in energy consumption and in GHGs emissions.

The current regulations for transportation of goods to cities and within them, is a fundamental theme of the more general concept of urban mobility as a factor of cities competitiveness, able to determine relevant impact on the quality of the urban environment, on the increase of transport efficiency and, in parallel, on its costs.

Protecting and developing the economic and social life of the city, also by optimising the distribution of goods to the cities as relevant points of production and consumption of goods and services, requires identifying and implementing appropriate measures to allow and facilitate the movement of goods. According to this principle, the European Commission identified a series of specific measures and objectives for the urban mobility of goods (the so-called "last-mile transport"), which aim to have a positive impact not only on the quality of 'air but also on the efficiency of the method of distribution (the transport White Paper of 2011). To achieve the goal of reducing 60% of emissions into the atmosphere by 2050, the White Paper identifies, among the numerous actions, the use of technologically advanced tools for the management of transport infrastructures and devices to support mobility, in addition to the use of more sustainable fuel and power systems (such as LPG, natural gas, electricity etc...). Furthermore, the European Agency for the Environment (www.eea.europa.eu) emphasises the key role of freight transport in urban areas both in economic and social terms (TERM 2013). However, the Agency highlights a number of potential adverse effects associated with both the environment and the quality of life, due to the impacts on air quality and noise pollution, traffic accidents, and to the contribution to climate change. The vehicles for goods

transportation, and in particular diesel vehicles, are in fact an important cause of emission of PM and NO_x in urban areas, contributing to the exposure of a high percentage of the population to levels of atmospheric pollutants exceeding standards of air quality set by the EU and the WHO.

EU policies, together with national and local ones, operate to mitigate this impacts. In particular, the European Commission communication COM (2008) 433 of 08 July 2008 "Making transport greener", COM (2009), n. 279 of 17 June 2009 "A sustainable future for transport: Towards an integrated, technology-led and user friendly system" and COM (2011) n. 144 of 28 March 2011 "White Paper - Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport," prompt member states and European cities toward a more efficient distribution of goods in urban areas in order to improve air quality in the urban environment and significantly reduce CO₂ emissions with the aim of achieving a CO₂-free city logistics ("CO₂-free logistics") by 2030.

In Italy, the strategic importance of the logistics sector has prompted the government to enable interventions to promote sustainable development at all levels. At local level, it can be noted that almost all medium to large municipalities have developed systems to regulate the transport of goods, introducing specific rules to regulate traffic flows and more generally the organisation of the distribution of goods. In recent years a growing attention to the issue has developed, even in some provinces and regions, while at the central level, the theme has been recently revived by the National Logistics Plan 2011-2020.

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THE URBAN CONTEXT OF LUCCA

1.1. THE TERRITORIAL AND SOCIO-ECONOMIC CONTEXT

The city of Lucca has a population of about 80,000 inhabitants and an area of slightly over 185 km² with an average density of approximately 430 inhabitants per square kilometer. The city of Lucca is a limited part of the territorial extension of the municipality and shows in its structure distinct traces of its history, initially Roman, then medieval, a fact that includes Lucca among Tuscany's best preserved historic towns. The core of the city is enclosed by the Renaissance walls, the city most representative monument, running for about 4.2 km, with a series of bastions. The Walls have allowed the historic centre to maintain a specific homogeneity and a balanced appearance. In the nineteenth century the walls lost their defensive function and were subsequently transformed into an urban park. They now represent an appreciated destination for citizens, as well as for tourists and visitors. The economic system of Lucca is historically determined, with a strong propensity for entrepreneurship. The traditional commercial vocation combined with the typical dynamics of outsourcing of the contemporary city, makes the services sector the prevalent one, as also demonstrated by data on produced added value (69.7% Source: Lucca Promos. "Productive structure and the territory of Lucca", 2007). This business, present especially in the area of the historic city centre, within the ancient walls, is represented mostly by shops; clothing and footwear; personal services and, in descending order, by hotels, food, companies and specific commercial sectors services (eg. car; ICT; pharmaceutical, sundries). The historic centre of Lucca and surrounding areas nowadays represent a system of "natural" commercial centres (the historic centre, San Concordio, Arancio, Borgo Giannotti and Sant'Anna) expressing a wide variety of economic activities: commercial, artisanal, professional, etc. in which 10% of businesses were established prior to 1960. Data collection and analysis of the business

activities of the historical centre and of the neighborhood interested by the services of urban logistics have been recently developed. The research carried out (mainly through the projects MEROPE, LIFE CEDM, LUSLIN and LOVELUCCA) and confirmed by studies of the Chamber of Commerce of Lucca (Lucca Economia: bulletin for business, No. 11/06 - December 2006), identified in this area about 1500 shop windows corresponding to more than 1,400 commercial or artisanal activity. The several categories and numbers are listed in the following table, which, in addition to the data relating to commercial and artisanal activities, also reports the number of activities carried out by professional businesses (source: SEAT), rising the total number of economic activities that can potentially be served by urban logistics services to about 1,900. The activities surveyed were classified according to SEAT macro-categories, with the aim of obtaining data on average weight and average frequency of deliveries to major macro product categories and activities.

List of the analyzed commodities sectors*(data provided by the Chamber of Commerce of Lucca - Lucca Economia: notiziario per le imprese, n° 11/06, december 2006)*

Commercial category	Historic centre	Other places	Total
Clothes	243	65	308
Food	228	112	340
Furniture	53	32	85
Cars, transport, packaging	3	25	28
Paper and printing	29	12	41
Chemistry, plastic materials	-	2	2
Culture, art, publishing	64	17	81
Ecology, heat engineering	2	3	5
Public maintenance and construction	2	8	10
Electronics, electrotechnics	8	12	20
Public authority, community	10	3	13
Finance, insurance	27	35	62
Supply for companies and offices	1	5	6
Information technology and telecommunications	9	15	24
Mechanics	7	6	13
Medicals and cosmetology	73	52	125
Watches, jewels, gifts	52	7	59
Professionals, counseling	185	280	465
Advertisement, services for companies	4	7	11
Sport	46	24	70
Tourism	115	43	158
Total	1161	765	1926



In the local context of Lucca, a relevant issue for the purpose of this plan is related to the low air quality that Lucca, like many Italian and European cities, faces. In particular, due to the local low thermodynamic activity and to mild winds, the rather static atmosphere contributes substantially to amplify the impact of human activities, causing a high level of local air pollutants. During the last 10 years, Lucca has always been among the top ten cities in Italy with the highest number of PM10 limit exceedances (in 2010, 100 exceedances). In the specific, these limits exceedances are related to the local density of traffic, domestic heating and industrial activities. In recent years, the Municipality of Lucca has recognised the urgent need to improve air quality and has implemented new measures to reduce the level of pollutants caused by urban mobility, including the strengthening of the Limited Traffic Zone (LTZ), the development of services for goods delivery by electric vehicles (Luccaport), the extension of the network of cycle paths, the improvement of the public transport, etc... The Municipality of Lucca has also recognised the importance of the reduction of climate-altering gases by providing for specific measures in the Action Plan for Sustainable Energy (PAES), among which some are related to mobility.

1.2 ENVIRONMENTAL CONTEXT

In recent years, the Administration has carried out many activities in order to evaluate and assess the impact of interventions concerning mitigation of climate change in the urban environment. In particular, with a specific Action Plan for Sustainable Energy (PAES, November 2013), the data on CO₂ emissions in the territory were analysed in relation to the final energy use attributable to activities within the direct and / or indirect municipal authority. The indirect jurisdiction activities include the emissions of private buildings, the service sector, small and medium-sized enterprises not subjected to the Emissions Trading

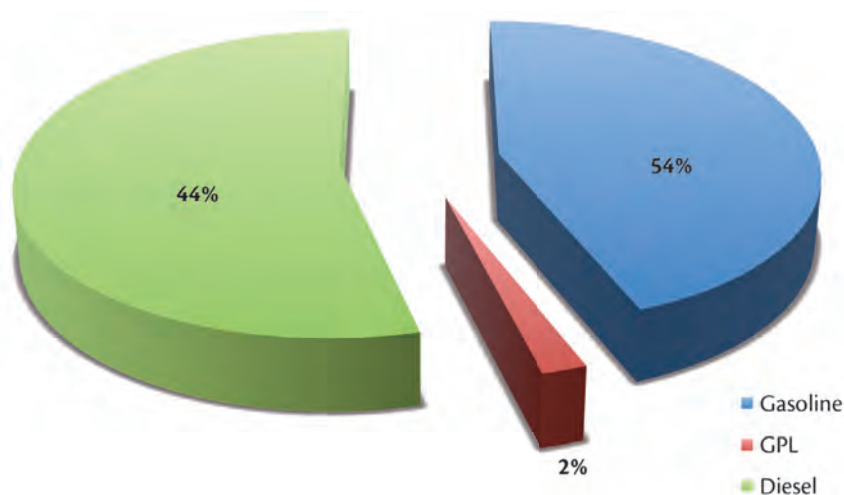
Scheme, and the urban transport in areas governed by the planning of the municipal administration.

In particular, CO₂ emissions in 2005 (which was taken as the base year for the PAES of the City of Lucca) amounted to approximately 468,182.61 t, for an emission of 5.41 t. per capita. The situation described for energy consumption can be seen also in the distribution of annual CO₂ emissions (2005), although with slight differences. From the analysis of macro-sector emissions contribution, the building sector is confirmed to have the greatest weight equal to 63%, followed by the transport sector that accounts for 35%. Of great importance is also the energy consumption related to transport, diesel and gasoline, equal to 35%, with 19% and 16% respectively.

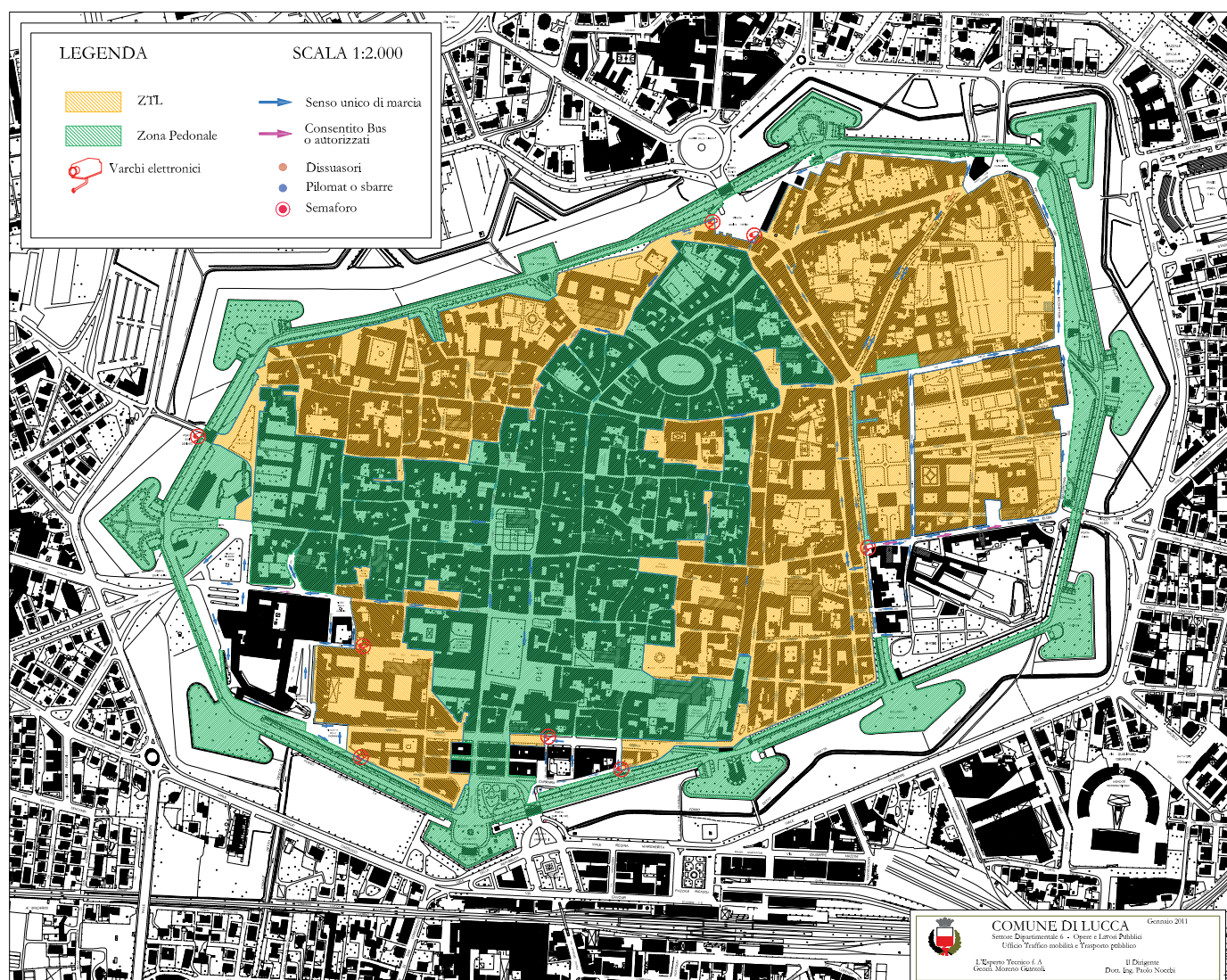
2005 emissions for public, private and commercial transport are approximately 166,248.17 tons of CO₂. However, emissions associated to private and commercial transport are clearly prevalent being the 98% of total emissions in the transport sector. Diesel, besides being the most widely used fuel, is also the fuel that contributes more in terms of emissions (54%), while gasoline contributes to 44%, and LPG contributes to 2% of total emissions. As already mentioned, the lack of local

thermodynamic activity and mild winds in Lucca generate a static atmosphere that helps to boost the impact of human activities, causing a high level of air pollutants. Over the past 10 years, Lucca has always been among the top ten cities in Italy with the highest number of exceedances of the PM10 limit (in 2010, 100 cases exceeded). In particular, the exceedances of air quality are related to a high level of traffic, domestic heating and industrial activities in the surrounding areas. In recent years, the local government has recognised the urgent need to improve air quality and has implemented new measures to reduce the level of pollutants. In particular, in 2010, the daily average values recorded were as follows:

NO ₂ :	35 mg / m ³
NO _x :	55 mg / m ³
PM ₁₀ :	31 mg / m ³
SO ₂ :	2 mg / m ³
O ₃ :	60 mg / m ³



Evaluation of relative contributions in terms of transport emissions per vehicle (ref. 2005)



1.3. THE ROAD SYSTEM AND MOBILITY IN LUCCA: GENERAL ASPECTS

As an updated Traffic Plan (PUT) prepared in accordance with the directives of the Highway Code is not currently available, the following description focuses on the historic centre and the surrounding area, which are also the areas of interest with regard to most of the goods distribution processes.

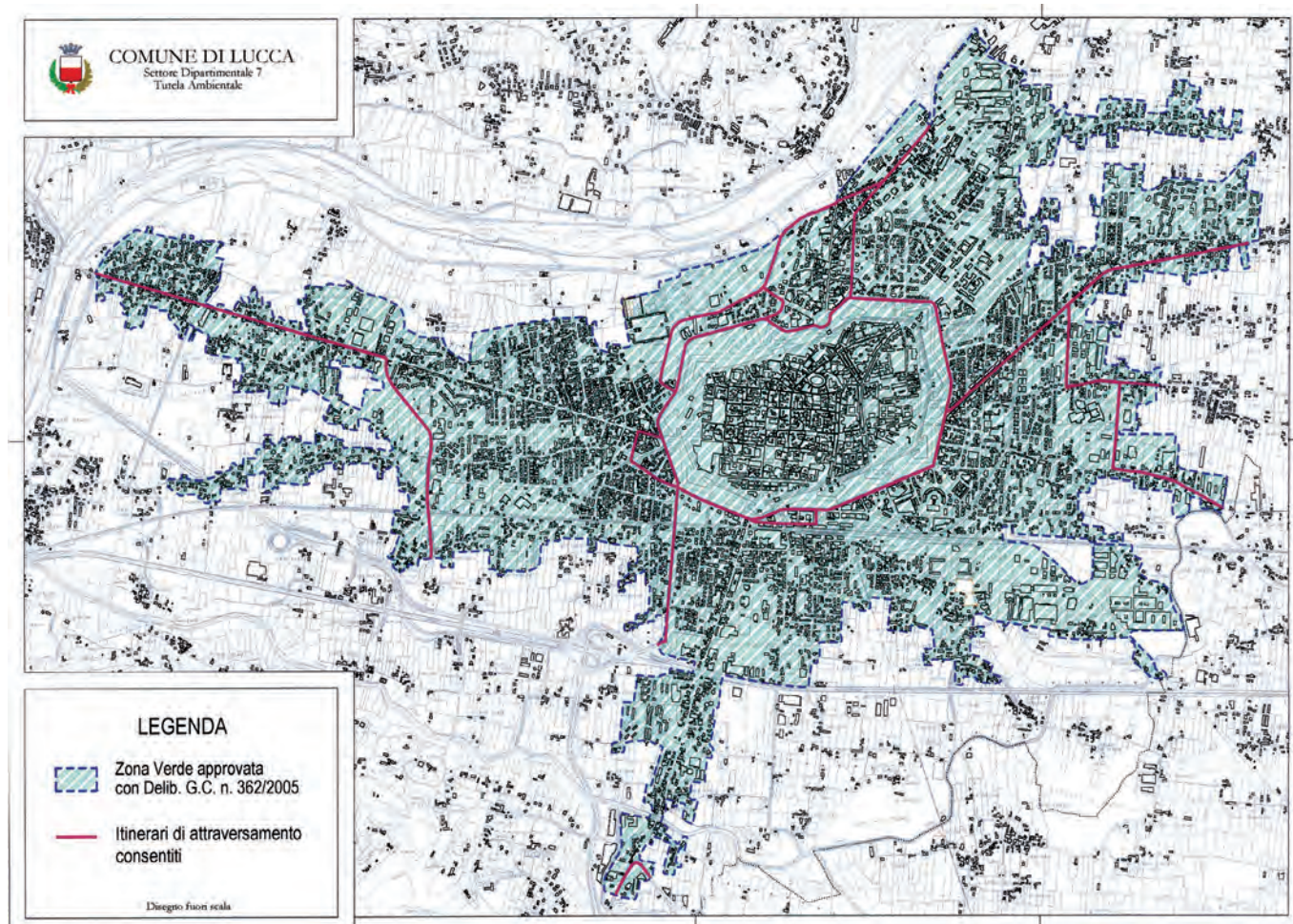
Access to the historical centre of Lucca is available through the six Doors located along the Walls, connecting the external road network with the internal one, characterised by its medieval footprint. Traffic and parking in the historic centre are

strongly influenced by the structure of the roads and access structure that required the definition of an articulated road regulations within the historic centre. The first pedestrian zone was established in 1967. Since then, the law has evolved up to the present configuration which states that the area included within the perimeter of the city walls (Old Town) is divided into:

a) Unrestricted access Area, in which entry is forbidden only to vehicles with mass loaded exceeding 3.5 tons and with overall dimensions exceeding 6.50 meters long and 2.20 meters wide. Authorised vehicles are permitted to park in the yellow stalls reserved for them and where not in conflict with the rules

of the Highway Code. All other vehicles must be parked in the blue spaces for a fee in respect of the ordinances;

- b) Limited Traffic Zone (LTZ), in which the access is allowed only to authorised vehicles with the dedicated badge, parking is allowed in yellow reserved spaces when not in conflict with the rules of the Highway Code.
- c) Pedestrian Area, in which the access is forbidden, except for authorised vehicles with the dedicated badge, the parking is permitted in accordance with these provisions. Transit, both for authorised motor vehicles and cycles, is subject to the following provisions and regulations:



- The driver of the vehicle must proceed at a snail's pace;
- The driver of the vehicle must proceed with the utmost caution so as to avoid artifacts that may be present on the roadway and pedestrians, keeping in mind that vehicles must give way to pedestrians.

Access permits are issued to residents, business operators (shop owners, craftsmen, etc.) that run their business in the city centre and to transport operators. Accessibility to the historic centre influences the mobility of people, which is difficult due to the limited number of stalls available for parking. In this regard, outside of the walls have been realised some park and ride systems, also providing a shuttle service to get to the centre, which is served by a widespread network of local public trans-

port, which comprehends a fleet of electric buses. The road network outside the walls, for historical reasons, converge in its main lines towards the city centre, and thus the traffic of the main lines of communication east-west and north-south flows on the ring road, causing frequent congestion in the local circulation.

In addition, the mobility in the historic centre comes into the broader context of the so-called Green Zone, which includes the urban area south of the river Serchio and north of the motorway network, as shown in the map below. This area, from the beginning of 2010 mainly includes restrictions on transit to vehicles with Euro 0 emission standards. However, the environmental benefits arising from the introduction of the Green Zone are strongly reduced by the need to ensure the vehicle traffic to

flow along the north-south and east-west routes, by the establishment of specific crossing corridors, in red on the map.

1.4 REGULATORY ASPECTS: CURRENT REGULATIONS, GENERAL PROVISIONS OF ACCESS, CAR ACCESS AND PARKING IN THE URBAN AREA

Together with the rules of the Traffic Law, the city of Lucca has been given an articulated access regulation to the historic city centre, including specific rules for commercial vehicles for goods distribution. These regulations have been put in place over the years having as main objective to achieve a substantial limitation of both private and commercial/industrial vehicles in the historic centre, in order to reduce related traffic congestion and energy consumption, noise and air pollution, as well as to minimise the costs of externalities of traffic, to increase the safety of pedestrians thus achieving an overall improvement of the urban environment. Since 1967, when the pedestrian zone was established, the regulation has evolved

to the present configuration described above. In the historical centre of Lucca the maximum speed limit of 30 kilometers per hour and the maximum gross vehicle mass (GVM) of 3.5 tones with maximum dimensions of 6.50 m long and 2.20 m width are in force for all vehicles.

In order to define the normative for access, transit and parking in the Historic Centre of the City of Lucca, a system of permits, which is currently managed by an in house company of the City of Lucca, Metro Srl, has been defined. Permits are organised into categories, with reference to the characteristics of the vehicle, owner and purpose for which the permit is issued. The transit and parking of vehicles within the city centre is governed by special rules for each type of permit.

The main categories of permission are summarised in alphabetical order in the following table.

It is not possible to make an exact comparison between the numbers of permits granted in different years for type of users because of the following factors: changes to permit categories in the last 10 years, waivers granted - significantly regarding permits for freight distribution- and the use of "temporary" permits make the comparison unfeasible. However, a growing trend in the number of permits can be observed in the period 2004-2014, with not less than 10% rise. A more accurate collection and analysis of data would allow an overall view of the phenomenon, certainly relevant to the planning of mobility.

In addition, the City Administration grant temporary permits (daily or extended) in accordance with the same requirements above described. Permits for vehicles having size and weight higher than those determined by these provisions (eg for bulky transport) are released under a specific regulation.

Category according to resolutions GC n. 17 of 07/02/2012	Generic description (new categories set out in resolution GC - n ° 246 of 12/03/2013)	Number of permits in 2014
A	A Residents (A1-A2) dwelling (A3), apartment owners (not in the order of 2012, now A4), garage residents (A5),	4965
D	D Artisans and cleaning companies and those engaged in similar activities (DA), walking (DM, former temporary permit)	1149
E	Freight (EC), Transport newspapers (EG), Wholesale based in the Old Town (EI), Movers (ET, former temporary permit), conveyors of values (EV, ex cat D)	294
E/S	E / S owners of hotels and guest houses (EA), perishable goods transport (ED) medicines transport (EM), sales representatives (ER), owners or partners of a business in retail trade	294
F	Disable parking permit	2003
F/S	F / S People with impaired walking ability (FS, temporary disabled)	temporary
	Dwelling and residents in neighbouring areas (G1-G6)	-
H	Doctors H (H)	100
I	Funeral agencies (I), Funerals (IF, former temporary permit), Weddings (IM, former temporary permit)	30 beside those temporary
M	M Services of public interest, public services, social and postal services sectors (M)	420
N	N Garage, garages, car parks (N)	961
O	Elderly residents O (O)	115
P	Public administrators P (P)	61
R	R Chroniclers and print media – radio, telephone service, radio, television (R)	12
T	T Schools and kindergartens and ground schools (companion: T)	206
U	Full electric vehicles	14



A specific regulation is in force for access to the LTZ and pedestrian areas for the following types of vehicles.

The current access regulation, including permits for residents and economic operators for transit and parking within the city centre is under revision.

It is worth to note that the City Council has adopted action plans for containment and prevention of acute episodes of air pollution in specific areas of the city centre, including measures related to vehicle emissions, industrial anthropogenic and activities and reference to different types of fuel. For regulation and policies related to goods flows, see paragraph 2.2.

1.5. EXISTING TECHNOLOGICAL CONTEXT FOR MOBILITY IN LUCCA

The Intelligent Transportation Systems, or ITS, are the integration of knowledge in the field of telecommunications, electronics, information technology (in short, telematics) with transport engineering, planning, design, operation, maintenance and management of transport systems. ITS consist today in tools and technologies, products and systems for the management of mobility and transport as a whole. ITS offer a wide spectrum of possibilities of implementation to operators/Authorities (whether public or private, planners

or managers, users or providers of added value services) virtually affecting all areas of urban and/or suburban mobility. Some examples are systems for the management of traffic (acquisition of traffic data, traffic light control, access control, parking management, variable message signs, supervision centres and integrated control, etc.), systems for users information (signposted path routing and parking lots, pre-trip information through different technologies - via internet, RDS-TMC, etc. - centres of transport information services - Call Centre, etc.), systems for the management of public transport (fleets monitoring and tracking, automation of deposits, call services, etc.), systems for modal integration and logistics platforms (e.g. Park and Ride systems, smart-card payment systems, system for distribution of goods, mixed systems for both freight and passenger, etc.). ITS are characterised by interactions between the different components that, working together, are adaptable to other functional areas of ITS.

Cities harbouring valuable historic centres as Lucca show numerous architectural and landscape constraints, as well as functional aspects making technology infrastructure and ITS very useful for a rational, flexible and coordinated use of existing roads and transport system. In fact, ITS application is one of the possible interventions allowing

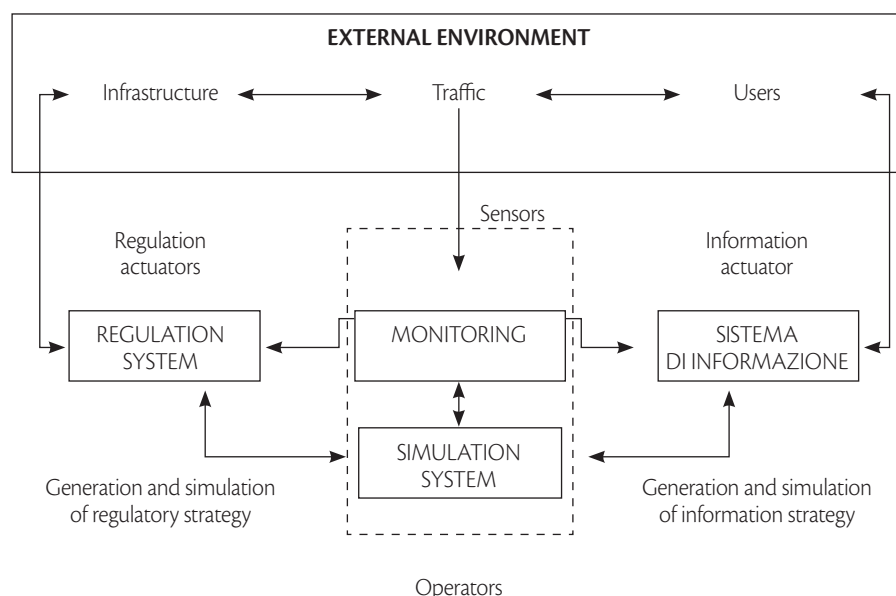
addressing in the short term the increasingly diverse and growing demand for mobility, including mobility of goods. It is therefore essential that the City of Lucca, in the framework of the already existing initiatives addressed by the Region of Tuscany in the field of infomobility, initiates a process for improving the technological framework supporting mobility processes in order to take advantage of results in terms of organisation, operation and information assets, systems of control and monitoring of urban services (in particular, access control and parking management). All the main subjects involved in the mobility system and acting in the transport network (e.g. Municipality, transport company, parking management operators, etc.) will take advantage from this approach.

The technological systems currently in operation on the urban territory of Lucca are:

- Management of permits and access control to the Limited Traffic Zone;
- Management, control and transit to parking areas;
- Monitoring of Environmental Conditions.

The company Metro Srl in Lucca (www.metro srl.it) manages the first two systems, while the Provincial Department ARPAT of Lucca is responsible for the third.

VEHICLE TYPE / USER	PRESCRIPTION
Animal-drawn vehicles	Not permitted unless exceptions
Bikes	Allowed in accordance with special regulations
Mopeds and motorcycles	Admitted in ZTL; in Pedestrian Area only for residents with limitations
Coach of the urban and suburban bus, tour buses	Allowed in accordance with special regulations
Motorhomes, caravans, trucks, articulated buses, articulated vehicles, trailers and car trailers	Not permitted, unless exceptions
Taxi and vehicles for hire with driver	Allowed
Vehicles of the City of Lucca, the State, the Region, the Province, military vehicles and police forces, emergency preparedness and emergency response.	Allowed
Customers of hotels and guest houses	Allowed
Nursing homes and retirement homes	Allowed



1.5.1 PERMIT MANAGEMENT SYSTEM AND LTZ ACCESS CONTROL SYSTEM

The granting of permit to access the LTZ, for the categories detailed above, is delegated by the City of Lucca to Metro Srl. The company makes available to city users all the documentation through its web portal, for applying for the grant of an access and parking permit to the LTZ. The Permits Office is located at the headquarters of Lucaport in via delle Città Gemelle, n.162.

Since January 2011, an automated access control system to the LTZ has entered in force: seven automatic control gates have been activated to record access of vehicles to the LTZ. The borderline of this zone, the pedestrian zone and the location of the controlled passages are shown in the map. In order to integrate the current infrastructure, a system of variable message signs (VMS) will be provided by 2015 to inform the public about the perimeter and restrictions within the ZTL, thanks to the project LuccaMo (co-financed by the Region of Tuscany in the programme Por Creo 2007-2013).

1.5.2 MANAGEMENT AND CONTROL SYSTEM OF PARKING AREAS

As already mentioned the management of the parking system in Lucca has been assigned to the Company Metro Srl. Metro provides prepaid cards to be used for local parking or subscriptions for parking including those using parking meters. The “€ Park” system was also recently introduced: a single ticketing system, that can be recharged with prepaid cards and can be used in all metered parking spaces, both inside and outside the Walls, adaptable to all types of fare.

A specific Parking Management System (PMS) manages both parking areas along the road (managed with parking meters) and car parks infrastructures in Lucca. PMS, besides making information about the occupancy status of parking lots available, also online, informs users through dedicated variable message signs placed along the main entrance arteries to the urban area.

1.5.3 AIR QUALITY MONITORING SYSTEM

Since the beginning of 2011 air quality has been monitored through the new regional network detection, managed by ARPAT, which has replaced the previous Province's networks.

The whole system is based on the following regulations:

- Community level: Directive 2008/50/EC;
- National level: Legislative Decree no. 155/2010;
- Regional level: L.R. 9/2010 and DGRT 1025/2010.

Such regulations aim to ensure that the evaluation and management of air quality is managed on a regional rather than on a provincial basis. The above-mentioned Regional regulations resulted in the need for a reorganisation of the system for air quality monitoring. The new monitoring network consists in 32 stations, replacing the existing regional networks of PM10 (DGRT 377/06), PM2.5 (DGRT / 2008) and O3 (DGRT / 2006), and becoming the reference network at regional level since 1 January 2011.

One of the main benefits introduced by the new system is the assessment of air quality without rigid administrative boundaries, favouring a system based on the division of the territory into homogeneous areas from the point of view of pollution sources, orographic and climatic features and degree of urbanisation. To this purpose, by DGRT 1025/2010, Tuscany Region identified 5 zones (coastal zone, Valdarno area, Pisa and Lucca plain, Prato-Pistoia area, Valdarno and Valdichiana area) and one agglomeration (Florence and the nearby municipalities), which involve monitoring stations for all relevant pollutants (PM10, PM2.5, NO2, SO2, CO, Benzene, IPA, O3 and metals), taking into account threshold on the basis of population, on recorded levels, and on all the critical aspects of each individual zone.

For each area, there is a number of monitoring stations, which depends on the resident population and the previous



measurements performed in the area. Data related to pollutants measured by each control units are processed daily by ARPAT and made available to the community through the publication of the daily air quality bulletin. A report describing the status of air quality in the province of Lucca and in the city centre in particular is presented annually.

Stations measuring the main environmental parameters for the city of Lucca are located in:

- Carignano;
- Lucca Viale Carducci;
- Lucca S. Michele, that will be relocated as provided by All. 3 and 6 of DGRT of 1025/201.

The following table shows pollutants detected by each of the measurement stations.

Train station	SO ₂	NO _X	PM ₁₀	O ₃	CO
Piazza San Michele	X	X	X		
Viale Carducci	X		X		X
Carignano				X	

THE CONTEXT OF LOGISTICS PROCESSES IN LUCCA

2.1. GENERAL ASPECTS

The transport system that ensures the distribution in the city centre of Lucca is a complex system made up of a large number of stakeholders that move in a wider scenario than the city distribution. In fact, on one hand transport companies listed in the Companies Register of Lucca (Province of Lucca) are about a thousand, of which more than a half is made up of individual professionals (owner-operators). On the other hand, the investigations conducted through the projects MEROPE, LIFE-CEDM, LUSLIN have confirmed that the share of freight traffic directed to the city centre is managed largely by a limited number of subjects (cooperatives, individual companies, large and medium-sized transport companies).

A very high number of subjects access daily the historic centre and the surrounding areas, while making a limited number of deliveries. In addition, incoming goods usually come directly from suppliers with legal or operational headquarters outside the province of Lucca. Finally, the analysis showed that many traders and shop owners make freight transport on their own account (in agreement with similar investigations conducted by the Italian Ministry of Transport).

2.2. FREIGHT FLOWS REGULATORY POLICIES

Access and parking for goods transport is regulated through a complex system of permits, which was introduced with the following changes and updates over the last fifteen years.

In the historic centre, the limit of loaded mass of 3.5 tons with maximum dimensions of 6.50 meters in length and 2.20 meters in width is applied for commercial vehicles, and is derogable only in special cases.

This system takes into account the needs of potential users, including transport professionals, and is based on specific restrictions, which differ on the basis of permits

categories, access areas usage and time windows. Although in place for a number of years, the current regulation is not sufficient to ensure a significant reduction in commercial traffic.

As mentioned above, permits to enter the LTZ, in particular dedicated to freight transport, are category E, E/S and M, defined as follows by the GC n. 17 of 07/02/2012 and further articulated by the GC - n. 246 of 12/03/2013.

Category E “Circulation Permits for freight, newspapers transport” includes vehicles owned by:

- Holders or members of a wholesale business based in the city centre.

Vehicle access to and transit through the ZTL and Pedestrian Areas is allowed from Monday to Friday during the following time windows: 6.30 am to 10.30 am and from 1.30 pm to 3.00 pm, with the obligation to follow the route indicated by the local Traffic Office on the permit to reach the destination point only.

Stopping in the LTZ and in Pedestrian Areas is only permitted near to the destination point, with the engine off without causing hindrance to movement, and for loading and unloading operations only, anyhow not exceeding 30 minutes.

- Couriers for third parties and transporters in general

The access and transit of vehicles is permitted:

- a) In the LTZ from Monday to Saturday from 6.30 am to 10.45 am and from 3.30 pm to 4.00 pm, excluding newspapers deliveries that can be done even during holidays. Parking is only permitted near to the destination point, with the engine off without causing hindrance to movement and for loading and unloading operations only, anyhow not exceeding 30 minutes;

- b) In Pedestrian Areas from Monday to Saturday from 6.30 am to 10.45 am and from 3.30 pm to 4.00 pm, excluding newspapers deliveries that can be done even during holidays. Parking is only



permitted near to the destination point, with the engine off without causing hindrance to movement and for loading and unloading operations only, anyhow not exceeding 15 minutes.

The maximum annual permits limit is two per company.

Category E/S: “Permits to medicines transport, perishable freight, owners or partners of a business and retail shops for perishable goods, salesmen, owners of hotels and bed and breakfast”

The maximum annual permits limit is two per company.

For the permit Category E/S the following provisions are in force:

Medical transportation: access allowed to the LTZ and Pedestrian Areas without limitations in time, with the exception of certain streets subject to a high pedestrian flow, in which the transit is forbidden between 5.00 pm and 8.00 pm. Stopping is only permitted near to the destination point, with the engine off without causing hindrance to movement and for loading and unloading operations only, anyhow not exceeding 15 minutes.

Perishable freight: access and transit is allowed in the ZTL and the Pedestrian Areas without limitations in time with the exception of certain streets subject to a high pedestrian flow, in which the transit is forbidden between 5.00 pm and 8.00 pm. Stopping is only permitted near to the destination point, with the engine off without causing hindrance to movement and for loading and unloading operations only, anyhow not exceeding 15 minutes.

Category M: “Services of public interest, public services, for social purposes and postal services”

Among the vehicles using the category M permit for logistics activities are companies that have permission to operate postal services. In Italy, as in other European countries, the postal market was run by the State until a few years ago. However, as a result of directives for postal liberalisation,

the sector was opened to private competition and now, together with Poste Italiane, other operators can provide postal services. Among professional operators, the fastest to acquire new market segments have been express couriers, characterised by added value services, such as increased speed, shipment tracking, delivery confirmation and the delivery at a predefined time.

The authorisation to perform postal service is widely spread in the world of transport and is often used for goods and deliveries that often are not actual postal services, in order to bypass local regulations and access restrictions to urban centres. This practice has become common in many Italian cities as evidenced by the growing number of operators qualifying themselves as postal service operators, and applying for the related permits (often less onerous) to provide transport of goods, also with significant volumes (groupage delivery, boxes, pallets, etc.). This is the case of express couriers, which, apart from postal services, deliver all the types of goods above mentioned.

Access and transit with permits is allowed in the LTZ and the Pedestrian Areas with no time restrictions. Parking is always forbidden with the exception of vehicles and motorcycles that can stand up to the collection or delivery.

The above regulation is currently under review, as permits and E/S as outlined in section 2 (GC-No. 246 of 12/3/2013). Moreover, the regulation of 2012 is the subject of a substantial review-resolution No. 106 of 5/16/2014 “Creation of load/unload bays -approved experimental phase”. Its most important elements are as follows:

- Creation of 12 load/unload areas for holders of residence permits to access the LTZ;
- Definition of predetermined routes for reaching specific areas for loading and unloading goods;
- Changing of the time windows for reaching such areas and parking for loading and unloading, as well as for the entire restricted traffic zone with anticipation of

morning entrance from 6:30 am to 05:00 am, the postponement of the release time from 10:30 am to 11:00 am and to the postponement of afternoon release time from 3:30 pm to 4:00 pm;

- Extension of entry days including Saturdays;
- Eccess to the whole area of the city centre 0/24 hours for businesses with laboratories – meaning exclusively bakeries, pastries and caterings services. To these activities, the new category permit EL is granted for the sole time corresponding to the period of experimentation.

2.3. LOGISTICS SERVICES AND INFRASTRUCTURES

Alongside logistics services and infrastructures of private operators active in the area of Lucca (DHL, GLS, SDA, BRT, etc.), the local Administration has invested considerable resources to develop specific infrastructures and to enable dedicated services contributing to the rationalisation of logistics processes in urban areas, ensuring greater sustainability. In addition to the technological infrastructure for automated access control, described above, another infrastructure is listed below: Luccaport services and the system of loading and unloading areas, which has been already put into practice, albeit in experimental phase, in 2014.

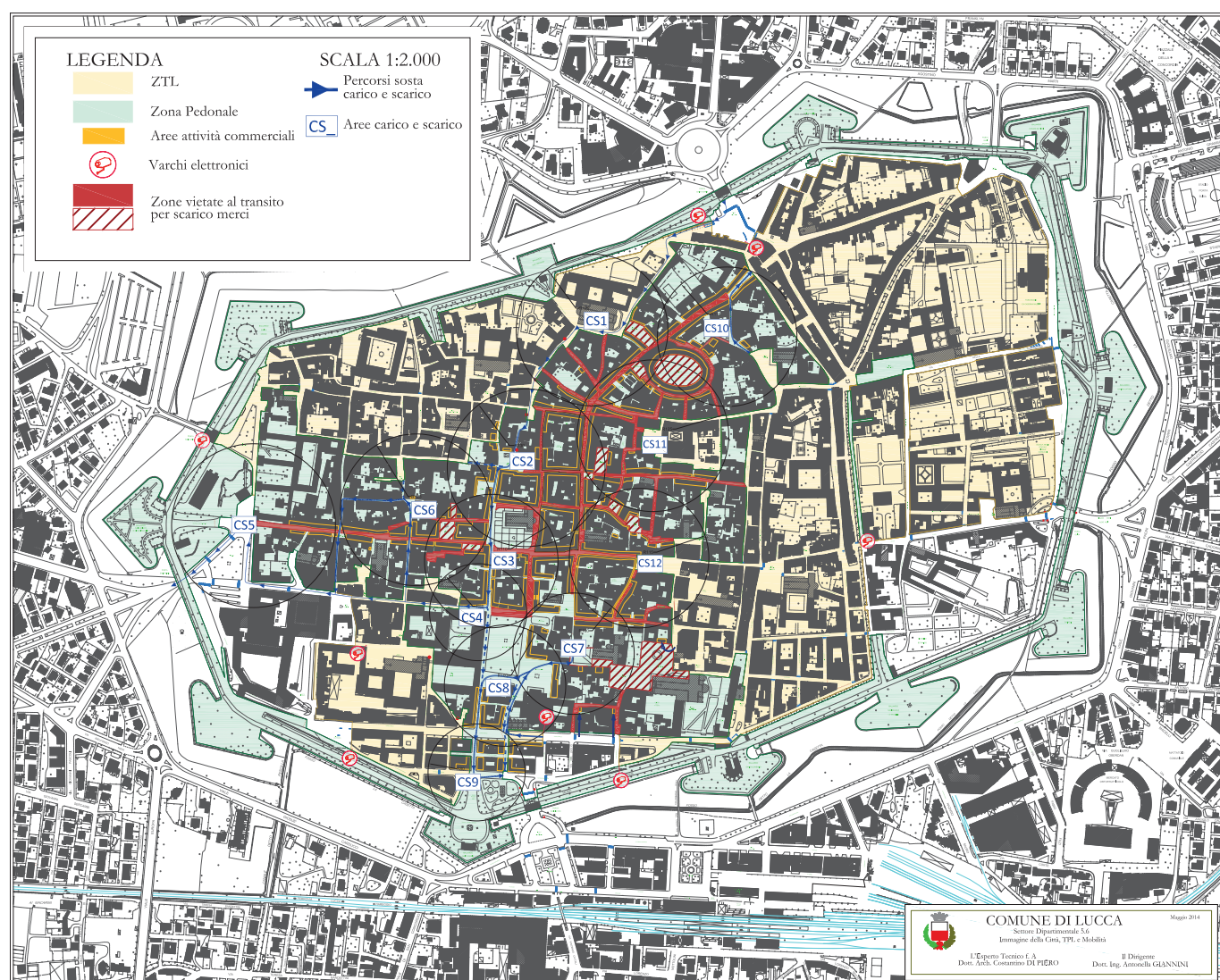
The essential components of Luccaport urban consolidation centre that are crucial for the performance of its services are:

- The logistics base is located in optimal position both in relation to the urban centre and commercial area and to the road and motorway network: the base serves as a transfer and consolidation point for inbound and outbound goods from the urban area and as a structure for the management of additional logistics services for the city of Lucca. The logistics base of Luccaport is located in via delle Città Gemelle n. 162, approximately 1000 meters far from both the toll Highway A11 Firenze-mare and the city walls. The operative parts of the building consist of:

- A covered area for loading/unloading of goods (about 1,000 square meters, with the possibility of future increase through the installation of a mezzanine floor, taking advantage of the high ceiling;
- Two uncovered areas for reception of incoming goods and for loading of environmentally friendly vehicles. The first is approximately 600 square meters, with 4 outlets for unloading goods from up to 4 heavy trucks at the same time; the second is about 300 square meters, since the bulk of electric vehicles are smaller and require less space for manoeuvre.
- The technological platform, designed for the management of logistics services;

Load/ unload Bays	Localization
CS1	Via san Frediano, southern side of Chiesa di San Frediano
CS2	Piazza del Salvatore
CS3	Via Vittorio Veneto at the corner of piazza S Michele
CS4	Via Vittorio Emanuele, at the corner of via Vittorio Veneto
CS5	Piazzale Verdi at the corner of via San Paolino
CS6	Via Burlamacchi, at the corner of Via di Poggio seconda

Load/ unload Bays	Localization
CS7	Via San Giovanni, at the corner of Via Duomo, at the front of Basilica San Giovanni
CS8	Piazza Napoleone, southern side
CS9	Porta San Pietro
CS10	Via Busdraghi, at the corner of via del Portico
CS11	Piazza del Carmine
CS12	Piazza Bernardini, western side





network that is formed also by alleys and narrow streets.

The fleet currently includes:

- 2 Ducato 35 q. electrified Micro-Vett;
- 1 Ducato 35 q. electrified Enerblu;
- 1 ISUZU 35 q. electrified Micro-Vett;
- 1 Piaggio Porter 16 2 q. electrified Micro-Vett

The logistics base LuccaPort is also strongly characterised by marked attention to environmental and energy issues as it is designed to accommodate a large photovoltaic power system allowing a considerable reduction of the environmental impact of the structure itself. The extension of the cover with solar panels has been designed and dimensioned in advance on the basis of the energy required both by the building and by the fleet, in such a way that the logistics base will be fully self-sufficient regarding energy needs.

The evolution of urban logistics measures in the city of Lucca took over 10 years to build an infrastructure to support a delivery service with fully electric vehicles in the historical centre of Lucca. Luccaport currently provides a range of services for different users such as

- Dedicated services for residents: small removals, transport of bulky objects, door-to-door delivery, shipping, temporary storage, etc. In the future, new services for the elderly and disadvantaged users will be activated;
- Services for tradesmen, artisans, organisations and service agencies: delivery and withdrawal of goods and documents, portorage, raised floors or deliveries from stock, temporary storage, retirement packages, etc.;
- Dedicated services for hotels, restaurants and tourists: deliveries and pick-up of goods and documents, portorage, raised floors or deliveries from stock, temporary storage, luggage transfer, wholesale distribution, deliveries in urban areas, etc.;
- Transportation agencies and operators of logistics: deliveries and pick-up of goods and documents, dedicated delivery programs, etc.

A series of added value services are being provided, including temporary storage, delivery services, reverse logistics, freight consolidation and recovery yields, packaging, etc. LuccaPort's objective is to extend and customise its services, in collaboration with transport operators and with the main stakeholders.

With regard to the areas of loading and unloading, it is a project that contributes to the rationalisation of the distribution of goods in urban areas, reducing pollution and land use in the most prestigious shopping street, famous for their historic, architectural and touristic features.

The project is currently in an experimental phase, GC No. 106 of 5/16/2014, and consists of 12 load/unload areas (some of which can be reached with a defined route) located at the addresses in the table in the previous page.

CURRENT STATUS OF THE LOGISTICS PROCESSES IN THE HISTORIC CENTRE OF LUCCA

The current system of logistics processes that ensures the distribution in the city centre of Lucca is a complex system made up of a large number of stakeholders who move also in a wider scenario than the urban distribution. Since 2003, numerous studies have been conducted, helping to identify the key actors and the relevance of the main factors involved, as described hereafter.

3.1. THE DEMAND

The demand for urban logistics services comes from and is represented by the several actors that provide and acquire goods in the area of interest: traders, retailers, manufacturers, artisans, Ho.Re.Ca. (Hotel, Restaurants, Catering) and citizens (as recipients of goods purchased online), tourists and visitors. In addition to these, also the area-related companies of the tertiary sector operating in different sectors of the service sector, as the numerous public bodies with offices based in the historic centre demand for logistic services.

The demand for goods from the actors mentioned above has become increasingly complex in recent years, as a result, for example, of the spread of a policy of “Just In Time” strategy, driven by the need to reduce the costs for the maintenance of warehouses, that require increasingly more frequent and smaller deliveries. Furthermore, the availability of narrow time windows for the delivery / receipt of goods has led to an increase in the number of vehicles used for transporting small consignments of goods. In this way, scale economy vanishes, resulting in increased transportation costs, while the attention to quality, reliability, security and flexibility, requiring investments in sophisticated systems of management systems and control techniques, disappear.

Even private citizens are involved in the process as recipients of goods purchased online: together with the development of e-commerce, in fact, the demand for transport to meet a distribution process from

door to door for small loads rises. As users of the service, individuals are interested in quick and on time deliveries.

A quantification of the demand for logistics services in the area of interest (the historic centre and surrounding areas), limited to the main economic activities and only to the delivery service is reported in the following table.

The data concern the average delivery rate. The main economic activities located in the city centre and in the surrounding areas are illustrated in the following table, showing the average deliveries by product category.



Average delivery rate for different commodities sectors

(year 2011 – LOVELUCCA Project)

Commercial category		Average number of deliveries per week
Clothes		2,71
Food		14,33
Furniture		6,38
Cars, transport, packaging		7,72
Paper and printing		5,49
Chemistry, plastic materials		4,00
Culture, art, publishing		7,37
Ecology, heat engineering		n.d
Public maintenance and construction		0,83
Electronics, electrotechnics		6,13
Public authority, community		n.d
Finance, insurance		n.d
Supply for companies and offices		6,00
Information technology and telecommunications		6,33
Mechanics		8,64
Medicals and cosmetology		6,88
Watches, jewels, gifts		3,95
Professionals, counseling		n.d
Advertisement, services for companies		8,50
Sport		9,42
Tourism		3,97

We also hereby report the distribution of the average delivery rate per week, depending on the supply chain and based on the behaviour of local economic operators. The graph reports the distribution of supply in the different days of the week, showing a fairly uniform number of deliveries, with slight increases on Tuesdays and Fridays. The table highlights that each store is open on average 300 days a year, 50 weeks per 6 days a week.

Distribution of the average number of deliveries during the week (year 2011)

Day		%
Monday		15,7
Tuesday		18,2
Wednesday		16,8
Thursday		17,3
Friday		18,2
Saturday		13,8
TOTAL		100

Distribution of the average number of deliveries at different time slots during the day (year 2011)

Time slot		%
06.00 – 08.00		8,8
08.00 – 10.00		26,9
10.00 – 12.00		26,9
12.00 – 14.00		6,5
14.00 – 16.00		9,2
16.00 – 18.00		15,7
18.00 – 20.00		3,9
TOTAL		100

3.2. FLOWS AND MAIN TYPES OF VEHICLES

In the historic centre and in its immediate surroundings outside the city walls, there are about two thousand business and professional activities, which are the main points of destination of goods flows. The commercial vehicle flow, including those determined by craft activities, involves an estimated number of accesses to the historic centre of approximately 1700 vehicles / day. In particular, data acquired from previous surveys have been verified with specific surveys carried out at the gates to the old town. From these surveys, certain categories of motor vehicles were excluded (private cars, two-wheeled motor vehicles, buses, public transport

services, trucks, taxis, etc.). Researches conducted since 2003 have surveyed 1680 inbound vehicles/day in the time window 8.00 a.m. - 8.00 p.m. The more consistent flow in the inbound traffic, when 247 vehicles entered the historical centre.

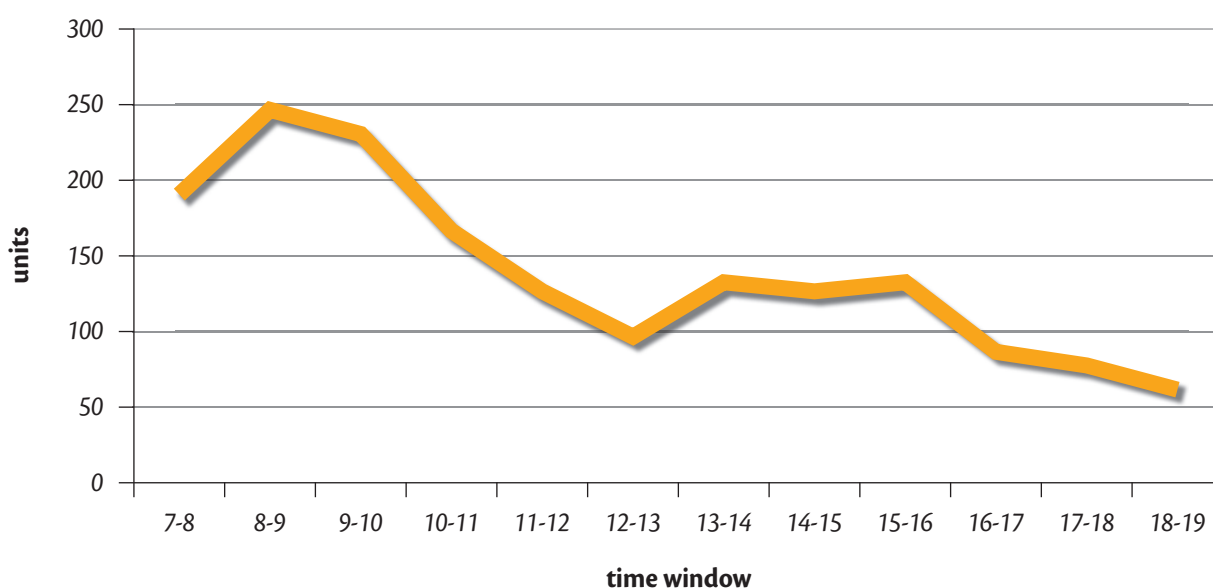
The following table shows the details of goods vehicles' flows, broken down by time slot and type of vehicle, while the following chart highlights the total data per time slot. The recorded data show that, with the current replenishment habits (even in the presence of limitations of time windows for delivery) the entrance of trucks into the city is practically free and concentrates (for more than 56%) during the hours from 08:00 to 12:00 am, with considerable distur-

bance to pedestrian residents and tourists (about 30% of deliveries takes place between 10.00 and 12.00 am). About a quarter of the shops (27,2%) uses its own means of delivery; the rest is served by carriers, shippers and other logistics operators. In addition, in general, the studies have shown a very fragmented freight distribution system, which shows a reduced use of the load capacity of vehicles (< 30%).

Number of commercial vehicles accessing the historic centre per time slot and per type of vehicle

	7:8	8:9	9:10	10:11	11:12	12:13	13:14	14:15	15:16	16:17	17:18	18:19	Tot.
Three-wheeled vehicles	21	25	20	27	8	4	7	7	8	5	5	1	138
City vans	63	115	82	63	53	50	62	56	62	38	39	28	711
Vans	94	98	124	74	64	41	57	51	49	34	31	29	746
Trucks (35 q.)	13	9	5	3	2	2	7	13	14	10	3	4	85
Total	191	247	231	167	127	97	133	127	133	87	78	62	1680

Total number of accesses of freight vehicles in different time slots





Based on the findings of these studies, the vehicles used in the delivery of goods in the historical centre of Lucca were subdivided in different categories, as reported in the following table. For fuel supply, the vast majority of vehicles has diesel engines.

Number of vehicles, absolute and percentage, subdivided by type of vehicle

Vehicle type	N.	%
Three-wheeled vehicles	138	8%
City vans	711	42%
Vans	746	44%
Trucks (35 q.)	85	5%
Total	1680	100%

Light commercial vehicles in Lucca county divided by emission standards (year 2011)

EURO 0	EURO 1	EURO 2	EURO 3	EURO 4	EURO 5	EURO 6	TOTAL
13%	8%	19%	30%	28%	2%	0%	100%

Emission standards for light commercial vehicles between 1760 kg and 3500 kg Categories N1-III & N2

	Date	CO (g/km)	THC (g/km)	NMHC (g/km)	NOx (g/km)	HC+NOx (g/km)	PM (g/km)
Diesel	(g/km)	NMHC					
Euro 1	(g/km)	NOx	-	-	-	1,7	0,25
Euro 2	(g/km)	HC+NOx	-	-	-	1,2	0,17
Euro 3	(g/km)	PM	-	-	0,78	0,86	0,1
Euro 4	(g/km)	0,74	-	-	0,39	0,46	0,06
Euro 5	Sept-10	0,74	-	-	0,28	0,35	0,005
Euro 6	Sept-15	0,74	-	-	0,125	0,215	0,005
Gasoline							
Euro 1	Oct-94	6,9	-	-	-	1,7	-
Euro 2	Jan-98	5	-	-	-	0,7	-
Euro 3	Jan-01	5,22	0,29	-	0,21	-	-
Euro 4	Jan-06	2,27	0,16	-	0,11	-	-
Euro 5	Sept-10	2,27	0,16	0,108	0,082	-	0,005*
Euro 6	Sept-15	2,27	0,16	0,108	0,082	-	0,005*

3.3. TRANSPORT OPERATORS: THE SUPPLY

The number of transportation companies registered with the Companies Register of Lucca (Province of Lucca) is about one thousand, of which more than a half is made up of individual firms (padroncini). The share of goods directed to the city centre is handled in large part by a limited number of authorised operators (cooperatives, individual firms, large and medium-sized transport companies), although there is also a very high number of operators accessing the historic centre and the surrounding areas to make a limited number of deliveries. In addition, incoming goods in the city come as well directly from suppliers without legal or opera-

tional headquarters in the province of Lucca. Finally, many operators provide transport on their own account. Over-

all, about a quarter of the deliveries made in the historical centre of Lucca is constituted by express delivery.

Synthesis of the average number of last mile deliveries in Lucca historic centre and surrounding areas

Type of delivery	Week	Year	Day
EXPRESS DELIVERIES	2797,2	139859,2	559,4
OTHER DELIVERIES	7031,0	365047,8	1460,2
TOTAL	10098,1	504907,0	2019,6

The goods distributed in urban areas may follow different paths (distribution channels) that imply different impacts on mobility. By following the flow of goods from producer to consumer, the following downflows can be identified:

- Distribution centres, nodes of the logistics system mostly for activities related to storage and sorting of goods: here large lots from producers are received, which are then allocated on the basis of orders received from customers, consisting of different articles, for the supply of stores;
- Wholesalers, organised as commercial companies, that generally buy in large lots from different manufacturers and resell in smaller lots to retailers at an increased price to cover the management costs and with a profit margin (mark-up);
- Transport companies that, with the support of their own structure, ensure the operations of transport, the delivery of goods flows and the execution of numerous other logistics services.

Taking into account the presence of these intermediate structures, the different distribution strategies can be distinguished in:

- Direct transport from producer to consumer, with delivery in small lots with numerous travels, widespread on the territory;
- Supply of small retailers: retailers, artisans, accommodations, restaurants and catering (Ho.Re.Ca), with medium-size lots and frequent deliveries to the city centre;
- Supply of large retail chains, with few deliveries with significant volumes of goods and the use of vehicles of medium and large size, even outside the city centre.

The atomisation of the transport services supply sector, and in particular the large quantity of transports, generally produce a poor optimisation of the distribution, both in terms of load consolidation of

the vehicles and in terms of route optimisation, and slows down the diffusion of shared information systems that enable the optimisation of loads, route planning and vehicles' optimal routes.

Logistics operators engaged in freight transport services are mainly managers of logistics areas adjacent to urban centres, transport operators and haulage contractors.

Managers of logistics areas located outside the city centre are interested in a greater involvement in the planning of urban logistics and in the provision of areas for freight management and the consolidation of logistics services. Transport operators, both working on their own account or for third parties, are interested in the possibility of increasing the efficiency of the service and of reducing management costs. In fact, in many cities, parked vehicles often restrict the space of passage and contribute to the delay in deliveries, and the bad condition of road surfaces can increase the costs of distribution, adding safety issues and deteriorating the quality of transport (e.g. risks to damage the goods). In addition, many commercial areas of the city centre often suffer from a lack of adequate facilities for loading and unloading, or, when present, of inefficient management of them.

3.4. ESTIMATE OF ENERGY CONSUMPTION AND QUALITATIVE CONSIDERATIONS

The definition of reference indicators is the prerequisite to properly assess the effectiveness of the actions envisaged by a

sustainable urban logistics plan and the achievement of its objectives. The use of indicators allows to carry out an ex ante assessment on the potential impacts of actions, i.e. the effects expected for each individual action; to verify the results of ongoing actions introduced, the trend of the overall policy identified by the plan and its compliance with the objectives set; to identify actions poorly incisive and implement any corrective actions.

In urban areas, freight distribution accounts for about 26% of the total emissions related to transport¹. The exact calculation of the level of pollutant emissions from freight transport is difficult to achieve. However, the studies carried out over the urban area of the city of Lucca and in particular on its historic centre allow a rough estimate of the emission level of the major pollutants related to logistics processes within the city walls.

This estimate, shown in the following table, was made on the basis of the data of the accesses to the historic centre and the population of commercial vehicles, divided by load capacity and emission standards. These values are also strongly linked to the Lucca context, in terms of road network and traffic and type and characteristics of businesses and deliveries, as described in the previous sections.

It is also important to emphasise that part of these emissions, estimated at around 15 %, has already been reduced thanks to the activity of Luccaport and regulatory policies put in place by the city of Lucca in recent years.

Estimation of emissions of main pollutants

Pollutant					
NOx	HC + NOx	CO	PM	CO ₂	Energy
2950 kg/year	3200 kg/year	9100 kg/year	390 kg/year	1300 Ton/year	5700 MWh/year

¹ European Commission, White paper 2011 – Roadmap to a Single European Transport Area. Towards a competitive and resource efficient transport system. Impact assessment



3.5. MAIN ISSUES AND RATIONALE OF THE PLAN

In Lucca, as in other Italian cities, freight transport and distribution are, together with private transport, a major cause of energy consumption, greenhouse gas emissions and increased levels of noise, and contribute to the well-known negative impacts on quality of life and urban environment, also taking into account that Lucca economic activities are, like many Italian and European cities, mainly related to services, commerce and tourism.

In this sense, the Municipality of Lucca has invested, in recent years, increasing resources in interventions aimed at the overall sustainability of the urban mobility system, and has put in place real measures / actions to improve urban logistics services, reducing environmental and social impacts and directing them towards full sustainability and development.

The improvement of the urban environment and, ultimately, of the quality of life of residents and visitors, is the main motivation that underlies the rationalisation of freight distribution processes in urban areas, together with the increasingly pressing needs for upgrading and developing the economic structures of town centres, often severely compromised by the negative effects of motorised traffic.

It is well known that, in addition to direct impacts such as pollution and occupation of public land, the road freight transport produces negative externalities (social and environmental costs) of various kinds, due to emissions of air pollutants, greenhouse gas emissions and noise, also linked to congestion and accidents. Especially with regard to pollution (air and noise) and congestion, urban environments are particularly vulnerable, due to the combined effect of high traffic density and of high concentrations of population. Moreover, in art cities such as Lucca, to these adverse

effects must be added the considerable damage caused by air pollution to the artistic heritage. There are many estimates of the social and environmental costs associated with such externalities. The estimates made by various research institutes, both Italian and European, which have recently been collected in a document of the European Commission (Handbook on estimation of external cost in the transport sector), agree to ascribe an extremely high economic value to the externalities arising from the distribution of goods in urban areas. The full internalisation of social and environmental costs might constitute by itself a sufficient measure to discourage most motorised traffic entering the historical centres of cities. However, it appears clear that, nowadays, no European city has had the strength to fully implement the "polluter pays" principle. The planning of logistics processes is part of a larger and broader planning activity of mobility, which essentially has a vision of planning infrastructure and transport networks in urban areas and represents a real opportunity of city development with a strategic vision, that coordinates all the components of the complex system of mobility (systemic plan), which has visions planned through time (process-plan), whose effects are measurable in the course of implementation. The sustainable urban logistics plan is an important part of this and in order to make it possible and to prevent that the actions of the Plan do not produce the expected effects, it is essential to structure a monitoring system capable of testing the effectiveness of and compliance with the schedule, and/or that might highlight the need to review, or introduce new and more effective actions to achieve its goals.

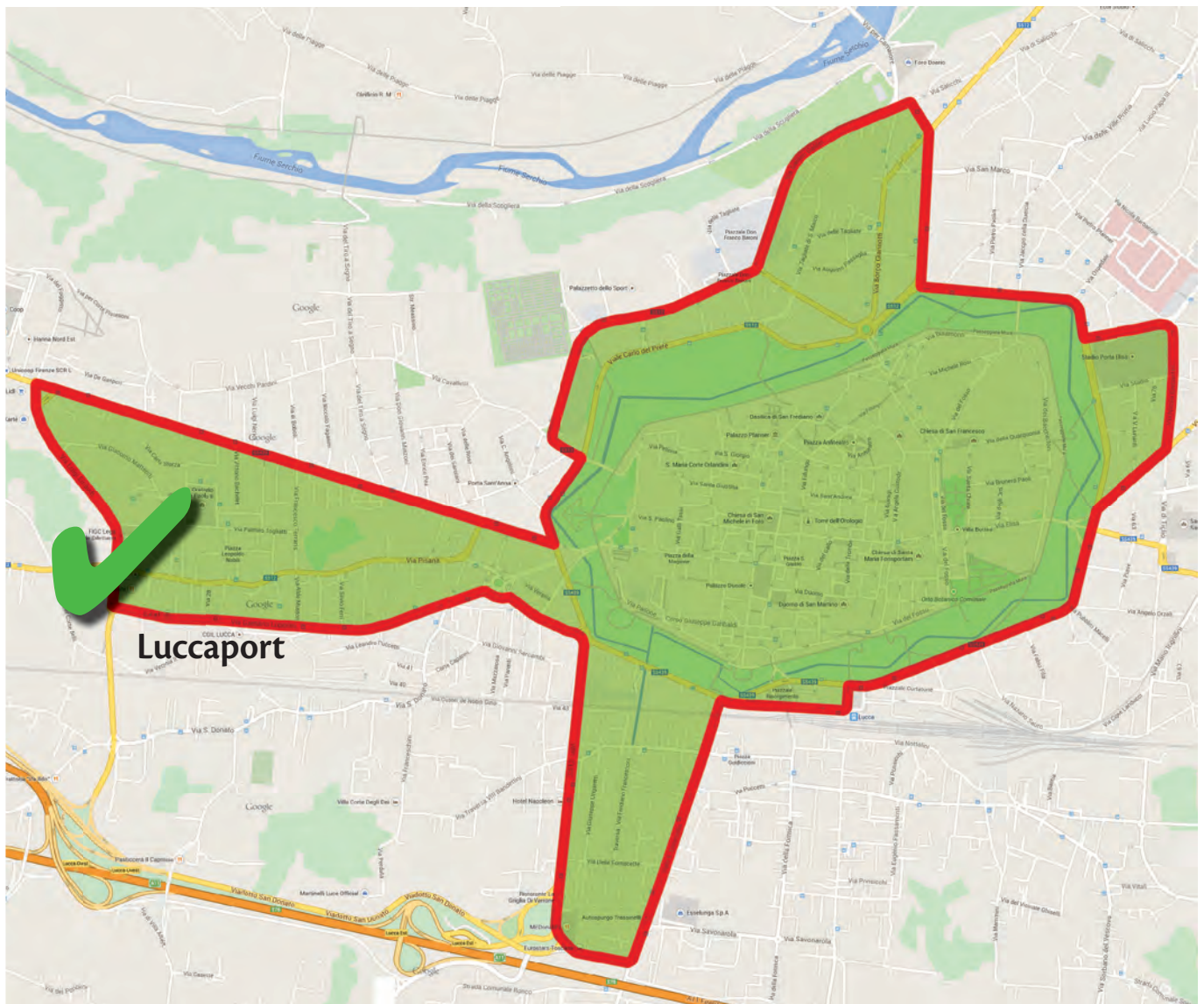
Starting from the results of the analyses and assessments developed in recent years by the municipality, describing the current state of the system of logistics processes, it will be possible to

develop monitoring activities that will accompany the various phases of the development of the plan. The systematised collection of information will define a framework, as much representative as possible of the current system, divided into statistical and spatial data (population, employees, number of freight vehicles, number of deliveries), demand for quality logistics services and transport of goods, obtained on the basis of sample surveys, measurements and simulations, data on supply logistics, environmental data (air quality, noise levels, ...), traffic data and network load (road traffic flows, modeling assignment, data on accidents, ...). The data, properly interconnected, will constitute the starting reference indicators (ex ante evaluation); these must be associated with the indicators of the expected results achievable with the implementation of the plan, according to a set of shared objectives and confrontations with the various stakeholders. The indicators will allow periodic verifications of the effectiveness of the interventions and of the implemented measures (ongoing evaluation).

Beyond the data analysis, labour associations will be directly involved in discussions, in order to make them actively participate in the definition of the plan's actions. The plan reference is the 2030 scenario, with an intermediate scenario in 2020. The plan has as its reference territory the historic centre and some areas of the first urban outskirts, constituting a natural system of shopping malls (historic centre, San Concordio, Arancio, Borgo Giannotti and Sant'Anna) expressing a wide variety of economic activities: trade, craft, professional, etc.

The strategy behind the plan is to rationalise freight distribution processes in urban areas, within the context of the overall mobility, by increasing the level of sustainability of logistics services, enabling a hard-hitting policy of low environmental impact transportation,

encouraging the use of electric vehicles and the transport of goods with vehicles alternative to high-emission vehicles, pursuing transport sustainability, in respect of health, safety and environmental protection.



Luccaport operation area



OBJECTIVES OF THE SULP OF LUCCA

The objective of this Sustainable Urban Logistics Plan is to create a smarter urban freight distribution system in the urban area of Lucca, for a better quality of life for residents, tourists and visitors, actively pursuing the improvement of the urban environment of the city.

The SULP promotes an integrated urban transport of goods. In this direction, we define the following guidelines (priority objectives of the plan).

The policy directives, on which the Urban Logistics Sustainable Plan of Lucca will develop, are closely related:

- *Improving air quality and urban environment, consistent with environmental standards promoted reducing emissions, noise;*
- *Reducing the carbon footprint of freight transport in the urban context, with a consequent reduction in emissions of climate-altering gases, in accordance with the objectives of the SEAP;*
- *Minimising the negative impacts of distribution activities on the livability of cities;*
- *Ensuring the efficiency and effectiveness of freight transport, by reducing the number of delivery trips and maximizing the load capacity of the vehicles;*
- *Improving the quality of logistics services available to the city of Lucca;*
- *Ensuring and improving the accessibility of the territory through the reduction of traffic congestion;*
- *Encouraging the use of low-emission vehicles and electric vehicles for deliveries in the historic centre;*
- *Ensuring efficiency and safety in the roads and transport system;*
- *Reducing externalities due to heavy traffic (health effects, damage to the historic and architectural heritage, etc.);*
- *Governing mobility through innovative technologies and info-mobility.*

The strategic objectives will descend, from the policy directives, with the identification of the actions for their achievement and the definition of indicators to measure the effectiveness of such actions during the implementation of the Plan.

In prospect, thanks to the implementation

of the Sustainable Urban logistics Plan, Lucca will strengthen its role as best practice of sustainable urban logistics at European level, achieved through significant investments by the Public Administration over the past 10 years.

SOLUTIONS FOR A SUSTAINABLE URBAN LOGISTICS

5.1. MEASURES, SCHEMES AND SERVICES

In order to rationalise the goods mobility system in the urban area of Lucca, the Plan foresees the following measures:

1. Reinforcing the services provided by Luccaport;
2. Introducing a technological approach to loading and unloading bays;
3. Reinforcing the LTZ access regulation, following the principle "polluter pays";
4. Enhancing the technologies supporting mobility, focusing on the implementation of an ICT solution for LTZ access and exit control;
5. Agreements with transport operators;
6. Cargo bikes.

5.1.1. REINFORCING THE SERVICES PROVIDED BY LUCCAPORT

Luccaport is an important asset for the rationalisation of the urban logistics processes of Lucca. The reinforcing strategy for Luccaport's services is structured in three phases, the scheduling of each could partially lay over the others.

PHASE 1 - Granting of concession to a private operator

The granting of concession of Luccaport to a private operator, awarded by public tender, will allow the development of the services achieving relevant market shares and the development of new and innovative services that will benefit the city. Some of these services have been already foreseen in the public tender rules. Among the others are:

- *Development of the third party transport activities (first and last mile)*

Trade relations with economic operators should be intensified upstream and downstream of the transport chain. In particular, given that the pool of potential customers for the main business of transportation and / or logistics activities relevant to the city centre is over a hundred units, it is necessary to ensure that operators will increas-

ingly turn to Luccaport in order to reduce the number of polluting vehicles circulating in the city centre.

- *Eco Third party deposit*

Luccaport is also able to activate a third party goods deposit service towards the economic categories of the historic centre of Lucca and the other operators that distribute in the historical centre and in the nearby areas, distributing then the goods stored by the Luccaport electric vehicles fleet. This type of service has been frequently referred to as a service of interest to many businesses settled in the centre of the city and their associations. In addition, several wholesalers have already shown interest in using a storage area next to the city for distribution activities. The development of this type of activity needs firstly an adaptation of the logistics base with the addition of a mezzanine level, already foreseen in the initial design of the depot, to increase the surface area. The space that could be made available will be integrated by handling services and specific delivery plans. The ICT management system will allow subscribed users to interact with the logistic base through specific management tools available online or via App.

- *Photovoltaic system installation*

In order to further characterise the environmental attitude of Luccaport activity, the installation of a photovoltaic system is foreseen, from which Luccaport and its activities could benefit. It would improve the company and its services image and give an important economic benefit in carrying out the activities.

PHASE 2 - Projects with the interested economic categories

It is necessary to develop shared projects with the interested economic categories. Some projects of common interest were discussed in the technical tables, e.g., pick up of parcels with daily periodicity and development of activities of third party goods deposit for the economic operators of the city centre.



The service contract with the Luccaport concessionaire includes a worktable with the categories, which could be a permanent tool for the definition and development of new joint projects. An example could be the “Smart packaging pick up”. With its electric vehicles, Luccaport is able to provide a service of collection of empty cardboard packaging to dispose of, produced by commercial activities in the city centre, integrating the service already offered by Sistema Ambiente. This activity, requested several times by economic categories to avoid retaining packaging in the store until the periodic collection by Sistema Ambiente, could be carried out by Luccaport electric vehicles with a frequent and organised collection.

PHASE 3 - Communication at the appropriate territorial level

The implementation of an effective communication of the services offered in the Lucca area is an important lever for the development of Luccaport activities. Investment in the communication activities has been very low so far, as experimentation and demonstration have been favoured. It is therefore necessary to initiate a more effective communication in order to raise awareness of the initiative among citizens and economic operators, including its benefits and the services provided by LuccaPort. Starting from the tools that have been developed for LuccaPort during 2012 (flyers, brochures, services and website, etc.), specific communication activities should be built, both in respect of citizenship (e.g., communication-oriented such as the promotion of the initiative in schools), and to the economic operators and stakeholders.

Despite the limited local visibility, the initiative is more and more popular, both in Italy and abroad, and arises increasing interest from many local administrations, also because of the establishment by the local government of the International Association Città Logica - Logical Town, for the promotion of sustainable urban logistics.

5.1.2. INTRODUCING A TECHNOLOGICAL APPROACH TO LOADING AND UNLOADING BAYS

Loading and unloading bays are going to be the subject of an experiment that would contribute to rationalise the distribution of goods in the urban area, reducing pollution, and the occupation of public land by goods transport vehicles in the most commercial touristic and historical-architectural valuable streets.

The limited space on the streets of the historic centre imposes a limit to the realisation of new loading and unloading bays. Therefore, the availability of a bay may represent a problem for the operator concerned. Moreover, both the number of operators potentially interested and the time windows of the bays accessibility are variables not yet analysed. The project foresees 12 loading and unloading bays, some of which reachable by a set route, and a trial period, which will provide useful information to better define these issues. Nevertheless, the experience of other Italian local administrations showed that the use of the bays can be optimised with a technological approach.

From a technological point of view, the Plan foresees that the loading and unloading bays will be equipped with detection sensors (ultrasonic or induction) of vehicles allowing to identify the transition from the free stall condition to the occupied stall and vice versa, thus determining the dwell time for each vehicle on each stall. This action is coherent with the Lucca PAES objectives (line of action B4).

The system of control and management of parking for loading and unloading goods will be composed of:

- 1) A peripheral infrastructure (loading and unloading areas) with sensors and a concentrator for each area communicating by mean of a wireless connection with the sensors and connected by UMTS network;
- 2) A station with a specific software that collects information about the occupation status of the stalls sending it to

handheld devices in use at the municipal police, that will be able to view the status of singular stalls, in order to check, in a second step, only those for which there were no changes from “occupied stall” to “free stall”.

The information about the state of occupation of the loading and unloading bays (busy / free) will be made available in real time for transport operators via online services, and especially by a specific App for Smartphone. Loading and unloading bays could therefore be booked by operators that will be sure of their availability at the time of their arrival. The management system could generate statistics regarding the use of parking areas useful for further development or for their optimisation.

5.1.3. REINFORCING THE REGULATION TO ACCESS THE LTZ FOLLOWING THE PRINCIPLE OF “POLLUTER PAYS”

The current regulation for commercial vehicles to access the LTZ foresees the need of a specific permission and temporal constraints and is linked to the type of vehicle (size and emission standards in relation to the green zone). In other words, Euro 0 and Euro 1 diesel vehicles cannot circulate in the city centre.

In Lucca, also in reason of the activity of the goods distribution centre Luccaport, it is possible to subsidise access to the centre by zero-emission vehicles and with a fixed minimum percentage of loads. The regulation for the management of freight traffic could therefore be significantly revised. In this regard, the City Council has many opportunities to intervene in the review of the regulatory policies of freight flows and the definition of rules facilitating the development of Luccaport. Keeping the collaborative approach distinguishing Luccaport and its governance toward the various stakeholder groups, it is possible to predict that the regulatory incentives, not intending to make a complete closure of the historic centre to freight vehicles, will

make use of a variety of technical measures discouraging the access to the historic centre and encouraging the use of the services of the distribution centre Luccaport. These can be based on vehicle characteristics (EURO 1-5, methane, hybrid, electric, etc.), on the differentiation of access fees, and then they may evolve, once introduced the access control system, in Pigovian policies based on dynamic fees based on the number of accesses and the length of stay, green certificates, etc.

These solutions are based on the principles recognised at EC level, establishing a framework for environmental responsibilities, the “polluter pays”, to prevent and repair damages to the environment (Directive 2004/35 / EC, White Paper on Environmental Liability, 2000), and on the need to interiorise in the policies the necessity to charge the costs of externalities from traffic, and apply fees proportionate to the length of stay in the LTZ, to the number of accesses and to the type of vehicles used for transporting goods. From the national legislation point of view, these measures are justified as part of the rules of the road (in part. Art. 7 and 9), which allow municipalities to restrict the movement of all or certain categories of vehicles, to prescribe time slots, and reserve spaces for vehicles used for the loading and unloading of goods. In addition, the Code foresees the possibility for municipalities to subordinate the access or the circulation of motor vehicles into the LTZ to the payment of a fee. Such a pricing policy would in any case face the problem of granting the access to public or public interest services, which now have complete access to LTZ, justified by the very nature of the services provided.

The specific rules for the transport of goods will be outlined in a specific regulation called “ZTL Goods” that includes a qualification of the vehicles circulating and their reduction through the gradual suppression of the time window in the afternoon and the opening of the morning one to less polluting vehicles, as defined according to the standard emission of the vehicle. An access

restriction to EURO 3 and subsequently to EURO 4 vehicles would operate in a very favourable way to less polluting transport modalities, in particular electric vehicles transport, in case the current annual subscriptions fees for access would also be revised. These are in fact much lower than the average of the most advanced experiences in Italy (see Committee resolution n. 158/2010). A differentiation of the rate based on the emission standards, which is proportional to the pollution caused, should be foreseen (eg. A EURO 3 vehicle pollutes about 4 times more than a EURO 5). After the enforcement of the rules specifically related to freight services, also the completion of the revision of the remaining parts of the rules to access the ZTL may allow a further upgrading of the commercial vehicles circulating in the city, through a revision of the different special conditions granting the access. A regulation for the access to the ZTL incentivising freight transport by mean of electric vehicles is also appropriate to support the development of Luccaport activities described in section 5.1.1. The foreseen interventions are coherent with the Lucca PAES objectives (lines of action B2 and B3).

5.1.4. ENHANCING THE TECHNOLOGIES SUPPORTING THE MOBILITY FOCUSING ON THE IMPLEMENTATION OF AN ICT SOLUTION FOR LTZ ACCESS AND EXIT CONTROL

Currently the system of access control to the LTZ can determine if the access of a certain vehicle takes place within the right time window and if it has the required authorisation. The system is not however able to determine the time of exit of the vehicle from the LTZ. With regard to goods transport, not being able to automatically fine the offender when he does not comply with the time limits established by the current regulation determines an illicit extension of the stay of freight vehicles into the LTZ, since only the Local Police is entrusted to verify.

The adoption of a radio frequency based system for the recording of the entry and exit from the limited traffic zone (LTZ) of commercial vehicles will obviate this problem. It will be possible to determine the time of exit from the LTZ and possibly fine the offender automatically. The control system, which will be imperceptibly integrated to the one used by the LTZ, will consist of an automatic identification system of tags (RFID) placed in the permit card allowing the access that each vehicle must expose, and will allow to monitor the stay in the LTZ and verify compliance with the time windows. The system will be implemented with the installation of readers on several gates of entry and exit routes to and from the LTZ. The measure also foresees a management software that will be made available to the subjects currently authorised to operate on the LTZ access control and verification software (eg METRO and Local Police), and this will allow to perform a systematic data collection and subsequent analysis of the freight traffic in order to better define the future planning and related regulations of the local administration. The system could scale up including new functions, as:

- Adding further identification portals inside the LTZ in order to trace a certain vehicle;
- Allowing the control body (Local Police) to verify the lawfulness of the presence of vehicles into the LTZ by mean of a handheld device able to “read” the RFID included in the permit card exposed in the vehicle and exchange data with the control station;
- Integration with the access system to the load/unload bays;
- Possibility of creating an access control “light” to prestigious areas of the historic centre.

5.1.5. AGREEMENTS WITH TRANSPORT OPERATORS

The contribution that the largest companies in the transport sector operating in



the area can offer is important in order to rationalise the distribution system. With the assistance of their trade associations (eg. AICAI) and other stakeholders concerned, specific agreements will be made with major industry players active in the distribution of goods in the historic centre to mitigate the effects caused by their activities over the urban area. In particular, examples of such agreements are those made between the trade associations of transport and municipalities of the metropolitan areas with the support of the Ministry of Infrastructure and Transport. These voluntary agreements that may be subscribed by operators in exchange of flexible access policies and shared principles of corporate social responsibility, will contribute to the rationalisation of the distribution system. Such agreements may for example relate to the use of less polluting vehicles, according to the PAES line of action B2 or restrictions on access to specific areas and shall involve traders who make a large number of logistics operations on the territory, above a certain threshold to be determined, or which are equipped with logistics platforms in the proximity of the city centre, thus ensuring a greater consolidation of goods.

5.1.6. CARGO BIKES

Subsidising more sustainable methods of transport is an essential action to rationalise the distribution of goods in urban areas. Rethinking urban mobility in terms of sustainability is in fact also to consider unconventional solutions to needs historically linked to urban living. This is particularly true in a city like Lucca in which transport by bicycles is developed as demonstrated by the investment of the Administration in the extension of the network of bike lanes. For some types of goods, as well as some special urban centres or for specific and limited urban areas, it is possible to think of a "light" way to transport by mean of specific trolleys or bicycles, using cargo bikes. The Cargo bike is an efficient means of transportation to make 100% sustainable last mile deliv-

eries. Cargo bikes can carry small loads of goods, with the great advantage of producing no CO₂ or other polluting particles and do not produce noise pollution: cargo bikes are perfect for transporting light loads (80 to 200 kg or more) for short distances and for this reason are ideal for use in town centres and urban areas.

In addition, unlike electric vehicles, Cargo bikes help to reduce urban traffic congestion, and then as a whole, they are a useful means of providing the needed services, while maintaining the environment of the city livable and improving the image of the city.

Their use can be promoted among the operators of freight, if this does not result in a loss of efficiency of the service. For example, a service of cargo bike sharing may be available to operators' subscribers at the loading and unloading bays so that they can optimise the final stage of the route of delivery or encouraging solutions to operators who have operational bases close to the historic centre.

In 2011, the European Union promoted a study to determine the feasibility of the bicycle as a means of transport for some forms of shipping. A recent project sponsored by the European Union - Cyclelogistics- designed to evaluate scenarios of bike mobility in European cities, has a business plan for a freight logistics, which has its strong point in cycling. CycleLogistics from 2011 to date has managed to motivate several municipalities, which in some cases adopted favorable regulations, evaluating the potential use of cargo bikes for municipal services. For this reasons, the cargo bike is leaving his position of niche market, presenting itself as a real alternative for transporting light goods in city centres.

The use of this method is an interesting opportunity for the development of Luccaport that could integrate this means of transport into the fleet of environmentally friendly vehicles for small deliveries or to develop services for the collection and distribution of goods point to point in the historic centre, such as pony express.

5.2. REGULATORY SUPPORT MEASURES

The measures provided for in this Plan shall be regulated by successive revisions of the regulative "framework" for LTZ access and parking (as defined in resolution GC n. 17 of 07/02/2012 and further articulated by resolution of the GC - n° 246 of 03.12.2013) and the concession agreement for Luccaport. These rules will subsidise the use of electric vehicles of low environmental impact, including cargo bikes, and then the use of the services offered by Luccaport.

5.3. SUPPORTING INFRASTRUCTURES

The infrastructures needed to support the implementation of this Plan are essentially already in place:

- Luccaport: Lucca ecological goods distribution centre;
- LTZ access control system with entrance tracking system (active) and outgoing (to be activated, already co-financed by the Tuscany Region with the project Lucca-Mo on the line of action of the IV.4a Por Creo 2007-2013);
- Load-unload goods areas with predetermined access routes (running in the short term);
- Lucca Mobility web Portal (Mobilù) providing information to users on the processes related to mobility (running in the short);
- Cargo bikes sharing system (to be implemented by 2020) in loading and unloading bays.

Some of the measures described above require the integration of some existing infrastructure such as those needed for the new activities planned for Luccaport (loft industrial) and the PV system to power the fleet of electric vehicles.

5.4. RELATIONS WITH MAIN STRATEGIES AND OBJECTIVES

The objectives of streamlining the processes of urban logistics with consequent

benefits for the environment and for the overall mobility are consistent with the major plans and strategic objectives of the Municipality of Lucca already in place or under development. Among these are:

- PAES - Action Plan for Sustainable Energy;
- Forecasting and planning report;
- Subscription of the Covenant of Mayors;
- Climate Change Plan;
- Cycling Plan.

They are also consistent with the content of the Plans that are in progress and will be completed shortly

- Urban Traffic Plan (to be updated);
- Sustainable Mobility Plan (to be completed by 2015);
- City Planning (to be completed by 2015).

In addition, the objectives of this Plan are consistent with the policies of the EU and the national and regional ones working to mitigate the impacts of transport. In particular, the European Commission communications COM (2008) 433 of 08 July 2008 "Greening Transport", COM (2009), n. 279 of 17 June 2009 "A sustainable future for transport: Towards an integrated, technology-led and user friendly system" and COM (2011) n. 144 of 28 March 2011 "White Paper - Roadmap to a Single European Transport Area - Towards a competitive and resource efficient transport system" invite member states and European cities to a more efficient distribution of goods in urban areas in order to improve air quality in the urban environment and significantly reduce CO₂ emissions with the aim of achieving a CO₂-free city logistics ("CO₂-free logistics") by 2030.

In Italy, the strategic importance of the logistics sector has prompted the government to enable interventions to promote sustainable development at all levels. At the local level, it should be noted that almost all of the municipalities of medium to large size in the course of time have developed systems to regulate the traffic of goods, introducing specific rules to govern the traffic flows and more generally the organisation of the distribution of goods. A growing attention to the issue has de-

veloped in recent years, even in Provinces and Regions (Integrated Regional Plan for Infrastructure and Mobility – PRIIM established by LR 55/2011, by Tuscany Region), while at the national level, the theme was recently raised from the National Logistics Plan 2011-2020.



DESIGN OF MEASURES AND IDENTIFIED SERVICES

6.1. REINFORCEMENT OF SERVICES PROVIDED BY LUCCAPORT

Facilities	Luccaport Urban distribution centre - Industrial mezzanine - Photovoltaic system				
Legislation/regulation and legal constraints	Service contract with Luccaport operator (concessionaire)				
Type of fleet, ICT support systems	ICT platform for third-party warehouse management				
Operational dimension and organisation (characteristics, resources and management model)	Integrated into Luccaport management				
Roles and responsibilities	Municipality of Lucca: owner of distribution centre Luccaport operator (concessionaire): responsible for the investments needed for the implementation, management and maintenance				
Costs estimation: main investment costs, operational costs and maintenance	Investment costs at the expense of Luccaport concessionaire: Industrial Mezzanine: 200 € / m ² with minimum 100 m ² of warehouse surface up to a maximum of 600 m ² Photovoltaic system: round 3k€ per KW/hp Integration/replacement of the FEV fleet: variable, depending on service levels.				
Estimated completion time	Foreseen by 2020 in the service contract (contact with operator (concessionaire) by 2014)				
Estimate of environmental impacts and energy savings	CO ₂ (kg) 28000	NOx + HC (kg) 52	CO (kg) 120	PM (kg) 5,8	Energy (kWh) 110000

6.2. LOADING AND UNLOADING BAYS (TECHNOLOGICAL APPROACH)

Facilities	Already defined, testing of load/unload bays expected by the end of 2014				
Legislation/regulation and legal constraints	Specific ordinance for access to the LTZ for the testing period				
Type of fleet, ICT support systems	ICT booking and management system of parking in loading-unloading bays				
Operational dimension and organisation (characteristics, resources and management model)	Traffic department of Municipality of Lucca, METRO, Local Police				
Roles and responsibilities	As those allocated for the management of access permissions to LTZ				
Costs estimation: main investment costs, operational costs and maintenance	Approximately € 40,000 with annual maintenance costs of approximately € 5,000				
Estimated completion time	By 2020				
Estimate of environmental impacts and energy savings	CO ₂ (kg) 12000	NOx + HC (kg) 30	CO (kg) 85	PM (kg) 3,7	Energy (kWh) 53000

6.3. REINFORCEMENT OF LTZ ACCESS REGULATION FOLLOWING THE COMMUNITY PRINCIPLE “POLLUTER PAYS”

Facilities	Automatic access control system to existing LTZ				
Legislation/regulation and legal constraints	Revision of LTZ regulatory framework				
Type of fleet, ICT support systems	ICT access control system already in place				
Operational dimension and organisation (characteristics, resources and management model)	Traffic department of Municipality of Lucca, METRO, Local Police				
Roles and responsibilities	As those allocated for the management of access permissions to LTZ				
Costs estimation: main investment costs, operational costs and maintenance	None				
Estimated completion time	2020				
Esteem of environmental impacts and energy savings	CO ₂ (kg) 65000	NOx + HC (kg) 200	CO (kg) 610	PM (kg) 26	Energy (kWh) 285000

6.4. REINFORCEMENT OF TECHNOLOGIES SUPPORTING MOBILITY AND IN PARTICULAR THE TRACKING SYSTEM OF ENTRANCE AND EXIT TO LTZ

Facilities	Entrance and exit tracking system based on RFID system				
Legislation/regulation and legal constraints	Revision of LTZ regulatory framework				
Type of fleet, ICT support systems	ICT access control of RFID tracking system				
Operational dimension and organisation (characteristics, resources and management model)	Traffic department of Municipality of Lucca, METRO, Local Police				
Roles and responsibilities	As those allocated for the management of access permissions to LTZ				
Costs estimation: main investment costs, operational costs and maintenance	200 k€: as in project funded by the Tuscany Region (Lucca info-mobility project)				
Estimated completion time	2018				
Esteem of environmental impacts and energy savings	CO ₂ (kg) 19000	NOx + HC (kg) 45	CO (kg) 130	PM (kg) 5,7	Energy (kWh) 80000

6.5. AGREEMENTS WITH TRANSPORT OPERATORS

Facilities	Luccaport Urban distribution centre				
Revision of LTZ regulatory framework	LTZ regulatory framework revision Memorandum of Understanding with operators				
Type of fleet, ICT support systems	N/A				
Operational dimension and organisation (characteristics, resources and management model)	To be defined depending on the agreement with the parties involved				
Roles and responsibilities	Monitored by the municipality				
Costs estimation: main investment costs, operational costs and maintenance	None				
Estimated completion time	2020				
Esteem of environmental impacts and energy savings	None	NOx + HC (kg) 32	CO (kg) 73	PM (kg) 9	Energy (kWh) 0



6.6. CARGO BIKE

Facilities	Cargo bike sharing station				
Legislation/regulation and legal constraints	Revision of LTZ regulatory framework				
Type of fleet, ICT support systems	n. 2 Cargo bikes per load/unload area (for a total of 24 cargo bikes and 12 stations) Cargo bikes booking ICT management system				
Operational dimension and organisation (characteristics, resources and management model)	Traffic department of Municipality of Lucca, METRO, Local Police				
Roles and responsibilities	As those allocated for the access permissions to LTZ management				
Costs estimation: main investment costs, operational costs and maintenance	30 k€ for cargo bikes (n. 24) To be defined for the stations and the ICT management system (about 60k)				
Estimated completion time	2020				
Esteem of environmental impacts and energy savings	CO ₂ (kg) 9700	NOx + HC (kg) 24	CO (kg) 68	PM (kg) 3	Energy (kWh) 43000

PRIORITIES FOR THE IMPLEMENTATION PHASE

7.1. TIMETABLE AND CONSTRAINTS TO TIMING OF IMPLEMENTATION

The timetable and the timing constraints are mainly determined by previous Plans and Deeds already approved by the Municipality.

7.2. PRIORITY SERVICES AND MEASURES, TO BE DEVELOPED BY 2015

Priority services and measures of the Plan, to be developed by 2015, are:

- Concession of Luccaport by public tender to a private operator in order to ensure the expansion of the services to achieve significant market shares and the development of new services for the city. The tender will be completed by 2014. Some of the measures to be implemented by 2020 are included in the tender procedure and therefore depend on this action;
- Reinforcement of technologies to support mobility and in particular the tracking system of entrance and exit to the LTZ which will be implemented by 2018.

the trial on 12 load/unload bays scheduled by the end of 2014;

- Reinforcement of the LTZ access regulation following the Community principle "polluter pays" – Since the new LTZ access regulation might have impacts on other measures listed, the development of the regulatory framework will be implemented in parallel with other measures / services;
- Agreements with logistics operators;
- Cargo bikes.

7.3. SERVICES AND MEASURES TO BE IMPLEMENTED BY 2020

In order to rationalise the system of freight mobility in the urban area of Lucca, the following measures will be implemented by 2020:

- Reinforcement of the services provided by Luccaport, following the concession by public tender:
 - Development of third-party distribution activities (first and last mile);
 - Third-party Eco-deposit;
 - Installation of a photovoltaic system on the LuccaPort building;
 - Projects with interested economic categories;
 - Communication on the territory;
- Load and unload bays (technological approach) – to be developed following



7.4. ESTIMATE OF ENVIRONMENTAL IMPACTS: ENERGY SAVINGS AND REDUCTION OF POLLUTING EMISSIONS

MEASURE	Estimate of impacts per year				
	CO ₂ Ton	NOx + HC Kg	CO Kg	PM Kg	Energy kWh
Reinforcement of services provided by Luccaport	28	52	120	5,8	110000
Loading and unloading bays (technological approach)	12	30	85	3,7	53000
Reinforcement of access regulation to the LTZ following the Community principle "polluter pays"	65	200	610	26	285000
Reinforcement of technologies to support mobility and in particular the tracking system of entrance and exit to LTZ	19	45	130	5,7	80000
Agreements with transport operators	4.4	32	73	9	0
Cargo bike	9,7	24	68	3	43000
TOTAL	138	380	1080	53	620000

PROMOTION AND COMMUNICATION

Communication will be developed following a specific Promotion and Communication Plan with the main strategies to disseminate all the information regarding the various activities and results of the actions and granting the sustainability of the results. An effective dissemination and local promotion is crucial to the success of the measures in order to gain the interest, involvement and confidence of all the interested users and trade associations on services and eco-friendly and sustainable solutions for the distribution of goods in city of Lucca.

In addition, the dissemination of information at national and European level helps to improve networking with other to small / medium-sized European cities, laying the foundation for sharing experiences and best practices and collaboration in future projects that can contribute to a further development and implementation of the measures listed above. In this sense, communication and promotion become a useful tool to support the fundraising for the implementation of the Plan.

"Parking lots close to home, a public transport station, a driving ban may change the daily lives of many people, while a structural intervention aimed at improving the environmental sustainability of urban transport cannot have direct impacts on the single citizen. Strategic planning cannot be entirely understood without a proper communication action."

(Montanari, Zara, Gragnani, Salvarsi dal Traffico. Il Sole 24ORE Trasporti. 2006).

8.1. COMMUNICATION PLAN

The Plan identifies the target audience for both the planning and the execution of communication activities and the communication / promotion materials. Local actors, transport operators, primarily compose the target audience; logistics service providers, operators and trade associations, politicians, citizens and user groups. In addition, the interested parties both at national and European level may be considered: the largest district of actors and stakeholders involved in the innovation of urban logistics and transport, including participants to other initiatives and their networks.

The communication plan includes a number of key elements to be taken into consideration and must be evaluated at the time of implementation of each phase of dissemination. The key elements to implement a coherent and effective a local dissemination and promotion strategy include:

Integration. All activities relating to the dissemination and communication must be integrated in the context of a single communication strategy with objectives and

action lines clearly identified.

Coordination. All actions and initiatives related to the sustainable urban logistics plan must be included in the activities of information and communication, and by mean of a continuous coordination, define and identify means, tools and content in order to most effectively develop communication actions.

Identification. It is very important that each message related to the Urban Logistics is immediately identified by the public with clear and direct reference to the action by mean of easily identifiable elements, such as logos, colors, slogans, etc.

Objectivity. Each message must be transmitted 'objectively' to the various stakeholders and users, to avoid being interpreted as a commercial communication, advertising or partial.

Persuasiveness. The messages and actions must be convincing and avoid any imposition or strong statements. Messages and actions should be attractive to the public and interested groups of users: they should suggest correct behaviours, provide assess-



ing and comparison elements and become compelling because of the collective advantages and benefits offered.

Visibility. All information and communication activities must contribute (through integration and coordination) to improve the visibility within the stakeholders of the territory and of the users concerned, giving the highest visibility to measures, activities and achievements (both locally and at national and European level). The visibility could also be the basis of an incentive mechanism to award the most virtuous operators selected on the basis of sustainability and eco-friendly goods distribution processes put in place in the city of Lucca.

Accessibility. The information, messages, and services in general should be characterised by simplicity, clarity and immediacy in order to ensure their accessibility to all types of audience expected and all stakeholders and users.

Interactivity. Communication and promotion initiatives on sustainable urban logistics should encourage interactivity and multi-directionality of messages. The main objective of the plan is to promote the creation of a network between all stakeholders in the distribution processes of the city: the different branches of the Public Administration, shop owners and traders, freight operators, citizens, tourists and visitors.

8.2. MEDIA AND COMMUNICATION SYSTEMS PROVIDED IN THE COMMUNICATION CAMPAIGN

The communication can not be separated from media and systems fostering interactivity and multi-directionality of messages. The growing need for technologies in the media highlights the need to use them to manage in an integrated and interoperable way mobility, parking and urban logistics, providing web services and app for smartphones that allow all interested users to access information in a simple manner.

In particular, web services foreseen by the Plan are:

- For citizens: urban logistics management

- services and payments;

- For companies: transport operators, artisans: touristic buses;

- For hotels and tour operators: management of specific services;

- Auxiliary and Local Police: verification and sanctioning violations by mean of a specific web portal reserved area;

- System administrators: analysis and reporting by mean of a specific web portal reserved area.

Services available on mobile devices (tablets and smartphones) are:

- Mobility and parking information;

- Pick up, delivery, storage, transportation, services reservations;

- Parking and other services payments;

- LTZ, civil registry, parking meters.

8.3. COMMUNICATING AND MONITORING: TIMING AND METHOD

The challenges set by sustainability principles require deep changes in the overall system of mobility, the way to conceive and practice it, by calling into question widespread and deeply rooted habits and lifestyles: a strategy for sustainable mobility is largely entrusted to a new culture mobility. The PUMS development process, along with the PULS one, must be accompanied by moments of sharing, information and control of the actions put in place. In other words by participation, communication, and monitoring involving all local stakeholders.

Participation: the participatory involvement of the local community and stakeholders with whom sharing the strategic objectives and actions. This is not only a guarantee of transparency and more democratic planning, but also the most effective means to innovate the vision that society has of the crucial problems with which it deals. The choices made will be disclosed with appropriate information campaigns about the different opportunities for mobility of goods, its possibilities and economic advantages.

Communication: to promote and indicate the various methods of distribution of goods within the city and outward becomes almost as much strategic as the activation of a new plan. The implementation process of the plan shall be under constant control, both as regards to the actual implementation of its measures and with regard to their effectiveness and their efficiency in relation to the targets set.

Monitoring: this real-time view of the plan and the results of its ongoing assessment must be publicly available. The updated view of the plan and the public accessibility of information resulting from the monitoring, evaluation and review, are now made possible by the use of the Internet as indicated by the principles of e-government.

ROADMAP FOR THE ADOPTION OF SULP

The city administration has managed with the active collaboration of users and stakeholders the urban logistics experiences of urban logistics made to date, and intends to continue with a process of participation and sharing of these measures. Numerous meetings were held with associations, citizens and stakeholders to arrive to an identification of the measures of the plan, to an analysis and discussion of the solutions with the several actors of the city and to the assessment of key issues and timing for the implementation of the solutions.

Given the given time schedule of the identified measures, the Plan will be submitted to the City Council through a specific resolution of the City Council Committee to be taken by 2014.