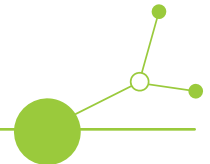


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Pilot action in FUAs: Maribor



Version 2
03 2026





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| Version | Date | Changes | Author (Organization) |
| 0 | 28/04/2025 | Template and ToC draft | Alice Benini and Fahad Anwar (ITL) |
| 0.1 | 05/05/2025 | Review | Luca Simone and Riccardo Maratini (OE) |
| 1 | 08/05/2025 | Template and ToC updated version | Alice Benini and Fahad Anwar (ITL) |
| 2 | 23/03/2026 | Review | Tadej Kurent (MOM) |





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



| Abbreviation table (update) | |
|-----------------------------|---|
| Abbreviation | Definition |
| CE | Central Europe |
| CO ₂ | Carbon Dioxide |
| FQP | Freight Quality Partnership |
| FUA | Functional Urban Area |
| GRETA | Greening Regional fReight Transport in functional urban areAs |
| HoReCa | Hotels Restaurants Catering |
| MUCC | Micro Urban Consolidation Centre |
| SME | Small and Medium Enterprises |
| SUMP | Sustainable Urban Mobility Plan |
| SULP | Sustainable Urban Logistics Plan |
| UM | University of Maribor |



1. The GRETA project

GRETA project aims to decarbonize 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 organizations 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 jointed 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 SUMP/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 capitalizing on previous experiences, exploiting synergies with ongoing initiatives, testing innovative pilots, improving competences and knowledge among PPs and stakeholders.



2. Executive summary

The Maribor pilot action, implemented within the GRETA project, addresses key challenges related to last-mile delivery in the historic city centre, particularly in the pedestrian zone where access for motorised vehicles is restricted. The pilot responds to the need for more flexible, efficient, and environmentally sustainable urban logistics solutions, in line with local policy frameworks (SUMP and SULP) and broader EU objectives such as the European Green Deal and the Urban Mobility Package. The core objective of the pilot is to test the feasibility and operational potential of a Micro Urban Consolidation Centre (MUCC) as an alternative delivery solution. The micro-hub is designed to enable zero-emission last-mile delivery using light logistics solutions (e.g. hand trolleys and other non-motorised or low-emission modes), while maintaining accessibility for businesses and residents in the city centre. The pilot has successfully established the physical and organisational foundations for the micro-hub system. A functional micro-hub facility with an operational space of approximately 7.65 m² has been implemented at the edge of the pedestrian zone, supported by an investment of approximately €30,000, with estimated annual operational costs of €10,000. The facility enables core logistics services such as transshipment, short-term storage, and the use of delivery equipment.

In addition to physical implementation, the pilot achieved significant results in terms of governance and stakeholder engagement. The reactivation of the Freight Quality Partnership (FQP) enabled structured collaboration between the municipality, logistics operators, and local businesses. The pilot also strengthened cross-departmental cooperation within the Municipality of Maribor, highlighting the importance of coordinated governance for the successful implementation of urban logistics measures. Due to the complexity of administrative procedures, cross-departmental coordination, and permitting requirements related to the historic urban environment, the full operational testing phase of the pilot will take place after the official completion of the project. As a result, certain quantitative KPIs (e.g. number of deliveries, utilisation rates, and precise environmental impacts) could not be fully assessed within the project timeframe. Nevertheless, the pilot has established a solid basis for systematic monitoring, which will be carried out during the operational phase.

The monitoring framework includes both quantitative and qualitative indicators, covering operational performance, environmental impacts, and user satisfaction. Data will be collected through operational management of the micro-hub and stakeholder engagement processes, providing evidence for future decision-making. The Maribor pilot demonstrates that micro-hub-based solutions can effectively complement regulatory measures such as delivery time restrictions by providing practical and sustainable alternatives for last-mile delivery. It also confirms that successful implementation of urban logistics solutions depends not only on technical aspects, but also on governance capacity, stakeholder involvement, and institutional coordination.


Overall, the pilot provides a strong foundation for the future scaling and replication of micro-hub solutions within the city and the wider Functional Urban Area. It contributes to long-term objectives of reducing transport-related emissions, improving the efficiency of urban logistics, and enhancing the quality of public space and urban liveability.



3. Pilot action set up

Maribor is the second-largest city in Slovenia and the largest city of the traditional region of Lower Styria. It is the seat of the Urban Municipality of Maribor and the Drava statistical region. Maribor is also the economic, administrative, educational, and cultural centre of eastern Slovenia.

3.1. General information

| | |
|---------------------------------|--|
| Location | <ul style="list-style-type: none">○ 2nd largest city located in the north-eastern Slovenia○ App. 113,000 inhabitants¹ |
| Map (general + detailed) |  <p data-bbox="395 1451 1200 1485"><i>Figure 1 Slovenia with neighbouring countries and Maribor location (SULP, 2019)</i></p> |

¹ <https://www.stat.si/obcine/sl/Municip/Index/94> (27.3.2025)
COOPERATION IS CENTRAL

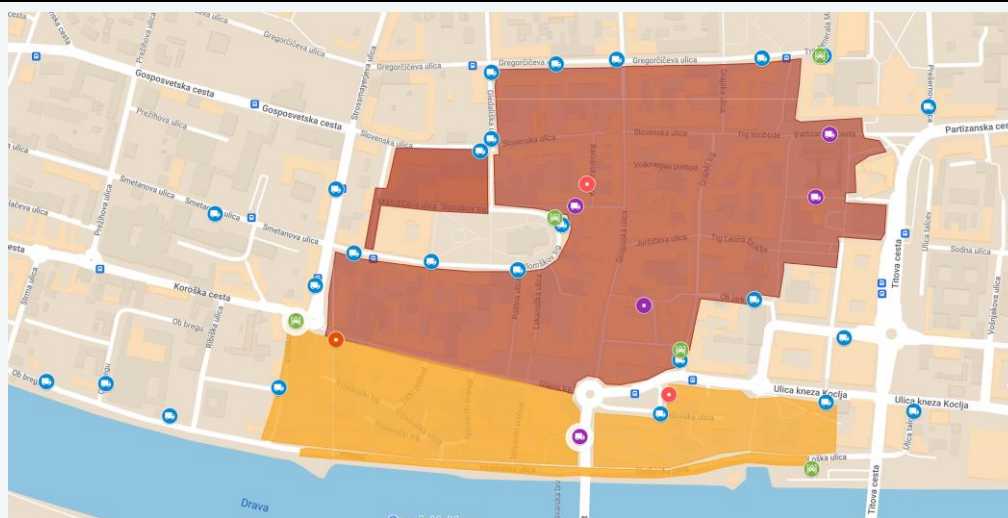


Figure 2 Maribor city pedestrian zone (GoogleMaps and UM, 2024)

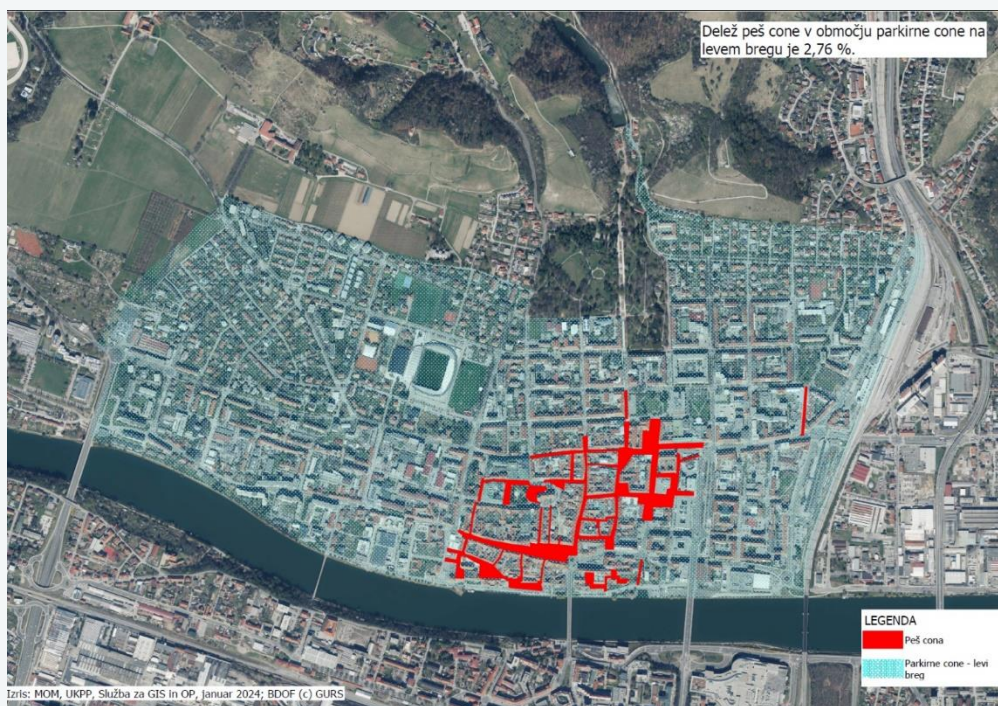


Figure 3 Maribor city pedestrian zone's share (MOM GIS, 2024)

Area characteristics

- Good geostrategic location along the Drava River and among Pohorje hills with good road connections and capacities.
- Centre of Eastern cohesion region of Slovenia.
- Located 18 km from the state border with Austria - city represents a threshold or gateway to Slovenia.
- Maribor has its own university represented by 17 faculties with approximately 20,000 students.
- 98% of local companies are SMEs.
- High car ownership rate (506 per 1,000 inh. with avg. car age of 11 yrs).
- Pilot area:
 - City centre (old city centre with narrow streets)



| | |
|-------------------------------|--|
| | <ul style="list-style-type: none">▪ Share of cargo transport limitation zone area 0.26 km² or 260,000 m² (pedestrian zone)▪ Shops and HoReCa subjects in the city centre |
| Additional information | <ul style="list-style-type: none">○ Sulp approved in 2019 as an additional pillar of Sump, which was approved in 2015.○ FQP was already established during the implementation of project Sulpiter (2016-2019). It will be re-activated for purposes of GRETA pilot. |



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

3.2.1. Pilot action objectives

- Testing alternative flexible solution for last mile delivery in pedestrian zone and old town as the access to the city centre is restricted for all vehicles after 10.00 CET(since April 2024 as the new act on traffic entered into force);
- To identify the most appropriate location for MUCC;
- To set-up and test operations of MUCC;
- To identify (and test) appropriate business model for efficient and sustainable functioning of MUCC;
- To discuss the whole concept and solution with Freight Quality Partnership (FQP) set already in SULPiTER.

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

| | |
|-------------------------------------|--|
| Problem(s) addressed | The main problem is related to flexibility of deliveries outside the delivery windows in the city centre. Several restaurants and residents in the city centre that need deliveries several times a day are having problems with their operations. Because of the short morning delivery windows, all commercial deliveries are made at the same time, causing congestion and conflicts with pedestrians. Until recent large portion of deliveries were made also by private vehicles that could enter the city centre also outside of the delivery windows, making deliveries very fragmented and far from optimal (low utilisation of delivery vehicles is recognised). There is also a lack of logistics facilities (low warehouse capacity) in the city centre which requires higher frequency of delivery. |
| Causes of the problem(s) | Because of the short morning delivery windows, all commercial deliveries are made at the same time, causing congestion and conflicts with pedestrians. |
| Rationale for implementation | MUCC equipped with environmentally friendly delivery vehicles (bikes, trolleys) for sustainable and flexible last mile delivery is considered as the best possible solution. It was established as part of a pilot project to assess its feasibility and test different services (transshipment, short-term storage, sharing of delivery vehicles and equipment, etc.). The location of the MUCC was carefully studied and selected to find the best compromise between demand, accessibility, and good connectivity to surrounding areas within the FUA. Based on the identified demand, the capacity of the MUCC was identified and the appropriate location identified. The final idea was to location at the border of the pedestrian zone. The whole concept and solution was discussed and implemented with the Freight Quality Partnership (FQP), established under the SULPiTER project. Some basic investments are required to operate the MUCC: logistics equipment, delivery vehicles and trolleys, and e-charging stations |



| | |
|-----------------------|--|
| | <p>are needed. Micro-hub in Maribor is the the first public MUCC in Slovenia.</p> |
| Future outlook | <p>Municipality of Maribor wants to decarbonise city logistics by planning to expand the pedestrian zone and further restrict motorised traffic in order to improve liveability and attractiveness of the old city centre. At the same time, the municipality is aware of the need to provide residents and shop owners with alternative solutions for flexible delivery to their premises also outside the strict delivery windows.</p> <p>Municipality will try to mitigate the issue of deliveries in the city centre by implementing 2 or 3 such MUCCs in order to cover all the city area and its nearest surroundings.</p> <p>Future scenarios depend in assuring adequate long-term funding which depends on project fundings, city's strategy and policy, combined with available budget.</p> <p>As solely depending on long-term funding, Municipality is implementing the logistics measures for the pedestrian zone - the alternatives for city logistics in two phases:</p> <ul style="list-style-type: none">- 1st phase: the implementation of the parcel locker network in the city centre in 2024 (financed by the city's own budget)- 2nd phase: the implementation of 2, maybe 3 locations of MUCC (first MUCC financed by GRETA) for last mile logistics (including supply of parcel lockers via MUCC in pedestrian zone). |

Table 1 Problems addressed



3.2.3. Governance analysis

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

Local policies and regulations:

- The area is managed by local government Municipality of Maribor. Entrances and exits into the pedestrian zone are supervised by Municipal department of utility and traffic and monitored by city wardens.
- The access to the city centre is restricted after 10.00 am according to the new Act on traffic which entered into force in April 2024. According to the new Act only hand trolleys, carts, hand trucks, e-cargo bikes, bikes or other ZEV vehicles are allowed for delivery after 10.00 am.
- In 2019 adopted Sulp has action plan with proposed measures. Main measures from the Sulp are for improving freight transport and stating tendencies towards closing the city centre. Deliveries friendly zones are proposed and defined (the priority for entering the pedestrian zone and friendly zone is to be given to environmentally friendly vehicles, additional benefits to be granted (e.g., longer time for unloading/loading/parking processes); micro consolidation centres are foreseen in action plan and to be equipped with light transshipment equipment (carts, hand trucks, e-cargo bikes); supply in the city centre to be done by cargo bikes; a network of loading bays outside the city centre is planned to be established according to the action plan). Decision by the mayor was that action plan serves as a framework, guidelines or recommendations for the implementation of measures in the field of regulating logistics and traffic of the Municipality of Maribor.

National policies and regulations:

- **National act on integrated transport planning** (since 2022)

Act regulates the goals and principles of integrated transport planning, types of integrated transport strategies, their content and preparation process, quality assessment and integration of transport and spatial planning. The law also determines the rules on the co-financing of comprehensive transport planning measures and financial incentives for the implementation of measures based on this act, as well as the competences in the field of comprehensive transport planning. Integrated transport planning as described in that act, ensures optimal coordination of the transport system with needs for mobility, supply and transport logistics. Act also determines the framework for sustainable urban logistics plan.

EU policies and regulations:

European Commission Transport White Paper setting the goal of a 'carbon-free urban freight distribution', i.e., zero direct carbon dioxide (CO₂) emissions by 2030; the proposed 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 directive², and vision zero for road safety³, the project can help meet broader EU targets for a greener, safer, and more efficient transportation system.

² 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

³ 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

We planned the pilot to manage the freight traffic in the city centre more efficiently due to pedestrian zone expansion. We needed to find solution and provide services to make last mile delivery more flexible during time slots when access to the city centre is restricted for motorised traffic. We are planning the implementation of MUCC to be the alternative to the policy of restriction which was introduced by the municipality in February 2024. Our plan is to enable 24-hour delivery in an environmentally friendly manner. The end result is less motorised traffic in the city centre, which is in line with city's sustainability goals. Consequently, we would like to find appropriate business model for efficient and sustainable functioning of MUCC and to identify and select its most appropriate location.

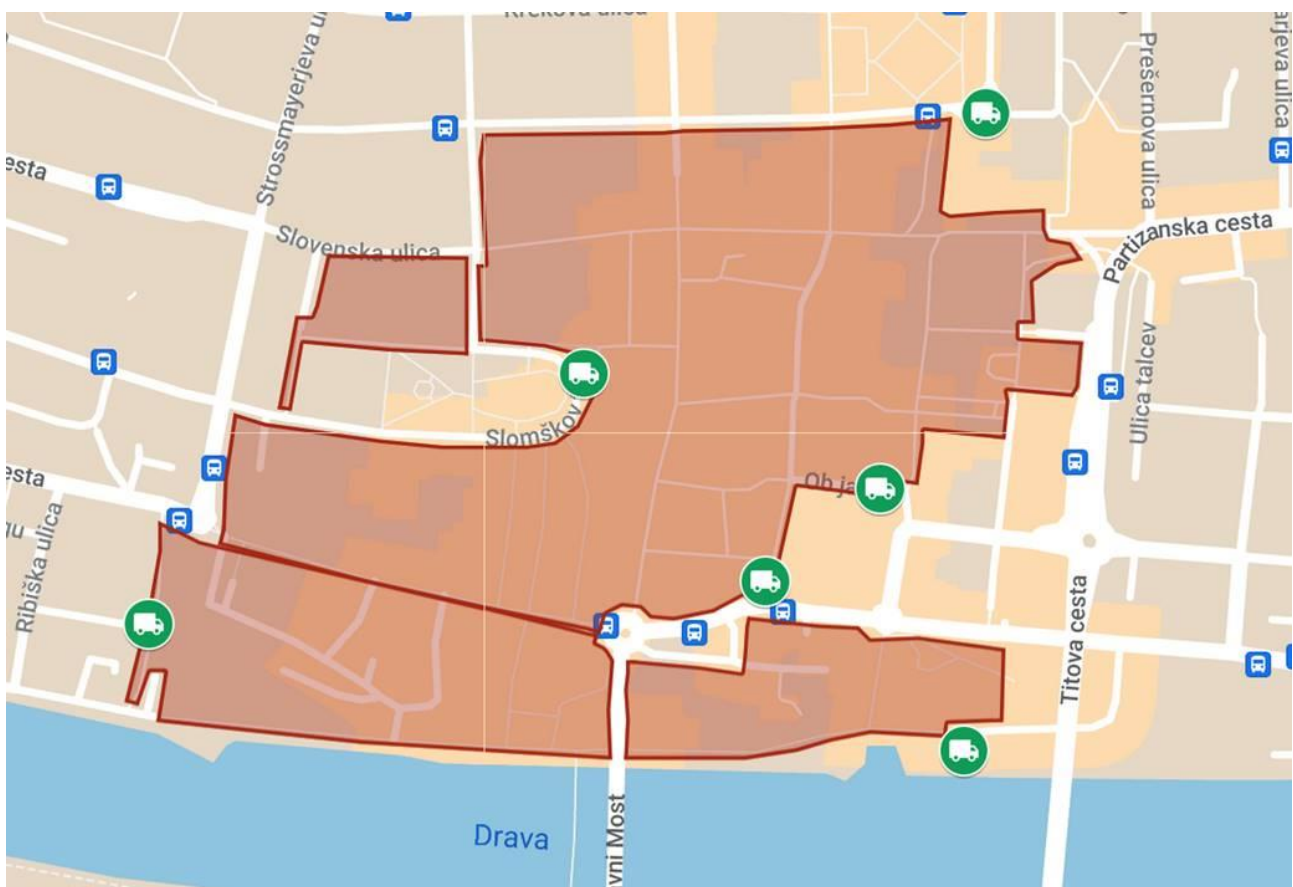


Figure 4 Maribor city pedestrian zone (GoogleMaps and UM, 2025)

- Implementation of MUCC at the border or within pedestrian zone, equipped with zero emission delivery vehicles (bikes, trolleys, trailers) for sustainable and flexible last mile delivery.
- To assess feasibility of MUCC and test different services (transshipment, short-term storage, sharing of delivery vehicles and equipment, etc.).
- The location of the MUCC still under deliberation (indoor or open space owned by the city) according to following factors:
 - demand,
 - accessibility and
 - good connectivity within the city



3.2.5. Transnational Cooperation

Maribor pilot action was jointly developed through close transnational cooperation with the City of Poznań (Poland) and the Municipality of Reggio Emilia (Italy), which implemented similar pilot actions focusing on micro-hub solutions and sustainable last-mile delivery.

The joint development process was structured through regular project meetings, peer-review workshops, bilateral exchanges, and thematic discussions, enabling continuous knowledge sharing among partners. These activities allowed partners to compare different approaches, identify common challenges, and jointly refine their pilot concepts.

All three partners acknowledged the problem of lack of data as the logistic operators are not available to share their transport data due to their internal policies. This makes very difficult for public entity to develop an effective city logistics planning based on real data. To cope with this issue, partners jointly developed a basic questionnaire to share among transport operators. Such questionnaire was shared among transport operators during summer of 2024.

All three partners share the need to implement and enforce access restrictions in pilot areas in order to boost the use of sustainable modes of transports. Indeed, the development of a rules system that limit 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.

In this view, Municipality of Maribor was able to provide a good example for both contributors by restricting and enforcing rules to access the pedestrian zone.

| | |
|--|---|
| Contributor | Municipality of Reggio Emilia (ITA) and City of Poznan (PL) (country) |
| Process of joint development | Contributors were chosen due to their similar issues in the city centre and approach towards the pilot action. Progress of pilots were presented and discussed multiple times via Project Meetings, online telcos and consultations, participating at online workshops. |
| Input received from contributor | Reggio Emilia and City of Poznan presented useful examples of providing business model and a way of collaboration with transport operators. City of Poznan built a strong partnership with a transport operator to test cargo bike deliveries, whereas Reggio Emilia's pilot business model is based on the idea where among logistic operators there is no cooperation nor competition but receive their own location for transhipments. |
| Value of collaboration | The information provided by the contributors has been highly valuable, especially regarding the specific circumstances of their pilot sites, examples of restriction enforcement, and details about collaboration with transport operators. |



The evaluation of whether transnational cooperation has improved the pilot's outcomes will be completed after implementation phase.

Throughout the preparation and implementation phases, the pilots have been exchanging information through regular teleconferences and workshops. This has increased their awareness of potential risks and highlighted the possibility of different approaches to pilot implementation or business models.

Table 1 Problems addressed

A key element of the cooperation was the exchange of practical experiences related to the design, implementation, and operation of micro-hubs. Poznań contributed valuable insights regarding cooperation with logistics operators and the operational testing of cargo bike deliveries, while Reggio Emilia provided experience in implementing a shared micro-hub model in a regulated urban environment with strong stakeholder involvement. These inputs supported Maribor in shaping its own approach, particularly in relation to business model considerations and stakeholder engagement strategies.

All partners faced a common challenge related to the lack of access to logistics data, as transport operators are generally reluctant to share operational data due to internal policies. To address this issue, partners jointly developed a basic questionnaire for data collection, which was used to gather insights from logistics operators across pilot areas. This represents a concrete example of joint problem-solving within the project. Another important area of cooperation was the shared understanding of the role of regulatory measures. All partners recognised that the implementation and enforcement of access restrictions for motorised vehicles are essential preconditions for encouraging the adoption of sustainable delivery solutions. At the same time, partners agreed on the importance of combining regulatory approaches with collaborative processes involving logistics operators and other stakeholders.

The transnational exchange also contributed to mutual learning in governance approaches. While Poznań demonstrated a strong operator-driven model, and Reggio Emilia focused on a shared multi-operator facility, Maribor explored a model based on public authority coordination combined with stakeholder involvement through the Freight Quality Partnership (FQP). These different approaches provided a broader perspective and increased the robustness of the solution design. Throughout the preparation and implementation phases, the continuous exchange of knowledge helped to identify risks, validate assumptions, and adapt the pilot to local conditions. The collaboration also strengthened the overall quality and transferability of the solution.

Overall, the transnational cooperation played a crucial role in the development of the Maribor pilot, ensuring that the solution is not only based on local needs but also aligned with tested approaches and experiences from other European cities. It significantly contributed to capacity building, improved decision-making, and the development of a more resilient and adaptable urban logistics solution.



4. Stakeholders and their role

Re-activation of the FQP (involving public and private stakeholders) developed in Sulpiter to make last mile delivery more flexible during the time slots when access is restricted to motorised traffic. The goal is to identify the most appropriate location for the Micro Urban Consolidation Centre and to make all stakeholders aware of existing problems and potential solutions to address the problems in urban traffic in order to co-create the final solutions.

| Organisation | Stakeholder type ² | Contact details | Stakeholders' priority ³ | Engagement level ⁴ | Engagement activity | | Feedback from stakeholder | Comments |
|---|--|---|-------------------------------------|-------------------------------|--|----------------------|---------------------------|--|
| | | | | | When | What | | |
| Municipality of Maribor - different departments | Public Institution | Municipality of Maribor, Ulica heroja Staneta 1, 2000 Maribor | High | 1 | From the beginning (different departments from April 2023) | Pilot implementation | Yes, project partner | Regular meetings from November 2023 |
| Public companies working for the Municipality | Other members and representatives | JHMB - public holding Maribor, Zagrebska cesta 30, 2000 Maribor | Medium | 2 | sep.25 | FQP meeting | Yes | Public company Nigrad will set-up the surroundings |
| Police | National and state administration | Police administration Maribor, Maistrova ulica 2, 2000 Maribor | High | 1 | sep.24 | FQP meeting | Not yet | |
| The Regional Development Agency of Podravje - Maribor | Regional administration | Regionalna razvojna agencija za Podravje - Maribor, Pobreška cesta 20, 2000 Maribor | Low | 2 | sep.24 | ASP | Yes, associated partner | Cooperation ongoing from November 2023 (MOM and UM presented project and they participated in PM Bologna, 14.-15.2.2024) |
| City wardens as the part of Municipality | Local administration | Medobčinski inšpektorat in redarstvo Maribor, Ulica heroja Tomšiča, 2, 2000 Maribor | High | 1 | sep.24 | FQP meeting | Not yet | |
| University of Maribor | Educational institutions and research institutes | Fakulteta za gradbeništvo, prometno inženirstvo in arhitekturo, Univerze v Mariboru, Smetanova ulica, center 17, 2000 Maribor | High | 1 | From April 2023 | PP | Yes, project partner | |



| | | | | | | | | |
|----------------------------------|--------------------------|---|--------|---|-------------|----------------------|------------------|---------------------------------------|
| Logistic and Transport operators | Private sector companies | tbc | High | 1 | sep.24 | FQP meeting | Yes, FQP members | |
| HORECA | Private sector companies | tbc | High | 1 | sep.24 | FQP meeting | Yes, FQP members | |
| Provider of bike sharing system | Private sector companies | Europlakat d.o.o., Koprska 98, 1000 Ljubljana | Medium | 2 | sep.24 | FQP meeting | Not yet | |
| Mobility Centre of Maribor | NGO/association | Center mobilnosti Maribor, Partizanska 21, 2000 Maribor | High | 1 | August 2025 | Pilot implementation | Yes | Future manager of the Microhub (MUCC) |

Table 2 Stakeholders' list



5. Pilot action implementation

5.1. Timeline

- Preparation → Sep 2023/May2025
 - Setting up intermunicipal departments cooperation → Nov23/Mar24
 - Presenting project to municipal management, getting green light → Apr24
 - Searching and scanning for suitable pilot location, FQPs → Apr24/May25
- Documentation → May/Sep 2025
 - Preparing entrance points and analysis of existing situation → May 2025
 - Coordination with head of office and municipal management → May 2025
 - Public procurement - preparation of tender → May 2025
 - Public procurement - tender procedure and realization → May/Sep2025
- MUCC implementation → Nov 2025
 - Preparing entrance points and analysis of existing situation → Apr 2025
 - Coordination with head of office and municipal management → Mar/Oct 2025
 - Public procurement - preparation of tender → Sep/Oct 2025
 - Public procurement - tender procedure and realization → Oct/Nov 2025
- Testing MUCC → Feb/Mar 2026
 - Preparing and start of testing → Feb 2025
 - Preparation of report on testing → Mar 2025

5.2. Planning

- Project documentation (if necessary) of MUCC → May/Sep 2025
- MUCC implementation:
 - tender preparation, procedure and realization → Sep/Nov 2025
 - construction works → Dec 2025/Jan 2026
 - purchase of equipment → Sep/Oct/Nov 2025
 - operation of MUCC → Mar 2026

5.3. Implementation

Implementation of logistics measures for the Maribor city centre - the alternatives for city logistics was divided in two phases:

- 1st phase: the implementation of the parcel locker network in the city centre was implemented in the years 2024/25 (financed by the city's own budget)
- 2nd phase: the implementation of MUCC (financed by GRETA) for last mile logistics (including supply of parcel lockers via MUCC in pedestrian zone)



5.4. Monitoring

The monitoring of the Maribor pilot action is designed as a continuous and data-driven process aimed at evaluating the operational performance, environmental impact, and user acceptance of the micro-hub solution.

During the pilot implementation phase, the operation and monitoring of the micro-hub will be carried out by the Mobility Centre Maribor, which will act as the pilot operator. Monitoring activities will focus on collecting both quantitative and qualitative data related to the use of the micro-hub and its associated services.

However, it should be noted that the full testing phase of the pilot will take place after the official completion of the GRETA project. This delay is due to factors that were beyond the control of both the contracting authority and the implementation partners. In particular, the implementation process required complex cross-departmental coordination within the municipality, involvement of multiple decision-making levels, and additional permitting procedures related to the historic urban environment. These aspects, together with the need for a phased implementation approach, have extended the timeline of the pilot.

Quantitative monitoring will include:

- number of users (businesses, operators, residents),
- number of deliveries handled through the micro-hub,
- utilisation rate of the facility and equipment,
- estimated reduction of delivery vehicle trips within the pedestrian zone,
- estimated impact on CO₂ emissions.

Where applicable, data will be partially supported by digital systems (e.g. Direct4Me platform), especially for parcel lockers and specific micro-hub compartments.

Qualitative monitoring will include:

- feedback from stakeholders involved in the Freight Quality Partnership (FQP),
- satisfaction of users (businesses, delivery operators),
- perceived impact on accessibility and quality of life in the pedestrian zone.

The monitoring process will be complemented by regular stakeholder consultations within the FQP framework, enabling continuous feedback and adjustment of the pilot.

In the longer term, the collected data and lessons learnt will be used to assess the feasibility, scalability, and potential replication of micro-hub solutions within the wider Functional Urban Area (FUA). Monitoring results will directly support future decision-making regarding the expansion of micro-hub infrastructure and further development of sustainable urban logistics policies.



6. Digital and physical infrastructure

The Maribor pilot is based on the implementation of a Micro Urban Consolidation Centre (MUCC) as an alternative solution for the delivery of small, medium, and larger shipments within the pedestrian zone of the city centre. The micro-hub is designed as a flexible transshipment point that enables the consolidation of goods and their distribution using zero-emission or low-emission delivery modes. The overall concept of the MUCC combines both organisational and technological elements. It is based on the identification of demand through stakeholder engagement within the Freight Quality Partnership (FQP), the definition of potential user groups (including shop owners, residents, and delivery operators), and the development of a suitable operational and business model. The solution is designed to function as a semi-autonomous system supported by digital tools, while maintaining strong coordination by the public authority.

Physical infrastructure

The physical component of the micro-hub consists of a small-scale logistics facility located at the edge of the pedestrian zone. The final location was selected based on several criteria, including demand, accessibility, and connectivity to surrounding areas. Due to spatial constraints in the historic city centre, the solution was designed as a compact and adaptable structure.

The implementation included:

- preparation and arrangement of the selected location,
- installation of the micro-hub structure,
- procurement and installation of logistics equipment.

The micro-hub is equipped with basic infrastructure that supports core logistics functions, including:

- transshipment of goods,
- short-term storage,
- handling of different shipment sizes,
- use of zero-emission delivery equipment (e.g. trolleys and other light logistics devices).

The design of the physical infrastructure allows flexibility in use and potential adaptation depending on future operational needs. The compact size of the facility (approximately 7.65 m²) reflects the constraints of the urban environment while ensuring sufficient functionality for pilot testing.

Digital infrastructure

The digital component of the solution is intended to support the operation, monitoring, and future scalability of the micro-hub. Although the digital system is still under development, it is envisaged as a key enabler of efficient and data-driven management.

The digital infrastructure includes:

- development of an application or digital platform for managing the use of the micro-hub,
- support for tracking deliveries and usage of the facility,
- data collection for monitoring KPIs and evaluating performance.

In addition, the micro-hub is designed to be compatible with existing digital logistics solutions, such as parcel locker systems (e.g. Direct4Me), which are already integrated into the broader urban logistics ecosystem.



Integration of physical and digital components

A key feature of the Maribor solution is the integration of physical infrastructure with digital support systems. While the physical micro-hub enables the operational aspect of last-mile delivery, the digital tools provide the basis for monitoring, optimisation, and future scaling of the solution.

This integrated approach ensures that the MUCC is not only a static logistics facility, but part of a broader, evolving urban logistics system. It also supports the transition towards more data-driven and service-oriented urban freight management.

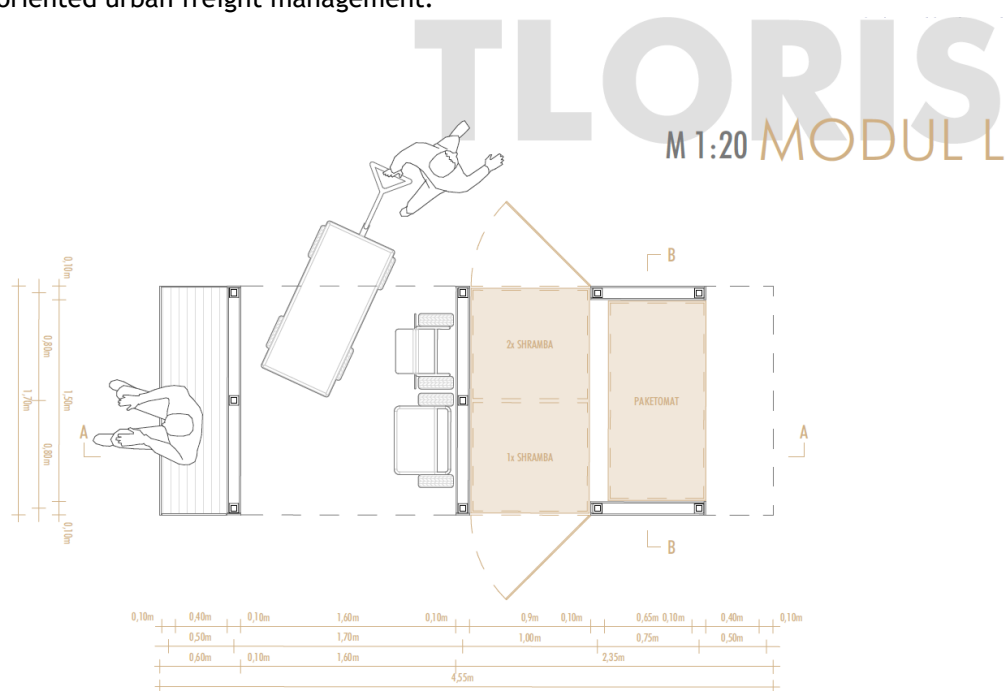


Figure 5 Maribor micro hub floor plan (UM, 2025)



Figure 6 Maribor micro hub 3D render I. (UM, 2025)



Figure 7 Maribor micro hub 3D render II. (UM, 2025)



Figure 8 Maribor micro hub solution I. (MOM, 2026)



Figure 9 Maribor micro hub solution I. (MOM, 2026)



Figure 10 Maribor micro hub solution III. (MOM, 2026)



Figure 11 Maribor micro hub solution IV. (MOM, 2026)



Figure 12 Maribor micro hub solution V. (MOM, 2026)

7. Evaluation/Impact assessment and results of implementation

The evaluation and impact assessment of the Maribor pilot action is based on a combination of implementation-related outputs and performance indicators. The assessment considers key elements of the pilot development, including location selection, infrastructure set-up, investment, and initial operational testing.

The following components form the basis for the evaluation:

- **Location selection:** identification and selection of the most suitable micro-hub location based on criteria such as accessibility, demand, and capacity,
- **Equipment selection:** definition and procurement of appropriate logistics equipment (e.g. storage elements, trolleys, and other delivery devices),
- **Digital support and operation:** development of initial concepts for digital tools and operational management of the micro-hub,
- **Investment:** procurement and installation of the micro-hub infrastructure and equipment,
- **Pilot operation:** initial testing of services, including transshipment, short-term storage, and last-mile delivery using zero-emission solutions.



These elements provide the foundation for the definition and monitoring of Key Performance Indicators (KPIs), presented in the following section.

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)
- Utilization of public spaces (sqm)
- Investment costs (and short description who is carrier of costs) (€)
- Operational costs (€)
- Forecast on revenues (€)
- Estimated Impact on carbon-emissions (+/-kg)

Secondary quantitative indicators:

- Estimated Number of vehicles using the hub per day
- Fermi-estimate on number of deliveries / number of possible deliveries
- Additionally created job (as stated by operators)
- Number of operators
- Number of services offered
- Estimated Impact on carbon-emissions (+/-kg) per delivery

Qualitative indicators:

- Impact of Neighbourhoods quality of life
- Benefits for shops and other retail businesses
- Satisfaction of the service users (drivers, micromobility device users, etc.)

In line with the defined KPI framework, several indicators have already been measured or estimated during the pilot implementation phase. The following values are available at the time of reporting:



- Operational space (size of hub): 7.65 m²
- Utilisation of public space: 7.65 m²
- Investment costs: approximately €30,000
- Operational costs: approximately €10,000 per year
- Number of services offered: at least 3 (transshipment, short-term storage, use of delivery equipment)

For other KPIs, such as number of deliveries, number of users, utilisation rates in operational terms, and environmental impacts (e.g. CO₂ emissions), data collection will be carried out during the operational testing phase, which will take place after the official completion of the project.

7.2. Results

The Maribor pilot action represents an important step towards the implementation of sustainable and flexible last-mile delivery solutions in the city centre. At the time of reporting, the pilot has reached the implementation and initial testing phase, with key results emerging primarily in terms of governance, stakeholder engagement, and system set-up. One of the main results of the pilot is the successful establishment of the micro hub concept as a viable alternative to delivery restrictions in the pedestrian zone. The pilot provides a practical solution enabling deliveries outside the restricted time window, using zero-emission delivery modes such as hand trolleys and other light logistics equipment.

In line with the defined KPI framework, the pilot has already achieved measurable results in several areas. These include:

- Operational capacity: establishment of a micro-hub with an operational space of 7.65 m², representing a functional transshipment point within the pedestrian zone,
- Utilisation of public space: 7.65 m² of public space has been allocated and reorganised for logistics purposes,
- Investment costs: approximately €30,000 invested in the establishment of the micro-hub and procurement of equipment,
- Operational costs: estimated at approximately €10,000 annually, covering basic operation and management,
- Services provided: the micro-hub enables at least 3 core logistics services (use of delivery equipment, short-term storage, and transshipment).

At the current stage, no revenues are generated, as the pilot operates in a testing and demonstration phase.



At the same time, it should be noted that for several quantitative KPIs – such as number of deliveries, utilisation rates in operational terms, number of users, and precise environmental impacts (e.g. CO₂ reduction) – complete and reliable data could not be collected within the project timeframe. This is due to the fact that the operational testing phase of the pilot will take place after the official completion of the project.

Nevertheless, the results achieved go beyond purely quantitative indicators. The pilot has demonstrated the capacity of the Municipality of Maribor to design, coordinate, and implement a complex urban logistics measure in a challenging regulatory and institutional environment. The process itself – including stakeholder coordination, permitting procedures, and internal alignment – represents a significant achievement and a valuable outcome of the project. Significant result is also the reactivation and effective use of the Freight Quality Partnership (FQP), which enabled structured dialogue between the municipality, businesses, and logistics stakeholders. Through this process, the pilot ensured that the solution reflects real operational needs and constraints of users in the city centre.

The pilot further contributed to strengthening cross-departmental cooperation within the Municipality of Maribor, highlighting the importance of coordinated governance for urban logistics measures.

By enabling the transition towards zero-emission last-mile delivery solutions and more efficient use of urban space, the Maribor pilot directly contributes to the objectives of the European Green Deal and the Urban Mobility Package, particularly in reducing transport-related emissions and improving urban liveability.

Overall, the Maribor pilot provides a solid foundation for the collection of further KPI data during the operational phase and for the future scaling and replication of the micro-hub concept within the Functional Urban Area.

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

The Maribor pilot action contributes to environmental and social objectives by introducing a micro-hub-based last-mile delivery solution aimed at reducing the negative impacts of freight transport in the city centre, particularly within the pedestrian zone. From an environmental perspective, the pilot is designed to support the transition towards zero-emission urban logistics by enabling the use of non-motorised and low-emission delivery modes (e.g. hand trolleys and similar solutions) for last-mile distribution. By shifting delivery operations away from conventional motorised vehicles within the pedestrian zone, the pilot has the potential to reduce greenhouse gas emissions, noise levels, and air pollution, while also decreasing congestion and pressure on public space.

Although precise quantitative environmental impacts (e.g. CO₂ reduction per delivery or total emission savings) could not yet be fully assessed within the project timeframe, the pilot establishes the necessary operational and infrastructural conditions for such impacts to be measured during the full testing phase. The implementation of the micro-hub creates a structural shift in delivery organisation, enabling consolidation of deliveries and reducing the need for multiple individual vehicle trips into the city centre.

Based on initial assessments and pilot design assumptions, the micro-hub solution has the potential to reduce the number of delivery vehicle trips into the pedestrian zone by consolidating multiple deliveries into a single drop-off point, thereby significantly decreasing traffic pressure in the city centre.

From a social perspective, the pilot contributes to improving the quality of life in the city centre by reducing conflicts between delivery vehicles and pedestrians, enhancing safety, and supporting the liveability and attractiveness of the historic urban area. The introduction of a structured and organised delivery system helps to minimise disruptions in public space and supports a more balanced use of the pedestrian zone. An important social impact is also reflected in the improved accessibility and flexibility of deliveries for local businesses and residents. By enabling delivery outside restricted time windows through alternative logistics solutions, the pilot responds directly to the operational needs of stakeholders in the city centre.



In addition, the pilot has generated significant institutional and governance-related impacts. The reactivation of the Freight Quality Partnership (FQP) and the involvement of a wide range of stakeholders have strengthened cooperation between public authorities, private sector actors, and civil society. This collaborative approach contributes to increased awareness, acceptance, and long-term sustainability of urban logistics measures.

The pilot also contributes to capacity building within the Municipality of Maribor by enhancing knowledge, experience, and coordination mechanisms related to sustainable urban logistics planning and implementation. These impacts are particularly relevant for the future development and integration of urban freight solutions within strategic planning frameworks such as SUMP and SULP.

Overall, while the full environmental benefits will be quantified during the operational phase, the Maribor pilot already demonstrates strong potential to deliver positive environmental and social impacts. It provides a solid foundation for scaling up sustainable last-mile delivery solutions and contributes to broader policy objectives related to decarbonisation, efficient use of urban space, and improved urban liveability.

8. Lessons learnt

The Maribor pilot provided valuable insights into both the preparation and implementation phases of an urban logistics measure, particularly in the context of introducing a micro-hub solution within a historic city centre.

Lessons learnt in the preparation phase:

1. Complexity of decision-making processes

The preparation phase highlighted the high level of complexity in municipal decision-making. Approximately 5-6 levels of stakeholders and departments (including technical departments, heads of offices, vice-mayor and mayor) needed to be involved in the process. This significantly affects the timeline and requires careful coordination and alignment.

2. Limited institutional capacity and decision-making authority

The department responsible for the GRETA project (Project Office) has limited formal decision-making power. As a result, additional effort was required to ensure internal coordination, stakeholder alignment, and progress of the pilot implementation.

3. Need for early involvement of key decision-makers

During the preparation phase, it became evident that key stakeholders such as the city urbanist, head of spatial planning department, and political leadership should be involved as early as possible. Their later inclusion (from March 2025 onwards) contributed to additional delays but was essential for ensuring the location of the pilot, the feasibility and the acceptance of the pilot.

4. Permitting procedures in historic urban areas

The selected location required approval from the National Institute for Cultural Heritage Protection. The permitting process was time-consuming and introduced significant delays, demonstrating the importance of early identification of regulatory constraints when planning interventions in protected urban areas.

Lessons learnt in the implementation phase:

5. Importance of cross-departmental coordination



The implementation phase confirmed that urban logistics measures require strong coordination across multiple municipal departments (transport, spatial planning, public utilities, legal services). Lack of early alignment can lead to delays and inefficiencies in implementation.

6. Stakeholder engagement as a critical success factor

The reactivation of the Freight Quality Partnership (FQP) proved to be a key enabler of the pilot. Continuous dialogue with businesses, logistics operators, and other stakeholders ensured that the proposed solution reflects real operational needs and increases acceptance of the measure.

7. Need for phased implementation and flexibility

The pilot demonstrated that implementing innovative logistics solutions requires a phased approach, including preparation, testing, and gradual scaling. Flexibility in planning and implementation is essential to adapt to unforeseen challenges and institutional constraints.

8. Challenges related to administrative and procurement procedures

Public procurement procedures and administrative requirements significantly influenced the timeline of the pilot. These processes require careful planning and realistic time allocation, especially when combined with technical and spatial constraints.

9. Urban space constraints and acceptance

The availability of suitable locations for micro-hubs is limited, particularly in dense and historically protected urban environments. In addition to technical feasibility, public acceptance and compatibility with the urban environment are key factors for successful implementation.

10. Value of the process as a result

Beyond measurable KPIs, the pilot highlighted that the process itself—building institutional capacity, strengthening cooperation mechanisms, and gaining practical experience—represents a significant outcome. The experience gained provides a strong foundation for future implementation, scaling, and replication of urban logistics solutions within the Functional Urban Area.



9. Conclusions

Maribor pilot provided valuable insights into both the preparation and implementation phases of an urban logistics measure, particularly in the context of introducing a micro-hub solution within a historic city centre. Maribor pilot action confirms that micro-hub-based solutions represent a relevant and promising approach for addressing the challenges of last-mile delivery in dense urban environments, particularly in pedestrian zones with restricted access.

The pilot demonstrates that regulatory measures, such as delivery time restrictions, need to be complemented by practical and operational alternatives in order to ensure acceptance among businesses and logistics operators. The micro-hub concept provides such an alternative by enabling flexible, zero-emission deliveries while reducing congestion and conflicts in public space.

A key conclusion is that urban logistics solutions are not only technical interventions but also governance processes. Successful implementation requires strong coordination across municipal departments, early involvement of decision-makers, and continuous stakeholder engagement.

The experience from Maribor highlights several critical factors for successful implementation:

- the importance of early and continuous stakeholder involvement (through FQP),
- the need for cross-departmental coordination within public administration,
- the complexity of permitting procedures, especially in historic urban areas,
- the necessity of phased implementation and testing before scaling up solutions.

The pilot also confirms that data-driven monitoring and gradual implementation are essential for developing sustainable and scalable urban logistics solutions.

In the long term, the micro-hub concept has strong potential for replication and scaling within the city and the wider Functional Urban Area. The pilot provides a solid basis for integrating urban logistics measures into strategic planning frameworks such as SUMP and SULP, contributing to broader objectives of decarbonisation, improved air quality and enhanced urban liveability.



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