GUIDELINES FOR INTEGRATED LOW-CARBON MOBILITY PLANNING IN FUNCTIONAL URBAN AREAS

CE1100

IMPRINT

About the LOW-CARB project

LOW-CARB - Capacity building for integrated low-carbon mobility planning in functional urban areas 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.

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For more info, visit the project website at:

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TAKING COOPERATION FORWARD

Contents

EXECUTIVE SUMMARY

Source: LVB, 2019.

This document provides guidance on how to plan for sustainable mobility on the level of the functional urban area with public transport as a backbone derived from the LOW-CARB project. Along the eight universal SUMP principles, lessons learnt in integrated planning derived from developing action plans, tools and pilots are presented and highlighted with examples from LOW-CARB.

This document was developed within the framework of the LOW-CARB project, financed by Interreg Central Europe, with the scope of gathering essential information to public authorities or other decision-makers who are at the starting point of

1. Either developing a mobility strategy to cover areas outside the city borders, or
2. Updating their existing mobility strategy by targeting a problematic area outside the city limits or expanding it to a broader geographical scope.

In either way, these guidelines offer fundamental information, efficient methods and a variety of tools designed to optimize the process at different steps in the planning process. Hand in hand with the existing collection of guides and briefings on the sustainable urban mobility planning (SUMP), the present handbook follows the validated stepwise methodology from the SUMP Guidelines 2019 – the basic mobility strategy guidance for public authorities across Europe.

1. Introduction

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 means to plan for the area of daily flows of people and goods which usually go beyond administrative boundaries, rather than for a confined municipal area. Such an integrated approach challenges planning tradition, as it entails communicating with a variety of “new” or “additional” actors on a common vision, joint objectives, targets, or to establish a joint evidence base with common key performance indicators (KPI) for planning and decision-taking. It also means to agree how to collect, analyse and use different types of data for planning and development of new transport services and technologies within and between organisations.

Four LOW-CARB teams – city administrations, Public Transport (PT) planning authorities and companies in Leipzig (DE), Brno (CZ), Koprivnica (HR) and Szeged (HU) – developed action plans for their FUAs. Doing this, they established new vertical, horizontal and spatial cooperation structures, with an unusual feature: PT companies played a proactive role, as they led the planning process in two cities - Leipzig and Szeged - and were active partners in Brno and Koprivnica. Two other central European FUAs implemented innovative pilots: The transport authority Kraków and the City of Skawina, who represent an urban core and a satellite municipality in one FUA, collaboratively implemented innovative pilots. Their cooperation in LOW-CARB even laid the foundation for a metropolitan SUMP. In Parma, a pilot action plan for a multimodal public transport electrification measure was developed by the PT transport company, ready to implement, but also to share with others for replication.

Based on lessons learned by the LOW-CARB partners in this project, this document formulates guidelines for integrated planning to increase the use of low-carbon transport in FUAs. It builds on the action plans[1] developed, the transnational strategies[2] on FUA governance, data-based planning and public transport in SUMP derived from the partners’ experiences, on recommendations for low-carbon mobility planning with companies[3] and on the LOW-CARB handbooks on pilots[4] and strategies[5].

1 Action plan output factsheets Leipzig; Brno; Szeged; Koprivnica. Please also consult the action plan deliverables Leipzig, Brno, Szeged, Koprivnica.

2 Strategies for PT in SUMP, Data-based SUMP strategy, Governance strategy

3 LOW-CARB recommendations for low-carbon mobility planning with companies

4 LOW-CARB pilot handbook

5 LOW-CARB strategies handbook

2. How to plan for low-carbon mobility in the FUA

The functional urban area (FUA) is characterized by its connectedness with the core city by the daily commuting system. With over 60% of European citizens living in urban areas with more than 10,000 inhabitants and over 72% living in FUAs, urban mobility accounts for 40% of all CO2 emissions from road transport (the whole transport sector in the EU accounts for about 25% of total CO2 emissions).

Planning for public transport (PT) accessibility and new innovative mobility services is crucial to reduce transport-related CO2 emissions and to relieve the transport network. Especially when characterized by growing industrial and economic activities and space consumption, it becomes important to prevent additionally induced traffic, congestion, air pollution, and to plan for better quality of life in the FUA. Increasing the use of sustainable and innovative transport services in FUAs is a major means to reduce transport-related greenhouse gas emissions in urban and suburban areas.

This can be achieved in a strategic and integrated planning process on the level of the FUA that systematically prioritizes low-carbon mobility modes. Four different levels of integration are needed: (1) alignment of municipal and regional transport objectives with spatial, technological, and ecological developments, (2) cooperation of vertical and horizontal policy and governance levels, (3) coordination of strategies and decision-taking between neighbouring municipalities (4), concertation between different planning disciplines, such as land-use planning, social policies, public health and economic adjustment policies.[6]

In the LOW-CARB project, the sustainable urban mobility planning (SUMP) methodology[7] served as general support framework for integrated planning in the partner FUAs. While the main aim of SUMP is to improve accessibility and to provide safe, clean, and equitable mobility in a comprehensive and participative approach, it helps taking all functional relations into account. Building on existing plans, emphasis is placed on citizen and stakeholder involvement, and on cooperation among actors in public administrations and with the private sector.

While Brno and Koprivnica explicitly developed or updated SUMPs for their FUAs, the partners in Leipzig and Szeged used the SUMP methodology to plan for sustainable workplace mobility to business districts at the periphery of their cities.

2.1. The universal SUMP principles applied

A Sustainable Urban Mobility Plan, as defined in the Urban Mobility package, is based on eight universal principles, which together guide the development of sustainable urban mobility.[24] These principles were considered by partners throughout their planning process. In the following chapters, each principle is shortly explained, followed by the key demands identified for practical application in the FUA planning context, and by guidance suggested by the project. LOW-CARB planning and pilot examples are illustrated for each principle.

2.2. Defining the geographical scope of the 'functional urban area'

A comprehensive and holistic SUMP should consider all existent flows of people and goods, identifying the city's functional urban area (FUA). This is not always limited to the city's administrative boundaries, as key connections often exist with their surroundings (e.g., a peri-urban area, an entire polycentric region, or another constellation of municipalities).

6 Schwedes, O., Rammert, A. (2020): Mobilitätsmanagement. Ein neues Handlungsfeld Integrierter Verkehrsplanung", Springer.

7 "A Sustainable Urban Mobility Plan is a strategic plan designed to satisfy the mobility needs of people and businesses in cities and their surroundings for a better quality of life. It builds on existing planning practices and takes due consideration of integration, participation, and evaluation principles." Rupprecht Consult (editor), Guidelines for Developing and Implementing a Sustainable Urban Mobility Plan, Second Edition, 2019, p.9. Find more information and SUMP guidance here: https://www.eltis.org/mobility-plans/sump-online-guidelines. In central European languages: https://sump-central.eu/

A definition of such functional space has been agreed upon by the OECD, the European Commission's statistics office (Eurostat), and its Directorate-General for Regional and Urban Policy. Parameters for its identification look towards "population density to define urban cores, and on travel-to-work flows to identify the hinterlands whose labour market is highly integrated with the cores".

What should be done?

Effectively addressing the entirety of the FUA in the planning process requires to clearly define the geographical area of a mobility strategy to follow the rationale of the functional urban area and the travel-to-work traffic flows.

Guidance

LOW-CARB developed two tools that can support to define the scope of the planning area: The SUMP Self-Assessment Tool (SSAT)[8] was developed in collaboration with the CIVITAS SUMPs-Up project[9]. 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 planning context, 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.

Figure 1: SUMP Self-Assessment Tool screenshot (source: Rupprecht Consult, 2020)

The **REACHIE** tool[10], a new application of available open data, is a replicable online journey planner for commuters based on static, weekly updated PT schedule data. It can be used to analyze the accessibility of remote areas by low-carbon modes, and to assess mobility needs based on queries from users and thereby help to define the planning area. It illustrates modes per trip by isochrones and visualizes routes according to its level of accessibility with respect to the starting point. REACHIE also increases environmental awareness of suitable services through a CO2 savings' comparison between trips.

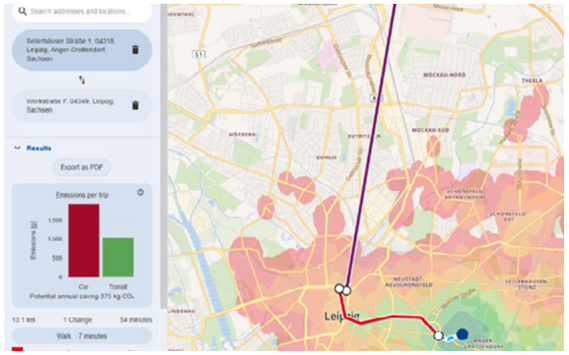


Figure 2: REACHIE screenshot - demonstrating accessibility (in time and per mode) of sites by multimodal mobility (source: LVB/MDV, LOW-CARB final conference, 2020)

What the LOW-CARB partners did

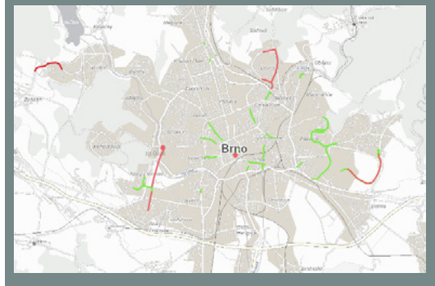
The LOW-CARB partners defined the geographical scope of their planning area either as the public transport zone (Brno) or by analyzing the functional dependencies and commuter flows based on both existing and newly collected data (Leipzig, Szeged, Koprivnica).

8 Find out more information on the SUMP Self-Assessment Tool in the output factsheet or access the tool here

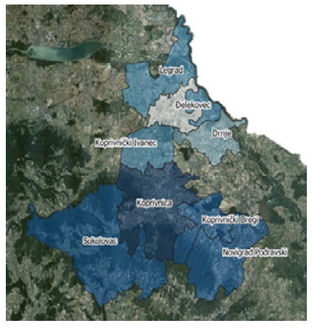
9 https://sumps-up.eu/home/

10 Find more information on REACHIE here

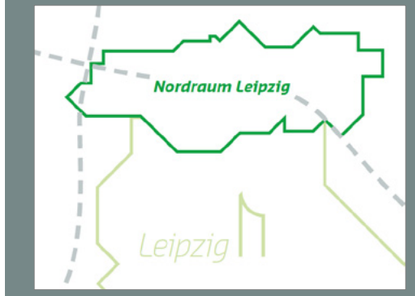
Table 1: How LOW-CARB partners defined the geographical scope of their FUA



The FUA of **Brno** (CZ), or the Brno Metropolitan Area, is an organic functional unit. The City of Brno is situated in its centre, with a dense network of surrounding mid-sized towns and villages, connected to the urban core by intensive daily commuting flows. The daily movement of people and goods is increasing and exhausting the traffic network. The scope of the FUA is defined by the integrated public transport network managed by the regional coordinator of transport services KORDIS JMK. On this basis, a definition of the territory of the Brno Metropolitan Area that includes 167 municipalities, and more than 600 000 inhabitants was created.



In **Koprivnica** (HR) a new joint low carbon PT service area was established with neighbouring communities. By this, Koprivnica and the participating communities created a functional urban area (FUA) based on analysis of traffic data and commuting patterns to Koprivninca and between those communities and planned a sustainable mobility system for this FUA based on new public transport services (incl. sharing services) and cycling infrastructure.



The **Leipzig** (DE) 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 study for motorized-individual-transport (MIT) was established on behalf of Saxony ministry for economic affairs, labour and transport. The traffic and situation of the Nordraum was analyzed. It was recognized MIT situation will become critical in the next years. One recommendation of these analysis is to increase the PT in this area, which also follows the City of Leipzig mobility strategy to increase PT from 18% to 23% until year 2030 (Mobilitätsszenarien 2030).

Szeged's (HU) Industrial Logistics Centre is a dynamically developing area, situated in the Northwest of the city. The city section is congested in the peak hours. Proximity to motorways M5 and M43 makes the area easy to reach by car. Also, the current PT offer in this area has a bottleneck of schedule and longer tracking time of PT vehicles (currently diesel buses) with a relatively longer time to travel into this area. The public transport authority SZKT consulted commuters via a survey and analysed the commuting pattern of employees – which mainly commute to the planning area every day by car from outside of Szeged.

2.3.Cooperate across institutional boundaries

Sustainable urban mobility planning is characterised by a high level of cooperation. This includes cooperation with a wide range of departments relevant to mobility, exchange with higher levels of government and coordination with transport providers. The development and implementation of a Sustainable Urban Mobility Plan should be based on strong cooperation, coordination, and consultation across different levels of government and between institutions in the planning area.

What should be done?

The stakeholder constellation at a FUA level is more complex than at city level and requires engaging a higher number of institutions in the planning process. It is, therefore, important to consider all the following forms of cooperation:

- Vertical cooperation – organizations cooperate with other organizations to whom they are accountable in a hierarchical manner (e.g., a local authority and the local public transport authority)
- Horizontal cooperation - describes an autonomous relationship between different organizations (e.g. between local authority and private operators)
- Spatial cooperation - organizations representing different geographical areas and levels (e.g. a lead local authority working with neighbouring authorities)
- Inter-departmental cooperation - organizations and experts with different backgrounds, knowledge, and fields of expertise cooperate (e.g. from different departments of the local authority).

Guidance

To identify stakeholders who should be involved in the FUA-planning process, the following criteria can be applied:

Competence	Relevance	Stakeholders	Key assets
Political support	Who can assure political support and resources within the transport sector and cross-sectoral?	Mayors of cities planning a low-carbon mobility strategy, city councillors (both majority and opposition)	Vision Leadership Power Resources
		Representatives of district town halls	
		Mayors and representatives of neighbouring cities part of the functional urban area	
		Heads of metropolitan areas, provinces, counties, regions	
		Politicians from different local authorities in FUA	

Transport network competence	Who manages the respective transport networks?	Public transport companies (municipal, regional)	Technical feasibility
		Public transport authorities	
		Owners of public transport infrastructure (roads, parking, mobility hubs etc.)	
		National railway companies	
		Providers of new mobility services (e.g. bike sharing, car sharing)	
		Public transport associations	
Technical expertise	Who has the data and relevant skills to deliver a technically sound plan?	Departments of public authorities from FUA	Technically sound planning
		Regional transport authorities	
		Universities and research centres	
		Independent experts, private companies	
		Specialised agencies	
		Qualified NGOs and associations	
Public participation	Who understands public and stakeholder opinions?	Communication departments from public authorities in functional urban area	Values Sense of urgency
		Communication departments in district town halls	Sense of ownership
		Local and regional NGOs and influencers	
		Representatives of companies located in business and industrial areas in the city outskirts	
		Representatives of logistic centres located in the city outskirts	

Table 2: Stakeholders by key assets for collaborative planning in functional urban areas (source: Rupprecht Consult, 2020).

What the LOW-CARB partners did

All four LOW-CARB FUAs developed collaborative planning structures that reflected the institutional stakeholder landscape of their planning areas. Thus, specific attention was laid on co-developing strategies with neighbouring municipalities, regional planning, and rail authorities.

For example, to develop the Leipzig action plan, the Leipzig Public Transport Company (LVB), the central German Transport Association (MDV) and the City of Leipzig cooperated with clear roles and assignments. A governance and organizational structure created between LVB, MDV and the City of Leipzig included the following levels:

- On a steering group level with the heads of units of the three institutions, decision making on milestones, content and framework of actions took place.
- In all participating institutions, project leaders were appointed, responsible for preparing the decisions, and consulting the practical work of the operational team in weekly meetings.
- The operational team members, employed in public transport departments of the respective institutions, communicated daily, and met weekly. One person was specialized in data-driven analysis, one in networking and communication and one in strategic planning.

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. They were involved throughout the planning process, and their feedback was considered.

Figure 3: Strategy for stakeholder consultation incl. companies in the planning area (Source: LVB 2020).

In Brno, the working structures for updating the previous version of the city SUMP were already set up in the framework of the CH4LLENGE project[11], during which the first SUMP was developed. Based on the lesson learnt in CH4LLENGE, and on the existing collaboration of main stakeholders at city and FUA levels, the institutional cooperation framework was defined. It focused on strengthening and continuing regular collaboration among the different levels of government – local, regional, and national - through exchange in meetings and workshops. Building on the SUMP set of targets and proposed measures, the updated SUMP Action Plan started from strengthening the cooperation with municipalities in the FUA and the South Moravian Region.

11 http://www.sump-challenges.eu/

Table 3: Stakeholders involved in Brno. Source: Municipality of Brno.

Stakeholder	Level of influence
City of Brno (SMB)	Key
Integrated Transport System Coordinator of the South Moravian Region (KORDIS JMK)	high
Transport authority of the South Moravian Region (JMK)	
Regional roads authority (SÚS JMK)	
Public transport operator (DPMB)	medium
Public infrastructure owner (BKOM)	
Public authorities in FUA	
Czech Railways (ČD)	
Railway Infrastructure Authority (SŽDC)	
Other PT (bus) operators in the region of South Moravia	
National road infrastructure (ŘSD)	
Transport Research Centre (CDV)	low

In the FUA of Kraków, the transport authority Kraków (ZTP) and the City of Skawina cooperated in LOW-CARB to implement their pilots, which kicked off the development of a metropolitan SUMP. 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 4: Map of FUA Kraków, Source: Krakow Metropolis Association.

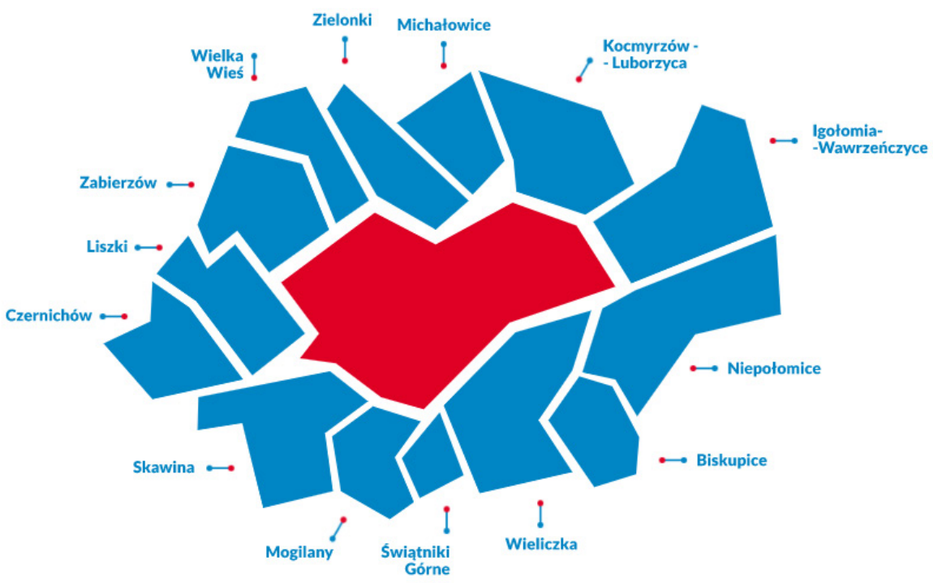


Figure 5: The Volvo 7900 hybrid bus on its route (Source: Municipality of Skawina).

A new low-emission bus line[12] 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.

Kraków transport authority ZTP demonstrated a Park-e-Bike sharing service that serves the Kraków and Skawina commune. 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[13].

Figure 6: Park-e-Bike sharing service in FUA Krakow, Source: ZTP Krakow.

In Parma, the public transport operator TEP spa, collaboratively 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[14].

12 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

13 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-I1-pilot-investment-factsheet-Krakow.pdf

14 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 pilot action plan description https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-D.T3.62-TEP-Action-Plan-final.pdf.

Figure 7: Impression from launch event for testing an electric bus. Source: TEP spa, 2019.

The coordination team for the implementation of this pilot action plan consisted of TEP, the local energy provider and the City of Parma, responsible for overseeing all activities related to the detailed planning and authorisation of the new bus line and the recharge modules and civil works for the recharging system at the hub and the depot. While eexperimenting 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, and cooperation with the municipality and with citizens increased the quality and acceptance of the action plan.

2.4.Involve citizens and stakeholders

Sustainable urban mobility planning follows a transparent and participatory approach. Citizens and a wide range of civil society and transport stakeholders are actively involved throughout the planning process to ensure a high level of acceptance and support. In its aim to meet the mobility needs of people in the functional urban area, as well as institutions and companies based there, a SUMP follows a transparent and participatory approach to actively involve citizens and other stakeholders throughout the plan's development and implementation.

What should be done?

Mobility is closely linked to the individual daily life of citizens. Therefore, there is great potential for the mobility sector and in particular for the public transport authorities/ companies to increase the understanding of the need for a mobility turnaround and the acceptance of measures to promote alternative forms of mobility, as well as a direct feedback with regard to existing PT services: e.g. gaps in the cycling and walking network or neighborhoods that are poorly connected to PT. As mobility systems for FUAs rely on a good interplay between sustainable mobility modes, e.g. rail and bus lines within the city area and their links to neighboring cities, several stakeholders need to be involved. This also requires building a common understanding on shared data.

Guidance

Encourage and enable citizens to get engaged and to join the debate, especially in the early planning phase when processes are still open and flexible. Use all possible ways of engagement – from classical face-to-face meetings and surveys to online consultation and co-creation, such as smart city challenges.

Creating consensus which data can or cannot be shared with externals requires well-moderated stepwise communication and discussion within the public administration first, and only then with external parties (as data providers and users).

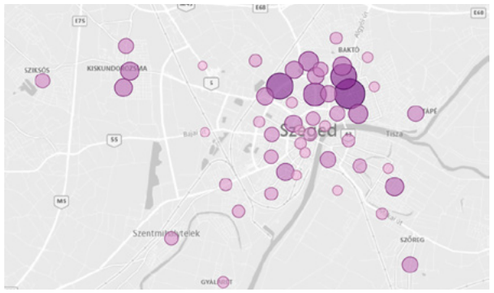


Figure 8: Place of departure of responders living in Szeged, by district (n=1.106). Workshops with employers and their employees in Leipzig and Szeged. Mobility consultation by MDV during European Mobility Week. Sources: SZKT, LVB.

What the LOW-CARB partners did

In Leipzig and Szeged, the public transport companies used the opportunity to get to know their customers – by consulting them via surveys and workshops about their mobility behaviour, challenges and needs – and to raise awareness and trust in existing PT offers and active mobility. In the following planning process, they used this knowledge to develop targeted, informed strategies with measures that aim at reducing traffic to and in the planning area, and that respond to the mobility needs of their target group.

In Brno, receiving online feedback from citizens and stakeholders to planned measures was enabled by the public function of the GIS SUMP monitoring tool[15]. The tool is usually applied to synthesize data in a GIS application, and supports planners monitoring the implementation and financing of measures, while assigning clear responsibilities for all stakeholders involved in the FUA.

Another opportunity to involve stakeholders and citizens actively is to invite them to find ways how to use data in applications and for mobility planning. For example, hackathons among start-ups organised in Leipzig and Szeged formed a solid basis for data and idea collection in the process of vision elaboration and measure selection at the FUA level.

Figure 9: Sustainable Mobility Planning with Open Data Session (36th Chaos Communication Congress) organized by the City of Leipzig on 27 December 2019; Source: City of Leipzig.

15 https://www.interreg-central.eu/Content.Node/LOW-CARB-SUMP-monitoring-tool-brochure-EN.pdf

Figure 10: Idea Challenge, Hungary, co-organised by the Szeged Transport Company together with the City of Szeged on 27-29 March 2019; Source: SZKT; 2019

An important condition for collecting and using big data in applications are technical and legal clarifications with stakeholders. In Szeged, where the accuracy of a passenger-counting method based on WiFi-counting was tested,[16] these legal and technical requirements needed to be agreed upon with politicians, scientific partners (e.g., University of Szeged), public transport authorities (SZKT) and service providers (e.g., DAKK Zrt), IT and traffic specialists, and legal advisors. Also, the local IT company of Szeged, RITEK Zrt, as a developer of the database, was involved, or New Line Systems Kft, who has the exclusive right of ownership of the firmware functioning in data-collecting devices in SZKT's fleet.

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 base 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".[17]

2.5.Assess current and future performance

A SUMP builds on a thorough assessment of the current and future performance of the transport system in the FUA. It identifies the main problems and opportunities for sustainable mobility, including future trends, and establishes a baseline and alternative scenarios against which progress can be measured.

What should be done?

Adequate data, joint targets, and indicators are needed as basis for objective performance assessment in the FUA. This can become a challenge, especially when there are no agreements on how to collect, analyse and use data for decision-taking in the planning process, e.g., to agree on key performance indicators with other FUA stakeholders.

Guidance

The SUMP-Self-Assessment Tool[18], co-developed by LOW-CARB, guides FUA stakeholders through the planning process – including the examination of the planning context and analysis of the mobility situation.

16 Find more information in the output factsheet: https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-O.T3.1-Szeged-fact-sheet-pilot-action-2.pdf and the LOW-CARB transnational pilot handbook: https://www.interreg-central.eu/Content.Node/LOW-CARB-Pilot-Handbook-EN.pdf

17 Find more information in the transnational data-based planning strategy document here: https://www.interreg-central.eu/Content.Node/LOW-CARB.html and in the LOW-CARB strategies handbook: https://www.interreg-central.eu/Content.Node/LOW-CARB-Mobility-Strategies-in-FUAs-Handbook-EN.pdf

18 https://www.sump-assessment.eu/English/start

Scenarios with future projections that consider significant trends (e.g., demographic, economic development, mobility behavior) and other influencing factors that can be actively influenced on the local level (e.g., urban development, investment in transport system, financing of public transport) can help show future impacts of strategic decisions on the transport system[19].

Furthermore, the sustainable urban mobility indicators as recommended by the EC can be used as a basis to agree on joint FUA indicators.[20]

Delays and uncertainties can be avoided through the timely identification of data gaps and alternative data sources. Cities are encouraged to consider solutions such as open-data sources and low-cost collection methods, but also real-time data to deploy traffic management solutions that consider all modes.

What the LOW-CARB partners did

Before the LOW-CARB project started, the Leipzig municipality conducted a scenario process to decide on a common vision and objectives for their mobility planning until 2030. Through computer-based future projections following a catalogue of trends, six scenarios were developed. They showed different possibilities for the prospective development of mobility. In a city-wide participative stakeholder process, a political decision was taken to follow the ambitious "sustainability scenario", aiming at a maximum increase of environmentally friendly modes with no additional increase of motorized individual traffic. Based on this scenario, and on the analysis of problems and opportunities, a vision for the *Nordraum* area was developed with stakeholders, as one of the selected priority areas with city-wide and regional appeal.

Figure 11: Discussion of scenarios for the City of Leipzig. Source: City of Leipzig.

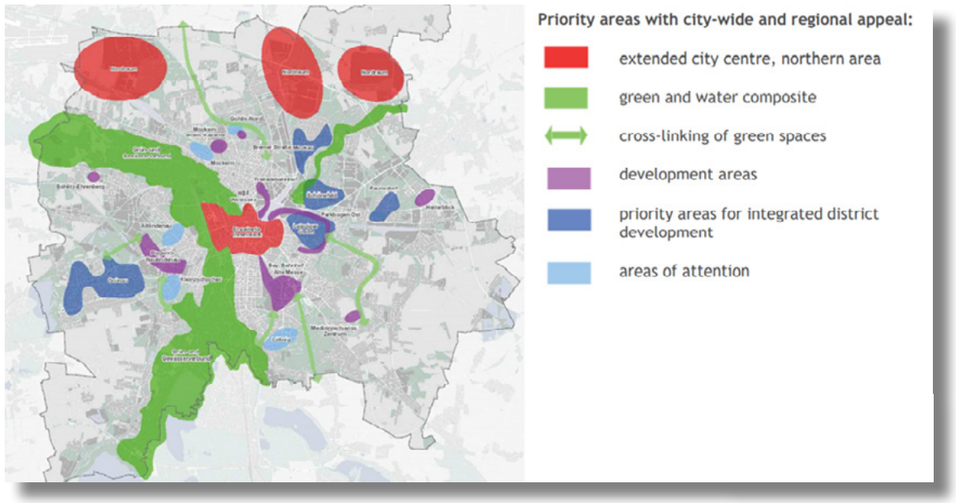


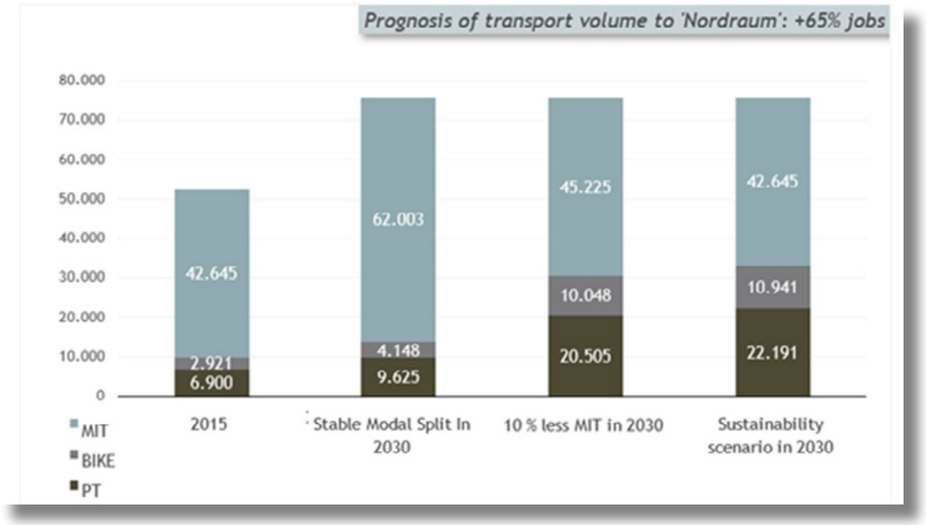
Figure 12: Mobility strategy 2030 for Leipzig: interdisciplinary focal areas of urban development. Source: City of Leipzig.

19 Find more information on how to start and implement a scenario process in the SUMP guidelines: https://www.eltis.org/mobility-plans/sump-guidelines

20 SUMI – Sustainable urban mobility indicators

To simulate future travel demand to the Nordraum area, a traffic model was developed based on modal split data, and the actual and expected economic, land-use and workforce development until 2030. Furthermore, a spatial analysis of the mobility situation based on commuting distances, mobility offers (PT, B&R etc.) and interchanges in PT was conducted.

Figure 13: Prognosis of transport volume and modal split to 'Nordraum' with increasing number of jobs in



2015, with stable modal split in 2030, with 10 % less MIT in 2030, and with the sustainability scenario in 2030. Source: LVB.

To increase data availability for real-time travel demand analysis, SZKT developed a data-collection method based on big data - the Wi-Fi-based passenger counting data methodology[21] - cooperating with researchers responsible for software development, while providing the testing equipment, vehicles, and data acquisition. The City of Szeged managed the user data incl. storage, access, and interface formatting.

Figure 14: Wi-Fi sensor-based passenger counting system in Szeged (HU). Source: SZKT.

21 Find more information in the output fact sheet: https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-O.T3.1-Szeged-fact-sheet-pilot-action-2.pdf

2.6. Define a long-term vision and a clear implementation plan

A Sustainable Urban Mobility Plan is based on a long-term vision for transport and mobility development for the entire functional urban area and covers all modes and forms of transport: public and private; passenger and freight; motorised and non-motorised; and moving and stationary. It also includes infrastructure and services. A SUMP contains a plan for the short-term implementation of objectives and targets through measure packages. It includes an implementation timetable and budget as well as a clear allocation of responsibilities and outline of the resources required.

What should be done?

Based on the objective assessment of the FUA's transport system's current and future performance, it is important to develop the vision and implementation plan in a participative process with all relevant stakeholders from the defined functional urban area.

Guidance

Invest time and resources into vision development, as co-creation pays back in long-term engagement of stakeholders outside the municipality, measure selection performance and smoother implementation.

Set clear goals and strategic objectives at the FUA level but understand local needs and expectations.

Invest in public engagement opportunities to bring credibility to the planning process. The steering group should spend considerable time providing the public and key stakeholders with a variety of opportunities for input for visioning, goals, and objectives process.

Define key performance indicators used to measure the level of achievement and the impact of projects. They need to be clearly understood by decision makers and by the public.

Give priority to public transport system improvements, as the main transportation mode at the functional urban area level. Public transport measures must be given priority in the mobility strategy and have sufficient finance allocated to them. Developing good quality public transport and infrastructure supporting active mobility is good practice in making functional cities more accessible, liveable, and safe.

Develop an action plan for measure implementation once the list of measures is approved by the City Council(s). The action plan should be developed two-folded: a general overview of measures and packages, and a detailed description of each measure.

What the LOW-CARB partners did

The partners developed future urban mobility visions, objectives, short and long-term targets for their FUAs. Based on the previous diagnosis work, they weighted and assessed different options for meeting the vision and objectives, e.g., using scenario and modelling techniques and data visualization, as basis for intense discussions with key stakeholders and citizens. Together with planning organisations and FUA stakeholders, actions were developed.

As a next step, the focus was on prioritization of measures, as well as the description of monitoring arrangements. Measures were specified as concretely as possible to ensure that they are clearly defined, comprehensive, and well-coordinated. The measure-planning phase was concluded with the preparation of the implementation phase and submission of the action plan to the decision-makers of the competent political bodies, who then adopted the plan.

In Leipzig, for example, the vision developed comprises the following main elements:

- Up to 70,000 employees work in the Northern Area of Leipzig in 2030.
- 44% use environmentally friendly transport modes, just 65% the car
- Most employees have access to trains or trams, meaning fast connections to the main interchanges.
- For the last mile, different transport modes and options can be used: buses, transport on-demand (partly autonomous), ride pooling, improved pedestrian and cycling infrastructure; bike-sharing and bike stands; easy booking and information through Apps, LOW-CARB accessibility map REACHIE[22] , and place-based information.

With the vision for the Action Plan in place, the Steering group developed a set of ca. 90 draft actions, which were discussed and prioritized with project leaders, administrative and political decision-takers, and external experts. Regional and FUA stakeholders, followed by the companies in the planning area, were consulted. The discussion showed that the actions met the specific needs of companies dealing with changing shift times, need for direct connections and high-quality transport systems. The actions were adjusted, and a detailed financial planning and adaption, especially of the actions with short time perspective until 2024, took place in close cooperation of the Leipzig city administration, and the public transport operator, LVB[23] .

Figure 15: Priorisation of measures with FUA stakeholders in Leipzig (Source: LVB)

22 Find out more about REACHIE on the tool website www.mdv.de/reachie

23 Find more information in the Leipzig action plan. Please also consult the Brno, Koprivnica, and Szeged action plans. Also available in English: SUMP Brno.

2.7.Develop all transport modes in an integrated manner

An integrated development of all relevant transport modes is required, while supporting a shift towards sustainable mobility. It uses integrated sets of regulatory, promotional, financial, technical and infrastructure measures to achieve its vision and objectives. The measures usually cover collective mobility (traditional public transport as well as new sharing services), active mobility (walking and cycling), multimodality, road traffic and parking, and urban logistics, focusing on improving road safety, equitable accessibility, liveability of public spaces, and air and noise pollution in all of them.

What should be done?

Planning for intermodality in the FUA requires the coordination - in space and time - of active mobility, public transport, and shared mobility networks, through the creation of intermodal networks and stations that guarantee a comfortable and quick change between the various modes and efficiency between transport activities.

Guidance

This requires analysis of the status quo and development needs of the network based on accessibility and mobility needs for, e.g., PT, cycling and walking infrastructure. Based on such an analysis, planning should ensure that the ‘last mile’ to multimodal stations is designed safely and walkable for pedestrians, and that there are safe cycling lanes to the station.

Generally, cycling to and from stations, no matter the size, should become an important basic mode for feeder transport in the FUA, with implications on services that should be part of an interchange portfolio.

To keep cars out of urban centres and at the same time contribute to decarbonisation in the FUA, multimodal hubs should also provide for e-mobility.

In the surrounding of interchanges, intermodal operations should be facilitated by clear traffic regulations, and pooled ride-hailing or transport on-demand services should be considered a substitute for private car park & ride services in general, which also improves access for vulnerable user groups.

What the LOW-CARB partners did

The REACHIE accessibility heatmap allows to analyse accessibility by all low-carbon modes in Leipzig’s FUA, but also mobility needs by analysis of user queries.[24] As an online journey planner, it informs and attracts commuters to shift their modes of transport to sustainable PT offers and thereby reduce their CO2 emissions.

Figure 16: REACHIE screenshots – demonstrating accessibility (in time and per mode) of sites by multimodal mobility. Source: MDV Central German Transport Association, 2020.

24 https://www.interreg-central.eu/Content.Node/LOW-CARB--Reachie-Tool-Factsheet-EN.pdf

The Leipzig partners also developed the concept for a mobility hub with companies and their employees in the planning area, which allows to solve the 'last and first mile' problem and gives the employees the flexibility to choose between different transport modes in a multi-modal and esp. intermodal way. These future users also decided on measures to strengthen cycling and pedestrian transport modes by infrastructures to shorten ways and make it thus more comfortable to use these alternatives[25].

LVB also examined the suitability of if its transport on demand system for the planning area[26], based on the insight that also solutions in non-peak-hours are needed, e.g., at shift times, as a suitable solution in weak demands to increase flexibility. To respond to this situation, standard buses during peak times need to be combined with more flexible forms for the rest of the time.

Figure 17: The Leipzig action plan includes integrated low-carbon mobility measures that also aim at solving the first & last mile problem from a mobility hub to workplaces by bus, foot, and bike. Source: LVB.

The transport authority ZTP Kraków implemented an innovative Park-e-Bike sharing service in the FUA as a P & R solution, and a cargo bike reloading hub in the city of Kraków. The location at the P & R was chosen to encourage users to switch from their cars to a bicycle. Users can rent a bike free of charge via the Park-e-Bike app for the entire day for use in the Kraków and Skawina communes and return the bike to the station. The reloading hub is linked with an access restriction (UVAR) in the city of Kraków.[27]

Figure 18: Left picture: Park-e-Bike sharing service in FUA Kraków. Right picture: CargoVelo e-cargo bike reloading hub in Kraków.

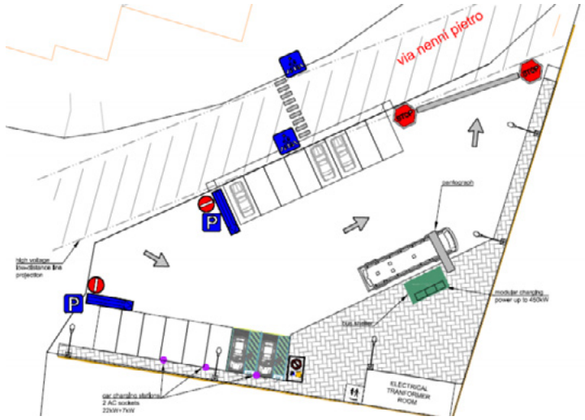
25 Find more information on planning with companies here: https://www.interreg-central.eu/Content.Node/LOW-CARB-Recommendations-for-low-carbon-mobility-planning-wi.pdf

26 The system works with virtual stops in another suburban area and flexible buses that can be taken using an app.

27 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, in the investment factsheet: https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-I1-pilot-investment-factsheet-Krakow.pdf

The City of Koprivnica implemented an innovative smart multimodal mobility station at the university campus at the outskirts of the city, which allows for smart charging of buses and e-bikes and is powered by a small photovoltaic plant[28].

Figure 19: The smart multimodal mobility station in Koprivnica (Source: City of Koprivnica).



TEP spa Parma 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[29].

Figure 20: New mobility hubs: layout of the terminal at Largo Nenni, Parma, Source: TEP.

2.8.Arrange for monitoring and evaluation

The implementation of mobility measures is monitored and closely evaluated. General progress towards strategic objectives and targets is assessed regularly based on clear indicators. Systematic monitoring of individual measures allows to adapt to changing circumstances and optimise future actions.

What should be done?

For monitoring and evaluation of integrated FUA measures and their impacts, it can be challenging to find common ground and identify joint indicators and quantified targets, or to have a joint understanding of how to monitor performance. It is important to understand that individual measures should be part of bigger strategies and objectives, and that definition of indicators and targets should take place before measure implementation.

Guidance

All involved planning institutions from the FUA should agree on indicators to measure performance of actions. The SUMI[30] project (sustainable urban mobility indicators) provides a comprehensive set of practical and reliable indicators that has been developed to support cities to perform a standardised evaluation of their mobility system and to measure improvements that result from new mobility practices or policies. The project partner FUA Szeged participated in SUMI.

28 Find more information about the smart mobility station in Koprivnica Find more information in the output factsheet: https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-O.T3.2-KOP-Pilot-factsheet.pdf

29 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.

30 SUMI – Sustainable urban mobility indiators

A continuous and systematic data collection effort is of key importance. Alternative and innovative collection mechanisms should be considered, and cooperation strategies developed to involve private actors and civil society.

The SUMP-Self-Assessment Tool[31], co-developed by LOW-CARB, can help in this process by guiding mobility planners in the FUA through the discussion and identification of KPI.

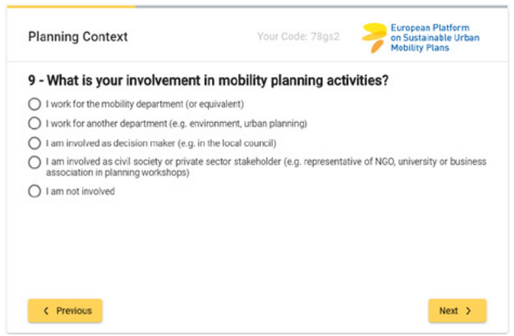


Figure 21: SUMP Self-Assessment Tool, Source: Rupprecht Consult, 2020.

LOW-CARB also developed the GIS SUMP monitoring tool[32], which can be replicated to monitor and evaluate measure package impacts[33]. The tool can be used by all FUA stakeholders to display selected measures and demonstrate cumulative intended impacts of the whole measure package. The SUMP measures are selected and then displayed in the relevant table. Multiple parameters can be filtered according to various criteria - for example by area of change, implementation status, price, start or end of measure, investor, etc. After selecting filters of interest, results are generated in both table and map formats. This provides both a quick overview and gives detailed insights of the measures. From here, results can be further analysed according to strategic or specified objectives.

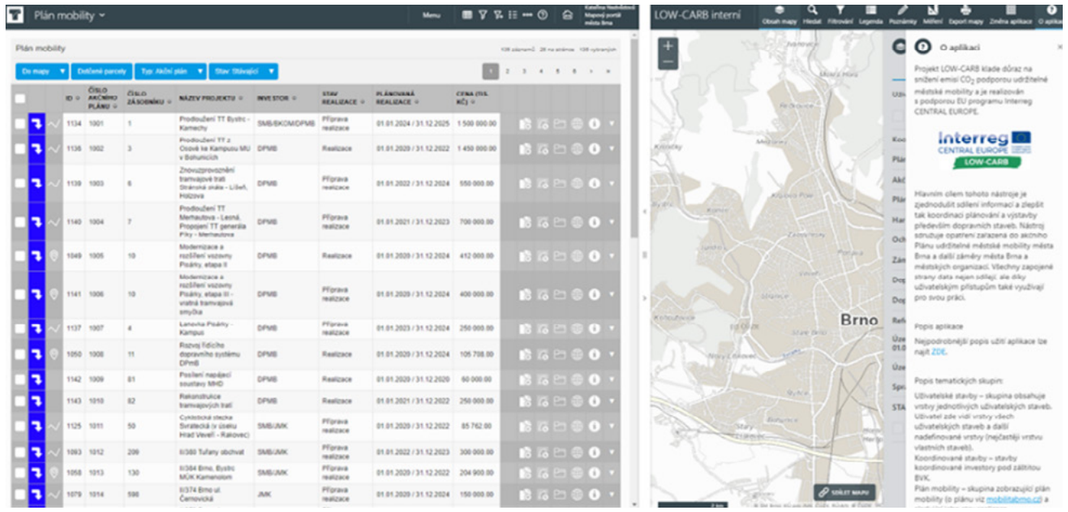


Figure 22: The SUMP GIS monitoring tool user surface (Source: City of Brno).

What the LOW-CARB partners did

All partners, besides maintaining close cooperation and communication with stakeholders, plan to assess impacts based on data collection, e.g., by repetitive consultation of target groups by surveys, and by collecting and analysing mobility data (passenger and traffic counting) with support from external experts. Also, the data collected from the pilots (e.g., passenger counting method based on sensor data in Szeged, or user data from the online journey planner REACHIE) will allow to understand changes in user behaviour.

To this end, the partners defined joint strategic indicators in their FUAs that allow to use the collected data to measure the impact of measures.

For example, Brno identified FUA indicators for strategic and specific goals, measures, along with the data collection methods and target values by 2030.

Table 4: Example for attribution of KPI to specific and strategic goals, method, and target values (Source: City of Brno[34])

Strategic goal	Specific goal	Measure	Indicator	Method	Target value (by 2030)
Increase the integration of sustainable modes of transport (share of multimodal routes) and accelerate public transportation (travel speed on reference journeys taken by public transportation higher by 15% in 2030)	Improving the possibilities of interchange, shortening the interchange distances, increasing the accessibility of the territory, building multimodal hubs and new train stops	• building new interchange hubs and upgrading the existing ones • upgrading to multimodal hubs (including bicycle traffic) • removal of barriers • increasing the accessibility of mass public transportation by building train stops for interchange with mass urban transport	• number of new and upgraded interchange hubs • number of new train stations • modal split (percentage of public transport • accessibility of mass public transportation stops	• DPMB, KORDIS and BKOM annual reports • survey of the modal split	• upgrading of interchange hubs > 90% of intentions • increase in the number of train stops > 95% of development fulfilment • increase in the share of mass public transportation > 54% of modal split • respecting the distances from journey source / destination to the nearest mass public transportation stop (according to the standards set out in the SUMP)

Similarly, SZKT together with the municipality of Szeged defined indicators that will be monitored to evaluate features of the transport services, such as, e.g., reduction of travelling time (passenger hours / year); change in PT use in the FUA (million passengers/ year); or the level of comfort (utilisation rate in %).

In Leipzig, the steering group with the heads of units of the three institutions LVB, City of Leipzig and MDV remain in place to evaluate the progress of the action plan implementation. The concrete implementation will be monitored by the coordination team, using, e.g., the pilot REACHIE to measure the effects of actions based on increased accessibility and user query data (as the tool is also used

31 https://www.sump-assessment.eu/English/start

32 https://www.interreg-central.eu/Content.Node/LOW-CARB-SUMP-Monitoring-Tool-Factsheet-EN.pdf

33 Find more information on how to plan for impact evaluation in the SUMP 2.0 guidelines

34 Find more information in the Brno SUMP brochure: https://www.interreg-central.eu/Content.Node/Brno-Action-Plan---SUMP.pdf

as an online multimodal PT journey planner on the MDV website). Additional studies are planned by the city to measure the possible effects of actions of the masterplan towards road infrastructure MIT (motorized individual transport) use and commercial transport. Within regular standard traffic counting (all modes of transport) the transport model based on PT-Visum will be used. Additionally, acceptance and use of implemented offers and measures will be investigated by coordination unit. Therefore, questionnaires will be prepared and analysed.

Furthermore, all LOW-CARB pilot actions were prepared, implemented, and evaluated so that they fit into existing or newly developed strategies and objectives. Their set-up for monitoring and evaluation of key performance indicators (KPI) allows for objective performance evaluation and adaptation of measures, if needed.[35]

2.9. Assure quality

A high quality and proactive risk management is assured in all activities. An honest assessment of the way transport has been planned for in the past and a good dialogue to further improve processes help to turn the planning authority into an adaptive, learning organisation ready for a fast-paced world.

What should be done?

A Sustainable Urban Mobility Plan is a key document for the development of the FUA. Following the eight SUMP principles along which this guideline document is structured already ensures a high process quality.

Mechanisms should be in place to review the quality of the plan and to manage risks during its implementation.

The assurance of data quality and risk management during implementation requires specific attention.

Guidance

Following the SUMP principles can be facilitated using the SUMP Self-Assessment tool, which guides mobility planners along these principles through their mobility-planning process for the FUA.

External review tasks can be delegated to external quality reviewers or another government institution (e.g. on the regional or national level).

Defining standards for the data utilised and developing capacities and tools can significantly facilitate the analysis and evaluation.

Another important factor to ensure quality is to facilitate institutional cooperation and communication with stakeholders and citizens also during implementation of measures.

What the LOW-CARB partners did

In Leipzig, to ensure quality of the action plan, its vision, objectives, and measures, were regularly discussed and prioritized with project leaders, administrative and political decision-takers, and external experts. Regional and FUA stakeholders, followed by the companies in the planning area, were consulted. The discussions showed that the actions met the specific needs of companies dealing with changing shift times, need for direct connections and high-quality transport systems. Feedback from all levels was considered to adjust the measures.

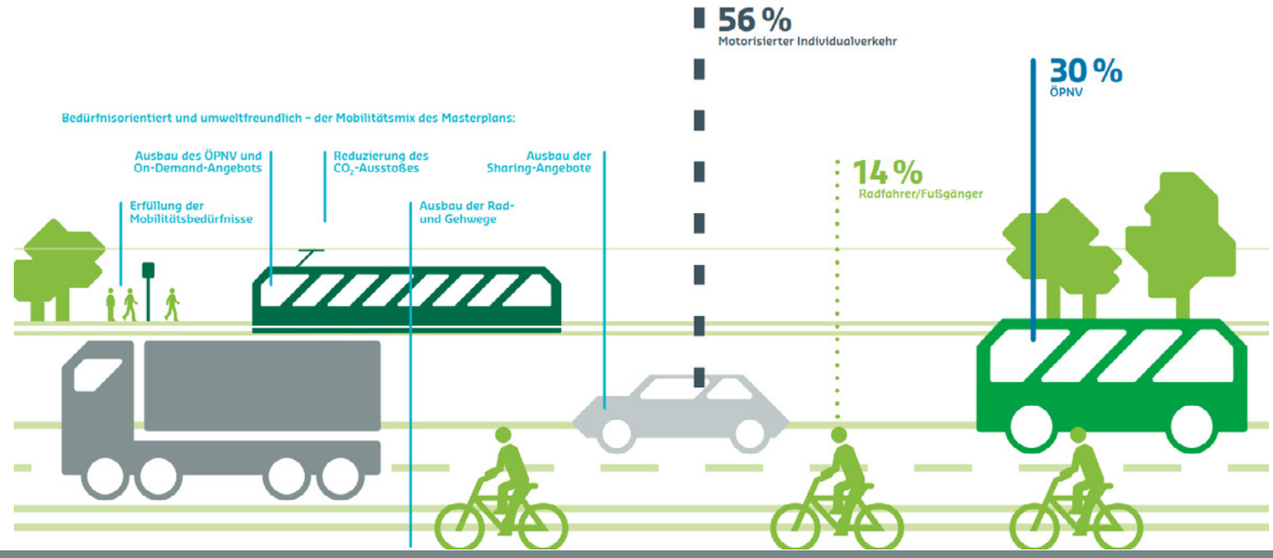
The Leipzig governance strategy for the action plan implementation builds on this cooperation structure developed for the Action Plan development, with broadened staff responsibility by project management, marketing, and stakeholder involvement including administrations and companies, preparation of actions and financing.

While all LOW-CARB partners developed brochures and/or videos to communicate and promote the FUA action plans and measures, and to create awareness, both the City of Brno and the Leipzig partners have installed a specific participation and communication plan. Thus, continuous involvement of the main target groups by specific communication activities is planned also during implementation.

Figure 23: An animated image video based on graphics explains the mobility challenges at Nordraum and the LOW-CARB action plan to the public. Source: LVB.

Furthermore, both Leipzig and Szeged sub-contracted external experts to consult their main target group in the planning area, companies, and their employees, with surveys on their mobility needs and behaviour. It is planned to repeat these surveys regularly to evaluate the success of action plan measures implementation[36].

Figure 24: Part of the communication and participation strategy: A well-designed brochure that explains the context, strategy, and action plan measures in detail. Source: LVB.



35 Find more information about all LOW-CARB pilot actions in the pilot output factsheets here and in the pilot handbook.

36 Find more information in the LOW-CARB recommendations mobility planning with companies in Leipzig and Szeged here

3. Conclusion

LOW-CARB's project transnational strategies, action plans, tools and pilots aim at planning for 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 strategies 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 concrete guidance how to plan for the FUA. They need to be understood together with the SUMP guidelines, as they investigate into practically achieving planning for the FUA along all eight universal SUMP principles.

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[37]. These tools provide targeted support to fill identified competence and knowledge gaps in the public transport and SUMP area, as they aim at practitioners with a large variety of experiences in sustainable urban mobility planning.

37 The SUMP-Central is a knowledge platform that connects to SUMP resources and news in the field, automatedly translated into all central European langueages.

4. References

Schwedes, O., Rammert, A. (2020): „Mobilitätsmanagement. Ein neues Handlungsfeld Integrierter Verkehrsplanung", Springer, Wiesbaden.

Rupprecht S., Brand L., Böhler-Baedeker S., Brunner L. (2019): "Guidelines for developing and implementing a sustainable urban mobility plan", second edition, Civitas SUMPs-Up project, https://www.eltis.org/sites/default/files/sump_guidelines_2019_interactive_document_1.pdf

Damerau M., Baston A. (2020): "Handbook on mobility strategies in functional urban areas. A guide for public authorities when planning mobility strategies", Interreg CE1100 LOW-CARB project, https://www.interreg-central.eu/Content.Node/LOW-CARB-Mobility-Strategies-in-FUAs-Handbook-EN.pdf

Damerau M., Juliat M., Baston A. (2020): "Recommendations for low-carbon mobility planning with companies in suburban areas", Interreg CE1100 LOW-CARB project, https://www.interreg-central.eu/Content.Node/LOW-CARB-Recommendations-for-low-carbon-mobility-planning-wi.pdf

Backhaus W., Damerau M., Tovaas K., Baston A. (2020): „Transnational pilots handbook for low-carbon mobility in functional urban areas", Interreg CE1100 LOW-CARB project, https://www.interreg-central.eu/Content.Node/LOW-CARB-Pilot-Handbook-EN.pdf

Deliverable D.T1.5.1-4 (2020): "Leipzig Action Plan", Interreg CE1100 LOW-CARB project, https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-D.T1.5.1-4-Leipzig-action-plan.pdf

Deliverable D.T1.5.1-4 (2020): "Brno Action Plan", Interreg CE1100 LOW-CARB project, https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-D.T1.5.1-4-Brno-action-plan.pdf

Deliverable D.T1.5.1-4 (2020): "Koprivnica Action Plan", Interreg CE1100 LOW-CARB project, https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-D.T1.5.1-4-Koprivnica-action-plan.pdf

Deliverable D.T1.5.1-4 (2020): "Szeged Action Plan", Interreg CE1100 LOW-CARB project, https://www.interreg-central.eu/Content.Node/CE1100-LOW-CARB-D.T1.5.1-4-Szeged-action-plan.pdf

Deliverable D.T1.2.3 (2020): "Report on strategies for PT in SUMP & collaborative development of new services", Interreg CE1100 LOW-CARB project, https://www.interreg-central.eu/Content.Node/LOW-CARB-D.T1.2.3-Strategies-PT-in-SUMP.pdf

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