GRETA

D2.3.2 Pilot action in FUAs: Reggio Emilia

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More information about GRETA can be found on https://www.interreg-central.eu/greta/

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 cargobikes 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, cargobikes, 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 on-going 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 action carried out in the city of Reggio Emilia, aiming to support the decarbonisation of last-mile freight deliveries in the city centre through the use of e-cargobikes and a micro hub solution. The pilot was developed in the historical centre where access restrictions for freight vehicles, increasing pressure to reduce emissions, noise, and space occupation represent critical issues for the community.

The pilot focused on the realisation of a micro hub located within the municipal fruit and vegetable wholesale market, strategically positioned close to the city centre and well connected to the main road and cycling networks. The micro hub was designed as a shared facility for multiple logistics operators, providing independent storage spaces and enabling the transhipment of goods from vans to e-cargobikes. The solution was developed through a complex and collaborative process involving the Municipality, a publicly owned operator, designers, local stakeholders and local and international courier companies. This process required significant coordination efforts, technical adaptations and continuous dialogue to ensure compliance with operators' standards and operational needs.

The micro hub is composed of a covered logistics area of approximately 250 square metres and includes four independent and modular storage units based on adapted ISO containers, each assigned to a single operator, a shared transhipment area where vans can unload goods and transfer them to e-cargobikes. The facility is equipped with electricity, lighting, secure access and it is directly connected to the city centre through dedicated and safe cycling infrastructure, including a specific new entrance reserved for cargobikes. This configuration allows operators to work independently while using a shared public space designed to support efficient and low-emission last-mile deliveries.

Despite the availability of four containers, only one was actively used during the pilot phase. Nevertheless, the results demonstrate the strong potential of the solution. The pilot also received positive feedback from local businesses, citizens and the media, confirming a high level of social acceptance.

Beyond the quantitative results, a key outcome of the pilot is the establishment of a structured relationship between the Municipality of Reggio Emilia and logistics operators. This collaboration, which was previously difficult to achieve, represents a strategic asset for future scaling-up actions. Once access restrictions and enforcement systems in the Limited Traffic Zone are fully operational, the micro hub is expected to be used more intensively, reinforcing its role as a core element of a sustainable urban logistics strategy.

3. Pilot action set up

3.1. General information

Reggio Emilia is a medium-size city in Northern Italy with 172.093 inhabitants (February 2025[1]). 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 three 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[2].

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[3].

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 cargobike deliveries especially in the city centre. Another measure included in the SUMP 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[4]).

During the GRETA project, the Municipality has made progress in implementing the 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.

[1] Municipality of Reggio Emilia

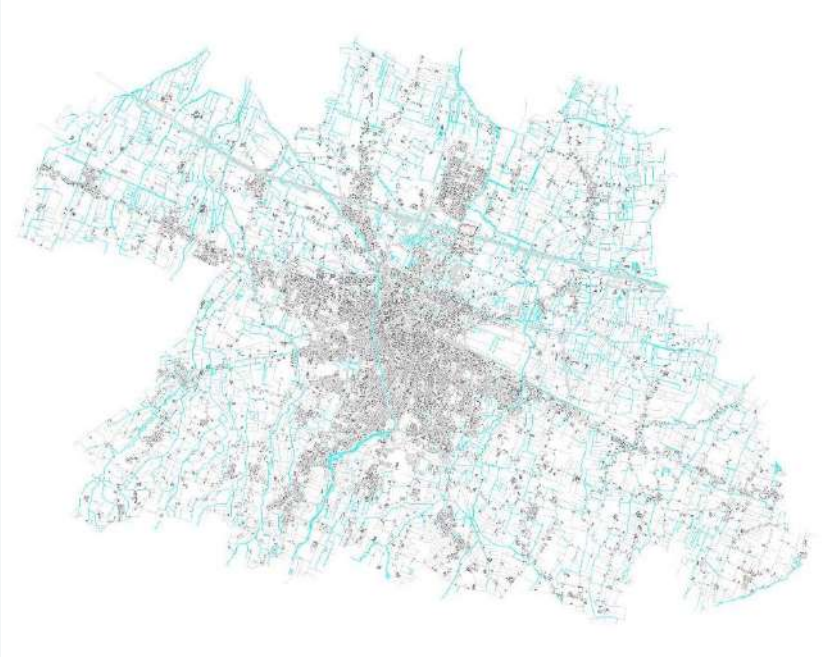
[2] Sustainable Urban Mobility Plan of Reggio Emilia

[3] Sustainable Urban Mobility Plan of Reggio Emilia

[4] Urban logistic in the city centre of Reggio Emilia – 2021 Report

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

Table 1 General information

Location	Reggio Emilia is a medium-size city in Northern Italy with 172.093 inhabitants (February 2025).
Map (general map of the Municipality + detailed map of the city centre)	 *Figure 1: General map of Reggio Emilia Municipality*[5]  *Figure 2: Detailed map of the city centre*

[5] Municipality of Reggio Emilia

Area characteristics	Brief outline of the main characteristics of the pilot area: area type: city centre area size: 1.8 km² access restrictions: freight vehicles allowed only in fixed time windows; access enforced with UVAR systems. Rising bollards protect the most central pedestrian zones. The city centre is a mixed area quite densely populated with about 10,000 inhabitants. The city centre is one of the main commercial hub of the city with 900 businesses (60% shops, 30% Ho.Re.Ca and 10% other).
Additional information	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.

3.2. Vision and problems/needs to be addressed in GRETA

3.2.1. Pilot action objectives

The SUMP approved by the Municipality of Reggio Emilia in 2023 includes in its objectives the reduction of the impact of freight deliveries in the city centre and the promotion of e-cargobike deliveries. To reach these goals, a municipality has two main types of policy tools or methodologies. Firstly, to reinforce and enhance rules to access the city centre and secondly to promote or incentivise alternative sustainable modes of transport.

Since the city has already started to enhance the enforcement of freight vehicles access to the city centre with UVAR system, in the framework of GRETA project, Reggio Emilia aimed to promote a sustainable option for transport operators, whose accessibility to the city centre will be reshaped. The goal was to test a system that promotes not only low-emission vehicles but also compact vehicles, in order to reduce noise and air pollution caused by freight vehicles and minimize space usage in an area with narrow streets and limited public space.

3.2.2. Specific vision & ambition and the pilot action problems/needs to be addressed by GRETA

The pilot initiative was developed in response to existing logistical challenges, which it has begun to address.

First of all, freight vehicles strongly contribute to air and noise pollution, as 89% of vans in Reggio Emilia FUA are diesel-powered[6].

Secondly, considering that the pilot area is in the inner city, that is one of the main commercial hubs of Reggio Emilia FUA, but in a typical Italian historical city centre, freight vehicles occupy high value space in an area with narrow streets and high-value public space.

[6] Automobile Club Italy regional data

Finally, freight vehicles operate even in most crowded streets with high presence of vulnerable road users (pedestrians and cyclists). Despite the fact that there are rules to access to the city centre and avoid the co-presence of vulnerable users and freight traffic at least in the peak hours, these rules are easy to elude. In fact, although there are time-windows to access the city centre and rising bollards to protect most crowded pedestrian area, cameras check only the entry time so vans can stay even after the end of their time-window and rising bollard needs lots of maintenance and they are often out of order. Moreover, enforcement by local police is difficult since their efforts are mainly addressed to other activities.

The city of Reggio Emilia had been working on this issue for years, but cooperation with transport operators was challenging due to differing internal policies, which made it difficult to collaborate on a unified project and share data with external entities

In this framework, considering all the problems previously described, Reggio Emilia pilot action aimed:

- to promote the use of low emissions and compact vehicles to deliver in the city centre. Considering the cycling culture of the city, the solution identified are e-cargobikes;
- to realise a micro hub for van-e-cargobike transhipment attractive for transport operators, and compliant to their polices and standards;
- to test a solution that can be easily scaled-up;
- to collect data about city logistics to plan scale up interventions.

The pilot goal was also to enable the city of Reggio Emilia to plan future interventions, reduce the impact of freight deliveries and implement low emission zones, while promoting e-cargobike freight distribution among freight operators and local retailers.

Table 2 Problems addressed

Problem(s) addressed	• Freight vehicles strongly contribute to air and noise pollution; • Freight vehicles occupy high value space in an area with narrow street and high-value public space; • Safety (co-presence of vulnerable users and freight vehicles); • Lack of transport operators' engagement and city logistic data.
Causes of the problem(s)	• 89% of vans in Reggio Emilia FUA are diesel-powered; • Lack of enforcement; • Each transport operator has strict standards and policies that make difficult to share a common project and exchange data with an external entity.
Rationale for implementation	Based on the strong cycling culture of the city and the good cycling infrastructure available in Reggio Emilia, the Municipality aimed to boost the use of e-cargobike for the delivery of goods in the city centre in order to promote the use of low emissions and compact vehicles. A micro hub for van/e-cargobike transhipment had been realised near the city centre. To engage transport operators and make it attractive they had been involved since the design phase to develop a project attractive for transport operators, and compliant to their policies and standards. During the pilot data about city logistics had been collected to plan scale up interventions.
Future outlook	In the long term, the goal is to implement the micro hub in other areas of Reggio Emilia FUA to contribute to the decrease of pollutant emissions produced by the freight transport sector. In the city centre, the micro hub realised in the frame of GRETA project, could be further expanded or enhanced with the potential to increase the number of transport operators using e-cargo bikes for last-mile deliveries, while reducing the presence of freight motor vehicles.

3.2.3. Governance analysis

3.2.3.1. Local, regional, national and EU government policies and regulations that influence the pilot action

Local policies and regulations:

Currently in the city centre, there are access restrictions for motorised vehicles. Only resident and freight vehicles can access. Residents do not have any time limitations, while freight operators have time windows to access the city centre. Nevertheless, for different reasons described in the previous paragraphs, these rules are not easy to enforce.

The SUMP, approved in 2023, identified the need to expand and enforce access restrictions in the city centre. In this context, the restricted access area has been enlarged, an electronic system for automatic enforcement has been installed, and it has been partially activated.

Regional policies and regulations:

Emilia-Romagna Region is part of the Po valley, that is one of the most polluted areas in Europe. To cope with this critical situation, the Region has elaborated a Regional Air Quality Plan (PAIR 2030), with the main objective, to protect collective health, identifying concrete actions to comply with air quality standards and to reduce polluting emissions in the territories regional.

In particular, PAIR 2030 plans to achieve compliance with the limit values of the most critical pollutants envisaged by the legislation, in the shortest possible time. The plan identifies the following principles:

- reduce emissions of both primary pollutants and precursors of secondary pollutants (PM10, PM2.5, NOx, SO2, NH3, VOC);
- act simultaneously on the main emission sectors;
- act both on a local scale and on an extended spatial scale of the Po basin with intervention by the Ministries on the sources of national competence;
- prevent acute pollution episodes in order to reduce local peaks.

In particular for transport sector, PAIR 2030 sets restrictions to polluted vehicles – especially for diesel ones - to face air pollution every year from 1st October to 31st March.

National policies and regulations:

Free access in limited traffic zones to BEVs, PEHVs and MHEVs due to national legislation.

EU policies and regulations:

European Commission **Transport White Paper** setting the goal of a carbon-free urban freight distribution, by 2030; the revision of **TEN-T Regulation** is followed with great attention from the cities, especially the part related to the definition of the Urban Nodes, which will influence also city logistics planning, as well as the ambitious target of phasing out ICE vehicle sales by 2035.

It supports EU goals for sustainability, decarbonisation of transport, and improved urban mobility while contributing to environmental and public health objectives. By aligning with the EU's Green Deal, urban mobility frameworks, clean Vehicle directive[7],and vision zero for road safety[8], the project can help meet broader EU targets for a greener, safer and more efficient transportation system.

[7] DIRECTIVE (EU) 2019/1161 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 20 June 2019 amending Directive 2009/33/EC on the promotion of clean and energy-efficient road transport vehicles.

[8] European Commission: Directorate-General for Mobility and Transport, Next steps towards 'Vision Zero' – EU road safety policy framework 2021-2030, Publications Office, 2020, https://data.europa.eu/doi/10.2832/391271

3.2.4. Solution description and technical specifications

The solution identified for Reggio Emilia pilot is a micro hub for e-cargobike. The idea was to realise a space where transport operators can tranship their goods from vans to e-cargobike 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.

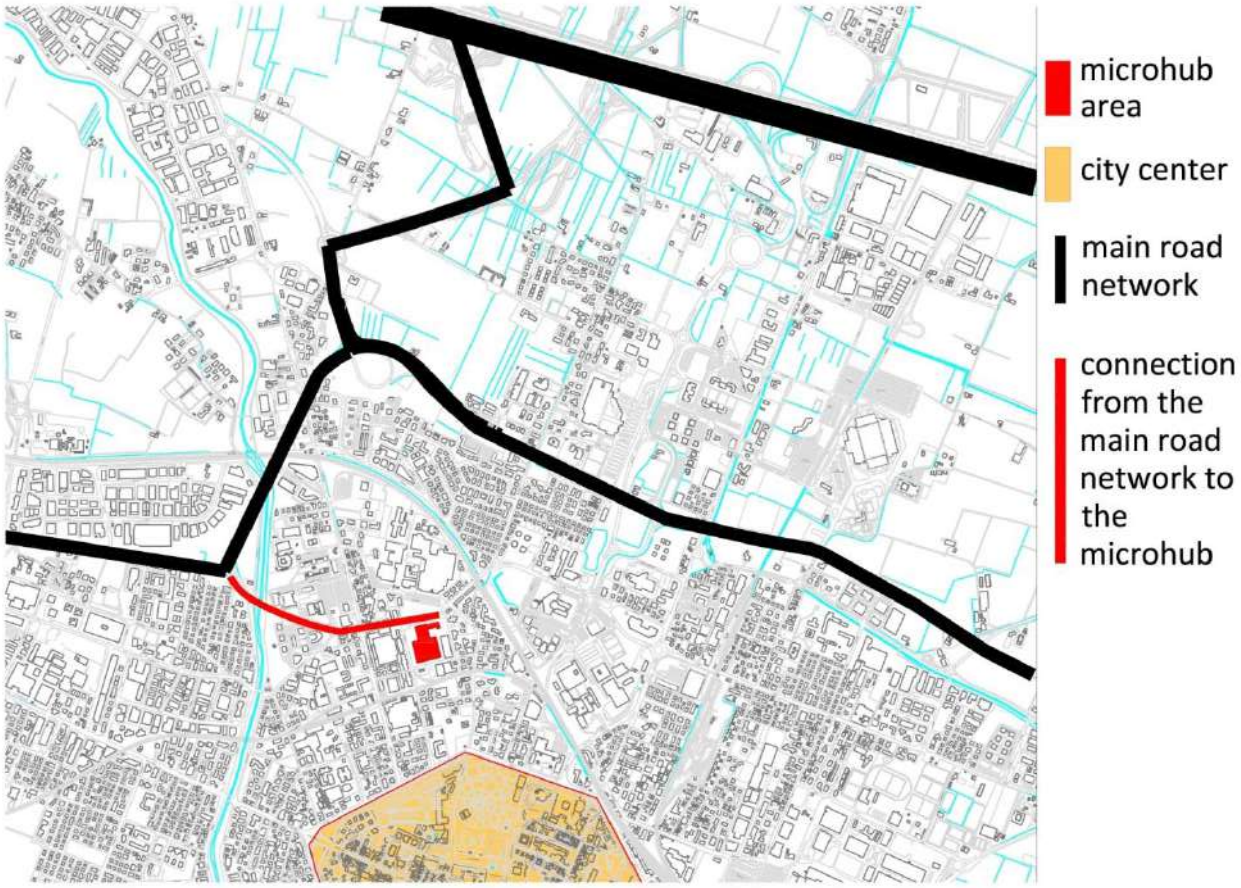


Figure 3 Micro hub location and main road network

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. Within the pilot it has been realised a dedicated automated entrance for cargobikes on a side of the market area that is directly connected with via Guido Riccio Fogliani. With this intervention, the cycling accessibility has been significantly improved allowing cargobikes to easily access the pilot area.

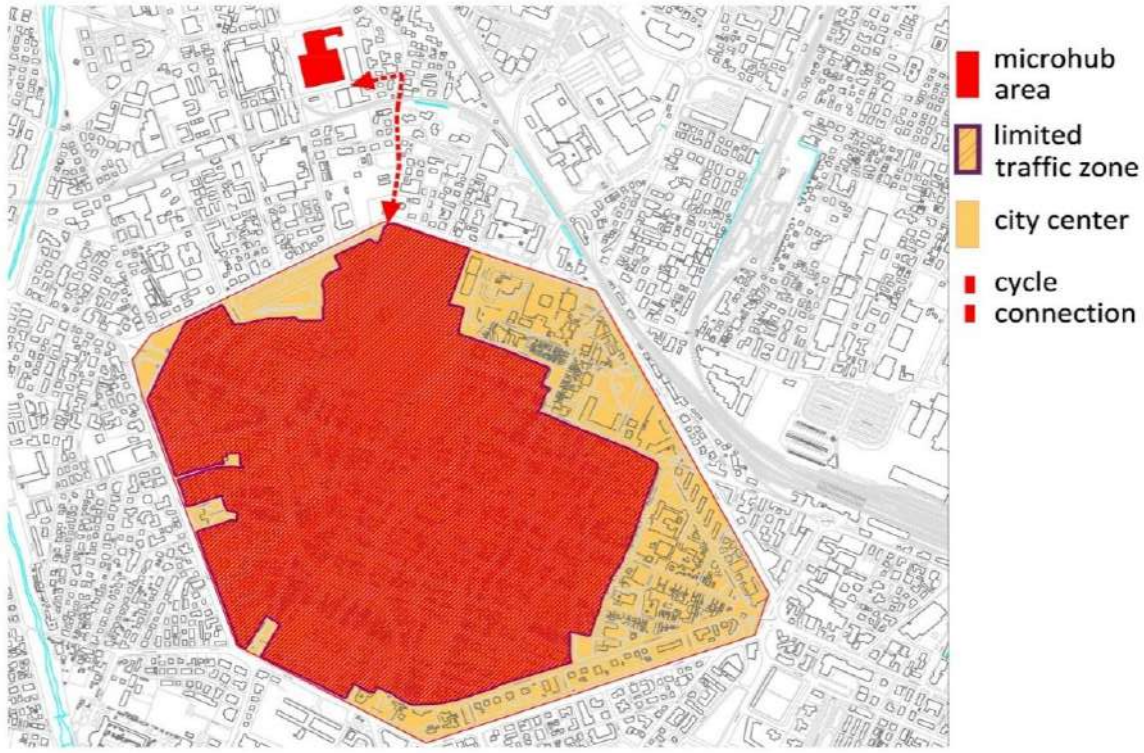


Figure 4 Micro hub area, LTZ and cycle connection

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 porterage service is available to assist with handling goods.

Figure 6 Market area 2

Figure 7 Market area 1

3.2.5. Transnational Cooperation

The solution has been jointly developed with the support of City of Poznan and the Municipality of Maribor. Six peer-review workshops have been organised to share issues, ideas and solutions among partners that face similar situations. Indeed, the Poznan and Maribor tested similar solutions with micro hub for logistic operators.

All pilot partners faced the challenge of limited data, as logistics operators are unwilling to share their transport data due to internal policies. This makes it very difficult for public entities to develop effective city logistics plans based on real data. To address this issue, the partners collaboratively developed a basic questionnaire to share among transport operators.

Moreover, partners share the need to implement and enforce access restrictions in pilot areas to boost the use of sustainable modes of transports. Indeed, the development of a rules system that limits the access to pollutant vehicles is the main requirement to encourage transport operators to change their delivery system. In the absence of restrictions, transport operators would not change their profitable system. At the same time, partners strongly agree on the need to build a collaborative approach with transport operators to support them in a fundamental change of transport behaviour.

The Municipality of Maribor and the City of Poznan provide very good examples in this perspective; Maribor was able to restrict and enforce rules to access pedestrian areas and Poznan built a strong partnership with a transport operator to test cargobike deliveries.

The implementation of both pilots was very inspiring for Reggio Emilia. The Poznan pilot, based on a strong collaboration with a courier involved since the beginning of the project, produced very interesting results especially in terms of data collection. The case Maribor, which installed a micro hub in an historical location under strict heritage protection rules and focused on deliveries in pedestrian area, could represent a further step for Reggio Emilia.

Thanks to the successful collaboration with GRETA partners, GLS Italy has been involved in Reggio Emilia pilot. The Polish partner facilitated a connection between the Municipality of Reggio Emilia and GLS Italy's City Depot and Urban Delivery Department.

Finally, pilots in Budapest and Verona, which tested curbside management solutions, encouraged Reggio Emilia to begin a similar process. A pilot project, funded with local resources, will begin in the coming months to install sensors in loading and unloading parking spots in the city centre. These sensors will detect and analyse occupancy patterns and, in the long term, the aim is to integrate the micro hub with a curbside management platform.

Table 3 Information on joint development

Main implementor of the solution	Municipality of Reggio Emilia
Contributor[2]	Municipality of Maribor (SL) – Maribor Pilot and City of Poznan (PL), L-PIT (PL) – Poznan pilot
Process of joint development	Poznan and Maribor tested similar solutions with micro hub for logistic operators. Six peer-review workshops have been organised to share issues, ideas and solutions among partners
Input received from contributor	MoM, CoP and L-PIT provided useful examples of access restrictions enforcement and collaboration with transport operators. Moreover they gave very interesting feedback throughout the pilot process thank to the peer-review workshop. Poznan put us in contact with the Italian offices of the international transport operator they are working with.
Value of collaboration	The implementation of both pilots was very inspiring for Reggio Emilia. The Poznan pilot, based on a strong collaboration with a courier involved since the beginning of the project, produced very interesting results especially in terms of data collection. The case Maribor, which installed a micro hub in an historical location under strict heritage protection rules, and focused on deliveries in pedestrian area, could represent a further step for Reggio Emilia. Thanks to the successful collaboration with GRETA partners, GLS Italy has been involved in Reggio Emilia pilot. The Polish partner facilitated a connection between the Municipality of Reggio Emilia and GLS Italy's City Depot and Urban Delivery Department.

4. Stakeholders and their role

For several years, the Municipality of Reggio Emilia has been working closely with local retailers to identify sustainable solutions for last-mile deliveries in the city centre. A dedicated working group was already in place before the GRETA project and retailers' associations were regularly involved in discussions with the Municipality. However, before GRETA, the Municipality of Reggio Emilia did not have structured or stable relationships with freight and logistics operators.

The GRETA project represented a turning point in this respect. Through the project, the Municipality successfully established a structured dialogue and collaboration with major international freight operators such as Amazon, GLS, BRT and UPS, as well as with relevant local actors. This engagement was formalised through the creation of a Freight Quality Partnership (FQP), which brought together trade associations, transport operators, logistics providers and public authorities.

The Freight Quality Partnership meetings played a crucial role in the early stages of the project, particularly in defining the operational and technical requirements of the micro hub. Stakeholder input was essential to ensure that the infrastructure and its management model would be aligned with real operational needs. A significant engagement action was also carried out through a dedicated co-design workshop for the micro hub, involving both local and non-local operators.

This participatory approach allowed stakeholders to actively contribute to the design of the space, its services and its governance model. The micro hub and its management model were therefore co-designed together with stakeholders, an approach that proved to be highly effective. Several companies were involved, encompassing logistics operators as well as cycle-logistics and cargo-bike service providers.

Although some of these actors do not currently operate in Reggio Emilia, they provided valuable technical feedback on the micro hub concept, participated in a site visit, and contributed insights on operational requirements, service models and management solutions. Their expertise remains relevant and they could potentially be involved in future implementation phases, when Reggio Emilia will be able to expand the range of operators or explore additional service configurations.

This collaborative process attracted significant attention from logistics operators and public institutions, to the extent that the Municipality of Reggio Emilia was invited to present the GRETA pilot project at the City Forum in Krakow in June 2025.

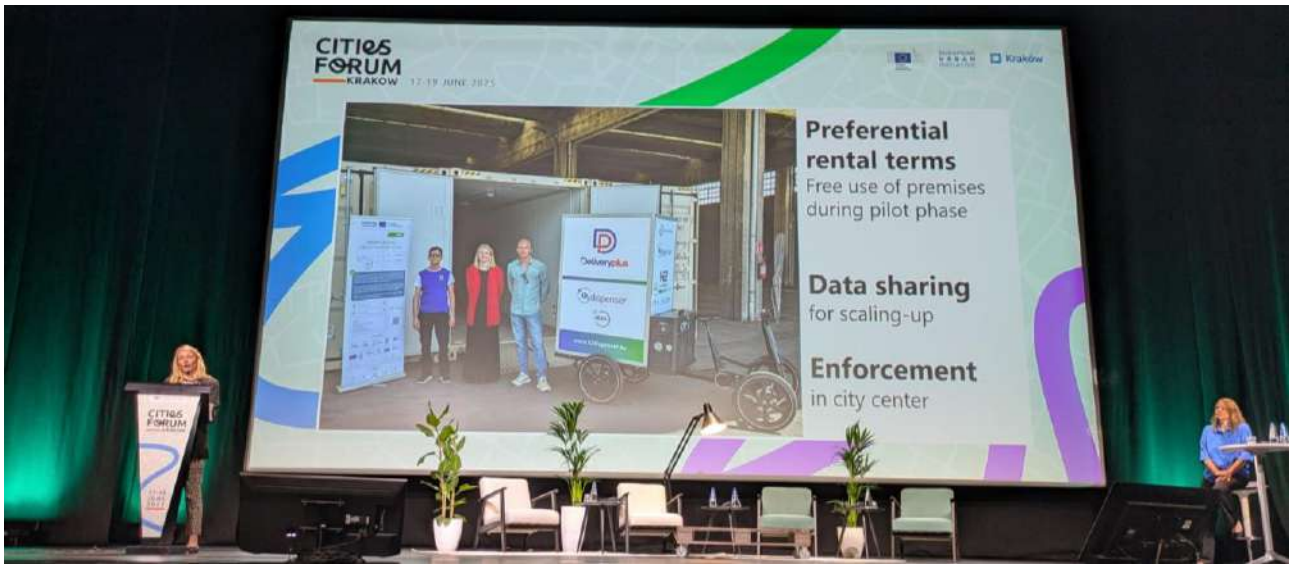


Figure 8: Carlotta Bonvicini – Deputy Mayor for Sustainable Mobility Policies – presents GRETA pilot during City Forum 2025

Stakeholder collaboration did not end with the completion of the infrastructural works. On the contrary, dialogue has continued, and new synergies are emerging that may lead to future projects and initiatives. The Municipality is confident that, once access regulations to the city centre are further strengthened, the relationships and trust built during the GRETA project will be instrumental in enabling the micro hub to reach its full operational and environmental potential.

Table 4 Stakeholders' list

Organisation	Stakeholder type[2]	Stakeholders' priority[3]	Engagement level[4]
Local retailers	SMEs	Medium	Low
BRT spa	Transport operators	High	High
Amazon	Transport operator	high	high
Mapre	Public company owned by the Municipality	High	High
DELIVERY - PLUS	Last mile operator	high	high
TRT	micro hub Designer	low	medium
UPS	Transport operator	high	high
GLS	Transport Operator	high	high
HDL srl	Transport operator	high	high
La Sajetta	Last mile operator	high	High
Poste Italiane	Transport operator	medium	medium

5. Pilot action implementation

5.1. Timeline

The pilot action implementation could be divided into three main stages: planning, implementation, and monitoring.

The planning phase was the longest, as it involved a comprehensive participatory process that engaged various stakeholders and required thorough preparation. This stage included all the necessary preparations for the pilot, such designing phase and the definition of governance model. In addition, several administrative procedures related to the micro hub had to be carried out during this phase. These administrative acts required significant time and coordination and contributed to extending the overall duration of the planning phase. The planning phase began at the start of the GRETA project and was concluded in March 2025.

The implementation phase took place from April to October 2025. During this period, one local freight operator used the micro hub to complete last-mile deliveries with their own e-cargobike.

The monitoring phase started immediately after the pilot launch. Data elaboration was completed in November 2025, allowing for the evaluation of the pilot's effectiveness and impacts.

5.2. Planning

The planning phase of the project beginning, with the Municipality engaging various stakeholders to develop the concept of a collaborative micro hub. After gathering insights from these meetings, it became clear that each transport operator has its own delivery scheme, policies and the need to control the entire delivery process up to the final recipient. Additionally, it was clear that the Municipality cannot have operational logistics expertise, since its primary activities are in other areas.

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 cargobike 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 cargobikes.

On the basis of this concept a draft layout for the micro hub was defined in October 2023.

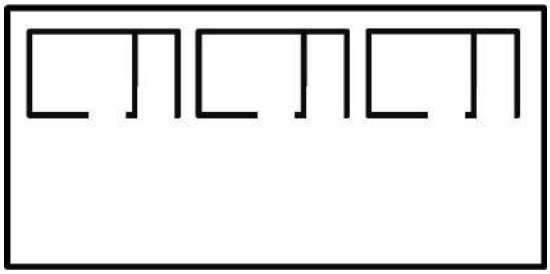


Figure 9 Micro hub draft layout

Subsequently the location selection process began. The area needed to meet the following criteria:

- accessibility for vans and good connectivity from the main road network;
- cycling distance from the city centre;
- good cycling infrastructures connecting city centre and the micro hub location;
- public property or equivalent.

Between November 2023 and February 2024, two potential areas were selected:

- the first area is owned by a regional public company and is located on the edge of the city center; it is an entirely vacant space that was previously an internal courtyard;
- the second area is the fruit and vegetable warehouse market, owned by a municipal public company.

After comparing the two areas and considering the allocated time and budget for constructing the micro hub, as well as the strong collaboration between the market and the Municipality, the second area was selected following a meeting with the market director.

In the meantime, the Municipality selected an external expert to develop the executive project of the micro hub. The first meeting with the designer took place in January 2024. Several calls and online meetings had been organised also with local stakeholders.

In late June 2024, local stakeholders, national and international couriers and last milers already active in other Italian cities had been invited to a co-design workshop and a site visit.

During this session, several actors - almost 30 participants - had the chance to see a draft version of the project and visit the micro hub site. The site visit was also an occasion to test some e-cargobike, thanks to the collaboration with a cargobike provider.

Figure 10: Site visit

Figure 11 Site visit - Cargobikes

The Municipality collected all feedback to finalize the project design before the construction phase began.

At the end of August, transport operators were involved in a survey, but the response rate was quite low[9]. The design stage has been completed in October 2024.

In December 2024, the public procurement phase for infrastructure was concluded and by February 2025, all infrastructural works were completed. Containers were installed and provided with electricity, with the works lasting two weeks.

The Municipality and MAPRE, the public company that owns the warehouse market spaces, signed a partnership agreement to define each actor's role in the pilot activities. The Municipality is responsible for all infrastructural works and for selecting transport operators, while MAPRE provides free access to the space and electricity until the period specified by the Interreg CE Programme.

[9] The results of the survey are reported in the Addendum to D1.2.2 Territorial needs and gaps carried out in all the GRETA FUAs.

Figure 12 Container positioning

A tender procedure to select transport operators for the micro hub was published on 13th December 2024, and closed at the end of January 2025. The procedure outlined the aims of the pilot, the business model, and specified that the Municipality would cover all costs related to the use of the micro hub, while any costs related to the acquisition of cargobike(s) or any furniture for the containers would be the sole responsibility of each operator. Some basic requirements were listed, including:

- container spaces cannot be used for storing of dangerous goods and/or fresh goods that require refrigeration;
- Operators are responsible for the ordinary maintenance of their assigned containers and must provide anonymous data to verify that goods have been delivered by cargobike.

Three operators submitted their applications to join the pilot activities and use the containers within the deadline. However, the tender allowed other transport operators to apply after the deadline if at least one of the spaces was still available.

In the meantime, a template contract was developed between the Municipality and the micro hub users. This contract outlined the duties of both the Municipality and the micro hub users. The main responsibilities are listed in the following table.

Table 5 Responsibilities

MUNICIPALITY	MICROHUB USERS
Grant free loan and electricity for the entire duration of GRETA project	spaces cannot be used for the storage of dangerous goods and/or fresh goods that require conservation in refrigerated areas
Not responsible for the goods managed by transport operators	micro hub users have to use a cargobike, not provided by the Municipality, to deliver their good in the last mile
	provide statistical data to prove the use of cargobikes in the last mile
	respect the warehouse market regulations
	cannot transfer the property to third parties for any reason
	need to take out an insurance policy for damages caused to third parties as a consequence of an event occurring in relation to the activities carried out

On March 12, 2025, we met with the three operators who submitted their application to show them the micro hub, which was ready to be used. The company managing the warehouse market and the entire area provided operational instructions for starting the pilot. We received very positive feedback about the realization of the micro hub, with all participants expressing satisfaction with the space.

Figure 13 Freight Quality Partnership meeting with local stakeholders in March 2025

5.3. Implementation

The implementation of the pilot project began in April 2025. Cargobike deliveries are still running because the micro hub will still be operation after the project's conclusion, but, for evaluation purposes, data collection covered the period from April to October.

During the pilot, one of the four containers has been actively used. A local freight operator (Delivery Plus) is delivering goods to the city centre using an e-cargobike twice a week.

Another international transport operator, which has already signed a contract with the Municipality, has encountered internal issues related to driver contracts. They are working to resolve these issues and plan to begin cargobike deliveries at the start of 2026.

A third operator, who has expressed interest in joining the pilot, is currently seeking partnerships with other transport companies to take over last-mile delivery operations.

To maximize the utilization of the micro hub, the Municipality has reached out to additional transport operators. The Deputy Mayor for Sustainable Mobility has participated in several Freight Quality Partnership meetings with various operators who joined the pilot's preparation phase. The goal of these discussions was to understand why some operators decided not to join the pilot and identify potential synergies for the post-GRETA phase, aiming to optimize the micro hub’s use. The reasons presented by the operators varied, but many cited that the current enforcement system allows them to deliver goods without restrictions, leaving no immediate pressure to change their delivery processes.

Currently, freight vehicles are supposed to access the city centre only during designated time windows. However, as already explained in previous paragraphs, in practice, they are able to enter at any time. Although technology for automatic enforcement (license plate recognition cameras) has already been installed, it has not yet been fully activated. Local decision-makers are still working on building consensus

regarding the access rules for the city centre. The original deadline for implementation was December 2024, but it has been postponed several times and a new activation date has not yet been set. As a result, transport operators do not have sufficient incentives to adjust their logistics processes and utilize the micro hub facilities.

However, the GRETA pilot has sparked engagement with several transport operators, who have begun collaborating with the Municipality. Thanks to this collaboration, once the enforcement technology is fully operational, the micro hub is expected to be fully utilized and function as intended.

In addition, in collaboration with partners from the H2CargoBike Horizon Project, a hydrogen-powered cargobike was tested for a couple of weeks by the local transport operator involved in the GRETA pilot. The results of the hydrogen cargobike tests were positive, with deliveries being made in a manner similar to the operator's existing cargobike.

Figure 14 The launch of the hydrogen-powered cargobike.

5.4. Monitoring

To ensure an effective evaluation of the pilot, transport operators using the micro hub facilities are required to share relevant data with the Municipality. The conditions set out in the micro hub usage contract specify that operators must provide the following information:

- number of cargobikes used;
- kilometres travelled by cargobikes;
- number of daily deliveries;
- number of daily trips between the micro hub and the delivery area;
- Number of employees involved in micro hub operations;
- working hours of these employees;
- Availability to participate in an interview to assess qualitative aspects.

Collecting this data supported a comprehensive evaluation of the pilot and serves as the basis for future scale-up actions.

6. 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 transhipment 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 15). 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-cargobikes.

The selected area covers approximately 300 square meters.

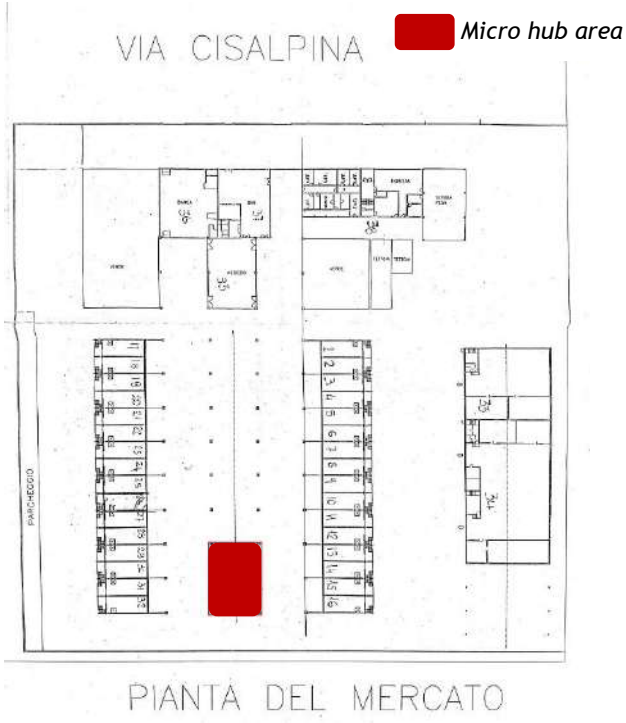


Figure 15 Selected area map

Figure 16 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 cargobikers travelling from the micro hub to the city centre

PHYSICAL INFRASTRUCTURE DESCRIPITON

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

Figure 17 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.

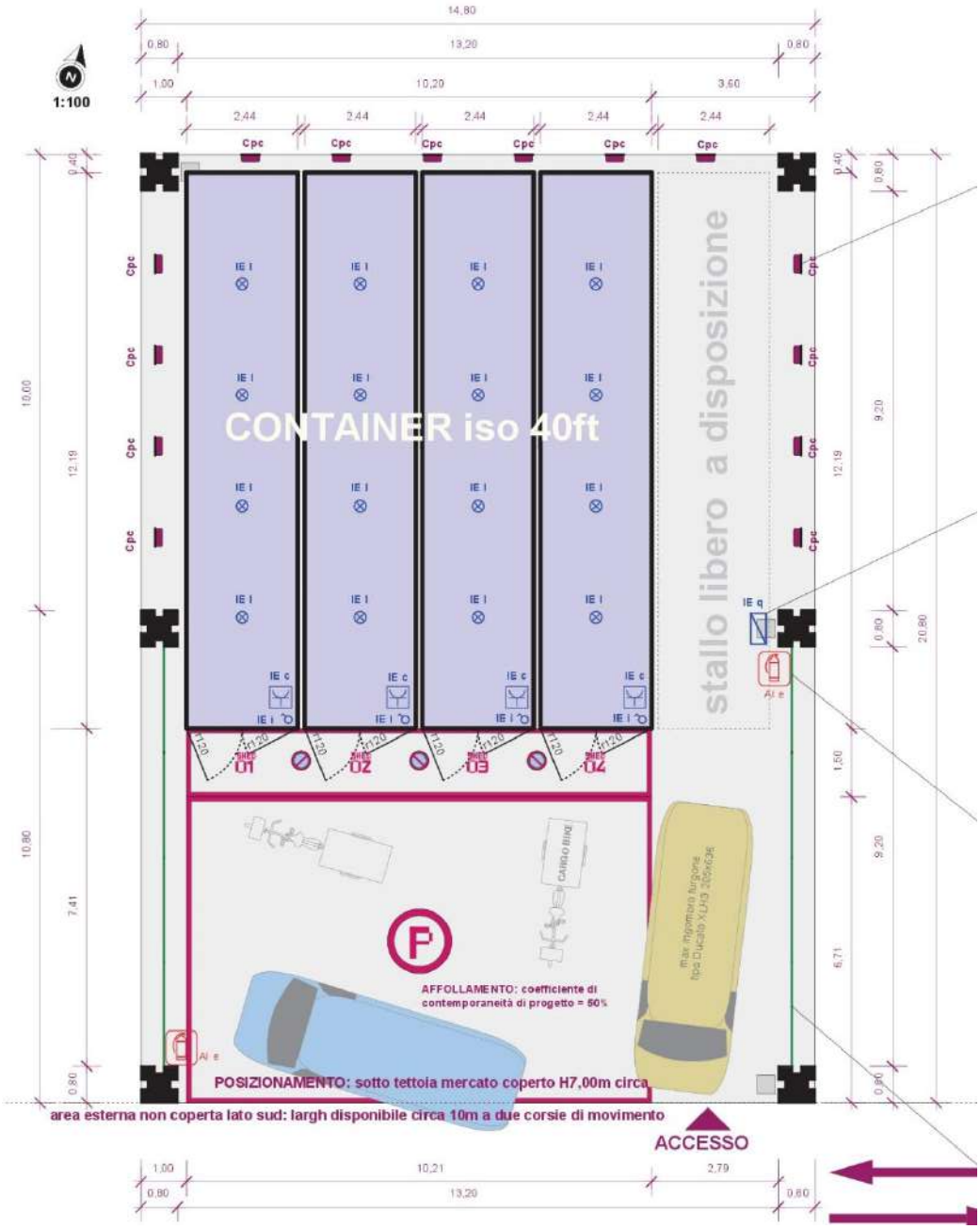


Figure 18 Microhub positioning 1

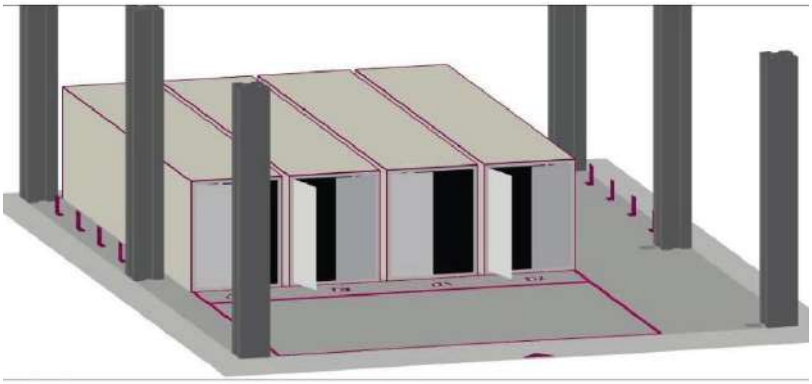


Figure 19 Microhub positioning 2

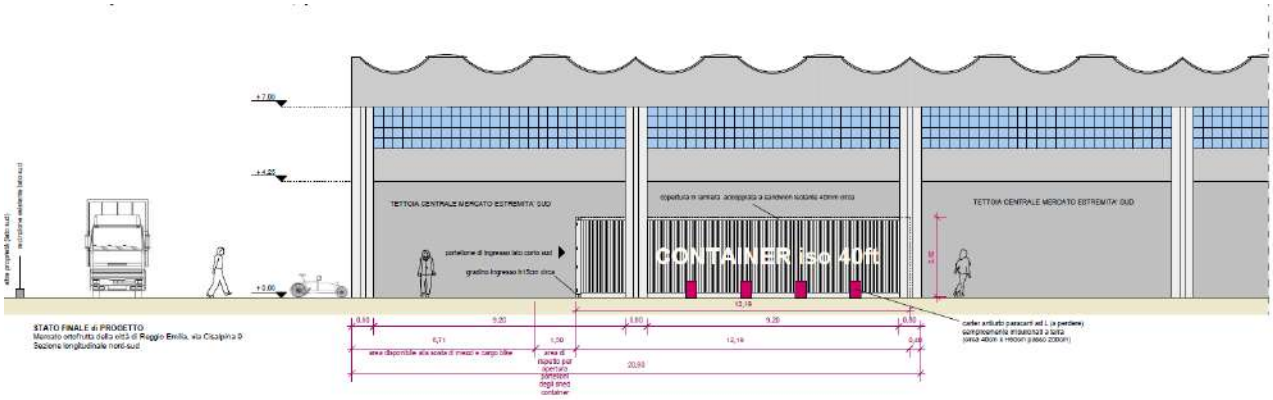


Figure 20 Micro hub section project

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 21 Micro hub front

Figure 22 Micro hub back

Figure 23 Mobile platform

Figure 24 Container – indoor

The containers are equipped with movable ramps to facilitate storage and unloading of cargobikes. Additionally, a new 1.8 m-wide entrance has been created exclusively for e-cargobikes, 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 transhipment area and creation of the new cargobike entrance.

Figure 25 New cargobike market entrance

Figure 26 New cargobike 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

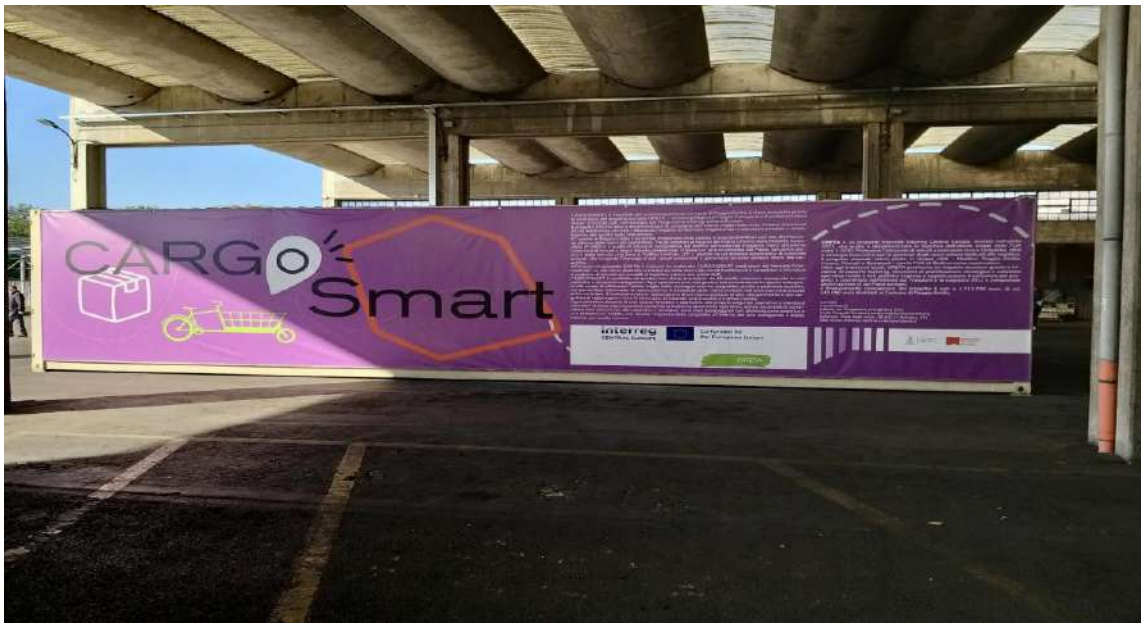


Figure 27 Banners covering micro hub

7. Evaluation/Impact assessment and results of implementation

7.1. Primary and secondary quantitative and qualitative KPIs

Primary indicators:

- **Available space - operational space** (e.g. size of hub - storage, parking) indoor and outdoor (sqm) - 310 sqm
- **Utilization of public spaces** 310 (sqm)
- **Investment costs** 90.000 (€)
- **Operational cost**: during the period defined by Central Europe Interreg Programme, operators can use free of charge the micro hub spaces
- **Forecast on revenues**: Once the micro hub reaches full operational capacity, after five years from the last payment received by Reggio Emilia from Interreg Central Europe Programme, operators will be required to pay rent. However, in the short term, to encourage couriers to begin cargobike deliveries, all costs will be covered by the Municipality.
- **Estimated Impact on carbon-emissions**: According to emission factors provided by ISPRA, the Italian Institute for Environmental Research and Protection, a diesel van emits 319.73 g/km in an urban context. Given that 90% of commercial vans in the Reggio Emilia FUA are diesel-powered, and assuming the van covers the same distance as the cargobike during the pilot—600 km—the total CO_2 emission savings amount to approximately 191.84 kg.

Secondary quantitative indicators:

- **Number of vehicles using the hub per day**: 1
- **number of deliveries** 24 per week
- **Additionally created job** (as stated by operators) 0
- **Number of operators**: 1

Secondary qualitative indicators:

- **Impact of Neighbourhoods quality of life**
  The general public appreciated the GRETA pilot, as cargobike deliveries became more visible during the project. There is strong public support for deliveries using small, zero-emission vehicles. Given Reggio Emilia's strong cycling tradition, cargobikes are seen as a natural evolution for green logistics. Even though the pilot involved only one cargobike, the feedback from the media was very positive. Two local newspapers dedicated a full page to the pilot with the following headlines: "Greta is a success: 720 zero-emission deliveries" and "Green logistics for the city centre: Zero-emission deliveries.
- **Benefits for shops and other retail businesses**
  Retail businesses that received deliveries via cargobikes highly appreciated the convenience of having goods delivered directly in front of their shops, as cargobikes can park more easily than traditional vehicles
- **Satisfaction of the service users (drivers, micro mobility device users, etc.)**
  The cargobike driver expressed great satisfaction with the job, finding it less stressful and more pleasant compared to traditional van driving. He also appreciated the opening of a new cargobike entrance, which saved him 400 meters per trip and helped him avoid a congested road.

7.2. Results

During the pilot implementation, significant results have already been achieved:

- 1 electric cargobike is currently in service.
- 20 km are covered weekly, amounting to a total of 600 km during the pilot phase.
- 24 deliveries are made each week, with a total of 720 deliveries between April and October 2025.

These results highlight the substantial potential of urban micro-logistics in reducing emissions, noise, and land occupation in the city centre, contributing to an improved quality of life for both residents and businesses.

The Municipality of Reggio Emilia plans to expand the number of operators involved in the project, extend the micro hub network to cover additional areas of the city and strengthen collaboration between the Municipality and logistics operators.

Indeed, thanks to the pilot, the Municipality has also successfully established a network of relationships with delivery operators, a connection that previously did not exist. This collaboration will be crucial for fully operationalizing the micro hub once stricter access regulations are implemented for couriers in the ZTL (Limited Traffic Zone) and pedestrian areas. These stronger rules will incentivize operators to make greater use of the micro hub, further enhancing the project's impact on urban logistics.

7.3. Summary of the environmental and social impact assessment of GRETA pilot actions and solutions

The environmental and social impact assessment of the GRETA pilot is based on the comparison between last-mile deliveries performed by the e-cargobike 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, NOx, SO_2, NH_3 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
NOx	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 6 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.

8. Lessons learnt

The process to select the area of the micro hub must consider not only the proximity and accessibility aspects, but also other basic requirements that transport operators have in their own premises concerning safety and facilities.

The dialogue with transport operators is not easy, but it is essential to find the right person or department especially when talking to international companies. The identification of transport operators active in the city is not always easy. This process might be facilitated in two ways:

- when rules change or new technologies to enforce are implemented, it is easier to engage some actors that are not easy to communicate with. Indeed, if new rules or enforcement method apply, probably freight operators will contact the city/region to ask for information or modification of the rules;
- even if just few contacts are available for the public authority, it is important to start the consultation phase as soon as possible because other freight operators will be informed about that and contact the city or region to be included in the discussion.

Each transport operator has its own delivery scheme; they might be very similar but can differ in some details that make each business model unique. For this reason, a Municipality can hardly offer operational tools or impose a delivery scheme that can satisfy everyone. The role of a city o a region is to set the rules for freight traffic and if needed define restrictions. Another instrument that PA can use is space: city and region usually owns underused areas and empty spaces; on the other hand, due to the shortage of logistic spaces freight operators are constantly looking for storage spaces. This can be used by city as leverage to greener logistic operations in FUAs, offering spaces in exchange for the shift towards more sustainable means of transport in logistic operations.

9. Conclusions

The GRETA pilot in Reggio Emilia demonstrates that even a limited-scale implementation can generate relevant impacts and valuable lessons for sustainable urban logistics. Although only one of the four available micro hub spaces was used during the pilot period, the achieved results clearly show the feasibility and effectiveness of cargobike last-mile deliveries in a dense historical city centre. The pilot confirmed that e-cargobikes can significantly reduce emissions, noise, and space occupation while improving delivery efficiency and working conditions for drivers.

One of the main strengths of the pilot lies in the complex governance and collaboration process that supported its implementation. The realisation of the micro hub required coordination between multiple public and private actors, alignment with existing mobility and air quality policies, and continuous engagement with logistics operators. Building trust and a constructive dialogue with couriers proved to be time-consuming but essential. Through the GRETA project, the Municipality succeeded in establishing a Freight Quality Partnership and direct working relationships with several operators, including international couriers. This represents a major step forward compared to the initial situation, when data sharing and cooperation were very limited.

The pilot also highlighted the importance of regulatory and enforcement frameworks as key drivers for change. The current limited use of the micro hub is mainly linked to the delayed activation of access control and enforcement technologies in the city centre. Without clear and enforced rules, operators have little incentive to modify established delivery practices. However, thanks to the pilot, the physical infrastructure, governance arrangements and partnerships are already in place. Once stricter access regulations are enforced, the micro hub is expected to become fully operational and scalable.

In conclusion, the Reggio Emilia pilot provides a solid foundation for future expansion of zero-emission urban logistics solutions. It shows that investing in collaborative processes, public space management, and relationships with logistics operators is as important as the physical infrastructure itself. The experience gained within GRETA will support the Municipality in scaling up the micro hub model, extending it to other areas of the city, and contributing to long-term climate, mobility and liveability objectives.

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GRETA Project