



**Interreg**  
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European Union  
European Regional  
Development Fund

**LOW-CARB**



# LESSONS-LEARNT BROCHURE

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## IMPRINT

### About the project

LOW-CARB - Capacity building for integrated low-carbon mobility planning in functional urban areas <sup>1</sup>aimed at enhancing capacities for integrated low-carbon mobility planning for functional urban areas (FUAs). To achieve this, the project tackled the most important aspects of sustainable urban mobility planning (SUMP) and looked at how these can be adapted to the realities of the functional urban area: integrated coordination, institutional cooperation, and action plan implementation, including joint financing and public investments in low-carbon mobility systems in challenging times. Clean public transport services together with new combined mobility offers, like sharing services or multimodal information services, were placed at the core of the planning process.

### Project Number

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<https://www.interreg-central.eu/LOW-CARB>

TAKING  
COOPERATION  
FORWARD

<sup>1</sup> <https://www.interreg-central.eu/LOW-CARB>

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Figure 1: The LOW-CARB project partners (Source: City of Brno, 2019)





## WHO WE ARE

### CROATIA

- City of Koprivnica
- University North (UNIN)

### CZECH REPUBLIC

- City of Brno

### GERMANY

- Central German Transport Association (MDV)
- City of Leipzig
- Leipzig Transport Company (LVB)

### HUNGARY

- Szeged Transport Ltd. (SZKT)

### ITALY

- Electric Tramways Parma (TEP)

### POLAND

- Municipality of Skawina
- Municipality of Krakow

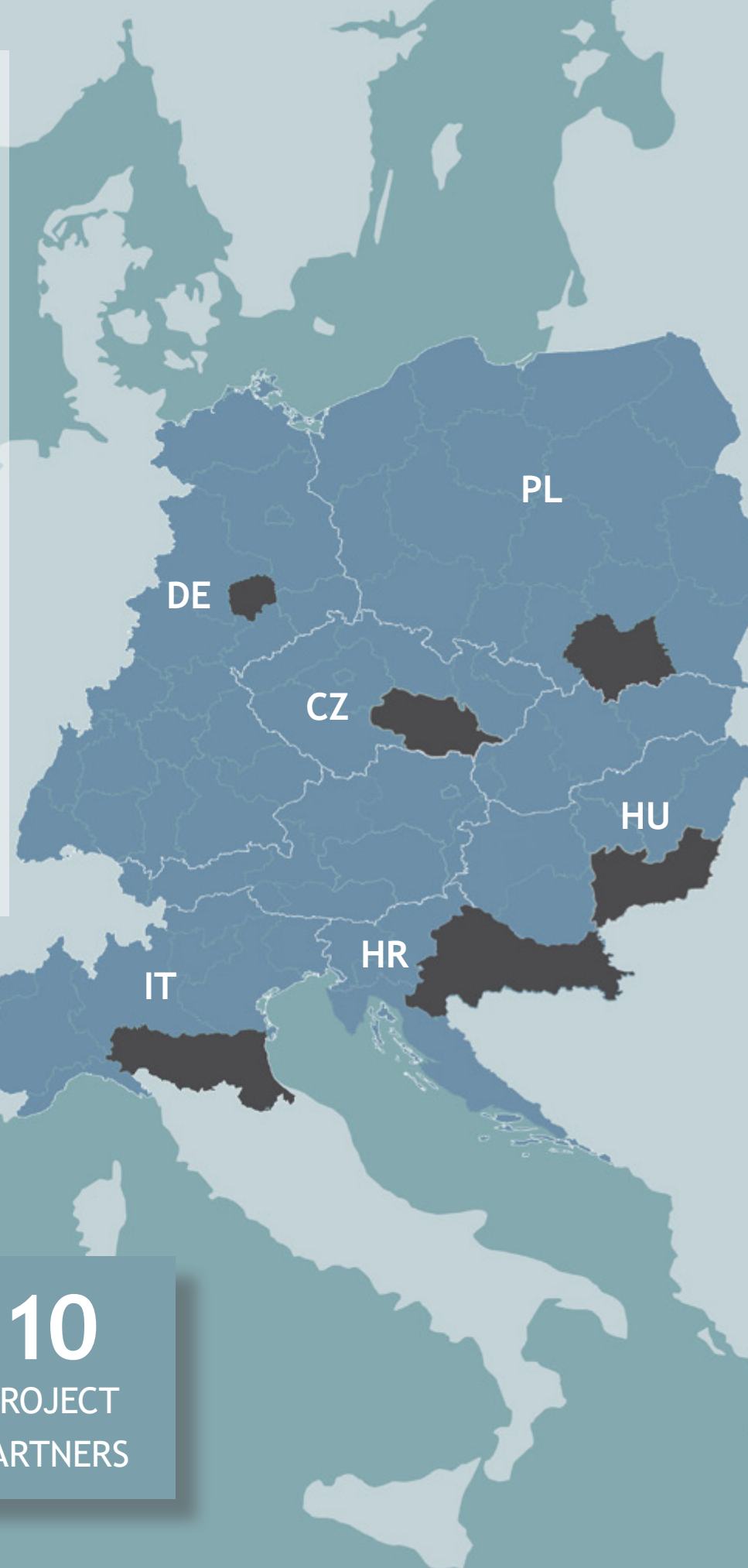
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COUNTRIES

6

FUNCTIONAL  
URBAN AREAS

10

PROJECT  
PARTNERS

## WHAT IS LOW-CARB ABOUT?

Planning for integrated and low-carbon mobility for public transport (PT) was at the core of the LOW-CARB project. The main objective was to increase public transport accessibility in the functional urban area (FUA) of cities in central Europe, thereby creating good planning practices, tools, and strategies with high take-up potential.

This could only be achieved when planners in municipalities, public transport authorities and companies join forces and cooperate beyond administrative, departmental, and organizational boundaries. With these objectives in mind, six LOW-CARB partner teams (in FUAs of Leipzig, Brno, Szeged, Koprivnica, Kraków, Skawina and Parma) developed action plans, pilots and tools for innovative low-carbon mobility. Preparation, implementation and evaluation of these tools and pilots were accompanied by SUMP action plan developments in four FUAs: Leipzig, Brno, Szeged and Koprivnica, creating enhanced synergies. For the pilots in Kraków and Skawina, who represent an urban core and a satellite municipality in a joint FUA, the cooperation of LOW-CARB catalysed the kick-off a metropolitan SUMP process; while in Parma, a pilot action plan for a multimodal public transport electrification measure was developed, ready to implement, but also to share with others for replication. Furthermore, the project jointly developed two tools at project level - the SUMP Self-Assessment Tool and the SUMP-Central knowledge platform, along with three transnational strategies for integrated mobility planning at FUA level.

While other LOW-CARB resources offer a detailed description and, thus, enable replication, the present brochure's objective is to show the lessons learnt and main take-aways from the project.

### LOW-CARB results in a nutshell

LOW-CARB action plans and upscaling of pilots will lead to estimated savings of over 120.000 t CO<sub>2</sub> until 2025 through implementation of low-carbon mobility measures in FUAs.

The project developed four innovative action plans with over 200 green mobility measures in the FUAs of Leipzig, Koprivnica, Brno and Szeged. Nearly 80 stakeholders from all governance levels and sectors were involved, either updating existing or developing new SUMPs. The GIS SUMP monitoring tool and three transnational strategies for integrated planning allow for inclusive take-up of green approaches towards planning, monitoring and financing. Also, the project essentially contributes to the SUMP Topic Guide "Planning for functional urban areas", promoted by the EC.

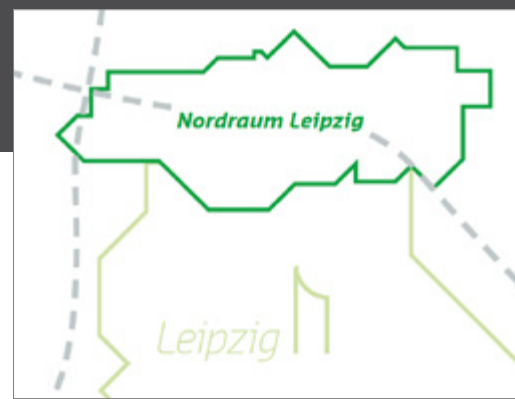
LOW-CARB increases planning competences of practitioners with two online tools available in all central European languages: the SUMP Self-Assessment Tool, already applied by 80 central European cities and 350 cities Europe-wide at project end. The SUMP-Central is a platform that connects to SUMP resources and news in the field, providing home to several CIVINETS in the region. The project also trained 690 people at FUA and transnational level, reached over 17.000 participants via its manifold communication activities.

Finally, the project demonstrated innovative pilots that further innovation in public transport, integrated into SUMPs: a solar-powered smart mobility station, schemes for P&R e-bikes and e-cargo bikes, as accessible mode to an UVAR, a hybrid FUA feeder bus line, an accessibility heatmap & travel planner, a WiFi-based passenger counting methodology, and a pilot action plan for multipurpose charging.

**Figure 2:** LOW-CARB's pilots took place in the following Functional Urban Areas: Leipzig (Germany), City of Brno (Czech Republic), City of Parma (Italy), Krakow-Skawina FUA (Poland), City of Koprivnica (Croatia), and City of Szeged (Hungary).

## WHAT THE PARTNERS ACHIEVED IN THEIR FUNCTIONAL URBAN AREAS AND WHAT THEY LEARNT

This chapter shortly describes the project results in each partner FUA: action plans, tools and pilots to enable seamless and sustainable mobility beyond administrative borders. It also sketches the main take-aways that partners draw from them.



### FUA LEIPZIG (GERMANY): ACHIEVE LOW-CARBON WORKPLACE MOBILITY TO A REMOTE DISTRICT

The Leipzig northern industrial area (Nordraum) is one of the largest and most important economic hubs of the Saxony region in Germany and Leipzig's primary industrial site. A massive increase of employees is expected until year 2030. The private car is the main transportation mode in the area for employees and suppliers.

The Leipzig Public Transport Company (LVB), the central German Transport Association (MDV) and the City of Leipzig cooperated with clear roles and assignments. Further consulted regional stakeholders were the district of North Saxony, the Regional Rail Association (ZVNL), the City of Schkeuditz, the public transport organisation of Northern Saxony, other affected surrounding communities and companies located in the planning area. A local Steering Group formed of all three partners led the process and endorsed the Action Plan.

The partners developed the Masterplan Mobilität Nordraum Leipzig (Mobility Action Plan Leipzig North Area<sup>1</sup>) aiming at a strong increase of environmentally friendly transport offers, to reach ambitious municipal aims. A set of 86 measures is clustered in 14 packages focusing on horizontal measures (e.g., stakeholder cooperation, communication, company-based mobility management), rail (e.g., improvement of the regional rail infrastructure), local public transport (e.g., enhancement of the bus and tram offer, on-demand services) and last mile (e.g., mobility hubs, new cycle paths, Bike/ Park and Ride). The action plan implementation leads to estimated CO<sub>2</sub> reduction of 75.000 t CO<sub>2</sub> until 2025.

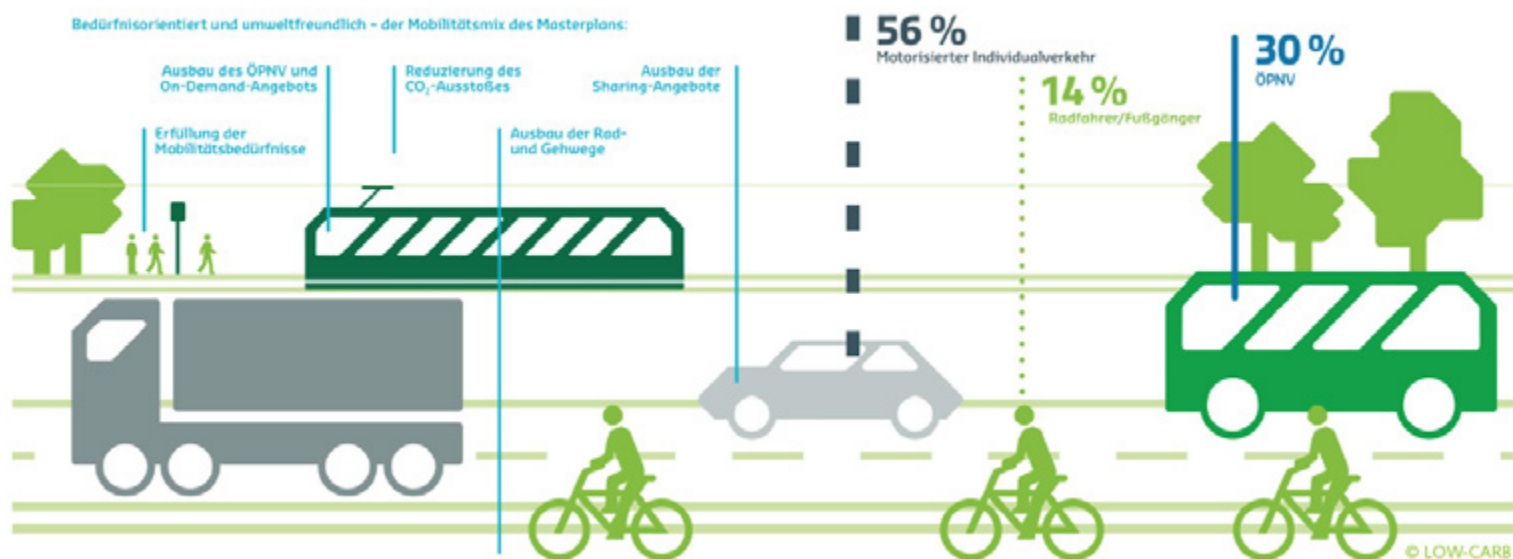


Figure 3: A new mobility mix focusing on sustainable mobility services in Leipzig mobility strategy for the northern industrial area (Source: Leipzig Transport Company, 2020)

<sup>1</sup> Find more information about Leipzig's action plan in the output factsheet <https://www.interreg-central.eu/Content.Node/LOW-CARB-Output-factsheet-Action-Plan-Leipzig.pdf> and LOW-CARB's mobility strategies handbook: <https://www.interreg-central.eu/Content.Node/LOW-CARB-Mobility-Strategies-in-FUAs-Handbook-EN.pdf>

### LESSONS LEARNT ARE:

- Following the SUMP approach worked well and led to a higher acceptance and willingness for the measure implementation.
- In the beginning, think big. An ambitious vision can only be created when we shift the focus away from financial feasibility towards people's needs.
- The close inter-departmental and cross-institutional cooperation among stakeholders and private companies is key for a successful implementation. A well-developed governance strategy is a first step towards sound planning and implementation of measures on the long run

The Leipzig partners also developed a strategic outlook towards data governance to make public data open and available for a wider audience, and applicable for mobility planning and service development. By creating a joint data basis this can allow for the deployment of innovative mobility solutions in the functional urban area, following major trends such as vehicle-sharing services and the transformation of urban mobility through decarbonisation, automated driving and "Mobility as a Service".<sup>2</sup>

A lesson learnt is that creating consensus which data can or cannot be shared requires well-moderated stepwise communication within the public administration first, and only then with external parties (as data providers and users).



Figure 4: Stakeholder workshop (Source: City of Leipzig, 2019)

“Our Leipzig pilot action, an innovative accessibility map REACHIE targeting commuters, is successful for communicating public transport modes in the project area. The technology behind REACHIE found applications beyond our initial ideas. Nowadays, it assists the City of Leipzig in the identification and assignment of sites for Kindergartens and helps the region to identify public transport friendly areas for future residential developments. It also provides data-based analysis for company-based mobility management [in business districts]. In LVB, another planning tool, based on the knowledge of this pilot action process, was submitted and approved for the [upcoming] project MONI. It will be acquired next year. In addition, other partners of Central Germany are considering the use of similar tools to improve their planning. Therefore, REACHIE became a first step towards new paths of a digital future in transport planning.”



Ronald Juhrs - Managing Director Technology and Operations at Leipzig Transport Company (LVB)

<sup>2</sup> Find more information in the report on data-based mobility planning: <https://www.interreg-central.eu/Content.Node/CE-1100-LOW-CARB-D.T1.3.3-Data-based-SUMP-Strategy.pdf>



## “REACHIE” - the Leipzig accessibility heatmap to enable using low-carbon modes for commuting

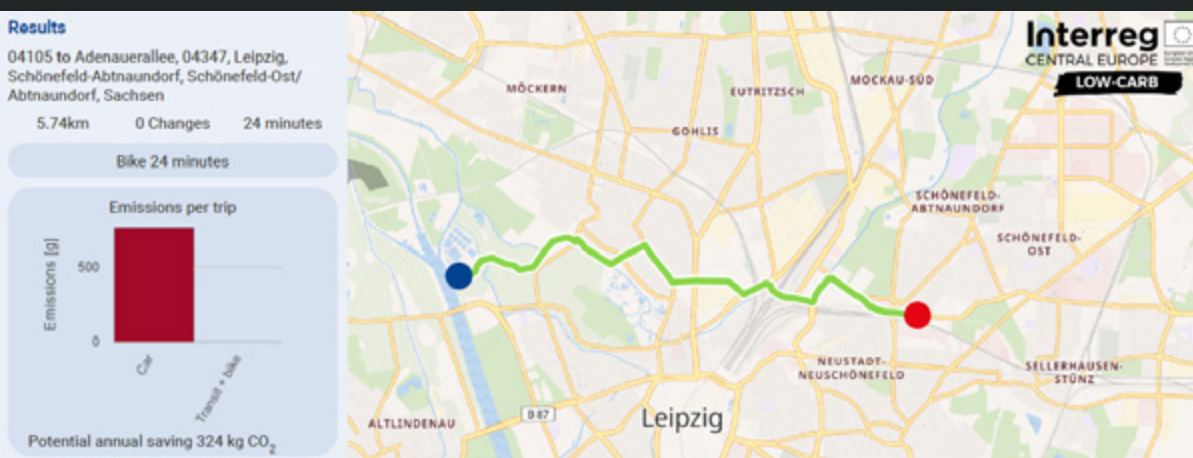
The purpose of REACHIE<sup>3</sup> is to inform and attract commuters to shift their modes of transport to sustainable PT offers and thereby reduce their CO<sub>2</sub> emissions. This powerful, multi-, and intermodal online journey planner based on open data informs about the most accessible and sustainable modes of transport to the remote business area “Nordraum”. It is estimated that usage of REACHIE leads to a CO<sub>2</sub> reduction of 160 t per year.

REACHIE has, however, also generated interest among public authorities, transport associations and consultancies in the FUA to be applied as a spatial analysis tool to understand accessibility by public transport or to monitor performance of public transport measures.

### LESSONS LEARNT ARE:

It became obvious that the unsupervised usage of this web-app without prior training is slightly too difficult for the end-user. This feedback helped to refine its future applications: REACHIE is best applied in active consultation processes and shows high potential as a tool that could be used as an alternative planning instrument for mobility management of companies.

Commuters are not only motivated to use PT services by travel time (the basis for using an isochrone calculator) but by “last mile” distances too.



Figures 5 & 6:

REACHIE screenshot - demonstrating accessibility (in time and per mode) of sites by multimodal mobility (Source: MDV Central German Transport Association, 2020)

<sup>3</sup> Find more information about REACHIE in the output factsheet: <https://www.interreg-central.eu/Content.Node/LOW-CARB--Reachie-Tool-Factsheet-EN.pdf> and LOW-CARB's transnational pilot handbook: <https://www.interreg-central.eu/Content.Node/LOW-CARB-Pilot-Handbook-EN.pdf>

## FUA BRNO (CZECH REPUBLIC) - INCREASE THE (HIGH) SHARE OF LOW-CARBON MODES USAGE IN THE FUA



The FUA of Brno, or the Brno Metropolitan Area, is an organic functional unit. The City of Brno, the second largest city in the Czech Republic, is situated in its centre, with intensive daily commuting flows, mainly for work and education purposes. The daily movement of people and goods is increasing and exhausting the traffic network.

The main stakeholders in the SUMP action plan development were the public transport operator, and the regional coordinator of transport services. Cooperation with municipalities in the FUA on strategic measures was gradually established at all levels (local, regional and national governance), horizontal (municipality, local PT operator, research institutions), spatial (neighbouring municipalities) and inter-sectoral (three different departments of the Brno Municipality).

The newly adopted SUMP Action Plan<sup>4</sup> reflects the recommendations included in the Regional Transport Plan. Its main goal is to increase the share of public transport at the FUA level by 1% compared to the current state (from 53% to 54%) by the year 2030. The measures were selected based on setup goals and policy fields, and their prioritisation is revised on a yearly basis.

### LESSONS LEARNT ARE:

- It is essential to focus on public transport as the backbone of the mobility system at the functional urban area level.
- The participation of citizens is an asset in the process of realizing large, expensive, and unpopular investments as it rises their acceptance level and their understanding on the benefits and impacts in the long run.
- Communicate with all stakeholders throughout the process, from the analysis to the implementation to monitoring and evaluation of measures.
- Only with having a high-quality plan, fully integrated into the regional policies and with a comprehensive understanding of the needs of all FUA stakeholders, can the vision be achieved.

<sup>4</sup> Find more information in the LOW-CARB output factsheet: <https://www.interreg-central.eu/Content.Node/LOW-CARB-Output-factsheet-Action-Plan-Brno.pdf>, LOW-CARB action plan report: <https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-D.T1.5.1-4-Brno-action-plan.pdf> and the Brno SUMP <https://www.interreg-central.eu/Content.Node/Brno-Action-Plan---SUMP.pdf>, as well as here: [www.mobilitabrno.cz](http://www.mobilitabrno.cz)



Figure 7: Visualization of reconstruction of tram lines Nové sady in Brno, where the “green belt” - meadow lawn with flowers - will be built for less noise and dust. (Source: www.dpmb.cz 2020)





The Brno team developed the GIS SUMP monitoring tool<sup>5</sup> that synthesizes data in a GIS application to support planners monitoring the implementation and financing of measures, while assigning clear responsibilities for all stakeholders involved in the FUA. The tool has been used by all involved stakeholders for overseeing the implementation process.

**LESSONS LEARNT ARE:**

- The cooperation established during the action plan development helps not only the implementation of measures but also their evaluation, at which step the SUMP monitoring tool was the key instrument, keeping stakeholders together and structuring their ongoing collaboration.
- Data entry can be considered time consuming by some stakeholders. It is therefore encouraged to keep the tool up-to-date with regular data entries.
- "Tradition" is a barrier for adopting new tools for data storage and analysis. However, this can be mediated by institutional support and motivation to adopt its usage instead of traditional tools and programs.

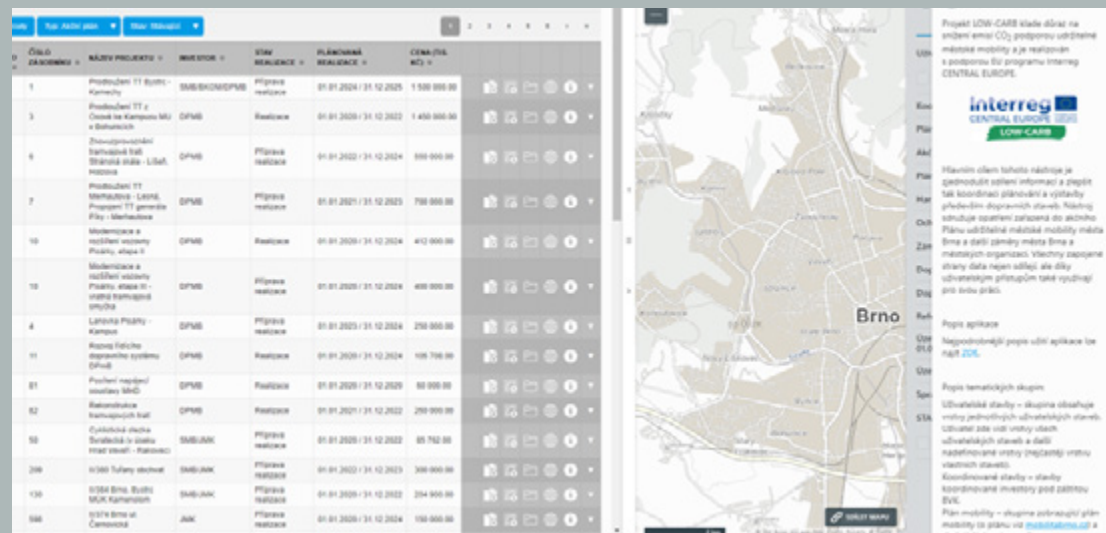
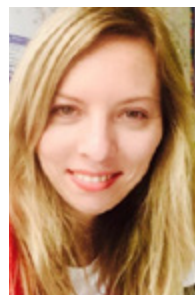


Figure 8: The SUMP GIS monitoring tool user surface (Source: City of Brno, 2020)

<sup>5</sup> Find more information in the LOW-CARB SUMP monitoring tool brochure: <https://www.interreg-central.eu/Content.Node/LOW-CARB-SUMP-monitoring-tool-brochure-EN.pdf> and output factsheet: <https://www.interreg-central.eu/Content.Node/LOW-CARB-SUMP-Monitoring-Tool-Factsheet-EN.pdf>



*To develop the SUMP GIS Monitoring Tool, the City of Brno took the same co-creative approach that the SUMP principles endorse - such as institutional cooperation, co-creation by stakeholder and citizens, planning for the wider functional urban area - to design, develop, and test the monitoring tool. Thus, stakeholders of Brno's mobility Action Plan were included in every step of the tool development.*

**Nedvěďová Kateřina, Project Manager LOW-CARB at City of Brno**

**FUA KOPRIVNICA (CROATIA): CREATE ONE SINGLE PUBLIC TRANSPORT ZONE IN THE FUA**



FUA Koprivnica is a newly established administrative layout formed by the City of Koprivnica and the 11 surrounding small municipalities that have functional relations with the urban core.

The main challenge related to public transport and mobility at the FUA level is the constant daily commuting flows between the city and the surrounding municipalities.

The city designed its FUA by the functional PT relations between city and the interurban area. To achieve this, the neighbouring communities were involved in a data and needs analysis, which resulted in a new spatial delineation of the FUA and an action plan for this area.

The action plan<sup>6</sup> creates, thus, one single overarching public transport system that covers the commuting flows between all localities surrounding the city. The objective is to increase the share of sustainable transport modes (especially cycling) by creating a framework for infrastructure investments. The measures are grouped in three main areas of interventions development of the cycling/pedestrian infrastructure in the surrounding areas, interconnectivity between city-level and FUA-level infrastructure, expansion of the public bike system and the bus system of the City of Koprivnica into the FUA area.

**LESSONS LEARNT ARE:**

- Set clear goals and strategic objectives at the FUA level but understand local needs and expectations.
- The main challenge related to expanding the urban public transport services from Koprivnica to the FUA communities lays in the large discrepancies between urban, peri-urban and rural built mobility infrastructure.
- A clear and well-structured mobility action plan, comprising a detailed description of measures, time line, budget and responsibilities, is essential for the implementation of measures.



Figures 9 & 10: Left: Scenarios for the expansion of public bus transport in the FUA Koprivnica area - new lines; Right: Public transport network in FUA Koprivnica (existing and planned routes) (Source: QGIS tool, City of Koprivnica, 2020).

<sup>6</sup> Find more information about the Koprivnica action plan here: <https://www.interreg-central.eu/Content.Node/LOW-CARB-Output-factsheet-Action-Plan-Koprivnica.pdf>





Figure 11 The smart multimodal mobility station in Koprivnica (Source: City of Koprivnica, 2020)

### Koprivnica's smart multimodal mobility station

The city-owned public transport operator together with the city of Koprivnica and energy provider installed

a multimodal electric mobility station equipped with Photo Voltaic (PV) technology at the premises of a new campus at University North. This PT station is the first ever to combine a charging system with on-the-place produced renewable energy to power electric vehicles used in public transport. It integrates different transport modes by one operator and managing system with up-to-date software, and powers e-buses and e-bikes in parallel, which is innovative in Croatia<sup>7</sup>.

#### LESSONS LEARNT ARE:

- A centrally run transport system is much more effective with an inclusive software system, enabling introduction of new mobility services (e.g., MaaS) by better tracking of number of users, patterns of usage, costs of usage, occupancy of bike and e-bikes, charging status of the buses, single operator interface.
- Koprivnica, like other small cities, experienced more resistance to change than big cities, and it can be too challenging to finance, implement and demonstrate an innovative measure alone. The transnational context of LOW-CARB enabled the city to prepare, implement and evaluate a very innovative pilot action, to learn from the partners how to handle innovative tenders, e.g., and to pass its own learnings on to others.

<sup>7</sup> Find more information in the output factsheet: <https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-O.T3.2-KOP-Pilot-factsheet.pdf> and LOW-CARB transnational pilot handbook: <https://www.interreg-central.eu/Content.Node/LOW-CARB-Pilot-Handbook-EN.pdf>



*“The challenging year 2020 seemed to largely disturb the progress in the pilot implementation phase, but in fact it urged the team to streamline the decision-making process and to really focus on the main aspects of the implementation.”*

Nebojša Kalanj, associate expert for sustainable development, City of Koprivnica

## FUA SZEGED (HUNGARY): UNDERSTAND MOBILITY NEEDS AND TAILOR THE PT OFFER ACCORDINGLY



Szeged's Industrial Logistics Centre is a dynamically developing area, situated in the Northwest of the city.

Most employees commute to the planning area every day by car from outside of Szeged. There is a need to increase accessibility for cyclists and PT from the northern residential area of Szeged, for clean bus services, more flexible schedules, line operations, and combined and multimodal offers, e.g., sharing offers for the last and first mile.

Companies and employees from the planning area, public transport operators, and the Municipality were involved via workshops and surveys by SZKT, the local public transport authority.

The action plan<sup>8</sup> contains 10 groups of measures with 60 targeted measures around public transport, cycling, improved road connections, car-sharing, green mobility promotion measures have been developed. A priority action is the new in-motion-charging (IMC) trolleybus line to the industrial area. Until 2025, implementation of these actions will lead to an estimated reduction of 37.000 t CO<sub>2</sub>.

#### LESSONS LEARNT ARE:

- knowledge of the area and companies through target group orientation, stakeholder engagement and involvement into the action plan development
- data collection through surveys (with a good response rate based on promotion activities, e.g., during European Mobility week 2019)
- sound data analysis of survey responses to get a sound basis for targeted measure development
- setting goals -linked to the SUMP objectives and goals of the City of Szeged.



*“We are dealing with a part of the city where we have existing transport links, well-established mobility habits, public transport, cycle ways and car traffic. But the northern segment of the city is a developing part too, [...] therefore, we need to better understand the needs of those who will travel there daily and to see if we can ease their commute by co-operating with their employers.”*

Sándor Nagy, Szeged's Vice Mayor

<sup>8</sup> Find more information about the SZKT action plan in the output factsheet: <https://www.interreg-central.eu/Content.Node/LOW-CARB-Output-factsheet-Action-Plan-Szeged.pdf> and <https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-D.T1.5.1-4-Szeged-action-plan.pdf>



### Pilot: Szeged's WiFi passenger counting system

To better define actual and future needs for mobility services and real-time traffic management in this area, the public transport authority, SZKT, developed a Wi-Fi sensor passenger counting methodology and algorithm, and tested its accurateness against other methodologies<sup>9</sup>. For this, SZKT provided the testing equipment, vehicles, data acquisition. The Institute of Informatics at Szeged University was responsible for the software development, and the City of Szeged managed the user data incl. storage, access, and interface formatting. The result is that WiFi counting is the most precise of all tested methods.

#### LESSONS LEARNT ARE:

- Close cooperation with researchers is very important in the development phase of the counting system, as well consideration of the timing of the project, because researching may need to be elaborated and extended.
- It is important to try a range of algorithms and methods to select the most appropriate one.
- Before realizing the pilot, it was important to explore the options and to collect the know-how regarding all sub-topics of the pilot, to have a clear and complete picture about the goals and to make a comprehensive analysis of the context and requirements. For this reason, communication with local project partners and a good cooperation is crucial, also a good flow of information.



Figures 12 & 13: Testing different passenger counting methods (Source: SZKT, 2020)

Line No.	Line Name	Stop Name	Stop Code	Vehicle No.	Planned Departure	Actual Departure	Planned Arrival	Actual Arrival	Stop Time	Passenger Count
101	101	101	101	101	101:00:00	101:00:00	101:00:00	101:00:00	00:00:00	0
102	102	102	102	102	102:00:00	102:00:00	102:00:00	102:00:00	00:00:00	0
103	103	103	103	103	103:00:00	103:00:00	103:00:00	103:00:00	00:00:00	0
104	104	104	104	104	104:00:00	104:00:00	104:00:00	104:00:00	00:00:00	0
105	105	105	105	105	105:00:00	105:00:00	105:00:00	105:00:00	00:00:00	0

Figure 14: WiFi based passenger counting platform (SZKT, 2020)

### FUA PARMA (ITALY): ACTION PLAN FOR A MULTIPURPOSE-CHARGING INFRASTRUCTURE INCL. UPSCALING SCENARIO



Parma is a medium-sized city that lays in the middle of the Pianura Padana, which is the most industrialized - and therefore polluted - area of Italy. The city is struggling with air pollution. The local administration is fighting this battle also by promoting public transport and reducing its impact over the environment to increase the quality of life for citizens.

For this reason, the public transport provider, TEP spa has, with the municipality and the local energy provider, developed a measure implementation plan including an upscaling scenario for the bus line 8 that will lead to CO2 savings of over 3.000 t/CO2 until 2025. The plan investigates how to turn this line into an electric bus line and provide a multi-purpose charging infrastructure which could also be used by other electric mobility modes like e-cars or e-bikes<sup>10</sup>.

#### LESSONS LEARNT ARE:

- Experimenting with vehicles and technologies allowed TEP to gather useful data for future investment decisions.
- Joint planning of TEP and the City of Parma for electric mobility charging infrastructure and electric vehicles increased the perception of TEP as a company committed to sustainability.
- Cooperation with the municipality and with citizens increased the quality and acceptance of the action plan.
- Replicability of the action plan is shown by the fact that the pilot action plan is taken up by the LOW-CARB follower city Municipality of Maribor.



Figure 15: New mobility hubs: layout of the terminal at Largo Nenni, Parma (Source: TEP 2020)

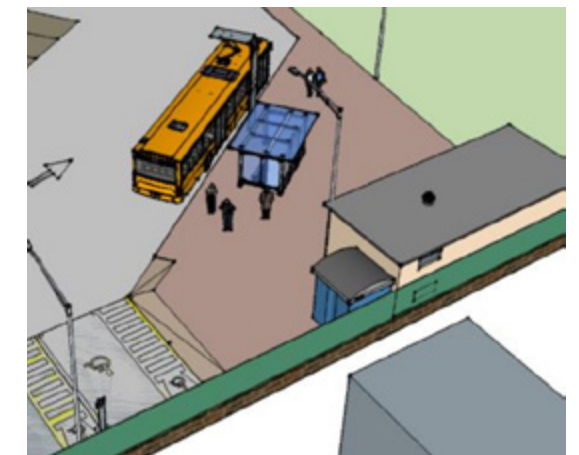


Figure 16: Proposal for the new terminal mobility hub, 3D rendering (Source: TEP 2020)

10 Find more information in the output factsheet: <https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-O.T3.4-TEP-Pilot-fact-sheet.pdf> and in the Parma Action Plan description <https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-D.T3.62-TEP-Action-Plan-final.pdf>.





“ We are supporting the Municipality of Parma in building the future of clean, low-impact mobility in Parma. TEP is committed in renewing its fleet and exploring new technical opportunities, such as recharging facilities made available at the terminal both for buses and for private cars. Our aim is to provide new solutions to make mobility easier for people commuting every day. ”

Roberto Prada, Chairman of TEP spa

## FUA KRAKÓW (POLAND): JOINT PILOT DEMONSTRATION BY TRANSPORT AUTHORITY OF KRAKÓW AND MUNICIPALITY OF SKAWINA



In LOW-CARB, the transport authority Kraków (ZTP) and the City of Skawina cooperated to increase the share of sustainable modes of transport in the FUA. Kraków is the capital of the Malopolskie voivodship (Lesser Poland Province) and the

second largest city in Poland, with 1.4 million inhabitants in the metropolitan area, which includes surrounding communes, incl. Skawina. The dynamically increasing FUA experiences traffic congestion from commuters. Trips are increasingly done by car and decreasingly by PT.

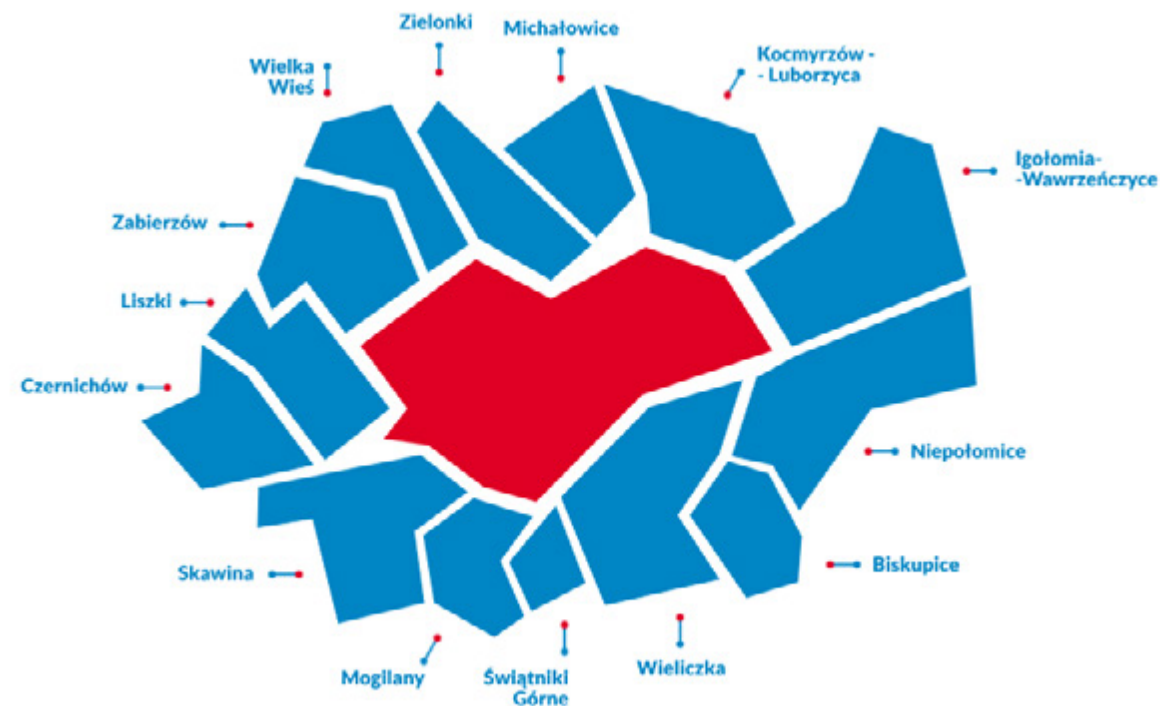
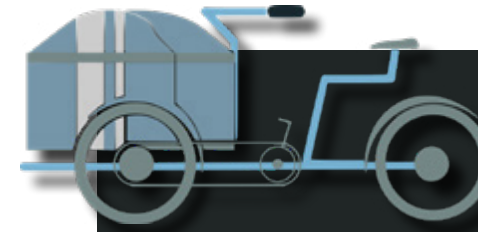


Figure 17: Map of FUA Krakow (Source: Krakow Metropolis Association, 2020)



## Pilot reloading station and e-bikes sharing system

Kraków transport authority ZTP demonstrated a Park-e-Bike sharing service that serves the Kraków and Skawina commune, and the CargoVelo e-cargo bike reloading hub. The sharing Park-e-Bike station was opened with 43 e-bikes and 2 CargoVelo e-cargo bikes in the Park & Ride Czerwone Maki, located in a densely populated residential area where the Kraków and Skawina communes meet, which is also home to clusters of commercial or office buildings<sup>11</sup>. The CargoVelo reloading hub in the Kraków city centre offers a solution for suppliers to reload goods from a van to a cargo bike so that they can be delivered to local shops and restaurants in the old town which is in a dedicated urban vehicle access restricted (UVAR) zone. Both pilots lead to estimated savings of 65 t CO2 until 2025.

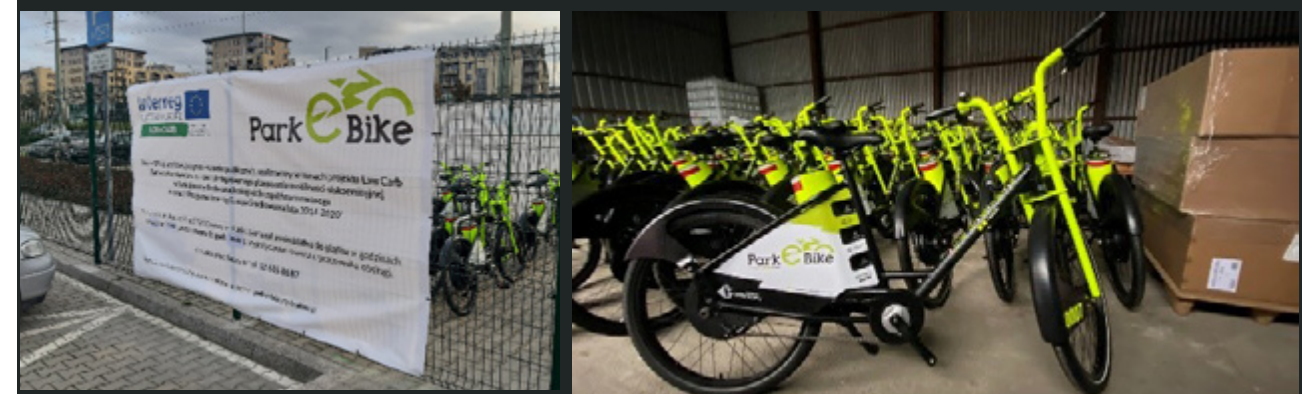
### LESSONS LEARNT:

- Electrically assisted public bicycle sharing systems are effective for attracting people who have previously travelled by car in the Kraków FUA.
- Implementing an e-bike sharing system at a Park&Ride facility that connected well with a bicycle path, offers people a convenient means for modal shift from car to e-bike by offering a comfortable trail of the new mode.
- The process of developing the Park-e-Bike sharing system has strengthened institutional cooperation between the Municipality of Skawina and Metropolia Krakowska (an Association of Local Governments).

Figures 18 & 19: CargoVelo e-cargo bike reloading hub in Krakow (Source: ZTP Krakow, 2020)

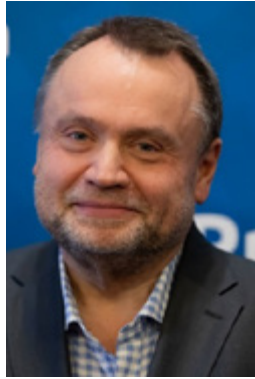


Figures 20 & 21: Park-e-Bike sharing service in FUA Krakow (Source: ZTP Krakow, 2020)



<sup>11</sup> Find out more information on the e-cargo- and e-bike sharing service in Krakow in the output factsheet: <https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-O.T3.2-KRA-pilot-factsheet.pdf> and in the investment factsheet: <https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-11-pilot-investment-factsheet-Krakow.pdf>





“ The test implementation of the Park-e-Bike system provided convincing evidence of the huge demand for this type of public transport service and (thanks to the results of the survey) confirmed once again that the introduction of the electrically assisted public bicycle system is an important and desirable utility alternative for people who have so far chosen passenger car as a means of urban mobility. Therefore, the activities started under the project will be continued or even extended after the formal end of the project. Where the full scope of implementations has not been achieved, it can be expected that their implementation is only a matter of time. Kraków, among others thanks to participation in the Dynaxibility4CE project, wants to continue to actively participate in the discussion about the future of urban transport, a field that is perceived by the inhabitants of European cities as one of the most important for ensuring the desired comfort of living in a metropolis. ”

Andrzej Kulig, Deputy Mayor of Krakow



### Low-emission feeder bus line (Skawina)

Although Skawina is well-connected to Kraków by rail within the same FUA, many commuters travel by car, resulting in heavy traffic congestion as well as air and noise pollution.

A new low-emission bus line<sup>12</sup> was piloted in Skawina using two hybrid diesel-electric buses. The aim is to provide school and work commuters with seamless connections to the regional PT network in the Kraków FUA. The Municipality of Skawina cooperated with the Kraków public transport authority ZTP, the public transport operator MPK Kraków and with a research partner, Via Vistula. The busline is planned to be implemented with potential to reduce 530 t CO<sub>2</sub> by 2025.

#### LESSONS LEARNT ARE:

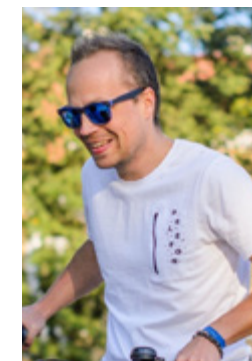
- This low-emission internal municipal feeder line was developed following processes and procedures that are common for opening a new bus line. It can therefore be replicated in other towns and communes in FUAs of Kraków and the rest of Europe.
- The fact that the bus could be used free of charge led to a high acceptance.
- The continued operation of this low-emission feeder bus line is supported by Kraków's SUMP which is currently being updated and aims to improve PT linkages with the SKA rapid metropolitan rail.



Figures 22 & 23: The Volvo 7900 hybrid bus on its route (Source: Municipality of Skawina, 2019)

<sup>12</sup> Find out more information on the new public transport service in Skawina in the output factsheet: <https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-O.T3.3-SKA-pilot-factsheet.pdf>

“ The first pilot low-emission bus line organised in Skawina proved that there's a lot of potential for public transport for local travel in our community. It has also shown that our plans described in the Mobility Plan, with feeder lines supporting the spine of the system - The Rapid Metropolitan Rail - is a feasible and scalable solution. We have also made the first steps to electrify our public transport soon. In general, it was a great learning experience with much better results than anticipated. ”



Maciej Zacher, project manager LOW-CARB in Skawina



## WHAT LOW-CARB ACHIEVED ON THE PROJECT LEVEL AND LESSONS LEARNT

Two essential capacity-building tools were developed by LOW-CARB: the SUMP Self-Assessment Tool and the SUMP-Central. Also, three transnational strategies summarize how integrated planning on FUA level can be realized following the SUMP guidelines<sup>13</sup>. In the following, these products are briefly described, along with the main lessons learnt and take-aways from their development.

The **SUMP Self-Assessment Tool (SSAT)**<sup>14</sup> was developed in collaboration with the CIVITAS SUMP-Up project<sup>15</sup>. The tool guides users in their native language through the entire SUMP planning process and provides tailored feedback. It supports mobility planners within and between organizations to undertake a stocktaking of available data, and to agree on targets, indicators and methodologies for monitoring and evaluation. It can be used alone or in workshop settings, and, thus, facilitates communication between stakeholders. It is ideally used when starting or evaluating a SUMP process.



### LESSONS LEARNT ARE:

- Assurance of data quality during analysis and implementation requires specific attention. The Self-Assessment Tool can help to jointly define standards for data utilised and for joint indicators. This can significantly facilitate collaborative integrated planning on FUA level.
- A test-run with Municipality of Skawina, ZTP Kraków and Kraków Metropolis Association led to intense discussions and revealed the high potential of the Self-Assessment Tool to facilitate joint planning in a FUA.
- When the Municipality of Skawina and ZTP Kraków with Kraków Metropolis Association then introduced the SUMP Self-Assessment Tool<sup>16</sup> in a workshop series to several municipalities from Kraków FUA, the development of a metropolitan SUMP was kicked off. This shows that the tool has a high impact also for FUAs with no significant experience with SUMP.

<sup>13</sup> <https://www.eltis.org/mobility-plans/sump-online-guidelines>

<sup>14</sup> Find out more information on the SUMP Self-Assessment Tool in the outputs factsheet: <https://www.interreg-central.eu/Content.Node/LOW-CARB-SUMP-Self-Assessment-Tool-Factsheet-EN.pdf>

<sup>15</sup> <https://sumps-up.eu/home/>

<sup>16</sup> <https://www.sump-assessment.eu/English/start>



Figures 24 & 25: SUMP self-Assessment Tool (Source: Rupprecht Consult, 2020)

Figure 26: Testing and adapting the SUMP-Self-Assessment Tool in a pilot FUA workshop with ZTP Kraków, Kraków Metropolitan Association, City of Skawina, LVB Leipzig, and Rupprecht Consult (Source: Rupprecht Consult, 2019).



Figures 27 & 28: Examples of questions from the SUMP Self-Assessment Tool questionnaire (Source: Rupprecht Consult, 2020)

The Self-Assessment Tool is applied worldwide. From Europe, not less than 350 cities and regions, out of which 80 cities and regions from central Europe, have used the SUMP Self-Assessment Tool in their local planning processes until the end of the project, in both individual and group versions.

The **SUMP-central**<sup>17</sup> is an online platform and knowledge hub dedicated to providing news, best practices, learning materials and resources to support planners in developing SUMPs in central Europe (CE). A special feature are the dedicated sub-sites for CIVINETS<sup>18</sup> online representation. Although similar platforms already exist, LOW-CARB identified further needs and requirements for central European planners for SUMP resources during many projects and trainings. Feedback was that SUMP resources should be available in central European languages, to better enable practitioners to cope with the challenges facing the Central European area.

### LESSONS LEARNT ARE:

- Creation of a knowledge platform with resources in different native languages and an automated language translation function required good communication between the project partners and IT experts.
- A user-friendly decentralized content-management system that provides a win-win (e.g., easy-to-handle representative website for CIVINETS) is crucial to attract content-providers.
- Constant communication with SUMP experts and CIVINETS, and integration of their feedback was essential to provide a high-quality platform that creates added value for users, and, thus, sustainability of the platform.



Figures 29, 30 & 31: Screenshots SUMP-Central (Source: LOW-CARB project, 2020)

<sup>17</sup> Find our more information on the platform <https://sump-central.eu/> and in the output factsheet at <https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-O.T2.3-SUMP-Central-factsheet.pdf>

<sup>18</sup> <https://civitas.eu/civinet>



### Good Practices Collection

Country	City	Topic	Steps in the SUMP cycle	Target audience	Entry date	Picture	Info
Germany	Leipzig	Collective passenger transport	Step 6: Set targets and indicators	Large City	23.11.2020.		
Germany	Leipzig	Traffic and demand management	Step 12: Review and learn lessons	Large City	23.11.2020.		
Germany	Leipzig	Public and stakeholder involvement	Step 5: Develop vision and strategy with stakeholders	Large City	23.11.2020.		
Germany	Leipzig	Integrated planning	Step 1: Set up working structures	Large City	23.11.2020.		
Germany	Leipzig	Integrated planning	Step 8: Agree on actions and responsibilities	Large City	23.11.2020.		
Czech Republic	Brno	Integrated planning	Step 10: Manage implementation	Large City	23.11.2020.		

Figure 32: Screenshot SUMP platform for Central European countries (Source: LOW-CARB project, 2020)

The SUMP-Central has become a requested representation and exchange platform for CIVINETs, such as the Hungarian MAGYAR CIVINET, which uses the platform as a homepage, or for the Slovenian-Croatian CIVINET, which updates the competence centre regularly with its news. Others, such as the Romanian CIVINET, have requested to be added to the platform.

#### Three transnational strategies for integrated planning

Integrated low-carbon mobility planning for FUAs with their inter-dependencies and dispersed responsibilities is a major challenge for local and regional authorities and public transport operators across Europe. Developing low-carbon mobility strategies and new approaches to data-based planning in the functional urban areas Leipzig, Brno and Koprivnica proved to be an innovative process due to the new collaboration frameworks that needed to be created by the local partners at the functional urban area level. By building on the SUMP guidance which has been strongly promoted at the European level<sup>19</sup>, a solid fundament for setting up new, more complex governance models has been laid. This opened the way to planning mobility at a broader geographical scope by taking into consideration the quality and efficiency of public transport offers, last-mile mobility, intermodality and new (sharing) mobility services. The challenges of improving low-carbon mobility planning at the functional urban area level have been tackled based on three main pillars:

1. **Governance:** new institutional coordination/governance models for integrated planning. Setting up vertical, horizontal, spatial, and inter-departmental cooperation structures in the FUA goes along with identifying and analyzing which data are available for mobility planning. Here, different types of data from, e.g., automated measurements, geodata, public transport schedules, quantitative and qualitative survey results, transport modelling, etc., were identified as possible data-sources.
2. **Data:** new ways of open-data based mobility planning in FUAs. The LOW-CARB FUAs Leipzig and Szeged developed a holistic approach towards making data available for planning and made concrete steps towards developing a municipal strategy for data governance by enhancing the existing open-data platforms and exploring key actions to enhance data collection.
3. **Public transport services:** collaborative development of new innovative services (including new ways of joint financing and procurement of low-carbon technologies for public transport).

The three LOW-CARB strategies have been published in the handbook on mobility strategies in FUAs - a guide for public authorities when planning mobility strategies in functional urban areas<sup>20</sup>.

<sup>19</sup> <https://www.eltis.org/mobility-plans/sump-guidelines>

<sup>20</sup> Find out more information in the handbook on strategies (English version): <https://www.interreg-central.eu/Content.Node/LOW-CARB-Mobility-Strategies-in-FUAs-Handbook-EN.pdf>, in the report on governance strategy: <https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-D.T1.1.3-Governance-strategy.pdf>, in the report on data-based mobility planning: <https://www.interreg-central.eu/Content.Node/CE-1100-LOW-CARB-D.T1.3.3-Data-based-SUMP-Strategy.pdf> and in the report on strategies for PT in SUMP: <https://www.interreg-central.eu/Content.Node/LOW-CARB-D.T1.2.3-Strategies-PT-in-SUMP.pdf>

## CONCLUDING REMARKS

LOW-CARB's project action plans, tools and pilots aim at planning for and providing innovative public transport services and solutions that increase service quality and users' satisfaction, for both current users and new customers. In addition, they support the ambitious decarbonisation targets for mobility in the involved functional urban areas.

All partners supported the objective of public transport remaining the backbone of urban mobility in their functional urban areas, as well as to increase accessibility despite the challenges of urban sprawl and increases in population. All action plans, tools and pilots contribute to the priorities of the European Green Deal, which stresses that mobility should become drastically less polluting through a combination of measures addressing emissions, urban congestion, and improved public transport.

The lessons learnt by the partners while developing and implementing these outputs provided important content for elaborating the transnational strategies that show how data can be used for integrated planning, how public transport can stimulate innovation with SUMP and how new governance structures can be built to support collaborative planning in the FUA. These new planning approaches, and new technologies, such as electrification, realise technical and service innovation and promote competence development for the involved project partners and relevant stakeholders. The valuable knowledge produced at partner level also provided input to the tools for capacity-building, the SUMP-Self-Assessment Tool and the SUMP-Central, which are further products from lessons learnt by the project. They provide targeted support to fill identified competence and knowledge gaps in the public transport area.






# DISCOVER MORE ABOUT LOW-CARB



Visit our website:  
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