

D2.5.2 Micro-hub, e-cargo bikes and innovative governance model - Reggio Emilia



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GRETA Website

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GRETA Project



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Abbreviation table	
Abbreviation	Definition
ToC	Table of Contents
FUA	Functional Urban Area
PP	Project partner
CE	Central Europe
SUMP	Sustainable Urban Mobility Plan
SULP	Sustainable Urban Logistic Plan
ZE	Zero Emission
EU	Europe
Ho.Re.Ca	Hotel - Restaurant - Catering
ANPR	Automatic Number Plate Recognition
PAIR	Air quality Regional Integrated Plan
LTZ	Limited Traffic Zone
PA	Public Authority
ISPRA	Italian Institute for Environmental Research and Protection
MoM	Municipality of Maribor
CoP	City of Poznan
L-PIT	Łukasiewicz - Poznański Instytut Technologiczny



1. The GRETA project

GRETA project aims to decarbonise the last mile delivery in Functional Urban Areas (FUAs) in Central Europe (CE) and create liveable and accessible cities for all by 2030. The project seeks to implement joint sustainable solutions in CE FUAs using zero-emission vehicles and cargo bikes and reorganise urban spaces with curb management. The pilot actions in the cities of Maribor, Reggio Emilia, Verona, Poznan, and Budapest (with Berlin FUA as an observer) have the potential to quickly deploy as pop-up measures in combination with existing measures. GRETA provides capacity-building activities, strategies, action plans, and tools for public authorities, enterprises, and relevant organisations to ensure financial, environmental, and social sustainability beyond the project's lifetime.

Last-mile delivery generates negative impacts, including emissions, noise, and congestion. Due to the COVID-19 crisis, global parcel distribution volume nearly doubled, further increasing inefficiencies in the peripheral areas. GRETA's FUAs recognise the problems that generate pollution, nuisance, noise, congestion and have jointly recognised three main problems: the lack of use of green zero-emission last-mile vehicles, conflicts between freight and public vehicles, and the lack of knowledge and strategies for a flexible and shared use of the curb and public space. Despite having SUMPs/SULPs, FUAs struggle to activate fitting measures while keeping their centres attractive and alive for residents and tourists.

GRETA addresses the common challenges of all CE FUAs by creating the conditions to promote ZE logistics using micro-hubs, cargo bikes, light e-vehicles, and curb management strategies. Additionally, the project also focuses on paving the way to innovative concepts such as regional collaborative logistics, physical internet, and freight curb management. GRETA facilitates the dialogue towards the acceptance of a business and governance as a service model, where cities must equip themselves with a network of innovative services to guarantee seamless experiences for their users and a mobility plan considering different functions and priorities of the services.

GRETA's objective is to support the urban mobility transition in CE FUAs by jointly developing solutions and strategies with a huge potential for decarbonisation of the last mile in line with the EU Green Deal and the Urban Mobility Package, abating congestion, pollution, and nuisance. The project's success relies on capitalising on previous experiences, exploiting synergies with ongoing initiatives, testing innovative pilots, improving competences and knowledge among PPs and stakeholders.



2. Executive summary

This deliverable presents the implementation and results of the GRETA pilot in Reggio Emilia, focused on the decarbonisation of last-mile freight deliveries in the city centre through the introduction of a micro hub for e-cargo bike operations.

The pilot addresses one of the main challenges faced by medium-sized European cities: reducing the environmental and spatial impacts of freight transport while ensuring the continuity and efficiency of urban deliveries.

The solution implemented in Reggio Emilia, rather than relying on advanced technologies or complex digital systems, focuses on the strategic identification and reuse of an existing logistics facility located at the edge of the city centre. The micro hub has been established within the municipal wholesale fruit and vegetable market, a semi-public area already dedicated to logistics activities and equipped with essential services such as security, electricity, covered spaces, and direct access to the main road network. This approach demonstrates how existing industrial or logistics infrastructures, often underutilized, can be exploited to support sustainable urban logistics with limited investments.

The micro hub functions as a transshipment point where logistics operators can transfer goods from conventional vans to e-cargo bikes and complete last-mile deliveries within the city centre. Its proximity to the delivery area, the city centre, combined with improved cycling accessibility, encourages the use of e-cargo bikes that benefit from the absence of access restrictions applied to other motorised freight vehicles.

The choice to promote e-cargo bikes is based on the strong cycling culture of Reggio Emilia. The city has a long-standing tradition of everyday cycling, a dense and well-developed cycling network, and a high modal share of bicycles for commuting and daily trips. This cultural and infrastructural context makes cargo bikes a credible, accepted and feasible option for last-mile logistics, particularly within the compact and densely populated city centre.

The infrastructure installed in the micro hub is modular and low-cost, based on adapted shipping containers that provide secure and independent storage spaces for multiple operators.

A key feature of the solution is its governance model. The Municipality provides access to space and defines regulatory conditions that favour zero-emission deliveries, supporting the initial phase of operation. At the same time, logistics operators keep the full control over their delivery processes, equipment choices and operational organisation. There is not a third operator or shared delivery areas, since stakeholders expressed the need for independence, control over goods and responsibility towards clients. This governance approach has proven essential to ensure stakeholder acceptance and operational feasibility.

The pilot highlights the importance of combining regulatory measures with enabling actions. On one hand, enforcement of access rules in the city centre creates the conditions for a more sustainable urban logistics. On the other hand, the availability of a suitable logistics space provides an attractive alternative for logistic operators that can adapt their business models without compromising service quality. The reuse of underutilised industrial or logistics sites can be a lever for collaboration between public authorities and private operators.

Overall, the Reggio Emilia pilot confirms that sustainable last-mile logistics solutions do not necessarily require high technological complexity. The exploitation of existing underutilised logistics or industrial spaces, the adoption of modular infrastructure and the strong partnerships with logistics stakeholders are key elements for other territories that are seeking solutions to reduce the environmental impact of urban freight transport while maintaining efficient delivery systems.



3. Solution

3.1. General information

Reggio Emilia is a medium-size city in Northern Italy with 172.093 inhabitants (February 2025). Reggio Emilia FUA is situated in the Po valley, one of the most polluted areas in Europe. This situation results from a combination of several factors. Firstly, the city is located between two mountain chains, Alps and Apennines, that surround 3 sides of the whole area. Secondly, this is one of the most industrialised European regions and lastly, Italy has one of the highest numbers of motor vehicles per capita. In Reggio Emilia alone, there are 652 cars per 1.000 inhabitants.

In this context, the city is working hard to promote sustainable mobility and reduce the use of cars and motor vehicles. Reggio Emilia has a strong cycling culture and is one of top Italian cities in terms of cycle path length per inhabitant. According to 2018 data, 23% of people cycle daily to work or school.

In 2023, the Municipality approved the Sustainable Urban Mobility Plan (SUMP) which includes several measures to reduce car use, enhance safety and liveability, promote cycling, public transport and shared mobility. One of the sections of SUMP is dedicated to freight mobility having the main objective to promote cargo-bike deliveries especially in the city centre. Another measure included in the Plan that significantly impacts logistics is the expansion of the limited traffic zone, an inner-city area where access is restricted, particularly for freight vehicles.

Indeed, the inner city is one of the most complex areas for logistics, affecting all stakeholders, including citizens, transport operators, the Municipality, and receivers. The Municipality has been working for years to reduce the impact of freight deliveries in the city centre. A working group with retailers' associations has already been set up for this purpose. An analysis of the commercial context had been carried out in 2021 and it emerged that there are about 900 businesses in the city centre (60% shops, 30% Ho.Re.Ca, 10% other).

During the GRETA project, the Municipality has made progress in implementing its Sustainable Urban Mobility Plan (SUMP) concerning the enforcement of access to the city centre:

- in 2023, the limited traffic zone was expanded;
- in 2024, an automatic system able to check both the entry and exit of vehicles from the limited traffic zone was installed;
- in 2025 the system was partially activated and at this moment all entry points are active.

Policymakers have also initiated a process with stakeholders to revise the access rules, which were established more than 20 years ago and did not include double checks for both entry and exit.

Once fully operational, the system will significantly impact freight vehicles. Light commercial vehicles are already allowed in the city centre only during certain time windows, but since the digital system only monitors only the entry time, they access before the end of their time window and stay de facto all day long in the city centre. However, with the new system, vehicles will be checked upon exit as well. If a vehicle exceeds its time window, it will be fined.

Through this enhanced enforcement system, the Municipality aims to promote a sustainable freight delivery system using e-cargo bikes, offering transport operators an alternative, eco-friendly option for delivering goods in the city centre without time restrictions.



Table 1 General information

<p>Location</p>	<p>Reggio Emilia is a medium-size city in Northern Italy with 172.093 inhabitants (February 2025).</p>
<p>Map (general map of the municipality + detailed map of the city centre)</p>	<div data-bbox="603 474 1433 1133" data-label="Image"> </div> <p data-bbox="788 1137 1318 1167" style="text-align: center;"><i>Figure 1: General map of Reggio Emilia municipality¹</i></p> <div data-bbox="603 1191 1433 1765" data-label="Image"> </div> <p data-bbox="788 1776 1187 1805" style="text-align: center;"><i>Figure 2: Detailed map of the city centre</i></p>
<p>Area characteristics</p>	<p>Brief outline of the main characteristics of the pilot area: area type: city centre area size: 1.8 km²</p>

¹ Municipality of Reggio Emilia



	<p>access restrictions: freight vehicles allowed only in fixed time windows; access enforced with UVAR systems. Rising bollards protect the most central pedestrian zones.</p> <p>The city centre is a mixed area quite densely populated with about 10,000 inhabitants. The city centre is one of the main commercial hubs of the city with 900 businesses (60% shops, 30% Ho.Re.Ca and 10% other).</p>
<p>Additional information</p>	<p>The Municipality has been working for years to reduce the impact of freight deliveries in the city centre. A working group with retailers' associations has already been set up. Automatic enforcement system installed and partially activated.</p>

3.2. Strategy description

The solution identified for Reggio Emilia pilot is a micro hub for e-cargo bike. The idea is to realise a space where transport operators can tranship their goods from vans to e-cargo bike and deliver to the city centre, where access for traditional freight vehicles is limited.

The micro hub is in the warehouse fruit and vegetable market, located at 1 km from the city centre. It has a very good accessibility for cars and vans. Indeed, the entrance is in a road well-connected with the main road network of the FUA.

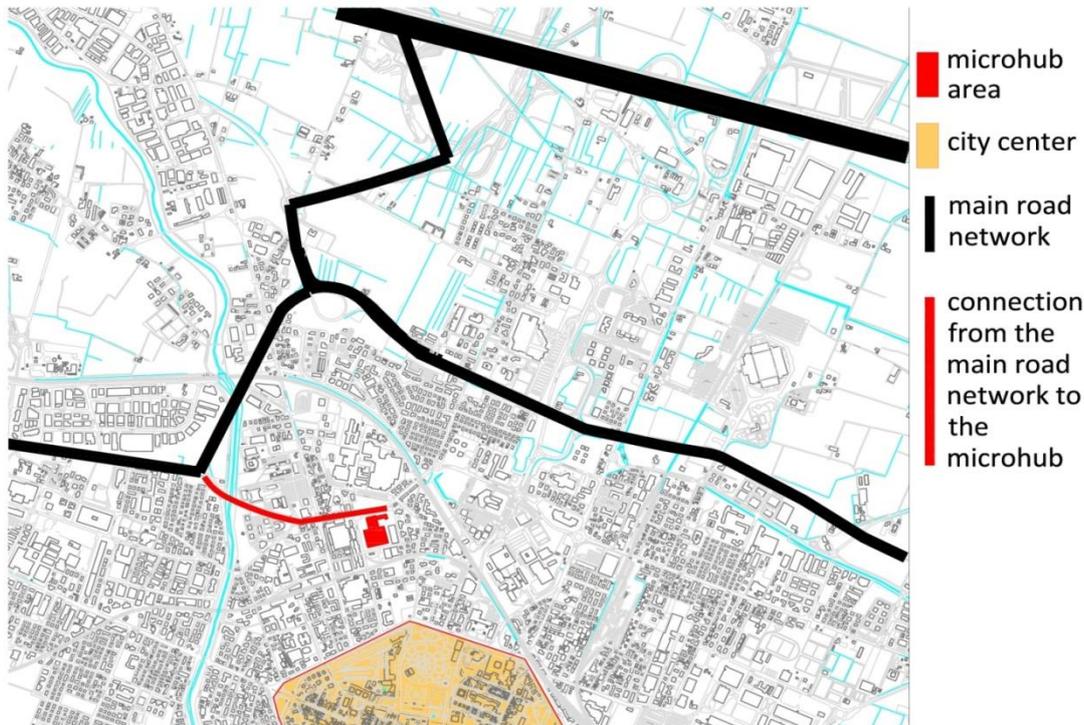


Figure 3 Micro hub location and main road network

Cycling accessibility is also reasonably good since the street, via Guido Riccio Fogliani, connecting the market to the city centre (pilot area) is one-way road with very low traffic and it has a separate large cycling path for counter way cyclists. The last part of the cycling connection insists on a very busy road and it needs to be improved. The idea is to realise a dedicated automated entrance for cargo bikes on a side of the



market area that is directly connected with via Guido Riccio Fogliani. With this intervention, the cycling accessibility is highly improved and cargo bikes can to easily access the pilot area.

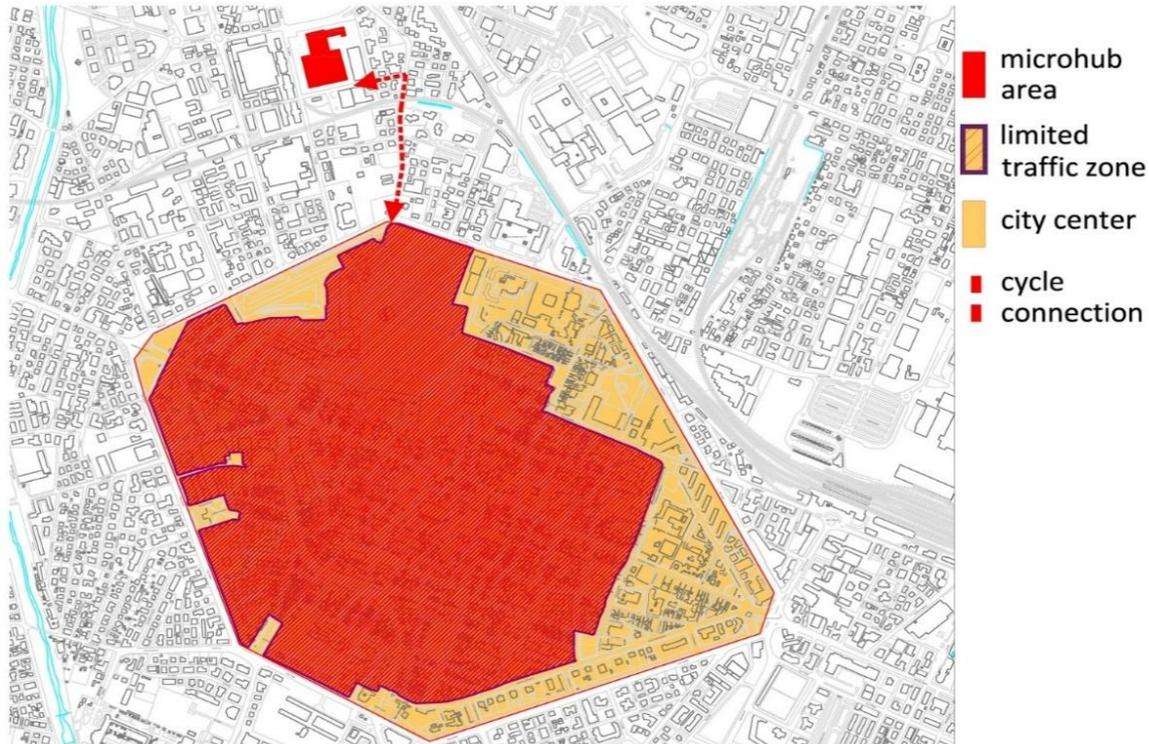


Figure 4 Micro hub area, LTZ and cycle connection



Figure 5 Connection with Via Guido Riccio Fogliani

Access to the market area is controlled and restricted to market operators. The area is open 24/7, with security staff monitoring the premises from midnight to 2 PM (00:00 - 14:00). From 2 PM to midnight (14:00 - 24:00), access is restricted to market lessees, and a CCTV system is in operation

The owner of the area is a public company owned by the Municipality and this enabled to realise the micro hub without particular restrictions. Additionally, the area serves already logistical functions and is equipped



with essential facilities: in addition to restrooms, an electricity system is already in place. There is also a dedicated area manager overseeing operations, and a portage service is available to assist with handling goods.



Figure 6 Market area 2



Figure 7 Market area 2

The micro hub was designed as a space where multiple operators can work independently, with each having its own dedicated area. Nevertheless, the shared space between operators is kept to a minimum to avoid conflicts over space. In this scheme:

- each operator is independent;
- each operator has its own space;
- each operator is free to organise it.

The governance model does not include a third or managing operator in order keep freight operator as independent as possible and maintain the responsibility of the delivery and the final contact with customers.

This means that each operator can chose the model of the cargo bike they need, without that Municipality chose a model that does not fit transport operator requirement.

In simple terms, the micro hub is meant as a space that is offered to logistic operators to complete the last mile with cargo bikes.



3.3. Governance model

The governance model in Reggio Emilia involves three key actors:

- the **Municipality**, which promotes sustainable urban freight transport and defines rules and access restrictions for delivery vehicles in specific areas, particularly within the city centre;
- a **public company** (MAPRE), which owns the space hosting the micro hub;
- **transport operators**, which use the micro hub and carry out last-mile deliveries using e-cargo bikes.

In Reggio Emilia, the public company corresponds to the wholesale fruit and vegetable market, which already rents commercial spaces for logistics purposes and reinvests the generated revenues into the maintenance and development of the entire facility.

The GRETA micro hub is expected to adopt, in the long-term period, a similar business model. Transport operators will pay a rental fee to the public company, according to the space used within the micro hub. Routine maintenance will be the responsibility of the transport operators (as tenants), while rental revenues will be allocated to extraordinary maintenance activities and further development of the micro hub.

In the long term, the Municipality will not be directly involved in the operational management of the business model but will continue to play a fundamental role as regulatory actor. As the owner of the public company hosting the micro hub, the Municipality may allocate financial resources for further developments, given the public benefits generated by the initiative, such as the reduction of greenhouse gas emissions and the decreased occupation of public space in the city centre. In addition, the Municipality is responsible for defining and enforcing access regulations that encourage transport operators to shift towards more sustainable urban logistics solutions.

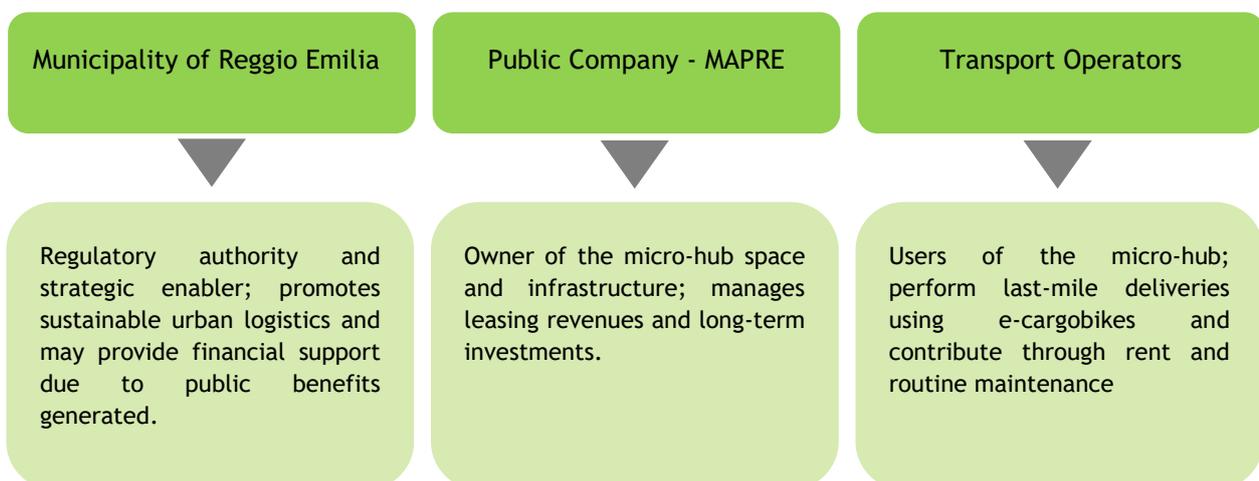


Figure 8 Governance model diagram



3.4. Digital and physical infrastructure

LOCATION AND ACCESSIBILITY

As mentioned in chapter 3.2.4. The micro hub is located within the vegetable and fruit warehouse market. The area is owned by a Municipality -owned company and is already used for logistic purposes. Therefore, several essential features required for a micro- consolidation centre are already in place:

- Security: the market is a fenced area; on weekdays from 00:00-14:00 security staff monitor access, while at other times a CCTV system operates.
- Facilities/amenities: restrooms are already available within the market and electricity system is quite well-distributed throughout the area. The space is covered facilitating transshipment even on rainy days.
- Accessibility: the market is well connected to the main road network and accessible for all types of vans. The pilot area (city centre) is at a cycling distance (1.5 km). Market space renters can access the area 24/7.

The micro hub has been established on the south side of the central covered hallway (the red area in figure 14). This space was chosen for two main reasons:

- the only spaces available in the market are in the central hallway.
- the south side of the hallway is closer to a new entrance reserved for e-cargo bikes.

The selected area covers approximately 250 square meters.

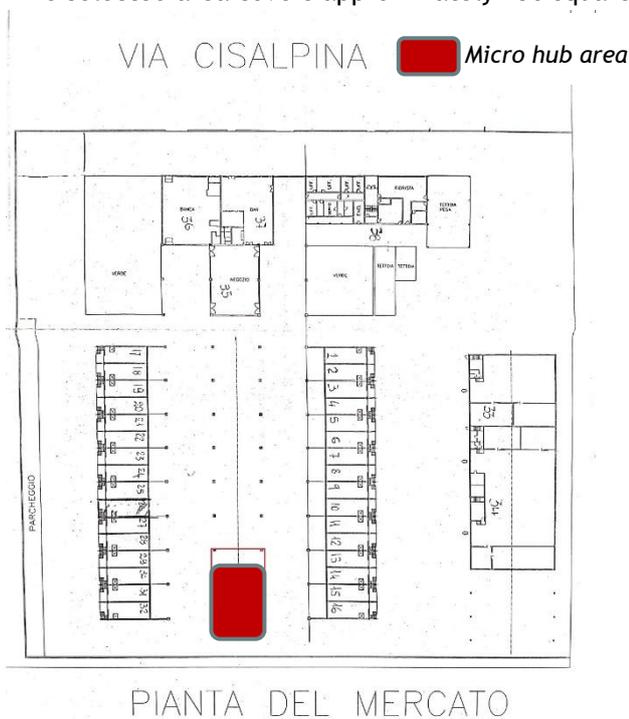


Figure 9 Selected area map

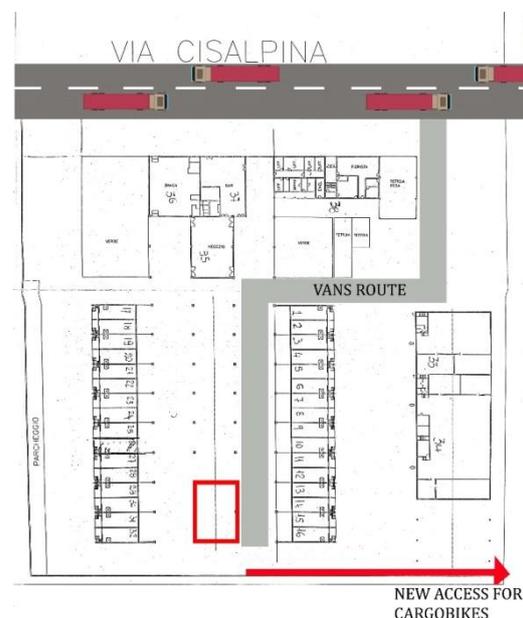


Figure 10 New design of the selected area

Delivery vans use the existing entrance on the north side, via Cisalpina, one of the main traffic corridors connecting the northeast to the northwest part of the city. A cycle path runs only on the opposite side of street from the market entrance.



The east side of the market area borders with a residential and low traffic area with 30-km/h streets. For this reason, a new entrance has been opened on the east side to provide a safer and shorter route for cargo bikers travelling from the micro hub to the city centre

PHYSICAL INFRASTRUCTURE DESCRIPITON

The micro hub occupies a covered space in the central hallway.



Figure 11 Central hallway

This space is divided in two main parts:

- storage area: four separate, independent and enclosed spaces assigned to transport operators;
- transhipment area: parking spaces reserved for transport operators' vans.

Four 40ft (12 m) ISO containers, each previously used for a single delivery, have been adapted to be used as storage spaces for transport operators. Containers have been equipped with sandwich walls with foam, anti-burglary protection on the lock, four internal lights, two-leaf tailgate on the short side, multilayer flooring, internal box with light point and 220V socket.

A first draft of the project included four prefabricated spaces occupying the full width of the available area. However, this solution would have increased significantly the budget and required additional seismic documentation, increasing design time. For these reasons, containers were chosen, as they do not require seismic documentation and can be installed more quickly. Initially, rolling shutter containers were considered, but this option would have reduced storage space by half due to budget constraints.

The chosen container dimensions maximize storage capacity, limit costs, and accelerate installation. Reducing 12ft containers to 9ft would have increased the budget and extended the installation timeline.

The project also included metal curb stone guards to protect containers from potential impacts caused by circulating vans.

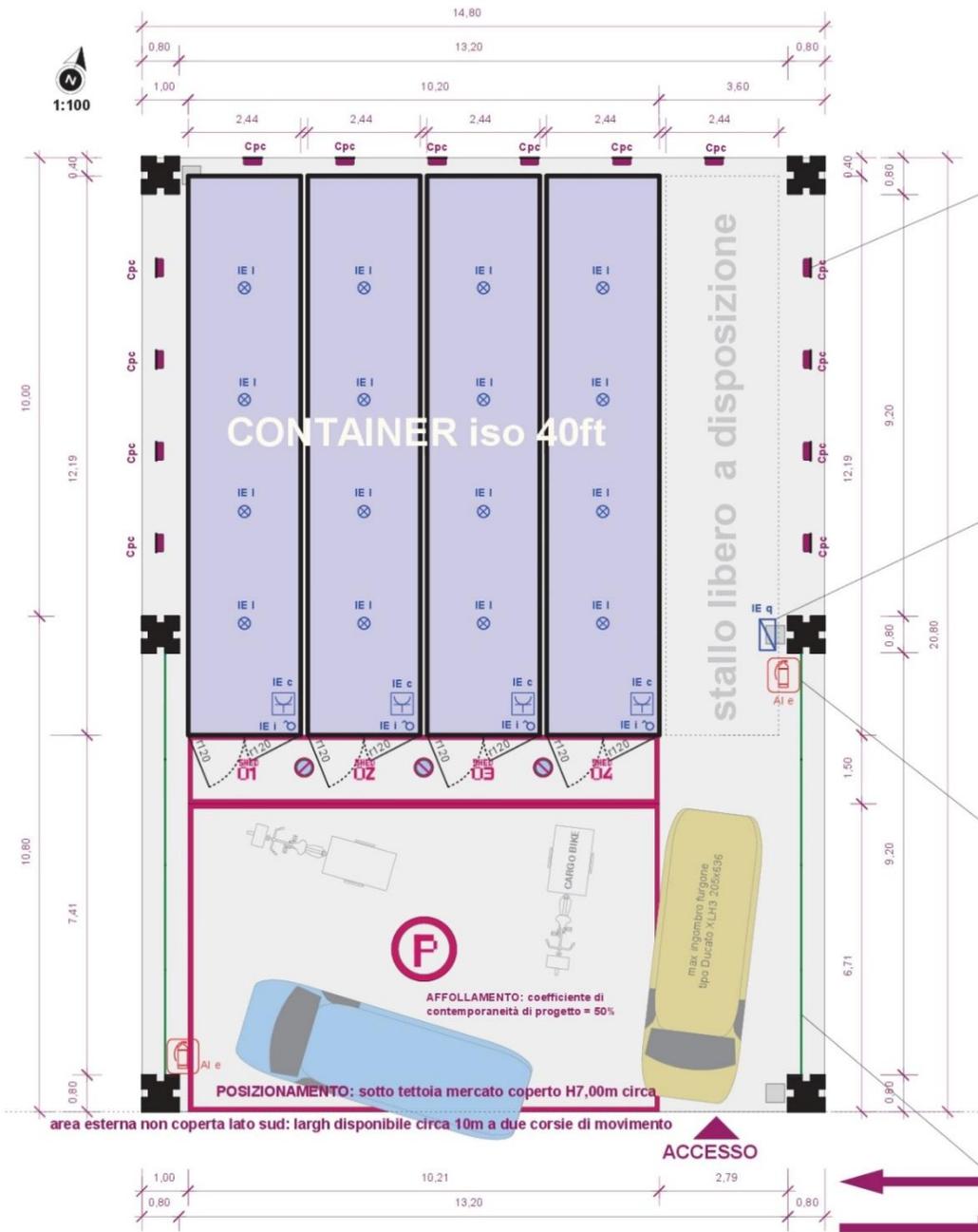


Figure 12 Micro hub positioning 1

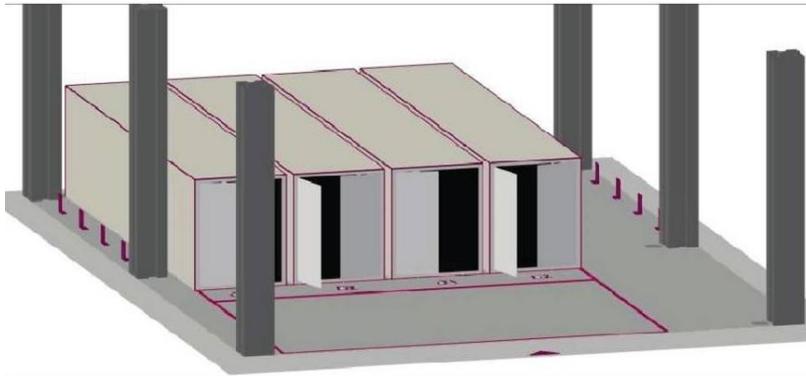


Figure 13 Micro hub positioning 2

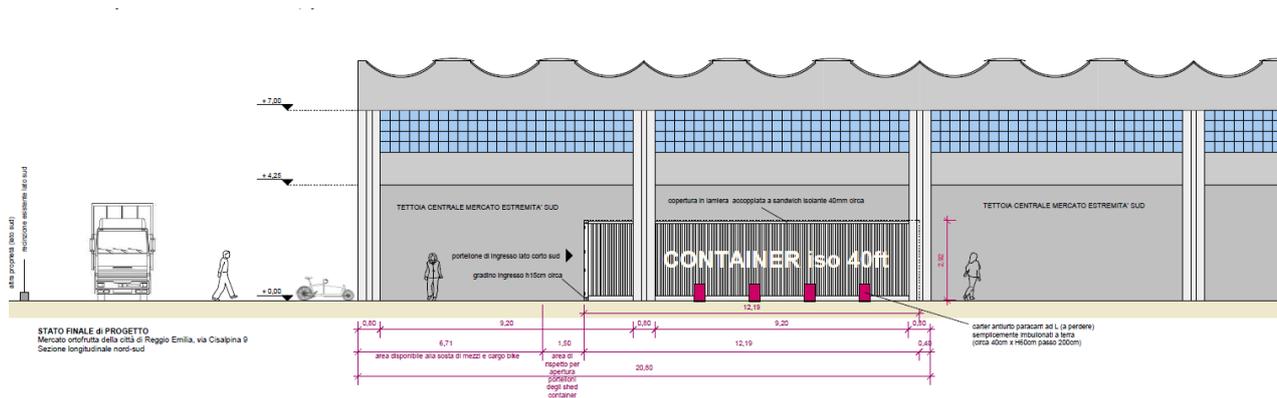


Figure 14 Micro hub section project

A significant part of infrastructural works budget was allocated to providing electricity to the micro hub (20%). Indeed, a 130m-long new power connection 130m has been realized specifically for the 4 containers.



Figure 15 Micro hub front



Figure 16 Micro hub back



Figure 17 Mobile platform



Figure 18 Container – indoor

The containers are equipped with movable ramps to facilitate storage and unloading of cargo bikes. Additionally, a new 1.8m-wide entrance has been created exclusively for e-cargo bikes, reducing travel distance by approximately 400 meters per trip.

Infrastructure works were divided into two phases due to budget constraints:

1. Installation of the four containers and the electricity system.
2. Definition of the transshipment area and creation of the new cargo bike entrance.

Infrastructural works for budget reasons has been divided in two phases:

- The first one concerned the installation of the 4 containers and the realisation of the electricity system;
- The second one included the definition of the transshipment area and the new access for cargo bikes.



Figure 19 New cargo bike market entrance

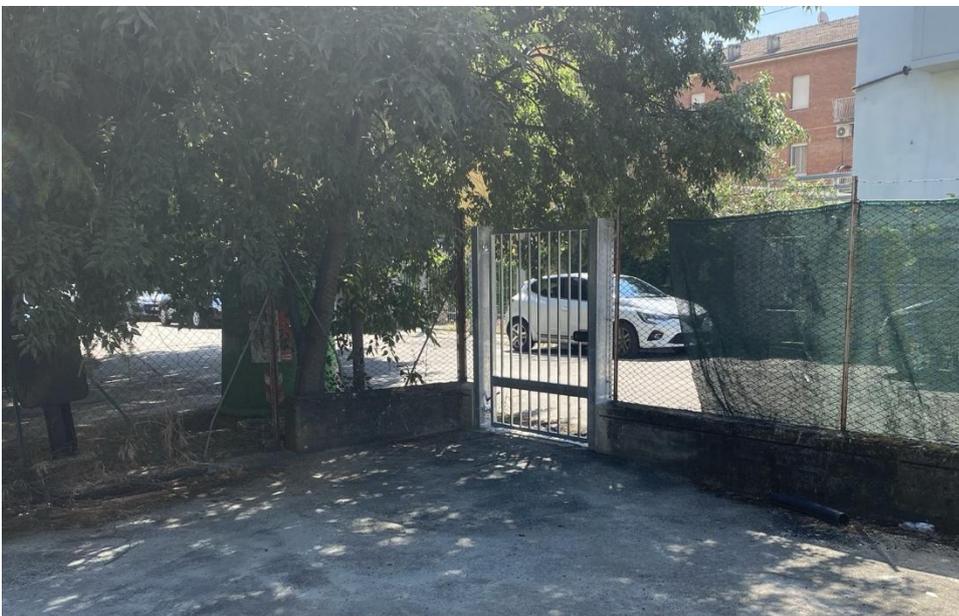


Figure 20 New cargo bike market entrance

For the first phase, the Municipality utilized GRETA funds, while the second phase was financed with local resources.

The project has been completed in all its components, except for the metal curb stone guards and the signage, as the effort was placed on the opening of the new entrance. Despite the absence of these additional elements, the micro hub is already functioning effectively.



Finally, to enhance visual appeal and comply with Central Europe Interreg programme branding guidelines, PVC banners have been installed on three sides of the micro hub, excluding the access side. Installation was completed in September 2025

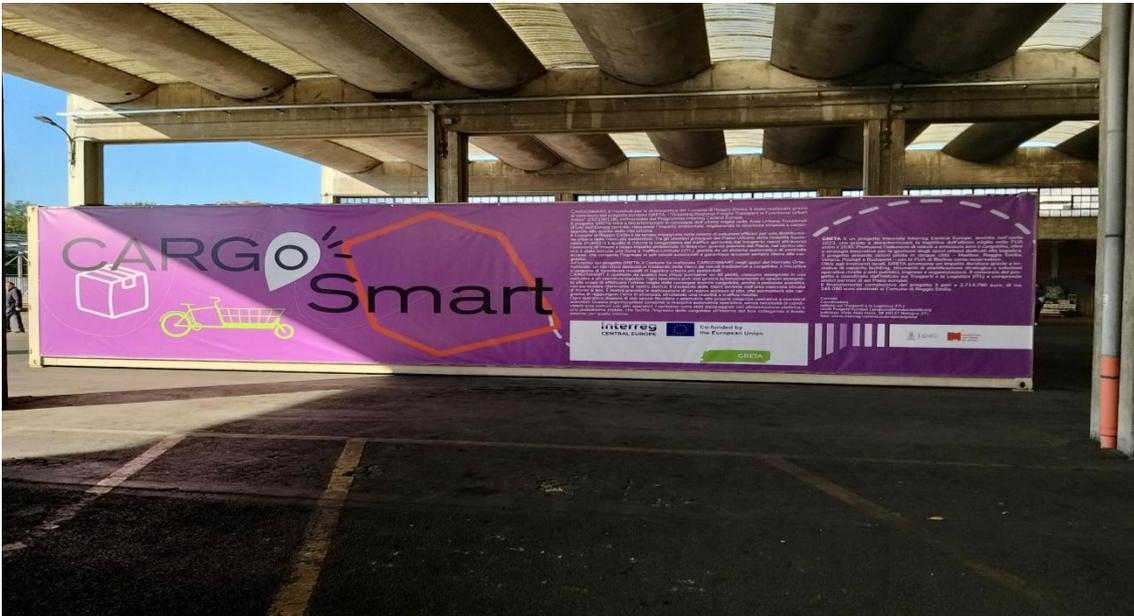


Figure 21 Banners covering micro hub



4. Impact

4.1. Environmental, economical and social impact assessment of the solution

The environmental and social impact assessment of the GRETA pilot is based on the comparison between last-mile deliveries performed by the e-cargo bike used during the pilot and a conventional light commercial vehicle operating in an urban context. For the environmental analysis, it is assumed that 90% of light commercial vehicles circulating in Reggio Emilia FUA are diesel-powered. Emission impacts were therefore calculated using the urban (U) emission factors for diesel light commercial vehicles published by ISPRA (Italian Institute for Environmental Protection and Research) for pollutants considered in the Regional Air Quality Plan (PAIR 2030), that are PM10, PM2.5, NO_x, SO₂, NH₃ and VOCs.

The following table summarizes the avoided emissions for the pilot phase, based on the emission factors for diesel vehicles operating in an urban environment:

Pollutant	Emission Factor (g/km)	Total Distance (km)	Total Emissions saved (g)
PM10	0,070549	600	42.33
PM2.5	0.044445	600	26.67
NO _x	0.983256	600	589.95
SO ₂	0.001448	600	0.8688
NH ₃	0.004777	600	2.87
VOCs	0.022292	600	13.38

Table 2 Total emission savings

These factors were applied to the total distance covered during the pilot (600 km), corresponding to the distance that would otherwise have been travelled by a conventional van. The pilot results demonstrate the clear potential of urban micro-logistics to reduce air pollutant emissions.

From a social perspective, the shift towards zero-emission deliveries contributes to improved quality of life for residents and local businesses and fosters a more liveable urban environment thanks to the reduction of noise levels and road space occupation in the city centre.



5. Transnational Cooperation

5.1. Scaling-up

Reggio Emilia's pilot model relies on the conversion of 20- or 40-foot shipping containers into modular micro hubs, preferably located within semi-public structures that already provide supporting logistics services. The MAPRE company is a prime example, offering on-site handling, security, electricity supply and potential co-location with other operators. Micro hubs can be deployed in series or clusters to achieve economies of scale, with each unit including a front-facing area suitable for parking a light commercial vehicle up to 3.5 tons to facilitate transshipment.

As part of Reggio Emilia pilot, four micro hubs have already been installed in the northern section of Reggio Emilia, within the MAPRE premises. Building on this initial configuration, a second cluster of micro hubs could be developed in the southern part of the city, in the area surrounding the municipal cemetery, where large parking facilities and existing services provide suitable conditions for logistics operations and last-mile distribution. Moreover, this area is connected by a major traffic corridor, located outside the city centre but still accessible to the historic centre, allowing goods to approach without passing through residential areas.

The micro hubs are designed to be configurable to the specific needs of each logistics operator, potentially including levelled ramps for direct cargo-bike access, internal shelving, power outlets for battery charging, and refrigerated compartments for perishable goods or pharmaceuticals. Optional electric charging points for light commercial vehicles can be integrated as needed. It is extremely important to allow operators the possibility to customise even minor technical details—such as ramps, gates, tailgates, shelving, and other internal fittings—as any misalignment with operational requirements could hinder the functionality of the micro hub and limit its effective use.

If of interest to other municipalities within the FUA, additional micro hubs could be implemented in their territories, allowing the model to be extended where demand, local spatial conditions and stakeholder interest align.

A key element for scaling up the model is the regulatory framework, which should be designed to maximise the relative advantage of zero-emission logistics solutions. A balanced combination of regulatory enforcement and incentives (the so-called “carrot and stick” approach) is therefore required to encourage logistics operators to progressively adopt more sustainable urban freight practices.

On the other hand, operators are expected to provide baseline operational data such as the number of cargo bikes in use, weekly kilometres travelled, deliveries performed, micro hub-to-delivery area trips, workforce allocation, and working hours. This data will allow continuous monitoring of the pilot's performance and support adaptive management of the micro hub network.

Through the combination of access regulation, micro hub infrastructure, and digital monitoring, the pilot can be scaled up from the city centre to the FUA dimension, balancing operational needs of freight operators with environmental and mobility objectives in the FUA.

Through the combined implementation of access regulation, modular micro hub infrastructure and digital monitoring, the pilot model can be progressively scaled up from the city-centre level to the broader Functional Urban Area (FUA). In the long term, additional complementary measures have been envisaged to further extend the impact of the initiative beyond freight delivery activities. These include the potential introduction of e-cargo bike sharing schemes for local retailers and citizens, with the aim of promoting the use of cargo bikes for a wider range of urban trips and purposes. Such measures would contribute to embedding cargo bikes into everyday urban mobility practices, supporting the development of a shared urban culture around cargo-bike use.



Table 3 Scaling up – plans and recommendations

<p>Plans for scaling up the solution in the pilot area.</p>	<p>Expand the micro hub network from the northern area to the southern part of Reggio Emilia and further to other municipalities in the FUA. Utilize modular, adaptable shipping containers and integrate additional services like e-cargo bike sharing in the long term.</p>
<p>Suitability for scaling-up</p>	<p>Modular design with flexible configurations allows adaptation to different operators and locations. Integration with existing logistics infrastructure ensures operational feasibility. Low administrative effort due to minimal data requirements and no need for mandatory digital platforms.</p>
<p>Identified risks for scaling up and solutions to overcome them (risk mitigation).</p>	<p>Misalignment with operational needs: Customise micro hubs to specific operator needs</p> <p>Insufficient regulatory incentives: Implement "carrot and stick" approach combining regulations and incentives.</p> <p>Lack of suitable locations: Prioritise semi-public sites and large parking areas.</p> <p>Data-sharing resistance: Establish an agreement for micro hub usage, including data-sharing protocols with the Local Authority.</p> <p>Financial sustainability: Promote multi-user models and explore public-private partnerships</p>

5.2. Transfer

The case of Reggio Emilia has a high degree of transferability to other European territories, since it addresses issues common to other European cities and the identified solution is based on available space, institutional commitment and governance conditions rather than on advanced or proprietary technologies.

Reggio Emilia pilot is focused on the identification and reuse of underutilised or semi-public spaces located at the margins of urban areas, such as wholesale markets, municipal warehouses, former industrial areas, large parking facilities, or logistics brownfields. These types of spaces are common across many European cities and FUAs, making this solution transferable to different local contexts. The pilot demonstrates that existing logistics-oriented sites can host micro logistic spaces as micro hubs with limited infrastructural investments, especially when basic services such as security, electricity, and accessibility are already in place.

From a technical perspective, the solution does not require high technological complexity. The micro hub infrastructure is modular, low-cost, and based on standard components (e.g. adapted shipping containers), which allows for rapid deployment and flexibility. The operational model does not depend on advanced digital platforms or data-sharing systems, reducing implementation barriers and making the solution accessible even to cities with limited digital maturity or financial resources.

Transferability is strongly linked to governance and stakeholder cooperation. A key prerequisite for replication is the establishment of a structured partnership between public authorities and logistics stakeholders, including transport operators, space owners, and local public companies. The Reggio Emilia experience shows that logistics operators are more willing to adopt sustainable delivery solutions when



public administrations combine access restrictions with enabling actions, including the provision of suitable spaces for last-mile operations.

The governance model, which preserves the operational independence needed by logistics operators and does not assign an operational function to the public sector, can be replicated in other contexts. This approach helps overcome common barriers related to liability, goods security, and operational control, which often caused issues to logistics solutions.

Overall, in a transferability perspective, another FUA should take into account the following key points:

- identifying suitable underutilised spaces;
- defining clear access regulations that favour zero-emission deliveries;
- engaging logistics stakeholders early in the process,
- adopting a flexible, low-tech micro hub model.

These elements make the solution robust, adaptable, and applicable across a wide range of European urban contexts.

Table 4 *What to expect - problems and solutions*

Problems and solutions	
Problems faced	Limited availability of suitable underutilised spaces and initial reluctance of logistics operators reduced the speed of transferability and required additional coordination efforts
Corrective actions taken	Identification of semi-public logistics-oriented areas and early engagement of logistics stakeholders through a governance model preserving operators' independence.
What to watch out for	Prioritise spaces with basic logistics services and involve freight stakeholders from the early planning phase, combining access regulations with enabling measures

6. Lessons learnt

The implementation of the Reggio Emilia pilot provided several important lessons related to scalability, transferability, and governance of sustainable urban logistics solutions.

Firstly, regulatory frameworks play a fundamental role in fostering behavioural change in urban logistics. Public administrations must clearly define objectives to reduce the environmental and spatial impact of freight deliveries and support these objectives with coherent access restriction policies and effective enforcement mechanisms. At the same time, enforcement should be accompanied by alternative solution, such as micro hubs, to ensure operational delivery services.

Secondly, stakeholder engagement is both essential and challenging. Freight transport stakeholders, particularly large logistics operators, are often difficult to engage through traditional participatory processes. Nevertheless, moments of regulatory change, such as the introduction of new access rules or enforcement technologies, create opportunities for dialogue. In these phases, public administrations can leverage the discussion to co-develop solutions that address both public policy objectives and operators' operational needs.

A key lesson learned concerns the importance of space as a lever for collaboration. Logistics operators have a strong demand for secure, accessible storage and transshipment spaces close to urban centres. Public



authorities often control or influence underutilised spaces that can meet this demand. Offering access to such spaces, even on a temporary basis, can be a powerful incentive to encourage operators to shift towards more sustainable delivery modes.

The Reggio Emilia pilot also highlighted that logistics operators are generally unwilling to share operational spaces or delivery responsibilities with competitors or third-party managers. Freight operators have different and strict policies related to goods security, liability, and operational efficiency. These issues make shared management models difficult to implement. Indeed, the independence of operators and their full control over the delivery process emerged as a critical success factor.

The chosen governance model, where the public sector facilitate the solution by providing space and regulatory support, while operators keep the responsibility for their operations, proved to be effective and attractive to stakeholders. This balance allows public administrations to achieve environmental and mobility goals without acquire complex operational roles.

7. Conclusions

The Reggio Emilia pilot demonstrates that sustainable last-mile logistics solutions can be effectively implemented through a combination of regulatory measures, strategic use of existing urban spaces, and cooperative governance models. By introducing a micro hub for e-cargo bike deliveries within an underutilised logistics facility, the Municipality was able to provide a concrete and operational alternative to conventional freight deliveries in the city centre.

The simplicity and flexibility of the pilot implemented in Reggio Emilia distinguish this solution. The absence of complex technologies, the modular nature of the infrastructure, and the limited need for digital systems make the model robust and adaptable to different urban contexts. The pilot confirms that meaningful environmental and social benefits can be achieved with relatively modest investments when interventions are well integrated into urban logistic policies.

The governance approach adopted in Reggio Emilia, which preserves the autonomy of logistics operators and identify the public sector as regulator, proved to be particularly effective. This model reduces implementation barriers, aligns public and private interests, and enhances the long-term sustainability of the solution.

In conclusion, the pilot provides a replicable and scalable model for cities aiming to decarbonise last-mile deliveries, reduce congestion and emissions, and improve urban liveability. Its transferability to other European territories is high, provided that suitable spaces can be identified and that strong partnerships with logistics stakeholders are established.



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