

D2.5.6 Curb management to differentiate road usage and optimise use of space



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GRETA Website

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





1. The GRETA project

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

Last-mile delivery generates negative impacts, including emissions, noise, and congestion. Due to the COVID-19 crisis, global parcel distribution volume nearly doubled, further increasing inefficiencies in the peripheral areas. GRETA's FUAs recognise the problems that generate pollution, nuisance, noise, congestion and have jointly recognised three main problems: the lack of use of green zero-emission last-mile vehicles, conflicts between freight and public vehicles, and the lack of knowledge and strategies for a flexible and shared use of the curb and public space. Despite having 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 capitalising on previous experiences, exploiting synergies with ongoing initiatives, testing innovative pilots, improving competences and knowledge among PPs and stakeholders.



2. Executive summary

This deliverable presents the results of the Budapest pilot action implemented within the GRETA project, focusing on curbside management as a key tool to differentiate road usage and optimise the use of limited public space.

Budapest faces increasing pressure on curbside space due to growing last-mile delivery demand, high parking needs, and competing uses from pedestrians, cyclists, micromobility and services. The pilot aimed to address these challenges by developing and testing a structured Curbside Management Framework and Function Assessment Methodology, allowing data-driven and stakeholder-informed decisions on curbside allocation. The Curbside Management Framework introduces a complex, multi-phase methodology tailored for three planning contexts: comprehensive, project-based, and temporary interventions. The process starts by defining strategic goals and spatial boundaries based on city-level development plans. It continues with extensive on-site data collection - static (what is there) and dynamic (how it is used) - combined with stakeholder input and local business surveys. The collected data supports the creation of current function maps, demand maps, and problem maps for the area. Based on this, a Future Function Map is developed, providing a strategic spatial arrangement of desired curbside functions aligned with local needs, mobility networks and municipal goals.

Two pilot areas were selected in Budapest: an inner-city area in District VIII and a suburban district centre in District IV. These locations represent different urban contexts and logistics demands. Based on on-site observations, data collection and stakeholder consultations, several curbside functions were introduced or reorganised, including loading areas, short-term parking bays, Kiss & Ride spots, designated waiting areas for food delivery cyclists, organised waste container zones, and pedestrian and cycling areas.

The pilot demonstrated that reallocation of curb space from long-term parking towards multifunctional and time-based uses can significantly improve predictability, efficiency and liveability of streets, while reducing conflicts between freight, passenger traffic and public space users. By developing and validating the Curbside Management Framework and Function Assessment Methodology, BKK created a unified planning tool that links strategic mobility and logistics objectives with street-level implementation. The pilot demonstrated that effective curbside management can simultaneously reduce emissions, improve operational efficiency and enhance the quality and predictability of public spaces, while stakeholder engagement and inter-institutional cooperation proved essential for successful implementation.

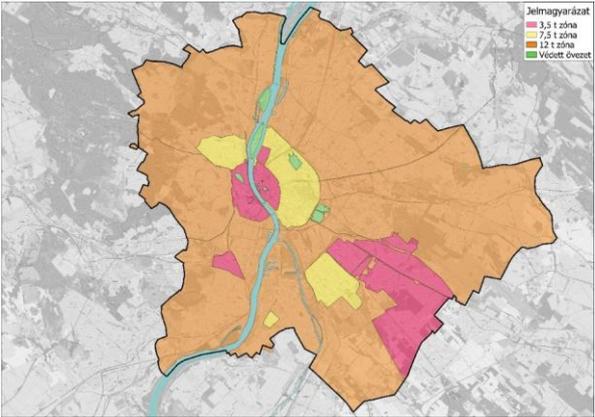
The validated methodology is modular and scalable, enabling application beyond the pilot areas and informing major urban transformation projects such as the Nagykörút (Grand Boulevard) renewal. The pilot approach can be replicated in other areas of Budapest to support a more coherent and well-functioning curbside system. Overall, the Budapest experience confirms that pilot-based experimentation, supported by robust methodologies and governance, can deliver lasting impact and provides a transferable model for other Functional Urban Areas seeking sustainable, climate-resilient urban logistics solutions.



3. Solution

3.1. General information

Table 1 General information

| | |
|--|--|
| Location | Budapest with a population of approximately 1.7 million inhabitants faces pressing challenges in public space usage and allocation and urban logistics, particularly in the densely populated and busy inner city and last mile deliveries. The Functional Urban Area (FUA) of Budapest experiences notable traffic congestions, often aggravated by irregularly parked vehicles and inefficient use of available curb spaces. |
| Map (general map of the municipality + detailed map of the city centre) |  <p>Figure 1: Map of Budapest</p> |



Two pilot areas:



Figure 2: 1st pilot area in District 8



Figure 3: 2nd pilot area in District 4

Area characteristics

The pilot areas are located in the inner-city (8th district) and suburban area (4th district).

The functions available in the inner-city pilot area are a mix of shops, restaurants, residential buildings, and business offices. The area has access restrictions, freight vehicles over 7,5t need access permit to enter. The size of the affected area is 137,364 km².

The suburban pilot area functions as a local district centre, functions are also mixed with market, shops, restaurants and residential buildings. The area has access restrictions, freight vehicles over 12t need access permit to enter. The size of the affected area is 52,135 km².



Additional information

The SUMP of Budapest (Budapest Mobility Plan) includes freight and city logistics measures and sets up goals to ensure sustainable transport. To further deepen the focus on sustainable urban logistics and to develop and implement an integrated plan (derived and in line with the SUMP), Budapest needs to focus on public space management (on both sides of the curb) encouraging environment-friendly mobility solutions. BKK is actively participating research and innovation projects to develop and pilot innovative, new solutions in real life living-labs, test regulatory measures & new policies for all modes of local transport. The interventions in Budapest offer an opportunity to develop sustainable urban mobility and public space regulation, fully in line with the city's plans (building on previous projects SULPiTER), giving opportunity to better understand user and stakeholder needs, collect data on areas where it is currently a weak point, and test different curb management solutions in real life environment.

3.2. Strategy description

The overall objective of the pilot actions is to create green and liveable public spaces in Budapest, have a deep understanding of curbside functions and their effects on city-logistics and to understand curbside management methods considering upscale ability.

BKK will develop a curbside management framework, containing curbside function assessment methodology, real-life testing and application of curbside assessment for the pilot area and main inner-city ring road/ boulevard in Budapest.

BKK prepared and operated curbside demo sites and activities based on the curb management framework and function assessment methodology, with the involvement of all stakeholders with focus on city logistics. BKK explored and contacted all the possible stakeholders to be involved in the pilot action, assess the base situation of curbside management in Budapest, to develop curb management framework for Budapest in cooperation of the stakeholders (especially the Municipality of Budapest, the public road operator, districts, shared mobility operators).

3.3. Governance model

Local policies and regulations:

District Municipality local regulations:

The owners of the public area land, where interventions are made are the District Municipalities. Each District has their own regulation and local development plan to be considered and taken into account, especially when scaling up interventions affecting a larger public area. All large scale interventions affecting public area to be accepted by the General Assembly of the District Municipality.

Sustainable Urban Mobility Plan (SUMP):

The primary goals of the Sustainable Urban Mobility Plan (SUMP) in Budapest are to address the mobility needs of a sustainable and resilient city while fostering integration with urban regional transport systems. To achieve the climate targets and serve these goals, the SUMP has 44 actions in 4 intervention areas. The



4 intervention areas that have been identified are: improved connections, attractive vehicles, customer experience, enhancement services and effective institutional system.

Sustainable Energy and Climate Action Plan (SECAP) of Budapest:

The SECAP document is in preparation, adoption expected in 2026:
https://archiv.budapest.hu/sites/english/Documents/BP_klimastrategia_SECAP_EN_final.pdf

Healthy Streets:

The Healthy Streets Approach is a human-centred framework for embedding public health in transport, public realm and planning. Published in September 2022, this tool has been developed for the City of Budapest to support designers deliver better streets for people.

Budapest Design Check: <https://www.healthystreets.com/europe#uk-alumni>

Regional policies and regulations:

Integrated Urban Development Strategy:

"Home in Budapest - Integrated Urban Development Strategy (ITS)" is the main document outlining Budapest's development until 2027, aligned with the European Union's budgetary cycle. It defines the development goals where the Budapest Municipality takes a leading and initiating role, and it presents the planned measures of the Municipality as well as the key development locations in the capital. (otthonbudapesten.hu/english-summary)

National policies and regulations:

National transport infrastructure development strategy sets development objectives at national level, which influence the planning of the urban freight transport system as well. These objectives include strengthening those segments and modes of passenger and freight transport that are more socially beneficial, resource efficient and improving the quality and efficiency of transport services. [Nemzeti Közlekedési Infrastruktúra-fejlesztési Stratégia.pdf \(kormany.hu\)](#)

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.

100 Climate Neutral Cities Mission: Budapest has recently joined the mission, whose aim is to enable participating cities to act as innovation hubs for pursuing climate neutrality and to enable all European cities to follow suit by 2050. As part of the mission, Budapest is working on developing its Climate City Contract (CCC), which is going to be co-created by multiple stakeholders in the local ecosystem. Two of the main emissions sectors addressed in the CCC are going to be transport and green infrastructure, for which a detailed action and investment plan will be drawn up. 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 directive¹, and vision zero for road safety², the project can help meet broader EU targets for a greener, safer, and more efficient transportation system.

¹ 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

² 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>



3.4. Digital and physical infrastructure

The curbside function assessment methodology was being tested through two pilot locations in Budapest (IV. district and VIII. district) during autumn and winter of 2025, where various curbside functions were introduced and monitored. The implementation plans were prepared by Budapest Közút Zrt, the city's public road operator. These plans were based on discussions with the affected districts, combined with initial data collection and needs assessment, leading to the elaboration of the Future Function Map. This process ensured that both local priorities and citywide goals were reflected in the design.

At the pilot sites dedicated curbside functions were introduced, including reorganization and reallocation of curbside functions in the pilot area (developing multifunctional public space, changing function and purpose within a day), providing proper and enough space for all the necessary functions based on the assessment methodology, curbside management framework and preliminary data collection:

- **Designated waiting area for food delivery cyclists**, supporting the rapidly expanding bike-based logistics sector. Food delivery cyclists can wait in this area for upcoming orders, or park here for the time they enter the mall to pick up the food to deliver.



Figure 4: Designated waiting area for food delivery cyclists

- **Short-term parking bays** for quick (max. 30 minutes) errands. These areas help people arriving by car to find a free parking spot, as these areas are used for quick stops, and not for storing vehicles for hours.

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Figure 5: Short-term parking bays

- Kiss & Ride spot (max. 15 minutes) to facilitate passenger drop-off and pick-up



Figure 6: Kiss & Ride spot



- **Designated space for residential waste containers**, creating more orderly and predictable waste management, to prevent waste containers to be put across the sidewalk, blocked by the parking cars



Figure 7: Designated space for residential waste containers

- **Loading areas** to accommodate urban freight while reducing conflicts with passenger traffic,
- Pedestrian and cycling zone.

4. Impact

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

The outcomes of the Budapest curbside management pilot align with the objectives defined, confirming the relevance and effectiveness of the implemented measures.

- **Efficient use of limited public space and improving liveability and greening of public spaces:** By reallocating curb space away from long-term parking towards multifunctional uses, pedestrian areas and organised service zones, the pilot contributed to a more liveable, predictable and human-scaled street environment.
- **Resolving opposing stakeholder interests:** The methodology's strong emphasis on stakeholder involvement, local business surveys and on-site observation proved effective in identifying conflicts early and developing balanced solutions that reflect multiple user needs.
- **Data collection for curbside management and Sulp development:** The pilot generated high-quality static and dynamic data on curbside usage, logistics demand and behavioural patterns, directly supporting both the refinement of the curbside management framework and the preparation of Budapest's Sustainable Urban Logistics Plan.
- **Creation of an upscalable and unified planning tool:** The validation of the Function Assessment Methodology in real-world conditions confirmed its applicability beyond the pilot sites, fulfilling the



objective of creating an upscalable tool for citywide and corridor-level planning, including major projects such as the Nagykörút renewal.

5. Lessons learnt

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- Curbside management topic is unique and neglected in European cities based on benchmarks, yet very important for achieving organized and liveable public space
- Stakeholder engagement can be fostered with clear communication putting emphasis on the stakeholder's gains and interests and letting long enough time for involvement, processing and responses
- A Curbside Management Framework should be formally integrated into the planning processes and require its application in relevant public space and street renewal projects, particularly where freight and service activities are significant.
- Link curbside planning to Sulp implementation: The methodology should be used as an operational tool within the forthcoming Sustainable Urban Logistics Plan, ensuring that strategic logistics objectives are reflected in concrete street-level interventions.
- Cross-institutional cooperation should be strengthened: Maintain and formalise cooperation between BKK, the Municipality, district governments and Budapest Közút Zrt. to ensure coherent decision-making and efficient implementation.
- Transferability and knowledge sharing to be supported more: Document lessons learned and share the Budapest methodology with other districts and Central European cities, contributing to broader uptake of sustainable curbside and urban logistics solutions.

6. Transnational Cooperation

6.1. Scaling-up

Table 2 Scaling up – plans and recommendations

| | |
|---|---|
| Plans for scaling up the solution in the pilot area. | <p>After a careful monitoring process, the idea is to implement the similar curbside management actions in other areas of Budapest. In the long-term period, the aim is to create a well-organized, liveable streets all over the city.</p> <p>Supporting the renewal of the Grand Boulevard (Function assessment and survey for shops): The pilots are more than temporary measures; they represent a testing ground for scalable solutions. By validating the Curbside Management Framework and methodology in real-world conditions, Budapest aims to create a curbside system that can be flexibly adapted to different urban contexts. Beyond the pilot interventions, the methodology is also providing input to the upcoming Grand Boulevard (Nagykörút) renewal project, one of the city's most complex public space transformations. Integrating logistics-friendly curbside design into this renewal is a priority, ensuring that freight and passenger needs can coexist within a multifunctional, climate-adaptive, and people-friendly street environment.</p> |
|---|---|



| | |
|---|--|
| <p>Suitability for scaling-up</p> | <p>The pilot can be implemented in other areas of Budapest to contribute to well-functioning, organized curbside alignment. The curbside actions realized in the frame of GRETA project, can be expanded or enhanced in order to increase the area (involve more districts), involve more shops reaching out to longer curbside sections.</p> |
| <p>Identified risks for scaling up and solutions to overcome them (risk mitigation).</p> | <p>Upscaling may bring operational difficulties to the road operator, as larger areas need more effort and manpower to maintain.</p> <ul style="list-style-type: none"> • One of the main challenges in scaling-up the curbside management pilot (and assessment methodology) is adapting it to the specific and various infrastructure of the different parts of cities. • Ensuring compatibility with existing planning guides, standards and suggestions. • Stakeholder engagement and collaboration with local authorities • Flexibility and adaptability of the solution to accommodate various logistics requirements. |

6.2. Transfer

By validating the Curbside Management Framework and methodology in real-world conditions, Budapest aims to create a curbside system that can be flexibly adapted to different urban contexts. Beyond the pilot interventions, the methodology is also providing input to the upcoming Grand Boulevard (Nagykörút) renewal project, one of the city's most complex public space transformations. Integrating logistics-friendly curbside design into this renewal is a priority, ensuring that freight and passenger needs can coexist within a multifunctional, climate-adaptive, and people-friendly street environment.

Table 3 What to expect - problems and solutions

| <p>Problems and solutions</p> | |
|--|---|
| <p>Problems faced</p> | <p>One of the main issues is the adaptation of curbside management actions to the diverse urban and infrastructural conditions of different parts of Budapest. Street cross-sections, parking arrangements, traffic volumes and utility layouts vary significantly across districts, making uniform application of solutions challenging.</p> <p>Another challenge related to operational and maintenance capacity. Scaling up curbside management measures to larger areas increases the workload of the road operator, as more resources and manpower are required for maintenance, monitoring and enforcement of curbside functions.</p> <p>Stakeholder alignment proved to be complex, as different user groups (residents, shop owners, logistics operators, delivery services and local authorities) often have competing expectations regarding curbside use, especially in dense inner-city environments.</p> |
| <p>Corrective actions taken</p> | <p>To address these challenges, BKK applies a flexible and modular approach to the Curbside Management Framework, allowing interventions to be adapted to local</p> |



| | |
|------------------------------|---|
| | <p>street conditions rather than applying standardised layouts. This ensures that solutions remain context-sensitive while still following a unified methodology.</p> <p>Close cooperation is established with the public road operator to integrate operational and maintenance considerations into the design and implementation phases.</p> <p>Stakeholder engagement is strengthened through targeted consultations with local businesses, residents and logistics operators, as well as on-site feedback collection during the pilot operation phase, enabling fine-tuning of curbside functions based on actual user behaviour.</p> |
| <p>What to watch out for</p> | <p>Based on the pilot experience, the following aspects should be considered when implementing and scaling up curbside management solutions:</p> <ul style="list-style-type: none"> • Context-specific application: the methodology should always be adapted to local infrastructural, functional and traffic conditions, • Operational capacity and resources: scaling up requires adequate staffing and maintenance capacity on the side of the road operator, • Alignment with existing planning and regulatory frameworks: early coordination with relevant guidelines and authorities is essential, • Continuous stakeholder engagement: ongoing dialogue with residents, businesses, logistics operators and local authorities is crucial to ensure acceptance and effective operation, • Flexibility and adaptability: curbside solutions must be able to accommodate different logistics needs, time-based demands and future mobility trends. <p>During the pilot operation the Municipalities or BKK did not receive any complaints from citizens, operators or road users, signs are understandable. Food delivery companies suggest using the designated areas for delivery colleagues in internal communication and onboarding education. When scaling up, user feedback has to be collected more widespread as on a larger scale it is more difficult to reach all users in advance to prepare for a change.</p> |

7. Conclusions

Through the GRETA project, Budapest has moved beyond isolated experiments and laid the foundations for a systematic, data-driven approach to curbside management that directly supports decarbonisation, liveability and efficient last-mile logistics.

The curbside management pilot confirmed that the curb is a critical and limited urban resource, where competing demands from freight, micromobility, public transport, private vehicles and public life must be actively managed rather than passively regulated. By developing and validating the Curbside Management Framework and Function Assessment Methodology, BKK created a unified planning guide that bridges the gap between strategic policy objectives and street-level implementation. This represents a significant step forward in aligning Sustainable Urban Mobility Planning with day-to-day public space operations.

The pilot actions showed that effective curbside management can contribute simultaneously to multiple policy goals: reducing emissions from last-mile delivery, improving traffic efficiency, increasing the quality

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and predictability of public spaces, and supporting emerging logistics and mobility services. The Budapest pilot also demonstrated the importance of stakeholder involvement and inter-institutional cooperation, proving that conflicts around curbside use can be addressed through transparent, evidence-based planning processes.

By developing and validating the Curbside Management Framework and Function Assessment Methodology, BKK created a unified planning tool that links strategic mobility and logistics objectives with street-level implementation. The pilot demonstrated that effective curbside management can simultaneously reduce emissions, improve operational efficiency and enhance the quality and predictability of public spaces, while stakeholder engagement and inter-institutional cooperation proved essential for successful implementation.

The validated methodology is modular and scalable, enabling application beyond the pilot areas and informing major urban transformation projects such as the Nagykörút (Grand Boulevard) renewal. Overall, the Budapest experience confirms that pilot-based experimentation, supported by robust methodologies and governance, can deliver lasting impact and provides a transferable model for other Functional Urban Areas seeking sustainable, climate-resilient urban logistics solutions.

As lessons learned BKK concluded that effective curbside management in Budapest requires clear, benefit-oriented stakeholder communication with sufficient time for engagement, the formal integration of a Curbside Management Framework into planning and street renewal processes, and its use as an operational tool within the Sustainable Urban Logistics Plan. Stronger, institutionalized cooperation between city and district actors is essential for coherent implementation, while systematic documentation and knowledge sharing can support transferability to other districts and Central European cities.

The pilot approach can be replicated in other areas of Budapest to support a more coherent and well-functioning curbside system. The curbside measures implemented within the GRETA project can be extended or further developed to cover larger areas, involve additional districts and businesses, and apply the methodology along longer curbside sections.

In conclusion, the GRETA project experiences in Budapest confirm that well-designed pilot actions, supported by robust methodologies and strong governance, can catalyse lasting change. The Budapest approach offers a transferable model for other cities seeking to reconcile logistics needs with liveable, climate-resilient urban environments and provides a solid foundation for scaling up sustainable urban freight solutions across the Functional Urban Area.

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