



MED COLOURS

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Pilot Factsheet – Livorno

Pilot action overview

The Municipality of Livorno implemented several activities within the MED-COLOURS project, both in terms of studies and pilot actions. Specifically, two relevant studies were conducted:

- the revision of the regulatory framework for freight distribution process in the pilot site Area (so-called “*La Venezia Estesa*”)
- the definition and specification for the revamping and extension of the current access control system; the specifications for the realization of smart loading/unloading bays (with a micro-hub approach); the specifications for the rewarding platform (functional, operational, organisational terms, static and dynamic criteria).

Concerning the implementation, the Municipality has proceeded with:

- the implementation of several loading/unloading bays (partly already implemented and partly currently being finalised) realised with environmental/bio material (galvanized steel, organic dyes, natural-based materials, bio-asphalt to avoid thermal effects, etc.);
- the implementation of an awarding platform for managing awarding static criteria (interfacing with the logistics operation access permits procedures).

The main modification concerned the loading/unloading bays. Initially, the project envisaged the implementation of three smart loading/unloading bays (micro-hubs) equipped with smart signage based on IoT sensors and digital devices for bay management (e.g. occupancy monitoring and information services for logistics operators). However, the Municipality increased the number of bays to be redeveloped (originally meant to be 3) and opted to postpone the equipment of the smart sensors or digital devices to a later stage.

Action Plan – timeline

Pilot Action	2025												2026				
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M
Activity 1 Revision of Regulatory framework	█	█	█	█	█	█	█	█	█	█	█	█					
Activity 2 Access Control Systems specifications	█	█	█	█	█	█	█	█	█	█	█	█					
Activity 3 3 Smart loading/unloading bays (micro-hubs) specification and realization										█	█	█	█	█	█	█	
Activity 4 IT Awarding Platform Specification and implementation (Static criteria)										█	█	█	█	█	█	█	

Activity 1 Revision of Regulatory framework

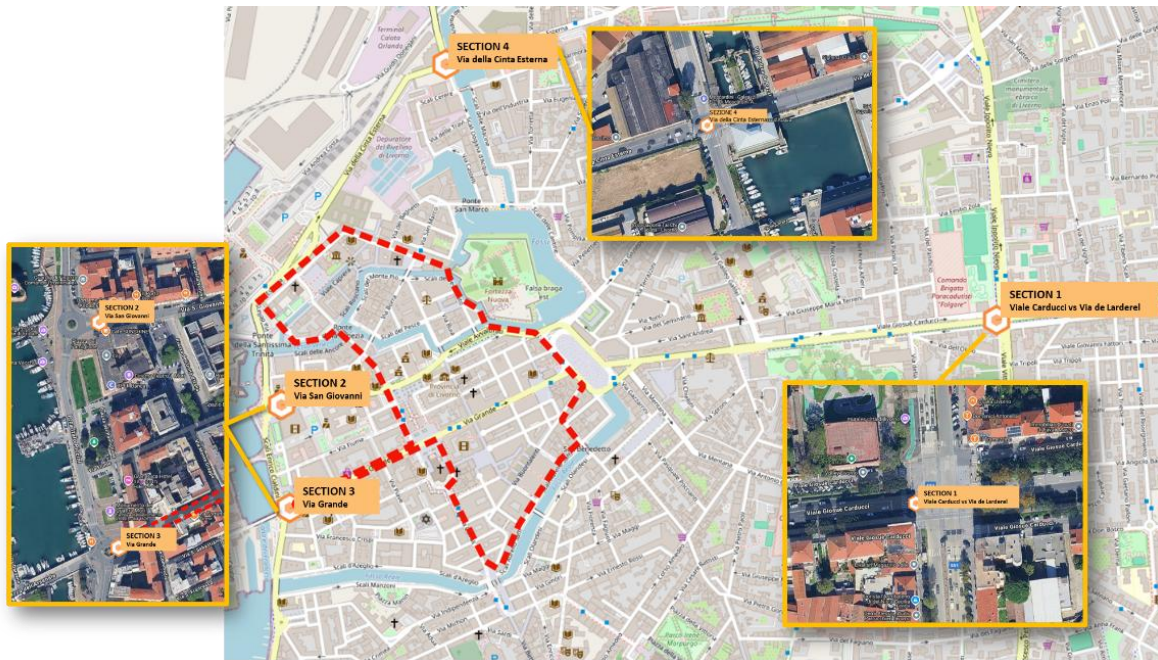
A thorough review of the regulatory framework supporting sustainable last-mile freight delivery in the “Extended Venezia” area was conducted, taking into account the other existing (or planned) Restricted Traffic Zones (RTZs) and pedestrian areas within the wider urban network.

The analysis was carried out in two stages: first, by identifying critical issues in the current regulatory framework, and second, by outlining potential changes and improvements. The study focused on the different types of Restricted Traffic Zones present both in the urban context and within the pilot area of La Venezia.

Like all other RTZs, the “Extended Venezia” area is subject to traffic restrictions for polluting vehicles, specifically commercial vehicles with an emission class below Euro 0, namely vehicles registered before December 1992.

Particular attention was paid to the access time windows for commercial vehicles. To assess the effectiveness of the current delivery time slots, traffic flows entering the “La Venezia Estesa” district were analysed.

Figure 1 – Access entrance to the “Extended Venezia” area



Almost all the main access routes for commercial vehicles to the district area were examined. This in-depth analysis allows to highlight for each area the current situation, the critical issues found, the possible interventions to be adopted, and their related impacts.

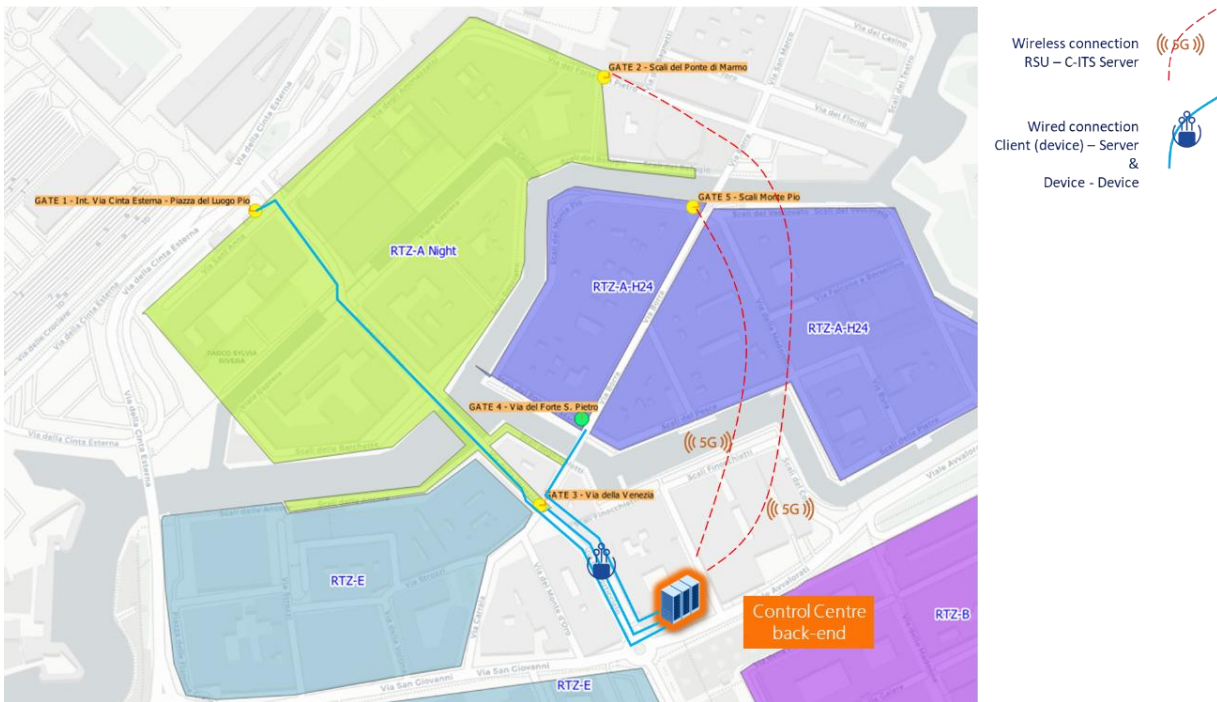
The study was finalised in December 2025

Activity 2 Access Control Systems specifications

This activity concerned the study and analysis on the current state of the Access Control System (ACS) implemented in the Livorno urban area. In particular, the study allowed to define the positioning of the electronic gates, their functionality (control of transits entering/exiting the RTZ), and the number of camera units. It also indicated the current architecture and the main characteristics (both in technical and functional terms, at peripheral level – gates - and at the central Control room and communication devices) of the implemented ACS and the possible intervention scenarios (revamping or new creation) for updating the system, providing for each scenario a list of cost items and a possible implementation timeline. Moreover, specific assessments of the related advantages and disadvantages for each scenario have been prepared. The main actions performed until December 2025 have been:

- Technical analysis on current system and new requirements
- Production of system technical/functional specifications

Figure 2 – General reference architecture of the existing system



Activity 3 Smart loading/unloading bays specification and realization

The first step concerned the analysis of the existing set of loading/unloading (L/U) lots available in extended Venezia district (and also in other LTZs nearby the pilot area) for couriers and last mile operators in terms of number and location. This analysis was carried out in April and May 2025, with a specific focus on the current location, possible future positioning, and any additional information useful for the creation/redesign of goods L/U lots, such as, for example, the real conditions of the road pavement and vertical signage.

This analysis clearly demonstrated that the current total number of L/U lots is very limited compared to the real needs and the necessity to guarantee functionality, safety, and fluidity of traffic flows, not only for urban logistics. Three different scenarios for redesigning the existing L/U lots to increase their visibility and, therefore, their efficiency:

- **SCENARIO “A”** - repaving the road surface with stamped asphalt, redoing the horizontal and vertical signage for greater visibility, application of LED markers;
- **SCENARIO “B”** – redoing the horizontal and vertical signage for greater visibility, application of LED markers, application of resins for colouring the pavement.
- **SCENARIO “C”** – repaving the road surface with stamped asphalt, redoing the horizontal and vertical signage for greater visibility, application of LED markers, application of resins for colouring the pavement.

For each of the scenarios described above, a “standard” lot layout was defined to serve as a reference for the redesign of goods lots not only in the “Venezia estesa” area but also in other city areas. Bill of Quantities were also prepared for each of the analysed scenarios. The

The most suitable L/U lots to be redesigned were also identified. At the end of April, beginning of May 2026 some of the existing loading/unloading lots were redesigned, taking into account all identified scenarios above described.

Figure 3 – Redesign of loading/unloading lots



Following the technical analysis and cost-benefit evaluation, the Municipality of Livorno decided to prioritize the physical redesign of a larger number of loading/unloading lots rather than implementing digital monitoring technology at this stage. Specifically, the Municipality opted to redesign several existing loading/unloading lots instead of the initially proposed 3, recognizing the urgent need to address the city's critical shortage of clearly visible and properly utilized freight parking infrastructure. Given the highly transferable and scalable nature of the intervention, additional loading/unloading bays were also implemented in adjacent areas

beyond the pilot zone in order to maximize the overall impact and replicability of the measure across the city. The Municipality is currently finalising other loading/unloading bays located in areas nearby the Venezia district.

While IoT sensors and digital occupancy monitoring represent valuable future enhancements, implementing such technology on only 3 lots would have provided negligible operational benefit and would have not been really cost-effective. The fixed costs of establishing a digital monitoring platform (including backend systems, data management, integration with enforcement systems, and ongoing maintenance) cannot be justified for monitoring such a limited number of spaces. A minimum critical mass of monitored spaces is required to make digital infrastructure economically viable and operationally meaningful.

Activity IT Awarding Platform Specification and implementation (Static criteria)

The last pilot action foreseen for the Municipality of Livorno was the development of an awarding platform to encourage green behavior among freight transport operators for last-mile delivery in the extended Venezia district. The IT platform collects and integrates static data related to permits (vehicle type, emission category, permit type, etc.) and will in a second stage incorporate dynamic behavioral data through integration with access control and loading/unloading bay monitoring systems.

The platform with static data criteria has been developed and is currently in testing (development version). The prototype enables permit management, vehicle/operator data collection, and establishes the baseline for the green scoring system.

The Platform manages the following main reward criteria: i) Vehicle age; ii) Fuel type and environmental class; iii) Distance of the depot from Livorno urban center, iv) number of permit days requested monthly. These criteria incentivize operators to consolidate deliveries and optimize route planning, reducing overall urban freight traffic.

The Municipality is currently updating its permit issuance regulations. The awarding platform has been developed based on the current regulations in force, while also incorporating certain aspects from the draft regulations under development. This approach ensures the platform is operationally functional immediately while being designed with flexibility to accommodate forthcoming regulatory changes, avoiding the need for major restructuring when new permit rules are adopted.

Stakeholders involved

The project fostered **cooperation among various municipal departments**, thereby enhancing the institutional capacity to design and implement integrated urban logistics policies. In particular, the Department of Public Works and Infrastructure has been actively involved throughout the project, particularly regarding the physical redesign of loading/unloading lots, assessment of pavement conditions, evaluation of infrastructure interventions, and preparation of Bills of Quantities. Their technical expertise has been crucial in translating strategic mobility objectives into implementable infrastructure improvements, ensuring that

proposed interventions are realistic in terms of construction feasibility, timelines, and budget constraints. The Department of Information Technology has played a key role in the development of the green freight awarding platform, providing technical guidance on system architecture, data integration approaches, compatibility with existing municipal IT systems, and cybersecurity considerations. Their involvement has ensured that the platform is built on robust technical foundations and can be effectively maintained and scaled in the future. The IT Department's input has also been valuable in considering how static and dynamic data will be collected, stored, and processed in compliance with data protection regulations and municipal IT governance frameworks.

Beyond internal municipal coordination, the project recognizes the critical importance of engaging external stakeholders who will ultimately determine the success of implemented measures through their adoption and utilization of new infrastructure and digital tools. Informal contacts with external stakeholders have been maintained throughout the project development phase, including freight transport operators, business associations, and representatives of the commercial sector. The Municipality is planning to organize an in-person stakeholder event during summer to formally present project outcomes and gather structured feedback. This event will bring together the various stakeholder groups that have already been identified and preliminarily engaged, creating an opportunity for comprehensive consultation and dialogue.

No modification to the following stakeholders table provided in the previous template.

Organization	Description	Role

Expected results and results achieved (if available)

Expected impacts:

The redesign and creation of dedicated loading/unloading bays will improve the efficiency of delivery operations in the city centre, reducing illegal parking, double-parking, and traffic disruptions caused by freight vehicles searching for available spaces. In turn, emissions from freight delivery vehicles will be reduced.

The revision of access regulations to restricted traffic zones is expected to better regulate freight vehicle flows, particularly during peak hours, contributing to improved traffic conditions and reduced congestion.

The reward platform, even in its initial static version, will create incentives for logistics operators to adopt more sustainable practices and lower-emission vehicles, encouraging gradual decarbonisation of urban freight transport.

Overall, these measures are expected to contribute to improved logistics efficiency, reduced environmental impacts, and better coexistence between freight transport activities and urban life.

Results achieved:

- N° 9 redesigned loading/unloading lots with new vertical and horizontal signage
- N° 1 awarding platform with static criteria
- Proposal for a revision of the regulatory framework
- Technical and functional specifications for a new and for a revamped access control system

Further expected results:

Implementation of a **new Access Control System**, following the technical and functional specifications already delivered

Loading/unloading Lots: The redesigned lots may in the future be subject to further development in terms of occupancy control with the installation of digital/IoT devices (sensors). These will be able to automatically detect the presence of parked vehicles, ensuring continuous monitoring of lot occupancy and thus providing significant support to the verification activities of the urban police.

Awarding Platform: Following successful testing and operational deployment, Phase B will integrate dynamic behavioral data (access control system, loading/unloading bay monitoring, potential IoT sensors), enabling comprehensive green freight incentives based on both static vehicle characteristics and actual operational behaviour (compliance with designated areas, delivery time windows, route optimization, etc.).

Regulatory framework: To reduce emissions in the city center, it would be useful to update the existing 2009 regulation by extending the transit ban in RTZs to commercial vehicles with an emission class lower than Euro 3, i.e., for vehicles registered before January 2001 (vehicles that are, as of today, about 25 years old). This new restriction could encourage goods transport operators (as well as artisans) operating in the city center to invest in modernizing their fleet towards low/zero-emission vehicles.