The Role of Logistics Services in Smart Cities: the Experience of ENCLOSE Project

Giorgio Ambrosino, Stefan Guerra, Irene Pettinelli, Carlos Sousa

(Giorgio Ambrosino, MemEx, Via Cairoli 30 Livorno IT, giorgio.ambrosino@memexitaly.it)
(Stefan Guerra, Lucense, Via della Chiesa XXXII Lucca IT, stefan.guerra@lucense.it)
(Irene Pettinelli, MemEx, Via Cairoli 30 Livorno IT, irene.pettinelli@memexitaly.it)
(Carlos Sousa, Ageneal, Rua Bernardo Francisco da Costa 44, Almada PT, carlos.sousa@ageneal.pt)

1 ABSTRACT

Freight transport is one of the primary components of the economic and social system not only in European towns. It is now widely recognised that sustainable goods distribution, particularly in urban areas and city centres (indicated also as City Logistics), is the objective to be achieved as environmental issues play an increasingly dominant role in the overall mobility governance and also in the emerging "smart city" initiatives.

Of course there is a link between transport efficiency and infrastructures, but traffic congestion in urban areas and city centres can be reduced also by efficient freight distribution processes based innovative organizational and business models.

In EU, the interest in city logistics solutions, is growing among Local Authorities, not only for more efficient and higher quality services and traffic congestion reduction but also for achieving an increased territory governance.

A significant number of real applications have implemented in many EU towns and under EU programmes with an emerging city logistics approach indicated as SULP (Sustainable Urban Logistics Plan) based an appropriate mix of different measures to be selected among different already demonstrated services like: Urban Consolidation Centres, optimised urban freight transport and delivery plans, clean vehicles and low emission technologies, restrictions and public incentive policies, ICT platform, last mile and value added services, etc. The SULP is the tool with related guidelines for integrating the city logistics processes within the overall management of urban mobility currently indicated at European level as Sustainable Urban Mobility Plan - SUMP.

In this context ENCLOSE Project, started in May 2012 under IEE - Intelligent Energy Europe programme, has the main objective of raising awareness about the challenges of energy efficient and sustainable urban logistics in European Small-/Mid-size Historic Towns (SMHTs) and about the concrete opportunities to achieve highly significant improvements and benefits by implementing and operating suitable and effective measures, schemes and framework approaches specifically targeted to such class of urban environments.

ENCLOSE Project aims to develop Sustainable Urban Logistics Plans (SULP) for Small-/Mid-size towns (SMTs) integrated in Sustainable Urban Mobility Plans (SUMP).

2 KEY LOGISTICS MEASURES AND PRIORITIES FOR THE EUROPEAN SMART CITIES

In the first year of ENCLOSE project activities, an analysis of the most relevant best practices currently introduced in Europe, particularly regarding small and mid-sized historyc towns, was performed, concerning the measures with the highest potential for the ENCLOSE towns (and for European Smart Cities in general). The key findings are summarized as follows:

- Urban Consolidation Centres (UCC) represent one of the most common and successful measures implemented in European SMHTs, with several notable experiences reviewed in Italy (Vicenza, Lucca, Padua, Parma, Modena), France (La Rochelle), and the UK (Bristol). The required investment pays off in terms of several benefits for the environment and population: optimizing vehicle load and runs, reducing the number of trips, direct goods mobility towards less environmental impact conditions, etc. However, in most cases, the (relevant) support from the local administration is still necessary to ensure financial sustainability of UCC operation. Overall, critical factors to be considered include: the build-up of a consensus around the "UCC project" among all the key stakeholder categories involved, the location and accessibility of the UCC and the role of public authorities and regulations.
- The implementation of Low Emission Zones (LEZ) is also an emerging measure in European cities and towns (e.g. Bologna, London, Maastricht, Prague, Randstad, Rotterdam, Utrecht, etc.). This

ISBN: 978-3-9503110-6-8 (CD-ROM); ISBN: 978-3-9503110-7-5 (Print)
Editors: Manfred SCHRENK, Vasily V. POPOVICH, Peter ZEILE, Pietro ELISEI

measure is naturally linked to other city policies, plans or measures, such as Air Quality Plans, Controlled Access Zones, etc. Access to the LEZ and transits may be controlled by barriers of tollbooths, or simply signalised and left without any special control infrastructure/technology. Pricing and enforcement systems may be also applied, e.g. through fixed and mobile cameras. The positive impacts and benefits of LEZs are generally relevant, leading to air quality improvements by reduced traffic emissions (PM10, CO, NOx, etc.). On the other hand, several kind of obstacles may be faced prior to and during their introduction: the consultation process with the involved stakeholders may be long (and often controversial), the costs of enforcement may be rather high for the authority, etc.

- The introduction of "eco-vehicles", particularly Fully Electric and Hybrid Vehicles (FEVs, PHEVs) for city logistics operation is becoming a viable option for local administrations and logistics service providers addressing sustainability policies. In most cases electric vehicles are vans and small trucks (up to 3,5t) but also other types of FEVs that started to be used for operating last mile and several forms of B2C services, like the cargo cycles used in the Petite Reine scheme in Rouen (FR) or Gnewt Cargo scheme in London. Besides last mile services, FEVs are also often used to support sustainable own-transport services (for shops, businesses and citizens) like in van sharing schemes. Overall, the surveyed best practices operating FEVs have shown that electric vehicles bring clear benefits as regards the abatement of exhausted gases, CO2 and noise emissions. Not least, FEVs are accepted by the public and have an "image" which may be an helping factor for the introduction of new sustainable logistics services introduction in a site.
- ITS and technologies have also gained an almost essential role in the operation of advanced city logistics solutions. Over 50% of surveyed best practices involves the implementation and operation of ITS and various technical facilities, from load and delivery planning software, to fleet monitoring systems, track-and-trace solutions, vehicle occupancy/transit detection technologies, automated vehicle identification (e.g. number plate reading), monitoring and enforcement systems.

The importance of the interaction between new urban logistics measures and urban planning has also clearly emerged from European best practices surveyed. The relationships that were more frequently identified in ENCLOSE survey concern: the location of Urban Consolidation Centres and their integration within the overall urban (and regional) transport network; the location of other urban logistics infrastructures such a "Proximity Logistics Spaces" (ELP), dedicated freight load/unload areas, etc.; the development of Urban Mobility Plans, Freight Distribution Plans, Low Emission Zones, etc. The integration of sustainable urban logistics development plans in the larger context of urban planning development represents a strategic issue for ENCLOSE cities to investigate when considering the design and implementation of a particular sustainable logistics measure.

3 THE IEE ENCLOSE PROJECT

The IEE-ENCLOSE project involves 16 partners, including 9 European towns, from 12 EU countries (Austria, Bulgaria, Greece, Ireland, Italy, Norway, Poland, Portugal, Spain, Sweden, Netherlands and the UK) and is focused on the following main issues:

- Assessment of the applicability and benefits of energy-efficient and sustainable urban logistics measures, specifically targeted to European small/mid-size historic towns, by implementation of (i) pilot measures in 3 forerunner towns: Lucca - Italy, Trondheim - Norway and s'Hertogenbosch - Netherlands and (ii) feasibility study and implementation of soft-measures in 6 mid-size (follower) follower towns: Balchik - Bulgaria, Serres - Greece, Almada - Portugal, Alba Julia -Romania, Burgos - Spain, Dundee – UK;
- Development of Sustainable Urban Logistics Plans, integrated in the related Sustainable Urban Mobility Plans (SUMP), in 9 European towns;
- Investigation into policy-level issues and definition of suitable strategies to ensure long-term sustainability of SULP for small/mid-size towns;
- Assessment of the efficiency of "green vehicles" (FEVs, PHEVs, Bio-gas) in urban logistics schemes for achieving energy savings and CO2 reductions.

4 THE LOGISTICS MEASURES IMPLEMENTED IN ENCLOSE TOWNS

The exchange of experiences and knowledge sharing activities, carried out in the first project months by the 3 pilot towns towards the follower towns, enabled ENCLOSE cities to define and implement different measures dealing with logistics processes: follower towns implemented "soft" measures, that do not require an high level of investment but can have important positive impacts on city logistics, while pilot towns realised further logistics services complementary to the ones that are currently being operated at their sites.

A summary of measures implemented in ENCLOSE follower and pilot towns is provided in Fig. 1 and Fig. 2 below.

	Alba Julia Rumania	**Almada** Portugal	**Balchick** Bulgaria	**Burgos** Spain	**Dundee** UK	**Serres** Greece
						
Soft measures in ENCLOSE follower towns	Regulation in the Transylvania. Boulevard area of commercial vehicles time windows, restrictions for high capacity vehicles, penalties for no respecting the rules, etc.	Create a loading & unloading regulation	Limitation of the vehicles' access to the coastal area. Limitation of the space accessibility of the logistics and public transportation as well as private cars during the touristic season	New regulation for the historical centre access, with special processing for loading-unloading tasks	Increase the enforcement levels of loading bays within the city centre	Awareness campaigns to the shopkeepers, transport operators and general public regarding the need to respect the city logistics policy
	Organizing an Awareness Raising Campaign involves a partnership between the Municipality and the media	Loading & unloading timeframes	Time limitation of the vehicles' access to the near coastal area, as well as to other heavy trafficked ways. Limitation of the time accessibility of the logistics and public transportation as well as private cars during the touristic season.	Card system on loading and unloading for shop owners and hostelry owners (for non-labelled vehicles).	The council intends to procure 39 Electric Vehicles as replacements for existing Diesel/ Petrol vehicles	Improving the visibility of the (un)loading areas. Increasing the number of these places according to the shop keepers' needs. Development of a booking platform in order to properly assign these areas to the transport operators.

Fig. 1: Soft measures in ENCLOSE follower towns

	Lucca Italy	**Trondheim** Norway	**'s-Hertogenbosch** The Netherlands
			
Services/ Measures implemented in ENCLOSE Pilot towns	B2B services for freight operators concerning the provision of palletized goods transportation to businesses with FEV;	Mail distribution (large and small envelopes) in Trondheim city centre by using electric-vehicles replacing 5 diesel vehicles	Set up of specific partnership agreements (B2B) between shopkeepers, transport companies and other stakeholders aimed at improving the efficiency of town delivery services by using biogas or CNG vehicles
	B2B services for local businesses concerning the provision of forwarding services toward any destination outside the target area, operated by FEV, in partnership with other national or international freight operators (reverse logistics processes)	Parcel distribution in Trondheim city centre by using electric and hybrid vehicles replacing 5 diesel vans	Demonstrating and enhancing the use of fully electric busses for transport of people with bulky purchases
	Freight operations integrated with leisure mobility, operated by FEV: dedicated delivery programmes providing services for tourists and travelers, luggage transport to/from hotels, etc	Pallets distribution in Trondheim city centre and transport between Trondheim city centre and Trondheim Post terminal by using electric and hybrid vehicles replacing 1 diesel truck	Town delivery services using biogas vehicles

Fig. 2: Services/measures in ENCLOSE pilot towns

5 ENCLOSE FIRST RESULTS: NEEDS AND PRIORITIES

A cross site assessment of needs and priorities of ENCLOSE Towns was carried-out for identifying the key high-level requirements common to all ENCLOSE sites. These are grouped into the four investigation categories – socio-economic, commercial, operational, technical – related to each site and showing the

ISBN: 978-3-9503110-6-8 (CD-ROM); ISBN: 978-3-9503110-7-5 (Print)
Editors: Manfred SCHRENK, Vasily V. POPOVICH, Peter ZEILE, Pietro ELISEI

corresponding relevance: strong interest (■■■), interest (■■), moderate interest (■) as showed in the following Fig. 3.

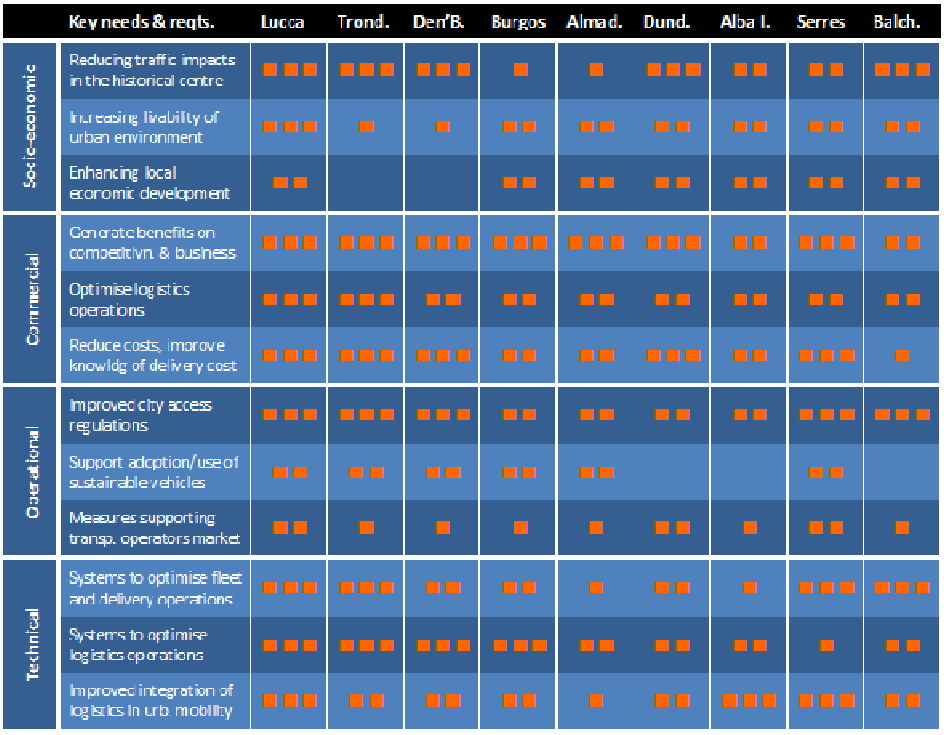

Fig. 3: ENCLOSE Logistics priorities

These key findings can be outlined as follows:

- Implementing more sustainable city logistics solutions to contribute reducing traffic impacts in the historic centres is the highest priority for ENCLOSE towns. Forerunner towns have already measures in place and consider this as a top goal in their urban mobility policies. Most part of follower towns too report this as the highest priority.
- The goal of providing more sustainable city logistics entails the objective of increasing the liveability of the urban centre, also reported as a main high level need in almost all ENCLOSE sites.
- Increasing the competitiveness of the commerce and retail system and of the connected business services is the highest priority for ENCLOSE towns as regards commercial and business needs.
- Due to their current experiences, the ENCLOSE pilot towns are also very focused on looking for business models enabling a substantial reduction of the operational costs.
- Improve the regulation for accessing to the urban centre is one of the priorities for all ENCLOSE towns due to the direct involvement of the Local Authorities and to the perception that they can act directly (i.e. formulating new rules by-local law), fast (as the normative is under their duties) and receive prompt benefits.
- From the technical point of view the focus is concentrated on several technology options but mainly on the "system" for managing all the operation/logistics cycle. The attention shown by most of the towns for the integration of logistics policies in the overall urban mobility plan mitigates to some extent the possible approach "buy technology and solve the problems", that is currently a key trend in the transport and mobility context.

6 THE SULP FOR ENCLOSE TOWNS

In the current phase of ENCLOSE project partner towns are working on the implementation of local SULPs, Sustainable Urban Mobility Plan, as a fundamental part of the Sustainable Urban Mobility Plan, as recommended by the relevant EU recommendations aiming to face traffic congestion, improving mobility and transport services and reducing CO2 emissions.

The SULP methodology, from the planning and operation point of view, is structured along two main stages: the feasibility study and the process to be performed by the Local Municipality to adopt the measures and services defined in the previous phase.

The figure below provides an idea of the SULP approach, more details and the specific contents of the SULP are available at www.encloseproject.eu.

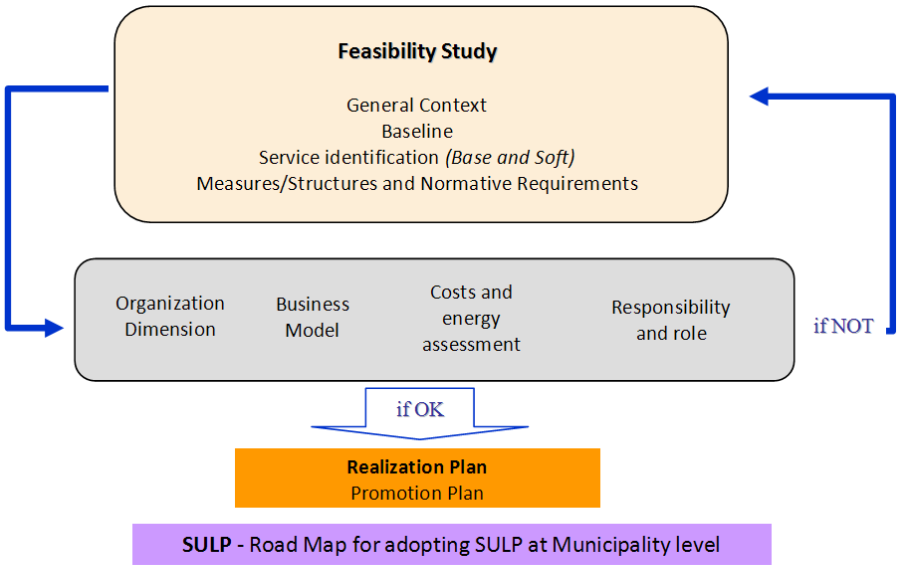

Fig. 4: ENCLOSE SULP methodology

The approach defined by the ENCLOSE consortium for elaborating SULPs is a very practical one, focused on the provision of real and operation working recommendations, based on a participatory approach and on the involvement of political level starting, firstly from user needs. The defined analysis methodology covers, among the others, the following aspects:

- Institutional Level: legal framework, rules;
- Political Level: consensus among the different city actors and stakeholders (Authority, Associations, Operators, citizens groups, etc.);
- Operation Level: freight distribution schemes and services, integration in the mobility management plan and technological framework;
- Infrastructures/Technology Level: ICT platform, systems, innovative vans/vehicles, web services, etc.
- Furthermore, ENCLOSE methodology includes the following tasks to be carried out by each town:
- status analysis and baseline scenario;
- definition of vision, objectives and targets;
- selection of policies and measures;
- assignment of responsibilities and resources;
- arrangements for monitoring and evaluation.

7 REFERENCE

Ambrosino, G Boero, M. Gini S., Liberato A. - "Last mile good distribution in small and medium historic towns; services schemes and technology tools" – in Proceeding IEEE ICALT 2013 “International Conference on Advanced Logistics and Transport” - Sousse, Tunisia 29-31 May 2013;

Freitas, C Souza, C Liberato A., Iacometti A, .Ambrosino G Deliverable D2.3 - “Sustainable logistics in European small/mid size historic towns: challenges, opportunities and priorities” in ENCLOSE Project (Contract N°: IEE/11/826/SI2.615930), January 2013;

EC White Paper on Transport “Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system” in COM(2011)-144 Final;

Ambrosino, G. Boero M, Nelson, M. Romanazzo J.D ed. “Systems and advanced solutions for sustainable city e-logistics”, ENEA, 2006;

ISBN: 978-3-9503110-6-8 (CD-ROM); ISBN: 978-3-9503110-7-5 (Print)
Editors: Manfred SCHRENK, Vasily V. POPOVICH, Peter ZEILE, Pietro ELISEI

Taniguchi, E., R.G. Thompson, T. Yamada and R. van Duin. “City Logistics: Network Modelling and Intelligent Transport Systems”. Emerald Group Publishing, 2001.