

Green LaMiS Capacity Building Toolkit & Implementation Guide

for Local Authorities and Social Enterprises
on Green Mobility Planning and Management

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1.1	Spring 2026	First integrated draft of the handbook.
1.3	August 2026	Partner comments integrated; structure aligned with the document. *Proposed structure and points to consider for Activities 3.1.a and 3.1.b.*
1.4	August 2026	Rewrite the course chapter as the delivery guide for the online course; harmonise module titles; expand the CO2 Tool user guide.
1.5	September 2026	Aligned with the final recorded presentations of the three modules; added vehicle-sharing models and route planning; added annexes with exercises, worksheets, model solutions, knowledge checks, and templates.
2.0	September 2026	Partner review integrated: document shortened and structure flattened; vehicle selection matrix and overview of route planning tools added; vehicle use models presented even-handedly; course chapter updated after the event of 10 September 2026; follow-up chapter removed, contacts kept; list numbering corrected.

Executive Summary

This document is the **Green LaMiS Capacity Building Toolkit and Implementation Guide** (Deliverable D3.1.1), developed under Activity 3.1 of the Interreg Central Europe project Green LaMiS – Greening the Last Mile of Public Home Services Delivery, led by Eupolis Group Ltd.

The Toolkit is a practical reference for **Local Authorities (LAs)** and **Social Enterprises (SEs)** that deliver home and public services with a mobility component. It supports them in:

- measuring the carbon footprint of a service and establishing a baseline with the Green LaMiS CO2 Tool,
- choosing green vehicles and the way they are used – owned, leased, pooled or shared,
- planning and reviewing the routes along which services reach the homes of their users,
- embedding the approach in governance and daily operations so that it outlasts the project,
- engaging citizens and collecting the stories that make results visible.

The Toolkit translates the transnational methodology (WP1) and the pilot actions in Bergamo, Szombathely and Klis (WP2) into training and operational material (WP3). Chapters 3 to 5 follow the three modules of the transnational online course delivered on 10 September 2026; Chapter 6 documents how the course was run and how each module can be repeated as a local workshop; Chapter 7 covers the collective knowledge-sharing moment with citizens and the online brochure; the annexes contain the exercises, worksheets, model solutions, knowledge checks and templates.

This Version 2.0 integrates the partner review of September 2026. We shortened the document and flattened its structure; added a vehicle selection matrix and an overview of route-planning tools; presented vehicle use models evenly; and updated the course chapter after the event. All figures quoted from the module presentations remain attributed to their presenters and are not results of the Green LaMiS pilots.

The Toolkit is designed as a living resource: adapt it to your services, territory and audience. For support, comments or cooperation proposals, use the contacts at the end of the document.

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1. Introduction

Green LaMiS is a transnational cooperation project co-funded by the Interreg Central Europe Programme (June 2024 – November 2026). It supports the greening of urban social mobility – the trips made every day to deliver meals, care, assistance and other services to people's homes – by giving Local Authorities and Social Enterprises common methodologies and tools, pilot actions in three cities, and collective learning. The project aims to reduce CO_2 emissions from these services, increase the uptake of green and low-emission vehicles, improve data collection and monitoring, and strengthen cooperation among municipalities, service providers, and citizens.

The partnership brings together nine organisations from four countries – research institutions, points of reference for social enterprises and cooperatives, a development agency and public authorities:

- **Italy:** Fondazione Politecnico di Milano (Lead Partner); National Consortium CGM; Municipality of Bergamo;
- **Hungary:** Westpannon Regional and Economic Development Public Nonprofit Ltd; Municipality of Szombathely City with County Rights; HUN-REN SZTAKI – Institute for Computer Science and Control;
- **Germany:** University of Passau;
- **Croatia:** Eupolis Group Ltd; Municipality of Klis.

Associated Partners contribute practical expertise; Elettra Car Sharing, operator of car-sharing and mobility services in Italy, delivered the second module of the online course. Three municipalities – Bergamo, Szombathely and Klis – ran the pilot actions that this Toolkit draws on.

Within Work Package 3, Activity 3.1 *Capacity building for sustainability* consists of four elements: this Toolkit (D3.1.1), the three-module transnational online course, the collective knowledge sharing moment with citizens, and the online brochure. Eupolis Group Ltd. is responsible for the Toolkit and supports the online course; the Municipality of Klis leads the organisation of the course events, the collective knowledge-sharing moment, and the online brochure, with Westpannon providing technical support.

2. About the Toolkit

The Toolkit is a hands-on implementation guide, not a theoretical manual. It supports LAs and SEs in planning and improving green mobility services, monitoring environmental performance, adopting green vehicles and suitable use models, planning routes for home and public services, and sustaining the approach after the project. It is fully integrated with the online course and can be used independently.

The Toolkit is an integrated set of components:

- this handbook (Chapters 1–8),
- the Green LaMiS **CO2 / Carbon Footprint Tool** and its manual,
- the three **training modules** and their recorded presentations with subtitles,
- the **training materials** in the annexes – workshop cards, exercises, worksheets, model solutions, knowledge checks and evaluation form,
- the **implementation templates** – local pilot transfer template, implementation roadmap and question register.

The three training modules are the Toolkit's operational backbone. Their titles follow the wording agreed in the partnership:

Module	Title and focus	Result for the participant
Module 1	**Carbon footprint tool, indicators and data collection system**	A calculated CO_2 baseline and a validated dataset for the own service (Chapter 3).
Module 2	**Green vehicles, including their use, characteristics, performance and consumption** – with a focus on electrification, procurement of green vehicles and vehicle use models	A vehicle assessment and a justified decision on the vehicle and its use model – owned, leased, pooled or shared (Chapter 4).
Module 3	**Practical application for municipalities, including routing and urban planning aspects** – with a focus on route planning for city and social services	A reviewed route, a feasible improved plan and an implementation roadmap (Chapter 5).

2.1 Target groups

The Toolkit addresses two core user groups that implement the methodology together:

- **Local Authorities (LAs)** – mobility managers, sustainability officers, technical and policy staff who plan, coordinate and monitor mobility systems. They ensure coordination, strategic planning, data validation and alignment with policy and funding frameworks.
- **Social Enterprises (SEs)** and other social economy actors – managers and operators who deliver home-based and public services with a mobility component. They ensure service delivery, operational data collection and the implementation of mobility solutions.

Specific sections also support stakeholders: technical partners and experts; procurement officers and public buyers; policy makers and funding bodies; mobility operators, including car-sharing and fleet-as-a-service providers; and service coordinators, dispatchers, and home-care providers who organise daily rounds.

The Toolkit applies in urban and rural settings, to different types of social and mobility services, and at different levels of data availability. No programming skills are needed for any part of it; for the exercises, knowledge of the service's daily organisation and basic reading of schedules and tables is sufficient.

2.2 How to use this Toolkit

The Toolkit is not meant to be read from cover to cover. Use the table below to go straight to what you need; the section references are clickable.

If you want to…	Go to
Understand the overall approach in one page	Section 2.3 (p. 9)
Define the baseline and calculate emissions	Chapter 3 (p. 11), in particular the CO2 Tool guide in Section 3.4
Analyse mobility performance with KPIs	Section 3.5 (p. 13)
choose a green vehicle for a service	Sections 4.1–4.4 (p. 14) and the selection matrix in Section 4.4
Compare owning, pooling and sharing a vehicle for the same service	Sections 4.5–4.6 (p. 17), Annex 4 and Annex 5
Prepare a procurement of vehicles or of mobility services	Section 4.7 (p. 19)
Plan or improve the routes of a service, and pick a routing tool	Sections 5.3–5.4 (p. 22), Annex 2 and Annex 3
Embed the approach in governance and daily operations	Sections 5.1–5.2 and 5.6 (p. 21)
Deliver or repeat the training modules	Chapter 6 (p. 26) and Annexes 1–8
Organise the collective knowledge sharing moment and collect stories	Chapter 7 (p. 35)
Plan a local pilot after the training	Annex 7 (p. 46)

Recommended journey for first-time users: read Section 2.3 → establish the baseline with Module 1 and the CO2 Tool (Chapter 3) → identify the services with the highest emissions or the greatest potential → plan vehicle, use-model and procurement decisions (Chapter 4) and route improvements (Chapter 5) → implement with the local pilot transfer template (Annex 7) and monitor with the KPIs of Section 3.5.

The Toolkit serves three purposes at once: **learning material** for the online course and its repetition as local workshops (each module has a delivery guide in Chapter 6 and its materials in the annexes); a **workbook** for participants; and an **operational reference** for daily practice – data collection and monitoring, vehicle and procurement planning, route review – after the project.

Online course module	Toolkit sections used
Module 1 – Carbon footprint tool, indicators and data collection system	Chapter 3; delivery guide in Section 6.3; CO2 Tool and manual.
Module 2 – Green vehicles, including their use, characteristics, performance and consumption	Chapter 4; delivery guide in Section 6.4; Annexes 1, 4, 5 and 6.

Online course module	Toolkit sections used
Module 3 – Practical application for municipalities, including routing and urban planning aspects	Chapter 5; delivery guide in Section 6.5; Annexes 1, 2, 3 and 6.
Follow-up of all modules	Section 6.6; Annex 7 (local pilot transfer template, roadmap, question register).

The handbook is distributed as a PDF; the worksheets, templates and forms in the annexes are also available as editable Word and Excel files, and every exercise has an offline (paper) variant so that no personal smartphone or internet access is required. All example data in the exercises are fictitious; where real prices, emission factors or operator conditions are used, record their source, date, units and scope. The Toolkit is a living document: each version is numbered and dated (see the version history in the Administrative Information), and the Activity leader reviews feedback collected after each training and engagement event and incorporates it into the next version.

2.3 The Green LaMiS operational methodology in one table

The methodology gives LAs and SEs a structured way to move from fragmented data and practices to coordinated, evidence-based decisions. It treats the mobility system as a whole through four dimensions – **data and measurement**, **service organisation**, **fleet and technology**, **governance and procurement** – and runs them through a four-step cycle that is repeated period after period. The table summarises the cycle, what each step involves in each dimension, and where the Toolkit supports it.

Step of the cycle	What is done (by dimension)	Output	Who leads	Toolkit / module
1 Measure – baseline definition	– Data: collect operational data per vehicle and per service; calculate emissions with the CO2 Tool; define KPIs. – Service: map services, users, trips and frequencies. – Fleet: record vehicle types, energy sources, utilisation. – Governance: agree who collects, validates and reports.	Baseline dataset and indicators	SE collects; LA validates	Chapter 3 - Module 1
2 Analyse – system understanding	– Data: read emissions and KPIs per service and per km. – Service: find inefficiencies – overlapping rounds, unnecessary return trips, idle time. – Fleet: find mismatches between vehicles and services; measure how much of the day each vehicle stands idle. – Governance: identify the decisions and budgets involved.	Priority services and improvement areas	LA and SE together	Sections 3.5, 4.1–4.3, 5.3

Step of the cycle	What is done (by dimension)	Output	Who leads	Toolkit / module
3 Plan – strategic and operational planning	– Data: set targets and the indicators to track them. – Service: redesign routes, schedules and task allocation. – Fleet: choose vehicles and the use model (owned, leased, pooled, shared) and compare scenarios. – Governance: plan procurement, roles, parking, charging and zone access.	Integrated action plan/implementation roadmap	LA coordinates; SE contributes	Chapters 4 and 5 – Modules 2 and 3; Annex 7
4 Implement and monitor – execution and continuous improvement	– Data: repeat the data collection each period and compare with the baseline. – Service: run the new routes; track punctuality and missed visits. – Fleet: operate, charge and maintain; track utilisation. – Governance: report to decision-makers and citizens; adjust; embed in plans and budgets.	Improved services; next iteration of the cycle	SE operates; LA monitors and reports	Sections 3.5, 5.2, 5.5–5.6; Chapter 7

Decisions are taken on a combination of environmental indicators (emissions per service and per km), operational indicators (km and minutes per service, utilisation), service-related indicators (timeliness, continuity of care) and, where applicable, economic ones (cost per km and per service). Technical partners support tools and analysis; procurement officers prepare and run the procedures. Each training module corresponds to one or more steps of this cycle, as shown in the last column.

3. Green Mobility Baseline and Measurement

Foundation for Module 1 of the online course – Carbon footprint tool, indicators and data collection system. Delivery guide: Section 6.3.

A green mobility transition starts with knowing the current situation. This chapter gives LAs and SEs a standard way to establish a baseline of the environmental and operational performance of last-mile social service delivery, to calculate its carbon footprint with the Green LaMiS CO2 Tool, and to keep measuring it over time. It codifies the data-collection logic, indicators and measurement approach applied during the pilot actions in Bergamo, Szombathely and Klis (Deliverable D2.2.1) and builds on the Common Assessment Tool (D1.2.1) and the Baseline Carbon Footprint Assessment (D1.2.2), so that results are consistent across the project and comparable between services and territories.

The typical starting point in the pilots was the same: little data and few indicators, vehicles not matched to the services they serve, high operating costs, services fragmented among several providers and weak links to policy. Measurement turns an ad hoc approach into a data-driven one, and it underpins every decision in Chapters 4 and 5. **Result of this chapter:** a validated baseline dataset and a calculated carbon footprint of the service, with the roles for keeping them up to date.

3.1 Two views of the same data: vehicle-based and service-based

Data collection is organised from two complementary perspectives. **Vehicle-based data** describe each vehicle: type, energy source, kilometres travelled, fuel or electricity consumed, and the emissions they produce. **Service-based data** describe each service: service type, number of trips, number of users reached, frequency, and emissions per service delivered. The vehicle view supports fleet decisions and operational optimisation; the service view supports strategic analysis and communication – it answers the question "what does one delivered service cost the climate". Because one vehicle may serve several services and one service may use several vehicles, both views are needed, and you must record the allocation between them (Section 3.4, common mistakes).

3.2 Roles, responsibilities and data governance

Measurement only works if roles are clear. In the Green LaMiS workflow:

- the **Social Enterprise** (or other service provider) collects the operational data per vehicle and per service during the collection period and ensures continuity between periods;
- the **Local Authority** validates the data, enters it in the CO2 Tool (or verifies the entry), controls the quality of the calculation, coordinates data standards and reporting cycles, and integrates the results into policy and planning;
- **technical partners** support the tool, the processing and the interpretation where needed.

Data collection complies with GDPR principles and avoids unnecessary personal data. Addresses of beneficiaries used for territorial analysis or route planning are anonymised or replaced by zones wherever possible, are never shared in training materials, and cloud-based tools that process them need a data-processing agreement (Section 5.4).

3.3 Establishing the baseline and repeating the measurement

The baseline is the reference situation before green mobility measures are introduced, captured during a defined data-collection period. In the pilots, data were collected quarterly, with a **two-week active collection period within a four-week window**; the pilot cities also produced a full-year baseline for the inventory year 2023 with the CO2 Tool. Fixed periods make comparisons between locations and over time possible.

The baseline is not a one-off exercise but the first iteration of a measurement cycle. Where precise data are unavailable, we use consistent, documented estimates, as in the first pilot period. KPI maturity increases with each period: the first periods establish the baseline, and later periods allow trend analysis, comparison, and assessment of the impact of the measures taken. Not all KPIs will be available in every period; progressive completeness is expected and acceptable. Where real before-and-after data are incomplete – as happened in one pilot because of the late delivery of a vehicle – forecast simulations with the CO2 Tool can complement the analysis, provided they are labelled as forecasts and validated later with real data.

3.4 Step-by-step use of the CO2 Tool

The Green LaMiS CO2 / Carbon Footprint Tool is an Excel-based tool with an input form, a fleet form and optional forms for public transport and electric fleets; conversion and emission factors are visible in locked sheets. The core principle is simple: **emissions = consumption × emission factor**. The tool converts kilometres into fuel or electricity consumed using the vehicle data, then multiplies by the energy-source factor. The full manual accompanies the tool; this is the short guide used in training, where the trainer works through the demonstration example first, and participants then repeat the steps with their own service.

1. **Identify the service** – name the service, the operator and the compiler; record the inventory period, the number of users served and the staff or volunteers involved.
2. **List the vehicles** – every vehicle used by the service (type, fuel, kilometres), including electric vehicles and any use of public transport.
3. **Collect the data** – kilometres travelled and/or fuel and energy consumption per vehicle for the period; mandatory fields are marked with an asterisk in the tool.
4. **Validate** – check completeness and plausibility; document estimates and their sources instead of silently substituting them.
5. **Enter the data** – fill the input form and the fleet form; skip the forms that do not apply (public transport, electric fleet).
6. **Quality-check and consolidate** – review the entries and correct mistakes (a form can be cleared and re-entered with one click).
7. **Run and read the results** – save the result as the baseline; read total emissions and the KPIs per service and per kilometre.
8. **Interpret and decide** – build scenarios and compare them with the baseline: *organisational measures* (fewer kilometres – mobility management, route optimisation) lower the consumption; *technological measures* (green vehicles, green electricity, modal shift) lower the emission factor. Agree on the next action.

Common mistakes are mixing inventory periods, double-counting vehicles shared between services, combining annual fuel data with monthly kilometres, and treating estimated data as measured. Steps 3 and 4 avoid all four by documenting sources and validating results. For estimates made outside the tool, the same logic applies – litres × fuel factor, or kWh × electricity factor – and the source, year, units and system boundary of the factors must always be stated. Life-cycle estimates (vehicle and battery production) are kept separate and compared on the same basis; they are never added to operational emissions.

3.5 KPIs and their use for decision-making and reporting

The Toolkit formalises the KPIs tested in the pilot actions. They fall into five groups:

KPI group	Indicators	Answers the question
Mobility activity	Total km per vehicle and per service; number of trips per service; service frequency; number of users	How much do we drive, for whom and how often?
Environmental	Total CO_2 per vehicle; total CO_2 per service; CO_2 per km; CO_2 per service delivered	What is our footprint and where does it come from?
Fleet	Vehicle type distribution; share of green vehicles; utilisation (hours or km of actual use)	Do our vehicles fit our services, and are they used?
Efficiency	Cost per km; cost per service delivered	What does one delivered service cost?
Service quality (Toolkit proposal for local monitoring)	Share of on-time arrivals; number of visits not delivered; minutes of driving per service	Are savings achieved without harming the service?

Two distinctions avoid confusion. First, the environmental and operational KPIs produced by the CO2 Tool are the official project indicators; the economic KPIs are used for vehicle and investment decisions (Chapter 4); the service-quality indicators are Toolkit proposals for local monitoring and pilot transfer (Section 5.5, Annex 7) and complement, but do not replace, the official set. Second, KPIs mature over periods: a single period gives a baseline, several periods give trends and allow the effect of a measure to be isolated.

KPI results are used to prioritise green mobility investments (which service first), adjust service organisation (which route, which vehicle), report progress to decision-makers in the regular planning and budgeting cycle, and communicate results to citizens (Chapter 7). Treated this way, measurement is a management tool rather than an administrative burden, and it links pilot implementation, project reporting and long-term operation.

4. Green Vehicles and Operational Transition

Foundation for Module 2 of the online course – Green vehicles, including their use, characteristics, performance and consumption. Delivery guide: Section 6.4.

This chapter supports LAs and SEs in making informed, realistic decisions on the vehicles used for last-mile service delivery – which vehicle, and how it is accessed – and in turning those decisions into procurement and a managed transition. It builds on the pilot experience and on the baseline of Chapter 3: the services with the highest emissions, the inefficiencies in delivery, the vehicles that do not suit their service, and the hours each vehicle actually moves are the starting point.

The chapter does not promote a single "best" solution. It provides a **decision-support framework** that reflects the diversity of services, territories and organisational capacities observed in Bergamo, Szombathely and Klis. Following the Module 2 presentation, the decision is treated as **two separate choices**: *what we drive* (from combustion to electric and other green options – Sections 4.1–4.4) and *how we access the vehicle* (owned, leased, pooled or shared – Sections 4.5–4.6). Procurement (4.7) and the conditions to verify (4.8) close the chapter. **Result of this chapter:** a fleet transition, procurement and management plan aligned with service needs, including a justified decision on the vehicle and its use model for each service (Annex 4 worksheet).

4.1 Green vehicle solutions and lessons from the pilots

Green mobility solutions for last-mile services cover a range of vehicles with different operational characteristics: electric cars and vans, cargo bikes and e-cargo bikes, light electric vehicles (LEVs), shared or pooled fleets, and mixed fleets combining several types. Each has advantages and limits depending on service type, distance, frequency, load and local conditions, and the pilots confirmed that **vehicle choice must be service-specific** rather than uniform across an organisation or territory.

The pilot actions showed that different services within the same municipality often need different vehicles; that a "one vehicle per service" logic improves operational efficiency and the clarity of KPIs; that terrain, climate and service organisation strongly influence vehicle performance; that adoption must fit real workflows and involve staff early; and that delays in vehicle delivery or in the readiness of a service directly affect the evidence that can be collected – a fallback assignment of the vehicle to a similar service keeps a pilot alive. Vehicle selection in the pilots was based on service-specific mobility patterns, procurement was adapted to local administrative frameworks, and staff involvement and training proved decisive. Green vehicle adoption is therefore an **organisational transition**, not only a technical choice.

4.2 Operational characteristics and common objections

Before choosing a vehicle, assess together – never in isolation – the following factors:

- **service-related:** average and maximum distance per trip, frequency, number of beneficiaries, required payload, equipment and accessibility (e.g. wheelchair users, meal containers);
- **territorial:** urban or peri-urban context, terrain and elevation, climate and seasonal variability, availability of charging or refuelling infrastructure;
- **organisational:** working hours and shift patterns, staff familiarity with new vehicle types, maintenance and fleet management capacity.

The Module 2 presentation addressed four objections that typically block the adoption of electric vehicles. **Range** – most city trips are a few kilometres and modern electric cars offer several hundred kilometres per charge; plan a winter reserve. **Charging** – needs a charging point at the base or, in a shared model, is handled by the operator. **"Not really green once you count the battery"** – producing an electric vehicle emits more than producing a combustion car, but the presenter argued that this initial carbon debt is repaid after roughly 17,000 km of driving (one to two years of normal use), after which the vehicle is ahead for the rest of its life and improves as the grid gets cleaner. **"It feels like a compromise"** – a perception that usually disappears after driving one. Range, charging, availability, billing and access to restricted zones are always conditions of the specific vehicle, operator and city, not general truths, and must be checked locally.

4.3 Environmental, economic and cost-benefit considerations

Vehicle decisions should rest on **environmental impact** and **life-cycle cost**, not purchase price alone. Costs include the initial investment (CAPEX), operating costs (OPEX) – energy, maintenance, insurance, tax, parking, infrastructure – the vehicle's lifespan and its utilisation. Most of an owned vehicle's cost is **fixed** and is paid whether it moves or not; fuel or energy is a minor share (the presenter cited European data of roughly 15% for an electric car and 23–28% for petrol and diesel cars). The advantage of an electric vehicle is its low running cost, its disadvantage the higher purchase price; **high utilisation** is therefore the condition under which it pays off – which is exactly the situation of service vehicles that drive all day and of vehicles shared by several users.

Three levels of emissions must be kept apart when comparing options: *tailpipe emissions* – zero for electric vehicles, with no nitrogen dioxide and no combustion particulates at street level, a direct public-health benefit that does not mean zero emissions overall; *energy-related emissions* – depending on the fuel or the electricity mix; and *life-cycle emissions* – including production of the vehicle and battery and end of life. The presentation quoted a 2025 life-cycle study by the International Council on Clean Transportation for the EU, according to which a battery-electric car on the average European grid emits about 73% less CO_2 per kilometre over its life than a petrol car, and up to 78% less on renewable electricity. Such figures must be tied to their source, year and conditions before reuse; they are not results of the Green LaMiS pilots.

Non-financial benefits observed during the pilots include lower noise and local pollution, better working conditions for staff, greater public visibility and acceptance of the service, and alignment with municipal climate objectives. They belong in the decision even though they do not appear in the cost table.

4.4 Vehicle selection matrix

The matrix below is the Toolkit's decision aid for narrowing down the options for a given service. It links the operational factors of Section 4.2 and the cost logic of Section 4.3 to four green solutions; the own conventional vehicle serves as the reference case in the cost comparison of Section 4.6. Use it as follows: for your service, go through the rows and mark each option as *fits* (✓), *conditional* (~) or *excluded* (✗). An option with ✗ on a mandatory criterion – typically accessibility, payload or availability for every shift – is out, whatever it costs. The remaining options go into the three-scenario comparison of Section 4.6 and Annex 4. The matrix can be copied into a spreadsheet and completed together by the LA and the SE.

Criterion	Electric car or van (owned or leased)	E-cargo bike / light electric vehicle	Shared electric vehicle (operator contract)	Pooled electric fleet (internal booking)
Trip profile	Daily rounds of any length within the range, several stops per shift; peri-urban and rural services	Short urban trips of a few km on flat terrain; small loads; dense areas	Planned or occasional trips; several services with low individual use; staff travel between sites	Several small services that each need a vehicle for part of the day
Payload, equipment, accessibility	Full range, including wheelchair-accessible vans and meal transport with equipment	Limited load, no passenger transport; meals or parcels in boxes	Standard cars; accessibility fittings only if the operator offers them	Depends on the vehicles put in the pool; can include one accessible vehicle
Terrain and climate	Weather-independent; range falls in winter – plan a reserve	Sensitive to hills, rain, snow and heat; needs safe, dry parking	Weather-independent; availability is the operator's task	As own vehicles
Infrastructure needed	Charging point at the base or at home; public charging as backup	Standard socket; secure storage	None for the user; charging by the operator	Charging points at the pool base; booking system
Utilisation needed to pay off	High – the vehicle should be in use most of the day	Low – small purchase price, pays off quickly	Low to medium – cost follows use	Medium – pooling raises the utilisation of each vehicle
Cost structure	High fixed cost, low running cost	Low fixed and running cost	No fixed vehicle cost; membership plus tariff per hour and/or km	Fixed cost shared across services; internal management effort
Availability for every shift	Guaranteed (own vehicle)	Guaranteed	Must be contracted: service levels, reservation rules, fallback	Booking rules needed; priority services first
Staff	Category B licence; short training on charging and range	No licence for most models; training on safety and load	App registration; pick-up and return effort	Booking discipline; a responsible fleet manager
Procurement and timeline	Purchase or lease; subsidies may apply; delivery times can be long	Purchase; fast delivery	Service contract or framework; depends on an operator being present	Internal reorganisation; possibly purchase of additional vehicles
Emissions	Zero tailpipe; energy-related emissions depend on the grid	Minimal	Zero tailpipe; high utilisation improves the life-cycle balance	Zero tailpipe; fewer vehicles in total

A completed matrix serves as the record of the internal discussion, as the justification of the procurement decision, and as the link between the decision and the baseline data and KPIs – which makes it easy to repeat for another service or territory.

4.5 Vehicle use models: owning, leasing, pooling and sharing

How a vehicle is accessed is a decision separate from what powers it. A service can own its vehicle, lease it, share an internal pool with other services, or use a vehicle only when it moves through a sharing operator. None of these models fits every service; each has strengths and limits, and the choice depends on utilisation, schedules, the need for special equipment, the presence of operators in the territory, and the service's priorities. The Module 2 presenter, a car-sharing operator, made the case for shared electric mobility; the Toolkit's position is that the model is chosen per service on the basis of the comparison in Section 4.6.

Model	How it works	Strengths	Limits – when it does not fit
Own vehicle – purchased	The organisation owns the vehicle; it carries all fixed costs and the residual-value risk.	Full control and guaranteed availability; any equipment or accessibility fitting; simplest for staff; subsidies may apply.	High fixed cost paid whether the vehicle moves or not; capital and parking tied up; a vehicle that stands idle most of the day is expensive per service.
Own vehicle – operating lease or long-term rental	Use of the vehicle for a fixed period, often with maintenance and insurance included.	CAPEX turned into predictable OPEX; residual-value risk transferred; newer vehicles.	Vehicle still dedicated and idle when not in use; contract terms and mileage limits to check.
Pooled fleet with internal booking	Several municipal or social services share one internal fleet through a booking system and a fleet manager.	Raises utilisation of existing or new electric vehicles; no external operator needed; keeps control in-house.	Needs booking rules, a responsible manager and priority rules; conflicts between services must be resolved internally.
Station-based car sharing	The vehicle is reserved, picked up at a fixed station and returned there.	Suits planned rounds from a base; predictable; several teams can share a small pool; charging, insurance and maintenance in one rate.	Depends on an operator and a station nearby; availability must be contracted; accessibility fittings rarely available.
Free-floating car sharing	The user takes the nearest available vehicle in an operating zone and ends the rental anywhere in the zone.	Flexible for unplanned and one-way trips and staff travel between sites; no return to base.	Only in compact urban areas with dense coverage; no guarantee that a vehicle is nearby when needed.
Community or condominium sharing	A small fleet shared within a defined community – a building, an energy community, a neighbourhood.	Combines service use with residents' use and raises utilisation; strong local acceptance.	Needs an organiser and clear rules; service priority must be secured against other users.
Ride sharing / route sharing	Sharing the ride, not only the vehicle: a trip is offered so that others heading the same way join.	Fewer trips for transport of elderly or disabled users to day centres; can be combined with vehicle sharing in one application.	Time windows and user needs limit it; it is not a vehicle solution in itself.

Vehicle sharing is not ride sharing: vehicle sharing means access to the same vehicle at different times; ride sharing means several people travelling together at the same time. In a car-sharing service, the user registers once (licence, identity document, payment method), books a charged vehicle in the application, picks it up at the station or nearby, drives – often with privileges the city grants shared vehicles, such as access to restricted zones and dedicated

parking – and ends the rental; one rate covers energy, insurance and maintenance. Booking lead times, rates, zone privileges, and parking rules depend on the specific operator and city.

The presenter's argument for combining sharing and electrification was that an electric car is cleaner per kilometre, a shared car takes several vehicles off the road (European panel studies quoted: one station-based shared car replaces on the order of nine private cars; switching to car sharing reduces a typical user's transport CO_2 by around 18%; over 70% of new car-sharing fleets in Western Europe are fully electric), and a shared electric car, being used intensively, is the case where electric vehicles work best economically. These are the presenter's figures; the Toolkit asks that they be verified against their source before reuse, and that the decision for a given service be taken on the local comparison.

4.6 Comparing use models for the same service

The decision on the use model is taken by comparing **three scenarios for the same service scope** – the same destinations, the same number of services delivered, the same period: **(1) own conventional vehicle** (petrol or diesel), **(2) own electric vehicle**, **(3) shared electric vehicle** (car sharing, fleet-as-a-service or pooled fleet). For each scenario, the worksheet in Annex 4 records the observed period, kilometres, days of use, hours of reservation, purchase or depreciation, financing, energy, maintenance, insurance, parking and infrastructure; for the shared option, the membership fee, the price of reserved time and/or kilometres under the operator's tariff, pick-up and return effort, and the fallback solution. Costs already included in a tariff are not counted twice; staff costs are usually equal across scenarios and are excluded.

Results are expressed per month, per working day, and per service delivered so they can be compared with the efficiency KPIs of Chapter 3; emissions are calculated over the same boundary in all scenarios (Section 3.4). The worksheet then asks two questions that decide the case: (i) **Can a vehicle of the right capacity and accessibility be guaranteed for every shift?** (ii) **At what utilisation or tariff would the decision change?** At least one sensitivity scenario (lower utilisation or a higher rental price) is shown.

Rule of the comparison. The shared vehicle is not assumed to be automatically the cheapest nor always available, and the electric vehicle is not assumed to be automatically the greenest in every boundary. A good answer states the assumptions, keeps the service scope identical, shows the formulas and names the condition under which the decision would flip. Annex 5 gives a worked example with fictitious data in which the own conventional vehicle has the lowest direct monthly cost, the shared electric vehicle is cheaper than the own electric vehicle at 100 reservation hours but more expensive at 160 hours, and both electric options have much lower calculated operational emissions.

The decision therefore depends on the objective – cost, emissions, continuity of service – and on operational conditions: availability for every shift, range and charging, capacity and accessibility, booking rules, and a tested backup in case the vehicle is unavailable or insufficiently charged (Annex 5, disruption simulation).

4.7 Procurement of green vehicles and of mobility services

Pilot implementation confirmed that public procurement decides whether a good vehicle decision becomes reality. Procurement should be treated as an **enabling mechanism**: LAs translate the methodological requirements into technical specifications, make the award criteria compatible with KPI monitoring, and document the decision for transparency. Green procurement is based on **performance requirements rather than specific products**. Procurement can target a vehicle or a mobility service; the options differ in who carries capital, risk and operational burden:

Option	What is procured	Main implications
Purchase	The vehicle, possibly with charging infrastructure and a maintenance contract.	Full CAPEX and residual-value risk with the organisation; full control; utilisation must be high to justify an electric vehicle; subsidies may apply.
Operating lease / long-term rental	Use of the vehicle for a fixed period, often with maintenance and insurance included.	CAPEX converted into OPEX; residual-value risk transferred; the vehicle is still dedicated and idle when not in use.
Car sharing / fleet-as-a-service contract	Access to a shared fleet under a tariff (membership, time, kilometres) with agreed availability and service levels.	No fixed vehicle cost; pays per use; availability, capacity and accessibility must be guaranteed contractually; depends on an operator being present in the territory.
Pooled municipal fleet	Internal reorganisation: vehicles of several services put into one booking pool.	No external procurement; raises utilisation of existing or newly bought electric vehicles; needs a booking rule and a responsible fleet manager.

Whichever option is chosen, the procurement documents specify **functional requirements** – capacity, accessibility, range with a safety reserve, availability windows, response time when a vehicle fails, data to be reported for KPI monitoring – and the award criteria are compatible with the KPIs of Chapter 3 and the cost comparison of Section 4.6. The municipality also controls levers outside the contract that make green and shared mobility viable for its own services and for its citizens: dedicated parking bays, access to restricted traffic zones and bus lanes, parking and incentive schemes, and public charging.

4.8 Conditions to verify and manage the transition

A case that only lists strengths is a sales pitch. Before any local decision, verify the following conditions, which the Module 2 presentation itself named as limits:

- **Density.** Sharing works best in compact cities with short trips and nearby vehicles; in low-density and rural areas, coverage and range gaps appear, and the answer is targeted solutions (hubs, pooling, own vehicles), not one model for everywhere.
- **Complementarity with public transport.** Sharing must add to public transport, not pull people off buses and trams; otherwise the environmental benefit is lost.
- **Purchase price and the grid.** Electric vehicles still cost more upfront, and an electric vehicle is only as clean as its electricity; both are improving, but neither is fully solved.
- **Operator- and location-specific conditions.** Range, availability, tariffs, charging, parking, and access to special zones are properties of a specific vehicle, operator, and city and must be confirmed locally, in writing, before the comparison in Section 4.6 is finalised.

- **Service priority.** A vehicle unavailable before a priority home visit is a service failure, whatever it costs; the backup procedure is part of the decision.

Once decided, treat adoption as a **managed transition** rather than a one-off investment: implement gradually, involve and train staff, monitor with the KPIs of Chapter 3, and adjust based on real performance. The pilots showed that this iterative learning is what makes green mobility solutions last.

5. Methodology in Practice: Governance, Route Planning and Long-Term Use

Foundation for Module 3 of the online course – Practical application for municipalities, including routing and urban planning aspects. Delivery guide: Section 6.5.

This chapter turns the methodology into day-to-day practice and keeps it working after the project. It shows how the approach developed in WP1 and validated in WP2 is embedded in the routines, governance and decision-making of LAs and SEs (Sections 5.1, 5.2, 5.6), and it presents the practical core of the Module 3 presentation: route planning for city and social services, the tools available for it and the urban planning aspects that surround it (Sections 5.3–5.5). **Result of this chapter:** a reviewed round with a feasible improved route, one organisational change with its effects assessed, and an implementation roadmap.

5.1 From methodology to practice in six steps

The methodology is cyclical and iterative, not linear. In the pilots, its practical application followed six steps: **baseline assessment** with common tools and indicators; **identification of priority services** – those with the highest impact or greatest potential; **selection of solutions** – vehicle, use model, routing and organisational changes, based on service characteristics and KPIs; **pilot implementation** under real conditions and within local administrative frameworks; **monitoring and evaluation** through KPIs and qualitative feedback during defined collection periods; and **adjustment and scaling** to further services or territories. This sequence proved effective in managing complexity and uncertainty.

Implementation rests on two pillars. The **quantitative pillar** – baseline footprint, KPIs on mobility, emissions, fleet and efficiency, comparisons across periods – measures what changed. The **qualitative pillar** – documentation of the implementation process, operational challenges, justified deviations from the plan, and the lessons of mobility managers and operators – explains why. Both are needed to learn from a pilot and to transfer it.

5.2 Governance, roles and integration into daily operations

Clear governance is what makes the methodology sustainable. **Local Authorities** provide strategic coordination and oversight, integrate the approach into mobility, climate and social policies, align it with procurement and reporting frameworks, shape the operating environment of the services – parking, charging, bases, access to restricted zones – and support capacity building across departments. **Social Enterprises** implement solutions in daily operations, collect and validate data, plan and review service routes, engage staff and beneficiaries, and report on feasibility and impact. **Knowledge and technical partners** support methodological consistency, help interpret data and KPIs, advise on routing tools when a problem exceeds what free tools can handle, and facilitate peer learning.

For lasting impact, the methodology must sit inside existing routines: data collection integrated into regular workflows, clear responsibility for mobility management and route planning, KPIs linked to internal reporting cycles, and green mobility decisions aligned with

service planning and budgeting. Integration works best when mobility managers and service operators are involved from the start.

5.3 Route planning for city and social services

Everyone uses navigation applications, but planning the trips of a public service – home care, meal delivery, maintenance teams, social workers – goes beyond finding a route from A to B: several destinations, several vehicles and staff, time windows, working hours and competences. The Module 3 presentation (HUN-REN SZTAKI) showed how trip planning grows from navigation into an optimisation problem, why some problems are easy and others surprisingly hard, and which tools fit each level. This section condenses that content into a procedure a service coordinator can apply without programming.

There is no "best route" without an objective

The best route depends on what is optimised: the fastest, the shortest, the cheapest or the greenest – or a combination. The shortest may run through the centre, the fastest may use a longer bypass, a toll road may save time but cost more, a greener route may take slightly longer. The operator chooses the objective, not the software. In social services, the objective is bounded by service quality: lower mileage or emissions must never come at the expense of punctuality, availability, or quality of care. Navigation software turns the map into a graph – intersections are nodes, streets are edges, each edge carries a weight (distance, time, cost or emissions) according to the objective – and searches for the path with the lowest total weight; each transport mode has its own network and constraints.

Three levels of planning

Level	Question	Difficulty and typical tool
Navigation (A → B) and fixed order of visits	Which path between two points is best for the chosen objective? If the order of visits is given, plan each leg in sequence.	Solved in seconds by any navigation app; the total is the sum of the legs.
Travelling salesman problem (TSP)	In which order should one worker visit all destinations to minimise distance or time?	Easy for a few stops by looking at the map; the number of possible orders grows extremely fast as the number of stops increases. Free tools that reorder stops exist (Section 5.4).
TSP with time windows and other constraints	As above, but some locations can only be visited during certain hours, and some tours need not return to the base.	Beyond standard navigation apps; partly manageable with free tools plus manual checks.
Vehicle routing problem (VRP)	Several workers and vehicles: who visits which location, and how is the workload divided, to minimise total distance or time? Variants add depots, capacity, working hours, time windows and vehicle-specific restrictions.	What parcel-delivery, waste-collection and maintenance companies solve daily. Needs specialised routing software – mostly commercial – or open tools that require programming (Section 5.4). Complexity grows exponentially with the number of locations.

The practical lesson for a municipality: **the right tool depends on the problem's complexity**. For everyday journeys and one vehicle with several stops, free tools are enough; for several vehicles with constraints, specialised software or expert support is needed.

Route review procedure

Before planning, record for every location an identifier, the time window in which the visit may start, the duration of the visit, the priority of the user, the staff competence required, the vehicle capacity or equipment required, and the start and end of the shift; plus the base or starting point, the end location, the return rule and a verified time and distance matrix (or a clearly labelled fictitious dataset for training). Early arrival means waiting; add breaks and delays where relevant. Then:

1. **Define the objective** for the round (time, distance, cost, emissions) and the mandatory constraints (time windows, priorities, competences, capacity, shift limits).
2. **Build the baseline schedule**: the current order of visits with kilometres, driving time, waiting time, service time and time of return.
3. **Reorder** the visits – manually for a few stops, or with a free reordering tool for a single vehicle – and recompute kilometres, driving and waiting time.
4. **Check every constraint** after adding service and waiting times; a route that violates a mandatory constraint is not a solution, however short it is.
5. **Compare** baseline and proposed route: relative change (%) = (baseline − new) / baseline × 100. Total tour time includes driving, service, waiting and breaks; shorter driving time is not proof of a shorter working day, and the percentages for kilometres, driving time and total time need not be equal.
6. **Justify the choice** and the tool used and – where several workers are involved – propose the allocation of locations to workers with different competences.
7. **Record the result** in the worksheet (Annex 2) and, if it will be implemented, in the implementation roadmap (Annex 7: owner, deadline, KPI, risk).

In the Module 3 demonstration, six addresses in Szombathely were pasted into a free online route planner; reordering the stops reduced the travel time and distance of the round with almost no technical knowledge required. Trainers repeating the demonstration should use the figures from the slides or the recording, as the automatic transcript of this passage is inconsistent (Annex 8).

Routing and work organisation together

One of the presentation's main lessons is that **organisational changes can bring larger benefits than route improvement.** In the example shown, two specialised operators with two vehicles each serve their own type of task and their routes overlap heavily; training one operator to perform both types of tasks makes the system more flexible and reduces total travel; training both reduces it further. Combining tasks applies only where it matches the competences of the staff and the requirements of the service – a home-care visit cannot be merged with a maintenance job because the addresses are close. Organisational decisions and route optimisation are therefore considered together, and the effect on staff workload and on service quality is assessed alongside the kilometres saved.

5.4 Route planning tools: what to use at which level

The table provides an overview of tools by level of complexity, with examples named in the Module 3 presentation or commonly used. Features, free limits and prices change; check the

current conditions before relying on a tool, and remember that beneficiary addresses are personal data – cloud tools that process them need a data-processing agreement, and training exercises use fictitious or public addresses only.

Level	Examples	What it does	Limits and cost
Navigation, few stops in a fixed order	Google Maps, Apple Maps, Waze, national journey planners	Best path between points for the chosen mode; several intermediate stops in the order entered (Google Maps: up to ten destinations).	Does not reorder stops; no time windows or service durations. Free.
One vehicle, reorder the stops (TSP)	MapQuest Route Planner (used in the demonstration; up to 26 stops), RouteXL (free for up to 20 stops), free tiers of Circuit, Routific and similar planners	Optimises the order of stops for one round by time or distance; you can paste addresses as a list; the result can be sent to a navigation app.	Free tiers limit the number of stops and routes per day; time windows, service durations and competencies are only partly supported and must be checked by hand. Paid upgrades available.
Several vehicles with constraints (VRP) – open tools	openrouteservice optimisation API (VROOM), OSRM with VROOM, Google OR-Tools, GraphHopper / jsprit	Multi-vehicle routing with time windows, capacities, skills and depots; scriptable and repeatable.	Requires programming or IT support; hosted APIs have quotas. Free and open source; hosting or support costs.
Several vehicles – commercial routing software	Fleet and route optimisation suites (e.g. PTV Route Optimiser, Routific, OptimoRoute, Onfleet, Circuit for Teams)	VRP with driver apps, live tracking, in-day re-planning, and reporting.	Licence or subscription; data-processing agreement needed; implementation effort.
Home-care and social-service scheduling	Care-management systems with routing modules (country-specific sector software)	Combines staff rostering, competences, visit windows and routes; visits' documentation.	Procurement and integration with existing records; subscription.

A pragmatic path for a small municipality or service: start with a free reordering tool for each single-vehicle round and the paper worksheet in Annex 2 to check constraints; move to open or commercial VRP tools, with expert support from the knowledge partners, when several vehicles and constraints must be planned together.

5.5 Urban planning aspects and service-quality indicators

The municipality shapes the environment in which routes are driven: the location of bases and depots, charging and parking infrastructure, access rules for restricted zones, and the integration of service mobility into mobility and climate plans – the Integrated Green Mobility Plans of D3.2.1 provide the pathway into SUMPs or equivalent documents. A route review that reveals a badly located base, a missing charging point or a zone-access problem should feed these instruments rather than remain an operational note. Beneficiary addresses used for planning are handled according to Section 3.2.

For monitoring route and vehicle-use changes, the Toolkit proposes to track, for periods with comparable scope and type of service: kilometres per service delivered; minutes of driving per service delivered; cost per service delivered; CO_2e per service delivered with the boundary stated; share of on-time arrivals (visit started within its time window); and number of visits not delivered. These indicators (Section 3.5, Annex 7) complement the official project KPI set and ensure savings are not achieved at the expense of service.

5.6 Sustainability, replication and transfer

The methodology is designed to remain in use after November 2026. Its sustainability rests on simple and replicable tools, compatibility with existing mobility and climate plans, adaptability to different services and territories, and progressive improvement rather than fixed targets. LAs are encouraged to adopt it formally in their strategic documents; SEs can integrate it into internal management and quality-assurance systems.

Replication across Central Europe and beyond is supported by the methodology's modular structure, standardised KPIs and data logic, the documented pilot experience, and the training materials in this Toolkit, which allow modules to be repeated locally by a trainer who is not the author. The approach transfers to additional services within the same municipality, to other municipalities and regions, and to other public services with a mobility component. The local pilot transfer template (Annex 7) is the instrument for this transfer.

6. The Three-Module Transnational Online Course: Delivery and Repetition

The Green LaMiS transnational online course was delivered on **10 September 2026** as one live event on Zoom, following the format agreed in the partnership (document: *Proposed structure and points to consider for Activities 3.1.a and 3.1.b*; 25th online meeting of 18 June 2026): three pre-recorded presentations in English of up to 30 minutes each, with AI-generated subtitles in Croatian, Hungarian and Italian, each followed by a moderated live Q&A block. Participants could attend at the partner municipalities, where municipal staff acted as facilitators, and the event promoted the project's final event in Bergamo (21–22 October 2026).

This chapter records how the course was organised and gives, for each module, a delivery guide with learning outcomes, content and timing, materials, likely questions and an extended workshop format, so that any module can be **repeated as a local workshop** – at the local events in the partner territories that the partnership foresaw for November 2026 (25th online meeting), and by any municipality after the project. Throughout, the Toolkit distinguishes the **recorded presentation content** (what was delivered, referenced with transcript timestamps) from the **proposed didactic extensions** (learning outcomes, exercises, assessment, extended formats), which are proposals for local repetition and not evidence of what happened at the online event.

6.1 Course format and agenda

Module	Title	Presenter	Recording	Toolkit chapter
Module 1	Carbon footprint tool, indicators and data collection system	Fondazione Politecnico di Milano	approx. 30 min	Chapter 3
Module 2	Green vehicles, including their use, characteristics, performance and consumption	Elettra Car Sharing (Associated Partner) – Marco Silvestri	approx. 27 min (transcript 0:01–26:56)	Chapter 4; Annexes 1, 4, 5, 6
Module 3	Practical application for municipalities, including routing and urban planning aspects	HUN-REN SZTAKI – Institute for Computer Science and Control	approx. 17.5 min (transcript 0:04–17:25)	Chapter 5; Annexes 1, 2, 3, 6

The original project note foresaw a 90-minute course; the three recordings alone take about 75 minutes, so a live event with an introduction, three Q&A blocks and a conclusion needs about two hours and a quarter. The agenda below is the structure used for the event and the template for its repetition. Where a strict 90-minute slot is required, share the full recordings with registered participants a few days before, show a 10–12 minute highlight per module live, and close with one joint Q&A block of about 30 minutes.

Time	Agenda item	Led by
0:00–0:10	Welcome, project introduction, agenda and housekeeping (recording notice, microphone and chat, subtitles, language support)	Moderator
0:10–0:40	Module 1 – recorded presentation	Technical support (playback)

Time	Agenda item	Led by
0:40–0:52	Module 1 – live Q&A	Moderator, presenter, content focal points
0:52–1:19	Module 2 – recorded presentation	Technical support (playback)
1:19–1:34	Module 2 – live Q&A and discussion on local applicability	Moderator, presenter, content focal points
1:34–1:39	Short break	-
1:39–1:57	Module 3 – recorded presentation	Technical support (playback)
1:57–2:09	Module 3 – live Q&A and discussion on routes and work organisation	Moderator, presenter, content focal points
2:09–2:15	Conclusion: one application step or open question per participant or municipality; evaluation link; follow-up channel; invitation to the final event	Moderator

6.2 Roles and preparation

The roles below were agreed in advance and assigned as shown; one person should hold only one role during an event. The same set of roles applies to a local workshop, where several roles may be merged if the group is small.

Role	Main tasks
Moderator	Leads introduction and conclusion, introduces each module, manages time and the flow of questions, groups similar questions, involves participants from different organisations, invites language support or content focal points to step in, coordinates with the chat monitor.
Language support	Does not translate the presentations (subtitles cover this). Steps in when needed: translating chat questions, clarifying a participant's question, helping participants who do not fully understand an answer in English. Reviews the AI-generated subtitles before the event.
Content focal points	Support the Q&A from the local or technical perspective, especially when the language support person does not know the topic in depth. Separate from language support where possible.
Chat monitor	Follows questions and technical comments in the chat, groups them by module, alerts the moderator via a direct channel (WhatsApp, Viber or similar), records unanswered questions in the question register (Annex 7).
Technical support	Organises the Zoom meeting; prepares and tests the link, recording, sound, video, screen sharing, and playback; assists participants with access issues; responds to technical problems.
Presenters	Define and record the content in clear, accessible language; answer questions live and, later, in writing.
Activity leader and Toolkit author	Review each presentation before the event (clarity, accessibility, fit with the audience), confirm the evidence package for reporting, update the Toolkit after the event.

Preparation followed a countdown that also applies to a local workshop:

When	What	Who
6 weeks before	Presenters confirm the content outline of their module (Sections 6.3–6.5).	Presenters, Activity leader

When	What	Who
4 weeks before	Send draft presentations for review; check fit with the audience and plain language.	Presenters → Activity and WP leaders
3 weeks before	Final recordings produced (max 30 min); subtitles generated in HR, HU, IT and reviewed for names, numbers, units and terms; figures quoted in the recordings checked against their sources (Annex 8).	Presenters, language support
2 weeks before	Finalise the one-pager (agenda, short invitation text, how to register and join) and translate it into local languages; each municipality invites its own audience.	Communication lead, municipalities
1 week before	Technical rehearsal on Zoom: playback, sound, screen sharing, recording; briefing on all roles; review expected questions; test the tool and exercise data.	Technical support, all roles
Event day	Run the event according to the agenda; collect screenshots and the participant list; log questions.	All roles
2 working days after	Share presentations, worksheets, a summary of questions, and (where permitted) the recording with participants.	Activity leader, technical support
14 days after	Accept additional questions through the follow-up channel and answer them within 5 working days (Section 6.6).	Activity leader, presenters
30 days after	Short enquiry on what has been applied and which obstacles remain; input to the next Toolkit version and the local events.	Activity leader

6.3 Module 1 delivery guide – Carbon footprint tool, indicators and data collection system

Aim and learning outcomes. Participants can independently calculate the carbon footprint baseline of their own last-mile service with the Green LaMiS CO2 Tool. After the module, they are able to: identify the data the tool needs (service, fleet and activity data, journey features) and who should collect them; enter the data in the input, fleet, public transport and electric fleet forms and distinguish mandatory from optional fields; run the tool, save the baseline and read the main KPIs; build simple scenarios (e.g. replacing a petrol car with an electric car, with and without green electricity) and compare them with the baseline; and explain the two levers for reducing emissions – organisational (fewer kilometres) and technological (lower emission factor).

Content and timing. The recorded presentation follows the Module 1 video script (Politecnico di Milano) and combines explanation with a demonstration on a worked example – a small home-delivery service with one diesel van and one petrol car:

Part	Content	Time
1	Introduction: purpose of the module and structure of the presentation	3 min
2	Data collection: general service information (city, service, operator, compiler, inventory year, users served, staff and volunteers) and mobility data (fleet and activity data, journey features)	6 min
3	Demonstration: filling the input and fleet forms, skipping non-applicable forms, conversion and emission factor sheets, running the tool and saving the baseline	10 min
4	Reading the results: carbon footprint KPIs and their meaning; emissions = consumption × emission factor	4 min

Part	Content	Time
5	Scenario building: switching a car to electric, effect of green electricity, comparison with the baseline	4 min
6	KPIs for territorial analysis and wrap-up: the first task for every service is the baseline analysis, as done by the pilot cities for 2023	3 min

Methodology and materials. Demonstration-based learning: participants watch the tool being used on a realistic example and replicate every step with their own data afterwards. They receive the recording with subtitles, the CO2 Tool (Excel) with the data collection form used in the demonstration, and a one-page quick reference (mandatory data, the basic formula, the two levers). **Likely questions:** which data are mandatory and what if we have no fuel records; how to treat vehicles shared between services; how often to update the baseline; whether the tool compares more than two scenarios; where the emission factors come from and whether they can be adapted nationally. Questions not answered live are recorded by the chat monitor and answered in writing within five working days.

6.4 Module 2 delivery guide – Green vehicles, including their use, characteristics, performance and consumption

Aim and learning outcomes. The Module 2 presentation (Elettra Car Sharing, approx. 27 minutes) links fleet electrification with vehicle-as-a-service use, covers the environmental, economic and social arguments, the sharing models, the user journey and the limits of application, and connects mobility explicitly with meal delivery, home care and the transport of elderly and disabled residents. The aim is for participants to justify their choice of vehicle and **use model for the same scope of public service**. After the module, they are able to:

- distinguish electrification, vehicle sharing and ride sharing and explain their possible role in a chosen public service;
- distinguish tailpipe, energy-related and life-cycle emissions and state the boundary of a comparison;
- compare one's own conventional vehicle, one's own electric vehicle and a shared electric vehicle for the same service scope;
- choose a use model according to availability, schedule, range, charging, accessibility and backup, using the selection matrix of Section 4.4;
- draft a booking and pick-up procedure and a response to at least two disruptions (vehicle unavailable; insufficient charge).

These are proposed measurable outcomes for the extended workshop format; the recording provides the content that supports them.

Content and timing of the recording:

Part	Content of the recording	Transcript
1	Framing: Elettra Car Sharing; the Green LaMiS context (pilots in Bergamo, Szombathely and Klis, common footprint method and KPIs); the vehicle that "never stops moving" as the hardest case; a private car is parked most of the time, and most of its cost is fixed; transport in European emissions.	0:01–3:43
2	Two separate shifts: what we drive (combustion → electric) and how we access the vehicle (owning → sharing); the link to social-service fleets.	3:43–6:20

Part	Content of the recording	Transcript
3	Culture and objections: possession versus access; the four objections (range, charging, battery footprint, "a compromise").	6:31–9:19
4	Evidence – environment: life-cycle emissions by powertrain (ICCT 2025 study quoted), carbon-debt payback, zero tailpipe emissions and public health, vehicles replaced by one shared car, and reduced user transport CO_2.	9:28–12:37
5	Evidence – economics: fixed versus running costs, share of energy in total cost, what sharing removes, running-cost advantage of electric vehicles; the caveat on purchase price and why high utilisation is where electric pays off; city levers.	12:47–16:04
6	Evidence – social: access without upfront capital, public space, community ownership.	16:20–17:43
7	How it works – the user journey: register, book, pick up (station-based or free-floating), drive with city privileges, end the rental with one transparent rate.	17:55–19:14
8	Sharing in small communities; carpooling and route sharing through the same application.	19:25–20:49
9	Limits: density and coverage, complementarity with public transport, purchase price and the grid.	21:04–22:28
10	The ask – drivers, households, city managers (dedicated bays, restricted-zone access, parking and incentive schemes); closing; where to find Green LaMiS results; invitation to questions.	22:38–26:56

Methodology and materials. A webinar with a thematic presentation, charts and numerical comparisons, questions for reflection, treatment of objections and the user journey; the recording ends with an offer to answer questions; the discussion itself is not recorded. For live and repeated delivery, the Toolkit adds a **moderated discussion and Q&A** (microphone and chat) on local applicability; hands-on use of a booking application or a vehicle is not part of the module. Participants receive the recording with subtitles, the vehicle use model worksheet with three scenarios and scenario cards (Annex 4), the selection matrix (Section 4.4) and the procurement options (Section 4.7), and the knowledge check and evaluation form (Annex 6).

Likely questions: the realistic range of an electric vehicle in winter and on our terrain; whether a shared vehicle can be guaranteed for every shift and what happens if two teams' bookings overlap; who carries the cost of waiting or of a replacement; whether there is a car-sharing operator in our territory and what a fleet-as-a-service contract looks like in public procurement; how to finance the higher purchase price and which subsidies exist; whether the vehicle can carry wheelchair users or meal containers; which condition could exclude the cheapest option; which data we need before a local pilot. Content focal points prepare short answers on national conditions (subsidies, charging network, procurement rules, operator presence). Discussion questions for the moderator are in Annex 5.

Extended local workshop format (90 minutes, proposed):

Block	Content	Time
1	Introduction and needs of the users of the service; initial check questions (Annex 6)	5 min
2	Recorded presentation (or live presentation by the trainer following the table above)	27 min
3	Cost and emission comparison of the three scenarios in pairs (Annex 4), after narrowing the options with the selection matrix (Section 4.4)	20 min
4	Simulation of booking and of an operational disruption (Annex 5)	15 min
5	Moderated discussion on local applicability with Q&A	15 min

Block	Content	Time
6	Individual knowledge check and conclusion (Annex 6)	8 min

Evidence of learning: a comparison of three scenarios with stated assumptions, the selected use model and a service-continuity plan. The trainer prepares the disruption cards and clearly separates demonstration prices from real offers.

6.5 Module 3 delivery guide – Practical application for municipalities, including routing and urban planning aspects

Aim and learning outcomes. The Module 3 presentation (HUN-REN SZTAKI, approx. 17.5 minutes) explains the step from navigating between two points to optimising the order of visits and allocating tasks to several vehicles; it stresses the choice of objective, the operational constraints and the effect of work organisation, and includes a demonstration of reordering six locations in a free online route planner and an example of cross-training staff. The aim is that participants can **produce and justify a feasible improved round plan** for their own service. After the module, they are able to:

- distinguish navigation, TSP and VRP and classify three given operational cases;
- define, for a concrete round, the optimisation objective and at least four constraints, including service duration and staff availability;
- compare a baseline and an improved order of visits for six locations and calculate the change in time and distance – on paper and with a route planner (Annex 2);
- check that the proposed route satisfies all mandatory constraints and justify the choice of tool (Section 5.4);
- propose one organisational change and explain its effect on routes, staff workload and service quality.

These are proposed measurable outcomes for the extended workshop format. Section 5.5 and the implementation roadmap (Annex 7) cover the urban-planning aspects of the module title.

Content and timing of the recording:

Part	Content of the recording	Transcript
1	Introduction: trip planning for city services goes beyond A → B; what "the best route" means – fastest, shortest, cheapest, greenest; several destinations, modes, vehicles and constraints.	0:04–2:00
2	How navigation works: the road network as a weighted, directed graph; the objective sets the weights; different modes need different networks.	2:00–5:55
3	Several destinations: fixed order versus free order – the travelling salesman problem; combinatorial growth; time windows and open tours; where navigation apps stop.	5:55–8:09
4	Demonstration: a free route planner (MapQuest Route Planner) reordering six locations in Szombathely pasted as addresses; route in the pasted order, then reordered; time and distance reduced with almost no technical knowledge.	8:09–10:56
5	Several vehicles: the vehicle routing problem and its variants; who uses it; tools are specialised and mostly commercial, or open but programming-heavy (Google OR-Tools); exponential complexity.	10:58–13:58
6	Theory and practice: optimisation is not only about routes – organisational change can bring larger benefits; two specialised operators with overlapping routes and the effect of training one, then both, for both tasks.	14:04–15:45

Part	Content of the recording	Transcript
7	Key messages: from navigation to broader optimisation; the right tool depends on the problem's complexity; closing.	15:52–17:25

Methodology and materials. A presentation with a demonstration approach – maps, graphs and visual examples, a live demonstration of the route planner – structured as a problem-based opening question, a gradual increase of complexity and a comparison of organisational scenarios. The recording contains no discussion or participant exercise; for repeated delivery, the Toolkit adds a **moderated discussion and Q&A** on participants' own services, plus the reproducible six-location exercise in Annex 2 in its paper and digital variants. Participants receive the recording with subtitles, the route planning worksheet with the fictitious dataset (Annex 2), the route review procedure (Section 5.3) and the tool overview (Section 5.4), the roadmap template (Annex 7), and the knowledge check and evaluation form (Annex 6).

Likely questions: do we need special software or can we start manually; which free tool reorders stops and does it handle time windows; what to do when two workers have different competences; how to protect beneficiaries' data when mapping routes; how to handle an urgent visit that breaks the planned route; what about a rural service with long distances; who should own the roadmap in a small municipality. Discussion prompts: which constraints in your work take precedence over kilometres; when does combining tasks require additional competences.

Extended local workshop format (75 minutes, proposed):

Block	Content	Time
1	Introduction and initial task (classify three cases: navigation, TSP or VRP); initial check questions (Annex 6)	5 min
2	Recorded presentation (or live presentation by the trainer following the table above)	18 min
3	Data preparation: reading the worksheet, the map and the distance rule (Annex 2)	10 min
4	Pair work on the six-location round: baseline, improved route, constraint check – on paper and, where internet is available, with a free route planner; last 3 minutes for the feasibility check	22 min
5	Moderated discussion on routes and work organisation with Q&A	12 min
6	Individual knowledge check and conclusion (Annex 6)	8 min

Evidence of learning: a completed worksheet with the baseline and improved route, the constraint check and a short recommendation. The savings calculation is valid only for comparable input data; without internet, the task is solved on paper with the given distance rule.

6.6 Checking learning, evaluation and follow-up

Participation alone is not evidence that learning outcomes were achieved, so the Toolkit proposes a light assessment scheme for local workshops: an **initial check** of three short questions before the presentation (not graded; used to adapt the delivery); a **final knowledge check** of five questions per module with an answer key (Annex 6), proposed threshold 4/5 with the possibility to answer again after clarification; and a **practical assessment** of the worksheet against four criteria scored 0–2 each – problem model, accuracy of the comparison, feasibility,

justification (0 = missing or wrong; 1 = partial, minor rework; 2 = correct and independently justified) – with a proposed threshold of 6/8 and the mandatory service constraints satisfied in all cases. In group work, each participant briefly justifies their own choice. Knowledge, practical work and satisfaction are reported separately.

Evaluation uses the short form in Annex 6: five statements rated 1–5 (clarity, usefulness of examples, applicability, availability of materials, room for questions) and three open questions (what will you apply, what should be improved, which support do you need). **Evidence for project reporting**, archived by the Activity leader: agenda, invitation and promotion material, participant list, screenshots, the recording, the three presentations and transcripts, the question register and the evaluation summary.

Follow-up after an event. Within two working days, the presentations, worksheets, summary of questions and – where permitted – the recording are shared with participants. Additional questions are accepted for 14 days through the follow-up channel (the Eupolis Group contact in Chapter 8, unless the organiser of a local workshop names another) and answered in writing within five working days by the presenter or a content focal point; the shared Q&A overview is updated and recurring questions feed the next version of the Toolkit. After 30 days, a short enquiry asks what has been applied and which obstacles remain. Participants may send a completed worksheet or a question on local application; if it requires the review of a concrete route or use model, an additional online consultation is agreed. The question register (Annex 7) includes date, module, question, responsible person, deadline, answer, and status; it never includes personal data of service users.

6.7 Running and promoting the event: checklist

The course targets municipal staff, local public institutions, social service providers, coordinators of public and social services, fleet managers and dispatchers, home-care providers, stakeholders in mobility planning, practitioners interested in carbon footprint tools, green vehicles and vehicle sharing, and those involved in routing, transport and urban planning. Each municipality identifies and invites its own audience with a simple one-pager – agenda, short invitation text, how to register and join – translated into the local languages.

- Zoom meeting created, tested, and recording enabled (technical support); backup co-host assigned; recordings tested for playback with sound and subtitles; demonstration tool and exercise data tested.
- At the start, the moderator explains microphone and chat use and that questions are collected during each presentation and grouped by module.
- Moderator and chat monitor connected through a direct messaging channel throughout; language support persons and content focal points present and briefed – they intervene at the moderator's invitation.
- Q&A blocks of about 12–15 minutes per module respected; unanswered questions transferred to the question register.
- Accessibility: readable worksheets, text alternatives for maps and demonstrations, a glossary, pair work possible without a personal smartphone, paper variant of the exercises ready.

- Screenshots taken during each module and the participant list exported; evaluation link shared before the conclusion; at the close, each participant or municipality names one application step or one open question.
- Within two working days: materials and summary of questions shared (Section 6.6).

7. Collective Knowledge Sharing Moment and Citizen Engagement

Besides the Toolkit and the online course, Activity 3.1 includes two elements addressed to citizens, both led by the Municipality of Klis: a **collective knowledge sharing moment** and an **online brochure**. The Application Form describes the first as a moment of direct exchange between the partners and citizens, taking place in every project country at the same time; the partnership's plan foresees it as local events in the three partner territories (November 2026) and the brochure – collecting significant stories of the people involved – for October 2026. This chapter is the practical guide for both, and for any municipality that wants to involve citizens in the greening of its services after the project. It is relevant for LAs, SEs and other local stakeholders.

Why engage citizens? Green mobility measures work best when communities understand, accept, and co-own them. Engagement raises awareness of the environmental and social impact of service mobility, strengthens acceptance of green vehicles and new service models, makes public action transparent, collects qualitative feedback that KPIs do not capture – the experience of users, operators and neighbours – and creates a sense of shared responsibility. Engagement should be proportional, inclusive and adapted to the local context; small, targeted interactions are often more effective than large events.

Formats. Local workshops and roundtables; demonstration events and open days, including a trial trip in an electric or shared vehicle as suggested in Module 2; mobility walks and on-site visits to a service base; public presentations and discussions; online activities. Engagement is most effective when linked to a concrete pilot action and a visible change in service delivery, and when it is coordinated with the project's communication and dissemination activities.

Organising the event – checklist

Element	What to decide or prepare	Who
Objective and message	One clear objective (inform, collect feedback, show the pilot vehicle, launch a service change) and two or three key messages for citizens	LA with SE
Target group and format	Who is invited (service users and families, neighbours, associations, staff, media) and which format fits them	LA
Timing and place	Date in the agreed window; coordination with the other partner territories for the transnational moment; accessible venue or route; link to the pilot service	Klis coordinates; each municipality organises
Programme	Short presentation of the project and of the local pilot results (KPIs in plain words, Section 3.5); demonstration; open discussion; story collection corner	LA, SE, technical partner
Materials	Invitation, agenda, presentation (project visual identity and funding acknowledgement), story template, evaluation slip	Communication lead
Evidence	Agenda, invitation, participant count or list, photos, stories collected, summary of feedback	Organiser
Follow-up	Feedback fed into service planning; stories forwarded to the online brochure; results shared on project channels	LA, Klis

Stories for the online brochure

Storytelling translates technical results into meaning: it focuses on people rather than technology, on concrete changes in daily life, on benefits for users and operators, and on the local context. The Green LaMiS storytelling video and the *Voices of Green LaMiS* series are examples; the online brochure collects stories from citizens, operators and managers in the three countries. To keep them consistent and comparable, each story addresses five questions: **who** was involved; **what** change was implemented; **which challenges** were encountered; **which benefits** were observed; and **what lesson** can be shared with others. Stories are collected with a simple template, in the local language and translated for the brochure; personal data of service users are never included. Documented feedback and stories are reused beyond the event – in planning and decision-making, in the policy recommendations (the Green LaMiS Decalogue and political roundtable), in training as real-life examples, and in the replication of solutions elsewhere.

8. Contacts

The Toolkit is a living resource. Users are invited to share experience and lessons learned, to report on the usability of tools and templates, and to propose improvements; feedback is collected after each training and engagement event and incorporated into the next version. The Toolkit can also serve as a reference framework for follow-up projects, policy development and capitalisation at local, national and European level.

Toolkit (D3.1.1) – Lead Activity Partner	Eupolis Group Ltd. – Activity 3.1, Capacity Building Toolkit www.eupolisgrupa.hr · info@eupolisgrupa.hr · +385 21 566 864
Online course, collective knowledge sharing moment, online brochure	Municipality of Klis (organisation of the Activity 3.1 events), with technical support from Westpannon
Project Lead Partner	Fondazione Politecnico di Milano www.fondazionepolitecnico.it · Project Manager: greenlamis-pm@fondazione.polimi.it · Communication Manager: greenlamis-cm@fondazione.polimi.it · +39 02 23999138
Project partners	For implementation of the methodology, pilots, and training in each country, contact the respective Green LaMiS partner (Local Authorities, Social Enterprises, technical partners). The project results, the carbon footprint methodology and the KPIs are published on the Green LaMiS website and social media channels.

Annex 1 – Workshop Cards

The cards summarise, on one page each, how to run Module 2 and Module 3 as a stand-alone local workshop. Module 1 is delivered as described in Section 6.3 with the CO2 Tool manual.

A1.1 Workshop card – Module 2: Green vehicles, procurement and vehicle use models

Purpose	Justify the choice of a vehicle and of its use model (own conventional, own electric, shared electric) for the same scope of public service.
Audience	Fleet managers, care coordinators, procurement officers, local administration staff.
Prerequisites	Basic cost arithmetic; no programming.
Expected result	A comparison of three scenarios with stated assumptions, a selected use model and a backup procedure.
Learning outcomes	Section 6.4 (five outcomes).
Format and duration	Online or in person: presentation, selection matrix, scenario comparison, simulation, moderated discussion. Recording approx. 27 min; extended workshop 90 min (Section 6.4).
Needed	Presentation (recording with subtitles or slides), selection matrix (Section 4.4), scenario cards and data (Annex 4), disruption cards (Annex 5), calculator, chat or flipchart. Demonstration prices clearly separated from real offers.
Assessment	Knowledge check M2 (Annex 6, threshold 4/5) and practical rubric (Section 6.6, threshold 6/8).
Follow-up	Worksheets may be sent to the follow-up channel within 14 days (Section 6.6).

A1.2 Workshop card – Module 3: Route planning for city and social services

Purpose	Produce a feasible round plan with a clear objective and constraints, and justify it.
Audience	Service coordinators, dispatchers, home-care providers, local administration staff.
Prerequisites	Basic reading of schedules and tables; no programming.
Expected result	A completed route worksheet (baseline and improved route, constraint check) and a justified choice of route and tool.
Learning outcomes	Section 6.5 (five outcomes).
Format and duration	Online with presentation and screen sharing, or in person; pair work and moderated discussion. Recording approx. 17.5 min; extended workshop 75 min (Section 6.5).
Needed	Video-conferencing tool with chat or a room with projector; presentation; worksheet (Annex 2); calculator; a free route planner for the demonstration and the digital variant (Section 5.4), or the paper variant. The trainer tests tool, data and access beforehand.
Assessment	Knowledge check M3 (Annex 6, threshold 4/5) and practical rubric (Section 6.6, threshold 6/8).
Follow-up	Worksheets may be sent to the follow-up channel within 14 days (Section 6.6).

Annex 2 – Route Planning Exercise and Worksheet (Module 3)

All data in this exercise are fictitious and serve the exercise only; they are not project data or results from the Green LaMiS pilots. The simple road model is deliberately schematic so you can check every figure by hand; the digital variant (A2.5) repeats the same steps using a route planner on real, public addresses.

A2.1 Case

One worker visits six users. All locations lie on the same two-way road with no shortcuts. Depot O is at kilometre 0; locations A–F are at kilometres 1–6 respectively. The distance between two points equals the difference of their kilometre positions; driving time is 2 minutes per kilometre in both directions.

Location	Position (km)	Visit may start	Duration
A	1	09:00–11:00	10 min
B	2	09:00–11:00	10 min
C	3	09:30–10:30	10 min
D	4	09:00–11:00	10 min
E	5	09:00–11:00	10 min
F	6	09:00–11:00	10 min

Departure from the depot is at 09:00 and the worker must be back by 11:00. One worker may perform all tasks; vehicle capacity is not a constraint. The time window refers to the start of the visit; arriving early means waiting. No breaks or delays in this short task. **Baseline route: O–A–D–B–F–C–E–O.**

A2.2 Task for participants

Calculate the baseline distance, driving time, waiting time and time of return. Propose a shorter route that keeps all six visits and satisfies the constraints. Compare the savings in kilometres, driving time and total duration and explain why the percentages need not be equal. Pair work lasts 22 minutes; reserve the last 3 minutes for the feasibility check. **Formula:** relative change (%) = (baseline − new) / baseline × 100. Total tour duration includes driving, service, waiting and breaks; shorter driving time does not prove a shorter working day.

A2.3 Worksheet

Objective of the round: _____ Mandatory constraints (at least four): _____

Indicator	Baseline route	Proposed route
Order of visits	O–A–D–B–F–C–E–O	
Total distance (km)		
Driving and waiting (min)		
Duration of all visits (min)		
Time of return		

Indicator	Baseline route	Proposed route
All constraints satisfied (yes/no)		
Tool used (paper / route planner)		

Justification of the choice and calculation of the change:

_____

What would change if location C could be visited only by a second worker with a different competence? _____

A2.4 Worksheet fields for real services

When the exercise is repeated with the participants' own service, record for each location: identifier, time window, visit duration, priority, required staff competence, vehicle capacity or special equipment, start and end of the shift; plus the starting point, the end location, the return rule and a verified time and distance matrix. Anonymise beneficiary addresses (Section 3.2). Advanced variant: allocate the locations to two workers with different competences.

A2.5 Digital variant with a route planner

Where internet access is available, repeat the exercise as it is done in practice. Each pair chooses six **public** addresses in its own town – the town hall, a school, a health centre, a pharmacy, a post office, a community centre – and a starting point, and enters them into a free route planner that can reorder stops (Section 5.4; the Module 3 demonstration used MapQuest Route Planner, RouteXL is an alternative). First compute the route in the entered order and note distance and time; then let the tool optimise the order and note the result; then check by hand what the tool cannot know – the time window at one location, the visit durations, the competence needed – and adjust if necessary. Enter both results in the worksheet with the tool named, and compare the outcome with the paper model: the same three questions apply – what was the objective, which constraints are mandatory, and is the shorter route also feasible. Never enter real beneficiary addresses into an online tool during training.

Annex 3 – Route Planning Model Solution and Trainer Notes (Module 3)

A3.1 Baseline schedule

The legs of the baseline route O–A–D–B–F–C–E–O are 1 + 3 + 2 + 4 + 3 + 2 + 5 = 20 km. Driving takes 40 minutes, the visits 60 minutes, there is no waiting. Return to the depot is at 10:40; the visit at C starts at 10:06 and satisfies its time window.

Order	Arrival	Visit start	Visit end
A	09:02	09:02	09:12
D	09:18	09:18	09:28
B	09:32	09:32	09:42
F	09:50	09:50	10:00

Order	Arrival	Visit start	Visit end
C	10:06	10:06	10:16
E	10:20	10:20	10:30

A3.2 Shorter route and waiting

The route O–A–B–C–D–E–F–O is 12 km and the drive takes 24 minutes. Arrivals are A 09:02, B 09:14, C 09:26, D 09:42, E 09:54 and F 10:06. At C the worker waits 4 minutes and the visit runs 09:30–09:40. The last visit ends at 10:16 and the return is at 10:28; total duration is 88 minutes.

Indicator	Baseline	Improved	Change
Kilometres	20	12	−40 %
Driving	40 min	24 min	−40 %
Waiting	0 min	4 min	+4 min
Total duration	100 min	88 min	−12 %

Both routes satisfy all constraints. Visiting the farthest location F and returning requires at least 12 km, so the new route is optimal by distance in this model. It is not the fastest: O–F–E–D–C–B–A–O also has 12 km but no waiting – the visit at C starts at 09:48, and the return is at 10:24, total 84 minutes, 16 % shorter than the baseline.

A3.3 Trainer notes

Accept any solution calculated consistently and satisfying the constraints; several valid solutions exist depending on the objective. For the fastest round, the model solution is 84 minutes: the minimum 24 minutes of driving plus 60 minutes of service. Typical mistakes include omitting the return leg, visit durations, or waiting time, and confusing the shortest route with the fastest. In the digital variant, expect the tool's order to differ from the paper model and use the difference to discuss what the tool optimised and what it ignored (time windows, durations, competences). In the two-worker variant, the constraint on location C forces either a second vehicle or a change of competence – use it to open the discussion on work organisation (Section 5.3).

Annex 4 – Vehicle Use Model Exercise and Worksheet (Module 2)

All data are fictitious and serve the exercise only; they are not market prices or results from the Green LaMiS pilots. Real decisions require dated local offers, verified emission factors and confirmed operator conditions.

A4.1 Case

Three options are compared for one month of 20 working days, 1,200 km and 120 services delivered, with 100 hours of vehicle reservation. In the base scenario, all options have adequate capacity, accessibility and availability. Staff costs are equal and excluded. All amounts are in EUR on the same tax basis.

Input	Own conventional vehicle	Own electric vehicle	Shared electric vehicle
Fixed monthly cost	350	500	Membership 20
Consumption	7 l/100 km	18 kWh/100 km	Energy in tariff
Energy price	1.60 EUR/l	0.25 EUR/kWh	Included
Maintenance	0.05 EUR/km	0.03 EUR/km	Included
Rental	-	-	4 EUR/h and 0.10 EUR/km
Pick-up and return	0 extra	0 extra	40 per month

The fixed cost of the own vehicles includes depreciation, financing, insurance, and registration; for the electric vehicle, it also includes the allocated cost of a charging point. Energy and maintenance are calculated separately. Additional parking costs are zero in the example. The sharing price includes insurance and maintenance; reservation time includes visit time.

A4.2 Participant worksheet

Calculate the cost per month, per day and per service for each option and justify your choice. Then increase the shared vehicle's reservation time to 160 hours with the same kilometres and services and check whether the decision changes. For each shift, check whether you can secure a vehicle with adequate capacity and accessibility; enter prices with a date or mark them as demonstration values; and state when you would change your decision.

Result	Conventional	Electric	Shared
Energy cost			
Total per month			
Per day			
Per service			

Choice and reasons: _____

Check of availability, charging and accessibility:

_____

Backup solution if the vehicle is not available:

_____

A4.3 Additional environmental task

Fictitious factors for the calculation: 3 kg CO_2e per litre of fuel and 0.25 kg CO_2e per kWh of electricity; electric consumption measured at the charging point. Calculate the emissions; the boundary excludes vehicle and infrastructure production. The shared vehicle has the same consumption and additional operator kilometres are zero in this simplified example.

Annex 5 – Vehicle Use Model Solution, Disruption Simulation and Discussion (Module 2)

A5.1 Costs for the same service scope

Conventional vehicle: 1,200 × 7/100 = 84 l; energy 84 × 1.60 = 134.40 EUR; maintenance 60 EUR. Total 350 + 134.40 + 60 = **544.40 EUR**. **Own electric vehicle:** 1,200 × 18/100 = 216 kWh; energy 54 EUR; maintenance 36 EUR. Total 500 + 54 + 36 = **590 EUR**. **Shared electric vehicle:** 20 + (100 × 4) + (1,200 × 0.10) + 40 = **580 EUR**; energy, maintenance and insurance are in the tariff.

Indicator	Conventional	Electric	Shared
Per month	544.40 EUR	590.00 EUR	580.00 EUR
Per working day	27.22 EUR	29.50 EUR	29.00 EUR
Per service delivered	4.54 EUR	4.92 EUR	4.83 EUR

At 160 reservation hours the shared option costs 820 EUR per month – 41 EUR per day and 6.83 EUR per service; the increase is 240 EUR. In this example the own conventional vehicle has the lowest direct cost; among the electric options, sharing is cheaper at 100 hours and the own vehicle at 160 hours.

A5.2 Environmental calculation and interpretation

Conventional vehicle: 84 × 3 = 252 kg CO_2e, i.e. 2.10 kg per service. Each electric option: 216 × 0.25 = 54 kg CO_2e, i.e. 0.45 kg per service. The difference is 198 kg or about 78.6 % – the result of the given fictitious factors and the limited boundary, not a general claim about electrification. A good answer recognises the lower cost of the conventional vehicle in this scenario and the lower calculated emissions of the electric options, and states that a real decision needs local offers, verified factors, charging, availability and additional operator trips.

A5.3 Disruption simulation

The vehicle is not available before a priority visit. The participant activates the pre-agreed replacement vehicle or transport, checks feasibility and informs the coordinator; postponing the visit is not an automatic solution. **The vehicle does not have enough charge.** The

participant compares the available range with the route plus a reserve, chooses another vehicle or a feasible charging stop, and updates the schedule while protecting the service priorities.

A5.4 Discussion questions

- Which condition could exclude the cheapest option?
- What if the bookings of two teams overlap?
- Who carries the cost of waiting or of a replacement?
- Which data do we need before a local pilot?
- Is there an operator in our territory – and if not, could a pooled municipal fleet play the same role?

Annex 6 – Knowledge Checks, Answer Keys and Evaluation Form

A6.1 Initial check for Modules 2 and 3 (before the presentation, not graded)

1. What determines the best route? 2. Which vehicle costs do we have even when the vehicle does not move? 3. Which obstacle could prevent a timely arrival at the user?

A6.2 Final check – Module 3: Route planning

1. Which problem covers the allocation of locations to several vehicles?
2. A route is shortened from 20 to 12 km. What is the percentage reduction?
3. Driving takes 24 minutes, visits 60 minutes and waiting 4 minutes. How long is the round?
4. Arrival is at 09:26 and the earliest visit start is 09:30. What must be done?
5. Give two reasons why the shortest route is not necessarily the best.

Key: 1. VRP. 2. 40 %. 3. 88 minutes. 4. Wait 4 minutes and include it in the schedule. 5. For example time windows, longer waiting, traffic, competences, needs of the users. One point per fully correct answer; for question 5, 0.5 for each valid reason.

A6.3 Final check – Module 2: Green vehicles and use models

1. What is the difference between vehicle sharing and ride sharing?
2. In the example tariff, energy is included. Should it be added again?
3. What do 60 additional reservation hours cost at 4 EUR/h?
4. Does the absence of tailpipe emissions mean zero life-cycle emissions?
5. Name two conditions you check before booking a vehicle for a public service.

Key: 1. Vehicle sharing is access to the same vehicle at different times; ride sharing is several people travelling together at the same time. 2. No. 3. 240 EUR. 4. No – there are emissions linked to energy, production and other phases. 5. For example availability, range, charging, capacity, accessibility, backup option. One point per question; for question 5, 0.5 per valid condition.

A6.4 Participant evaluation form

Rate from 1 (strongly disagree) to 5 (strongly agree):

Statement	1	2	3	4	5
Clarity of the presentation	☐	☐	☐	☐	☐
Usefulness of the examples	☐	☐	☐	☐	☐
Applicability in my daily work	☐	☐	☐	☐	☐
Availability of the materials	☐	☐	☐	☐	☐
Enough room for questions	☐	☐	☐	☐	☐

What will you apply? _____ What should be improved? _____ Which additional support do you need? _____

Knowledge check, practical work and satisfaction are reported separately (Section 6.6); attendance alone is not evidence that the outcomes were achieved.

Annex 7 – Local Pilot Transfer Template, Implementation Roadmap and Question Register

A7.1 Local pilot transfer template

The recommended final product of the training is a short pilot application plan: the current state of the service, the improved route, the selected vehicle and use model, the comparison of scenarios, the operational risks and the measurement plan. Lower mileage or emissions must not be achieved at the expense of timeliness, availability or quality of service.

Organisation and service	
Users and current state (baseline, Chapter 3)	
Problem and objective	
Proposed change: route (Section 5.3)	
Proposed change: vehicle and use model (Sections 4.4-4.6)	
Responsible persons and deadline	
Cost and backup solution	
Risks	
Indicators and data source (Sections 3.5 and 5.5)	
When and how the result is checked	

A7.2 Implementation roadmap (one line per action)

Action	Owner (LA / SE)	Partners	Deadline	Resources	KPI	Risk

A7.3 Question register

Date	Module	Question	Responsible	Deadline	Answer	Status

Personal data of service users are excluded from the shared overview. An additional online consultation is agreed when a question requires the review of a concrete route or vehicle use model.

Annex 8 – Materials Register, Traceability Matrix and Pre-Publication Checklist

A8.1 Register of sources and training materials

Material	Status and organiser task
Transcripts of the Module 2 and Module 3 presentations	Delivered; timestamps referenced in Sections 6.4 and 6.5.
Module 1 presentation and video script (Politecnico di Milano)	Delivered; file or link, version and permission of use to be recorded.
Module 2 presentation (Elettra Car Sharing)	Delivered; file or link, version and permission of use to be recorded.
Module 3 presentation (HUN-REN SZTAKI)	Delivered; file or link, author, version and permission of use to be recorded.
Recordings of the three modules with subtitles (HR/HU/IT)	Links, access rights and sharing conditions to be recorded.
CO2 / Carbon Footprint Tool and manual	Available; link to the current version to be recorded.
Worksheets, model solutions, knowledge checks, evaluation form, templates	Annexes 2–7; fictitious training data.
Follow-up channel	Eupolis Group contact (Chapter 8) unless the organiser of a local workshop names another.

When publishing, record the date on which each link was checked. Transcript passages to mark for alignment with the recordings: Module 3 demonstration (8:09–10:32) and organisational example (14:06–15:45); Module 2 use models (17:55–19:14) and limits (21:04–22:28).

A8.2 Traceability matrix

The matrix links each proposed learning outcome to its source in the recordings, the activity that trains it, the evidence and the success criterion, so that a trainer who is not the author can deliver the modules without additional oral explanation.

Source	Outcome	Activity	Evidence	Criterion
M3, 0:04–5:55	Objective and constraints of a round	Worksheet header (Annex 2)	Objective and ≥ 4 constraints listed	Constraints relevant and complete
M3, 5:55–13:10	Navigation / TSP / VRP	Three case cards	Classification of three cases	All three correct with justification
M3, 8:09–10:32	Compare baseline and improved route	Six-location exercise, paper and digital (Annex 2)	Completed worksheet	Correct arithmetic; constraints met; tool named
M3, 14:06–15:45	One organisational change	Two-worker variant of the exercise	Written proposal	Effect on routes, workload and quality explained
M2, 3:43–6:20; 19:25–20:49	Electrification vs sharing vs ride sharing	Knowledge check Q1 (Annex 6)	Answer	Correct distinction
M2, 9:28–12:37	Tailpipe / energy / life-cycle emissions	Environmental task (Annex 4)	Calculation with stated boundary	Boundary stated; no double counting
M2, 12:47–16:04	Three-scenario cost comparison	Selection matrix (4.4) and worksheet (Annex 4)	Cost per month, day and service	Same scope; assumptions stated; sensitivity shown

Source	Outcome	Activity	Evidence	Criterion
M2, 17:55–19:14; 21:04–22:28	Use model choice and continuity	Booking and disruption simulation (Annex 5)	Procedure and two responses	Feasible; user priorities protected

A8.3 Figures quoted from the presentations – verification points

- **Module 3, 9:36–10:31.** The automatic transcript gives 37 and 34 minutes for the route before and after reordering together with "7 minutes saved", and distances of 6.1 and 15 miles that do not match the described shortening. Use the figures from the slides or the recording; do not reconstruct them.
- **Module 2, 9:28–15:40.** The figures on life-cycle emissions by powertrain, the payback mileage of the battery, the number of private cars replaced by one shared car, the reduction of a user's transport CO_2, the share of energy in total cost and the share of electric car-sharing fleets are the presenter's and must be tied to their source, year and conditions before reuse. Zero tailpipe emissions are never presented as zero emissions overall (Section 4.3).
- **Operator- and location-specific conditions.** Range, availability, billing, charging, parking and zone access are conditions of the specific vehicle, operator and city.
- **Screenshots and tool steps** are checked against the current version of the route planner when materials are published; the paper variant of the exercise is always available.
- **Attribution.** The delivered presentations and the proposed extended formats are kept distinct; undocumented exercises or outcomes are not attributed to the online event.

A8.4 Pre-publication checklist

- Presentations, recordings and conditions of use recorded; links and demonstration tools checked; verification points above resolved or clearly separated from the teaching content.
- Follow-up contact confirmed; accessibility, partner names, project visual identity and funding acknowledgements checked against the project documentation.
- Both exercises piloted with a trainer who is not the author; actual duration, unclear steps and participants' mistakes recorded; author of the revision, date and version entered before distribution.
- The Toolkit is complete when every outcome has verifiable evidence, every exercise has all necessary data and a model solution, a trainer can deliver a module without oral clarification from the author, formulas and units are consistent, and an alternative to the digital tool exists.