

DELIVERABLE D.2.1.3 - PILOT ACTION REPORT PÉCS AND ČESKÝ KRUMLOV PROJECT AREAS

A report on implementation of alternative fuel technology solution in the Pécs and Český Krumlov project areas with guidance for future actions for sustainability of the pilot action

Version 2.0

March 2026





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Abbreviations

AF	Application form
DRT	Demand-responsive transport
KPI	Key Performance Indicator
PA	Pilot action
PT	Public transport



1. Introduction

The OPTI-UP project (*Optimizing and greening Public Transport networks through Integration with Urban Planning and data-driven approaches*) aims to optimise PT in small and medium-sized cities in Central Europe through integration with urban planning and data-driven approaches. Tailored optimization solutions for PT have been tested on six pilot areas: Modena (Italy), Grosuplje (Slovenia), Osijek (Croatia), Paks (Hungary), Pécs (Hungary) and Český Krumlov (Czech Republic).

In the pilot areas have been implemented 6 pilot action optimization solutions in 3 thematic fields.

1. **Demand-responsive transport (DRT)** thematic field focuses on providing a flexible PT to low-demand areas to improve both PT service accessibility and financial viability. Different DRT pilot actions were tested in two pilot areas: PA1 in Modena (Italy) and in PA 2 in Grosuplje (Slovenia).
2. **PT network optimisation** thematic field deals with adjusting routes and schedules of the existing PT system. Pilot solutions were tested within two pilot areas: PA3 in Osijek (Croatia) and PA4 in Paks (Hungary).
3. **Alternative fuel technologies** thematic field refers to testing impact using electric propulsion vehicles on energy efficiency and PT ridership through increased comfort levels, cleanness, both contributing to better sustainability. These solutions were tested in two pilot areas: PA5 in Pécs (Hungary) and PA6 in Český Krumlov (Czech Republic).

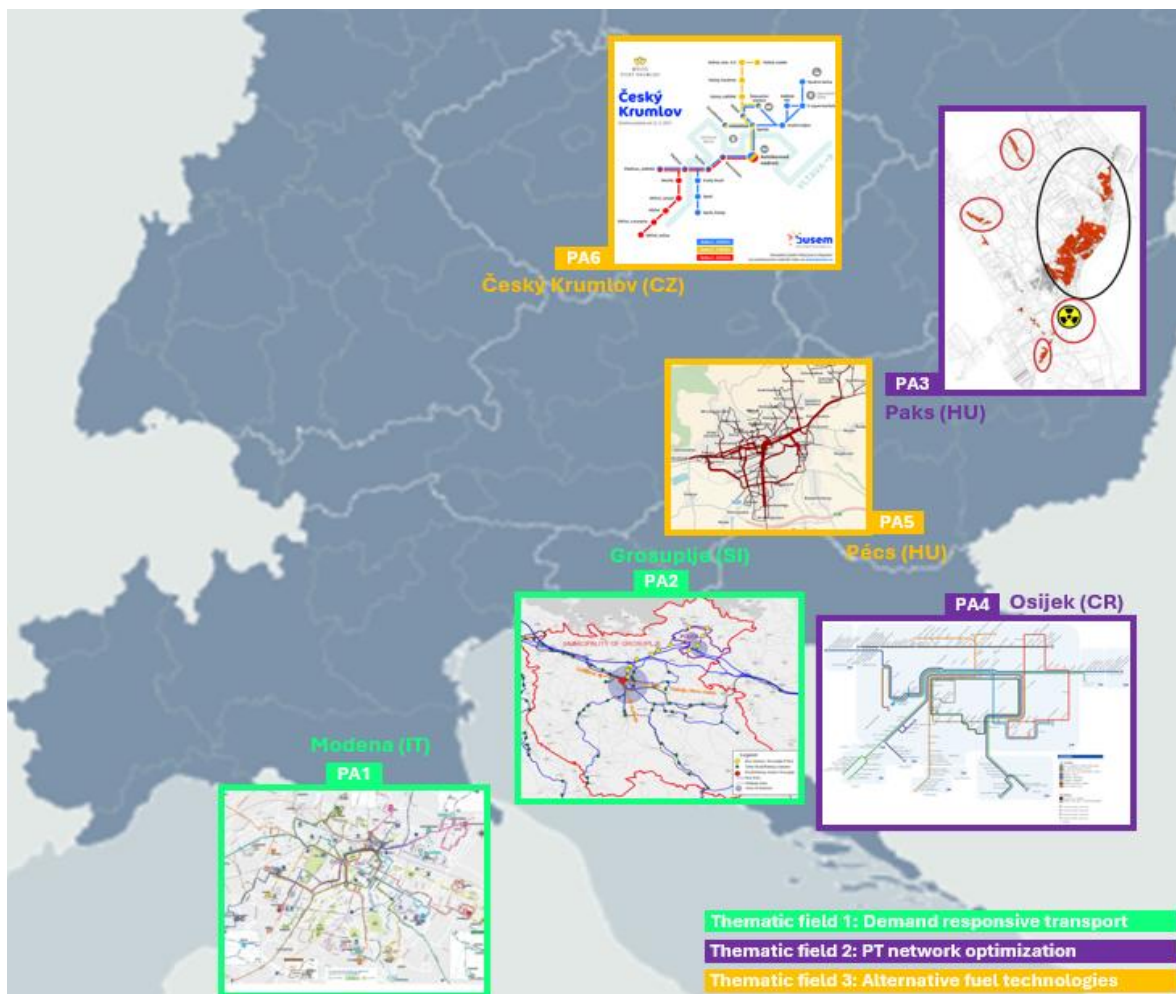


Figure 1: Locations of OPTI-UP pilot areas



This deliverable D.2.1.3 focuses on Alternative fuel technologies thematic field. It aggregates and compiles the outcomes of Alternative fuel technologies pilot actions implementation in Pécs (Hungary) and Český Krumlov (Czech Republic) and provides guidance for future actions to ensure sustainability of the implemented pilot solution. The outcomes and guidance for other two thematic fields are presented in separate deliverables:

- D.2.1.1: A report on implementation of the Demand-responsive transport (DRT) thematic field. It aggregates and compiles the outcomes of DRT pilot action implementation in Modena (Italy) and in Grosuplje (Slovenia) and provides guidance for future actions to ensure sustainability of the implemented pilot solution and
- D.2.1.2: PT network optimisation solution in the Paks and Osijek project areas with guidance for future actions.

Deliverable D.2.1.3 is compiled from the pilot action implementation reports prepared by the responsible project partners STRIA (PP4: Pécs) and VŠTE (PP8: Český Krumlov). It is composed of:

The pilot action report is composed of eight sections, giving:

- Reports on individual Alternative fuel technologies pilot project, covering the implementation and outcomes of the two different Alternative fuel technologies solutions tested in Pécs (Hungary) and Český Krumlov (Czech Republic). The report is structured in seven sub-sections, covering:
 - o Pilot action scope and objectives
 - o Pilot action solution and end expected outcomes
 - o Implementation of pilot action activities
 - o Difficulties and deviations from the implementation plan
 - o Analysis of pilot action implementation
 - o Common conclusions
 - o Guidance for future actions for pilot action sustainability.
- A comparison of the two pilot actions, which addresses common characteristics of the pilot activities, key differences between the implemented solutions, common findings, opportunities for improvements and conclusions.



2. Pécs pilot project report

This chapter presents the report on the implementation of the alternative fuel technologies pilot project in Pécs (Hungary), detailing the tested solutions, their outcomes, and guidance for future actions.

2.1. Pilot action scope and objective

Key information about the pilot area is presented, including the main public transport challenges addressed and the desired outcomes to be achieved through the pilot action.

2.1.1. Description of pilot project area

The description of the pilot project area provides an overview of its geographical, demographic, and transport-related characteristics. Key features of the area are illustrated with numerical data and supporting maps.

Location

Pécs



Figure 2: Map of Pécs (general and detailed)

Area characteristics

Pécs is located in a hilly area at the southern foothills of the Mecsek Mountains in the South Transdanubian region of Hungary. The terrain is varied, combining hilly landscapes with urbanized valleys.

Pécs has a population of approximately 135,000, making it the fifth-largest city in Hungary. The region has experienced demographic decline due to outmigration and an aging population. Economically, Pécs has undergone significant restructuring following the collapse of heavy industry and coal mining in the 1990s. Today, the local economy is driven by education, healthcare, culture, and small to medium-sized enterprises. The University of Pécs is a major employer and innovation driver.

Pécs is composed of several distinct urban districts, each with unique characteristics. The historic city centre (Belváros) features cultural landmarks, administrative buildings, and pedestrian zones. Kertváros is



a large residential district with high-density housing and local commercial centres. Uránváros, built during the socialist era to serve the uranium mining industry, is known for its apartment blocks and public institutions. Other important areas include Meszes and Vasas in the eastern part of the city, which have a more industrial and working-class character, and the western suburbs like Patacs and Mecsekoldal, which are more residential and affluent. These neighbourhoods form the functional structure of the city and influence mobility and public transport planning.

The public transport network in Pécs is primarily based on bus services operated by Tüke Busz Zrt. There is no tram or trolleybus network. The city is connected by regional and national rail lines, though rail infrastructure requires modernization. Bicycle infrastructure and pedestrian zones are being developed gradually.

Pécs is not directly located on the core TEN-T corridors but is connected to the TEN-T comprehensive network via road and rail. The closest core network corridor is the Mediterranean Corridor (part of the 3rd TEN-T corridor: Algeciras-Barcelona-Budapest-Záhony), which runs through Budapest and southern Hungary. Road connections link Pécs to the M6 motorway, which is part of the national infrastructure connecting to the TEN-T network.

While Pécs functions as a regional centre, certain parts of the city—such as the Diófa utca - Tüskésréti út area—are considered peripheric due to limited access to public transport. Despite the presence of several workplaces and industrial facilities in this zone, it remains underserved by frequent or direct bus routes, making it difficult for employees and visitors to reach the area without a private vehicle. This lack of integration into the city's public transport network reduces accessibility, limits sustainable commuting options, and highlights the need for improved multimodal connections within the urban fabric.

2.1.2. Key issues & objectives of pilot action

This section presents the main PT and accessibility challenges in the pilot area and the objectives set to address them through the pilot action.

Key public transport issue(s) addressed and main causes

Public transport service is currently non-existent in the Diófa utca - Tüskésréti út area of Pécs, despite the presence of numerous workplaces and industrial facilities. The area lies outside the main public transport corridors of the city and is not served by any bus lines. As a result, employees working in this zone are forced to rely entirely on private vehicles or walk from distant stops, which significantly reduces accessibility.

The lack of basic transport infrastructure further exacerbates the problem: there are no designated bus stops, no sidewalks, and no safe pedestrian connections in the area. This severely limits access for those without cars and reinforces the zone's disconnection from the rest of the urban network.

In environmental terms, the absence of public transport leads to increased car traffic and higher emissions, especially during peak commuting hours. This car dependency is not only socially exclusive, but also contributes to air and noise pollution, contradicting the goals of sustainable urban mobility.

The planned pilot line would also extend the use of alternative vehicle technologies within the city's public transport system. The service would be operated by electric buses, further expanding the role of zero-emission vehicles in the network while serving a currently inaccessible industrial area. The area is also particularly suitable for this development, as the existing charging infrastructure for electric buses is located nearby. This allows efficient operation and charging of vehicles directly within the operational area. As a result, the pilot would not only improve accessibility for employees working in the area but also support the practical and efficient use of electric buses in the city's public transport network.



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The further development of the pilot focuses not only on improving accessibility, but also on strengthening the role of clean and sustainable transport solutions, as the 90 bus line is operated exclusively by electric buses. This provides a modern and environmentally friendly alternative to private car use, making public transport a more attractive option for employees working in the area. The quiet operation, zero local emissions, and overall improved travel experience of electric buses contribute to a higher quality of service and increased user satisfaction.

If the new services are well received and ridership increases, there is strong potential to further expand both the frequency and coverage of the 90 line. Future adjustments could include better alignment of the timetable with shift changes at nearby workplaces, ensuring a more convenient and reliable connection for commuters. At the same time, the continued use of electric buses—supported by the nearby charging infrastructure—allows these improvements to be implemented in a sustainable way without increasing environmental impact.

In the long term, the combination of enhanced service levels and zero-emission vehicle technology can lead to significant environmental benefits, including reduced traffic congestion, lower CO₂ emissions, and improved air quality. This approach supports the transition toward a more sustainable and future-oriented urban mobility system in Pécs.

2.2. Pilot action solution and expected outcomes

This section provides an overview of the pilot action, covering its expected outcomes, the stakeholders engaged in the implementation, and the potential risks identified prior to the start of the project.

2.2.1. Description of Pilot action solution

The implemented pilot action solution is described with a focus on its operational features and its contribution to improving accessibility, connectivity and overall system efficiency.

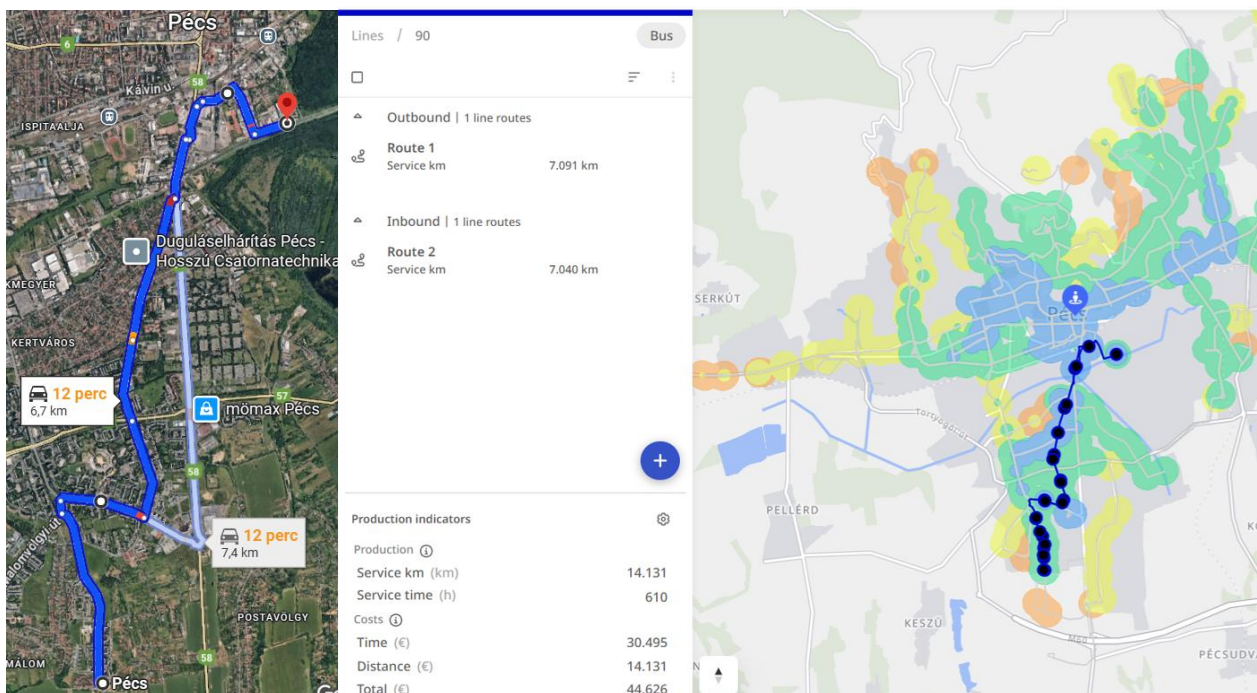


Figure 3: Route of the Pilot Action line

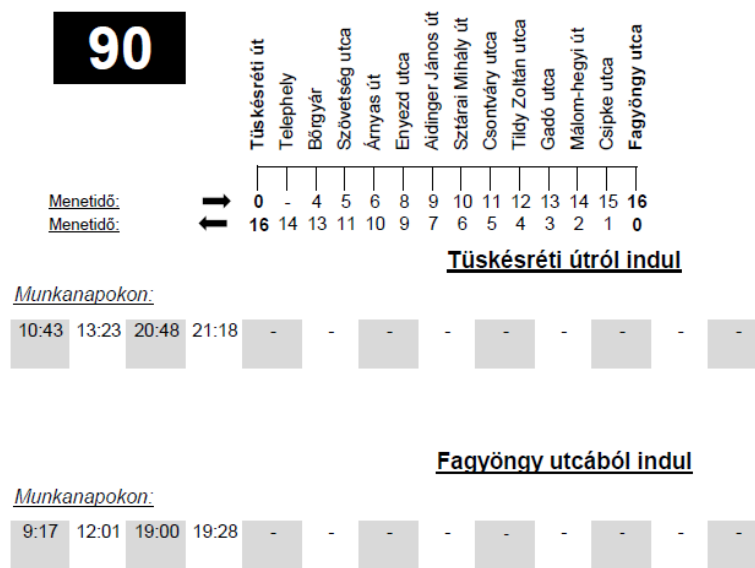


Figure 4: Timetable of the Pilot Action line

The Pilot Action extends public transport services to this previously underserved area through the operation of the 90 bus line, which is served exclusively by electric buses. This provides a modern, sustainable mobility alternative for employees working in the zone. By offering reliable and direct connections, the action is expected to significantly reduce dependence on private cars, while the use of zero-emission vehicles contributes to lower environmental impact. As a result, the pilot not only improves access to workplaces but also supports cleaner, quieter, and more sustainable urban mobility.

The Pilot Action services are operated using the existing resources of the public transport system, therefore no additional vehicles have to be purchased and no new bus drivers needed to be recruited for the implementation of the service. This allows the experimental operation to be introduced in a cost-efficient manner while relying on the already available operational capacities.

The services are operated exclusively with electric buses, primarily using Mercedes-Benz eCitaro vehicles, while BYD electric buses occasionally also appear on the line. Charging of the vehicles take place at the depot located at the Tűskésréti út terminal, where buses typically spend approximately 45-70 minutes recharging their batteries before returning to service. Depending on environmental conditions, the Mercedes-Benz vehicles can travel approximately 120-160 km on a single charge.

Addressing key objectives

- Increase public transport ridership, especially among employees in the area
- Extend the coverage of the public transport network to a previously unserved zone
- Reduce car use and harmful emissions, contributing to more sustainable urban mobility

Expected outcomes/effects of Pilot Action

The pilot solution—introducing new bus lines and stops—was selected because the most critical issue in the pilot area is the complete absence of public transport services. Without any form of scheduled public transport, employees working in the Diófa utca - Tűskésréti út area are forced to rely on private vehicles. This creates barriers to access, increases traffic and emissions, and contradicts urban mobility goals. Providing basic, regular bus service is a logical first step to integrate the area into the city’s transport network and improve accessibility.



The pilot directly addresses the identified problems by establishing new connections between the underserved industrial area and the rest of the city. It improves physical access to jobs, reduces reliance on cars, and encourages more sustainable commuting.

In addition, operating the Pilot Action with electric buses further strengthens its positive environmental impact. Electric vehicles produce no local exhaust emissions, which helps reduce air pollution and greenhouse gas emissions associated with daily commuting. This is particularly beneficial in an industrial area with concentrated employee traffic, where a shift from private car use to electric public transport can significantly lower the environmental burden. The pilot is also facilitated by the presence of a charging station directly within the Tüskésréti út terminal, allowing buses to recharge efficiently on-site. Furthermore, electric buses generate less noise compared to conventional diesel vehicles, contributing to a quieter and more sustainable urban environment. By combining improved accessibility with zero-emission vehicle technology, the pilot supports both mobility development and the city's long-term environmental and climate objectives.

The chosen solution is appropriate because it provides a simple, scalable, and immediately effective response to a clearly defined gap in the network. It does not require major infrastructure investments but offers high potential impact by linking a major employment area to the public transport system.

2.2.2. Engagement of stakeholders

The table lists the key stakeholders involved in the pilot action, showing their roles, levels of involvement, importance, and influence during the preparation, implementation, and evaluation phases.

Table 1: List of stakeholders involved in pilot project implementation & impact assessment

Stakeholder	Type	Role	Importance	Influence
Municipality of Pécs	Local Authority	main financier of the PT service, provider of resources	Very Important	Very high
BIOKOM Nonprofit Ltd	Public Transport Organizer	responsible for the timetable of city buses	Important	High
Tüke Busz Ltd	Public Transport Operator	operator of municipality transport; provider of transport resources; provider of PT operational data	Very important	Very high

2.2.3. Risk assessment

The table presents an assessment of potential risks related to the pilot action, showing their probability and impact, along with the measures identified to mitigate them.

Table 2: Identification of potential pilot action implementation risks



Risk	Probability	Impact	Countermeasure
Late conclusion of agreements with PTO	Low	High	All documentation prepared and STRIA is controlling the activities
Poor acceptance of new service by car-users	Medium	Medium	Promotion campaign, communication



2.3. Pilot action implementation activities

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The table presents the key activities carried out during the implementation of the pilot action, including a description of how each activity was carried out, along with timelines and monitoring arrangements before, during, and after the pilot period.

Table 3: PA monitoring table of implementation of activities and steps

PLAN				IMPLEMENTATION	
Pilot activity	Brief description	Start	Deadline	When	Comment
Activity 1	Pilot action planning	May 2025	Sept 2025	May 2025 - Sept 2025	Explore the city area where there isn't any PT. Schedule and infrastructure planning. Agreement with PTO.
Desktop research	Planning operations and resources for implementation of PA	May 2025	July 2025	June 2025	
Meetings with stakeholders	Consultation with stakeholders on the operation and resources needed for PA	July 2025	Aug 2025	Aug 2025	
Proposals for infrastructure development	Proposing route, bus stops, and options for timetables	Sept 2025	Sept 2025	Sept 2025 - Sept 2025	
Activity 2	Promotion of the pilot before launch	Aug 2025	Sept 2025	Sept 2025	Social media and local press campaign.
Promotion plan	Planning of PA promotion	Aug 2025	Sept 2025	Sept 2025	
PA promotion	Publish information on pilot project preparation in municipal channels and/or in online social media	Sept 2025	Sept 2025	Sept 2025	
Activity 3	Launch and implementation of pilot action (2 months: 01/10/2025-30/11/2025)	Oct 2025	Nov 2025	Oct 2025 - Nov 2025	Contract with PTO. From 1st October to 30th November. Bus line: nr. 90 8 departures per workdays
Implementation of pilot action activities	Implementation in accordance with the logic of the OPTI-UP project	Oct 2025	Nov 2025	Oct 2025 - Nov 2025	
Activity 4	Monitoring of performance parameters	Oct 2025	Dec 2025	Oct 2025 - Nov 2025	Collecting data from PTO.



PLAN				IMPLEMENTATION	
Pilot activity	Brief description	Start	Deadline	When	Comment
Data collection and processing	Acquisition of pre-defined data in pre-defined intervals	Oct 2025	Nov 2025	Oct 2025 - Nov 2025	
PA monitoring report	PA monitoring and analysis report	Dec 2025	Dec 2025	Dec 2025	
Activity 5	Assessment of the pilot action implementation and report	Dec 2025	Dec 2025	Nov 2025 - Dec 2025	Evaluation of data received from the PTO based on previously defined KPIs.
Final PA implementation report	Final report	Dec 2025	Dec 2025	Dec 2025	
Activity 6	Promotion of results of implemented pilot actions	Dec 2025	Jan 2026	Feb 2026 - Mar 2026	Social media contents.



2.3.1. PA promotional campaign

The communication and promotional activities supporting the launch of the pilot action and its visibility among users and stakeholders are described.

Table 4: PA promotion campaign

Date	Purpose of publication	Publication location
29/09/2025	promotion of the pilot line	Facebook and website of the PTO
30/09/2025	promotion of the pilot line	Facebook site of STRIA
12/11/2025	post about the partners' site visit	Facebook site of STRIA
01/12/2025	promotion of the survey	Facebook and website of the PTO
10/12/2025	promotion of the survey	Facebook and website of the PTO
13/12/2025	promotion of the survey	Facebook and website of the PTO
15/12/2025	promotion of the survey	Facebook and website of the PTO
17/12/2025	promotion of the survey	Facebook and website of the PTO

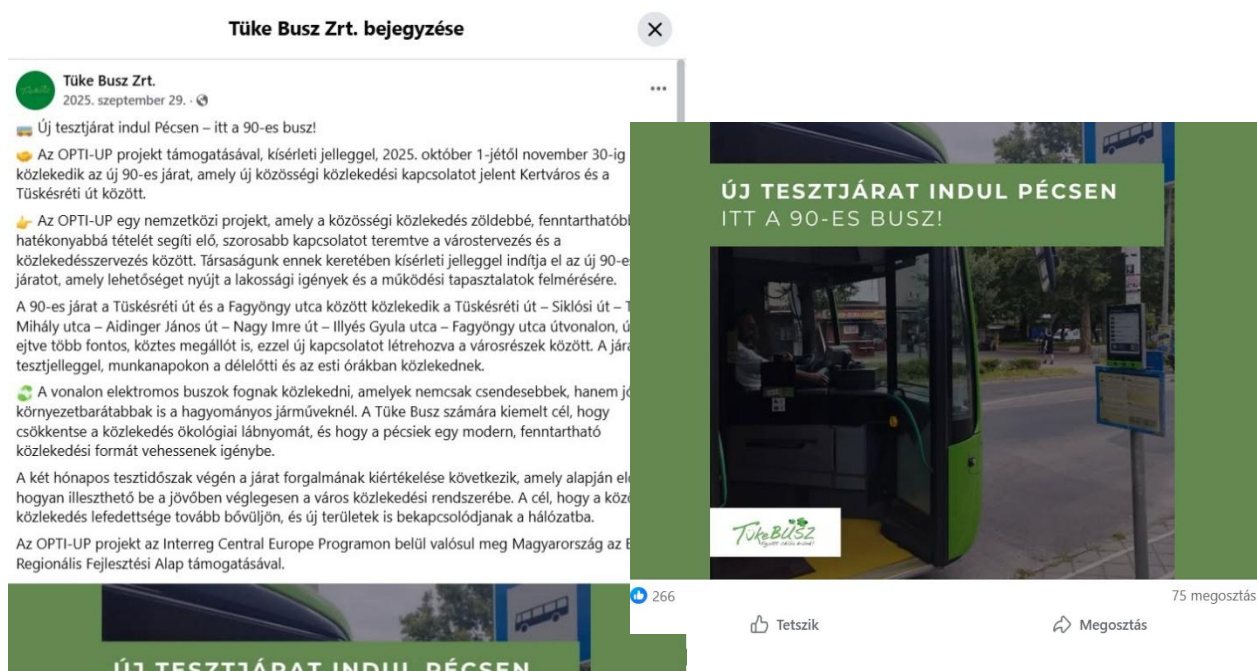


Figure 5: Facebook post of the pilot action



Tüke Busz Zrt. bejegyzése

Tüke Busz Zrt.
2025. december 1. · 🌐

👉 Az OPTI-UP projekt támogatásával, kísérleti jelleggel, 2025. október 1-jétől november 30-ig közlekedett az új 90-es járat, amely új közösségi közlekedési kapcsolatot jelentett Kertváros és a Tüskésréti út között.

A 90-es járat a Tüskésréti út és a Fagyöngy utca között közlekedett a Tüskésréti út – Siklósi út – Táncsics Mihály utca – Aidinger János út – Nagy Imre út – Illyés Gyula utca – Fagyöngy utca útvonalra, újba ejtve több fontos, köztes megállót is, ezzel új kapcsolatot létrehozva a városrészek között. A járatok tesztjelleggel, munkanapokon a délelőtti és az esti órákban közlekedtek.

✅ Az OPTI-UP egy nemzetközi projekt, amely a közösségi közlekedés zöldebbé, fenntarthatóbbá és hatékonyabbá tételét segíti elő, szorosabb kapcsolatot teremtve a városrendezés és a közlekedésszervezés között. Társaságunk ennek keretében kísérleti jelleggel indította el az új 90-es járatot, amely most lehetőséget nyújt a lakossági igények és a működési tapasztalatok felmérésére.

Kérjük, szánjon néhány percet erre a kérdőívre: válaszaival hozzájárul ahhoz, hogy az új járat – útvonalával, menetrendjével és szolgáltatásával – még inkább az Ön igényeihez igazodjon.

👉 A kitöltés anonim és mindössze néhány percet igényel.

Visszajelzése nagyon fontos számunkra, hiszen az Ön véleménye segít abban, hogy Pécs közösségi közlekedése valóban „zöldebb”, modernebb és utasbarátabb legyen.

Kérdőív kitöltése: <https://docs.google.com/.../1FAlpQLSf.../viewform> ✓

Köszönjük, hogy utazik velünk, és köszönjük az aktív közreműködését!



Figure 6: Publication of the user survey on the Public Transport Operator’s Facebook page

2.3.2. Promotion of Pilot action results

The results of the Alternative fuel pilot action in Pécs were presented by Tüke Busz Plc. at a stakeholder meetings held on 10th and 11th December 2025. The meetings included a presentation of the background to the Pilot Action, how it was defined, and how Tüke Busz Plc. prepared for it. A short summary on the operation of the 90 bus routes was also shared, and participants received information about the conditions of the two-month trial operation and the results of the previously defined KPIs.

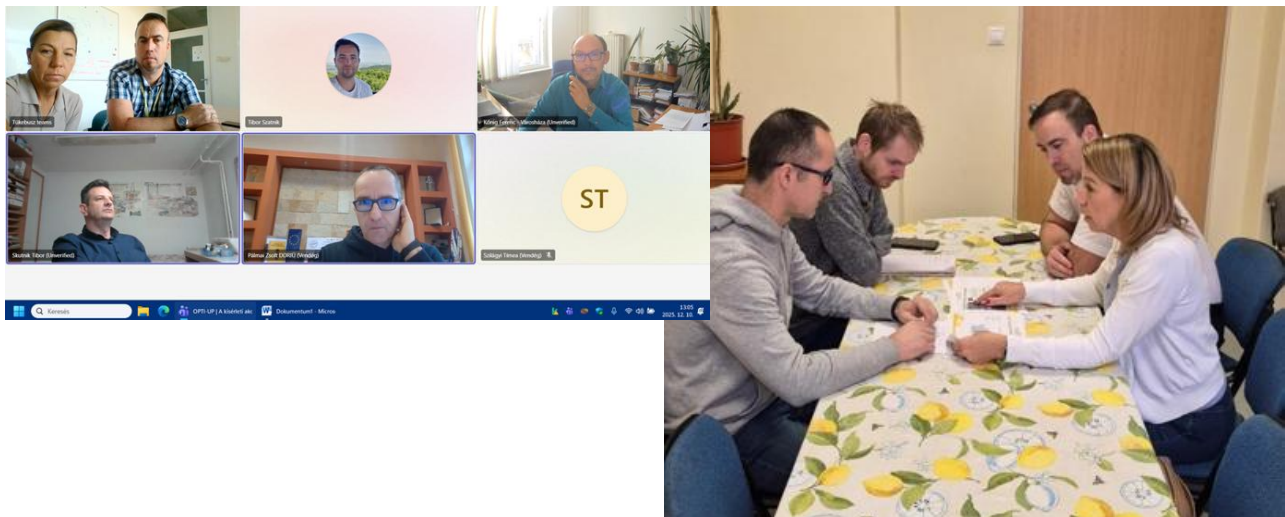


Figure 7: Stakeholders meetings



2.4. Difficulties and deviations from the plan

Difficulties and deviations encountered during the implementation of the pilot action are summarised in the list below.

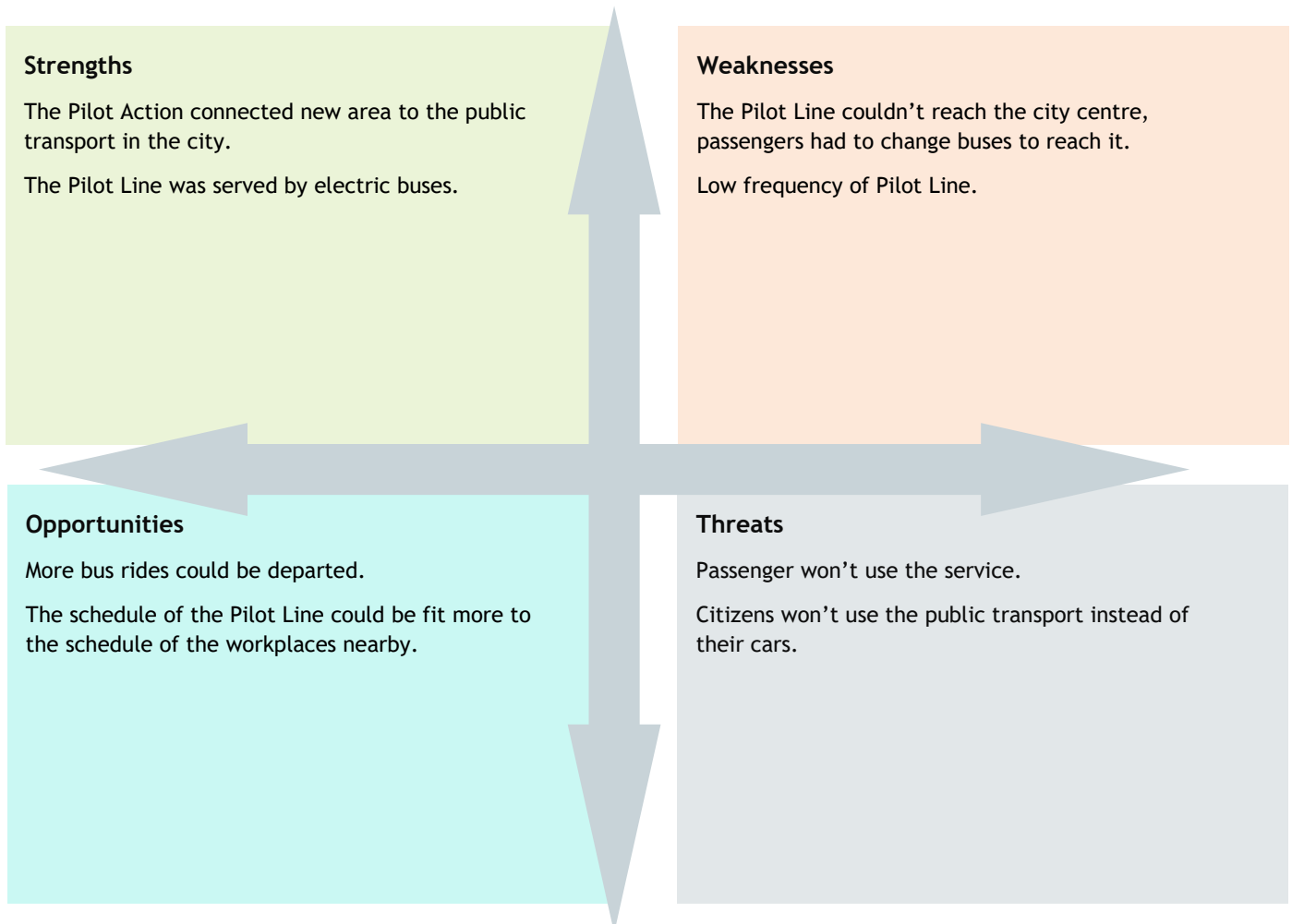
Table 5: List of difficulties/deviations in implementation of the PA plan

Date	Brief description	Reason	Management/solution	Impact rating
15/10/2025	Faulty passenger counter equipment	operational	replace the bus	moderate
on several occasions	Technical failure of an electric bus	operational	replace the bus	low

2.5. SWOT analysis of implementation

Key internal and external factors influencing the implementation of the pilot action are summarised through a SWOT analysis, highlighting strengths, weaknesses, opportunities and threats.

Table 6: SWOT analysis of pilot action implementation





2.6. Pilot Action conclusions

As the service of the Pilot Action, bus line 90 operated as planned between 1 October and 30 November 2025. The route was served by electric buses equipped with passenger-counting devices, enabling accurate measurement of the designated KPIs. The implementation was therefore fully consistent with the initial schedule and the project’s objectives.

No modifications were made to the service during the Pilot Action period, and therefore no justification for changes was required. The operation remained stable throughout, with no need for technical or operational adjustments.

However, based on the feedback collected via user questionnaires, several aspects could be improved in future pilot operations. Respondents highlighted that selecting more favourable departure times and increasing service frequency could have enhanced the attractiveness of the route, thereby contributing to the achievement of the KPIs.

Overall, all necessary data and information required for the project evaluation are fully available. The technical tools functioned reliably, and data collection was comprehensive, enabling the assessment of the pilot project to be carried out in line with expectations and on a solid methodological basis.

2.7. Guidance for future actions for pilot action sustainability

The table below provides guidance for future actions to support the long-term sustainability of the pilot solution, based on the lessons learned and highlighting key steps for continuation and potential scaling.

Table 7: List of activities for achieving sustainability of the implemented pilot solution

Action	Providers	Inputs/resources	Hints
To review the schedule and the route of the line 90	PTO	According to the users’ survey	By increasing the number of trips, the Pilot Action bus line can attract more passengers.



3. Český Krumlov pilot project report

This chapter presents the report on the implementation of the alternative fuel technologies pilot project in Český Krumlov (Czech Republic), detailing the tested solutions, their outcomes, and guidance for future actions.

3.1. Pilot action scope and objective

Key information about the pilot area is presented, including the main public transport challenges addressed and the desired outcomes to be achieved through the pilot action.

3.1.1. Description of pilot project area

The description of the pilot project area provides an overview of its geographical, demographic, and transport-related characteristics. Key features of the area are illustrated with numerical data and supporting maps.

Location

Český Krumlov is a historic town with approximately 12,800 inhabitants, covering an area of about 22 km². It lies in a meander of the Vltava River, and its town centre is a UNESCO World Heritage Site. The town consists of 10 municipal districts: Domoradice, Horní Brána, Latrán, Nádražní Předměstí, Nové Dobrkovice, Nové Spolí, Plešivec, Slupenec, Vnitřní Město, and Vyšný. Its urban structure is based on a central historic core, surrounded by residential areas with varying degrees of urban development.

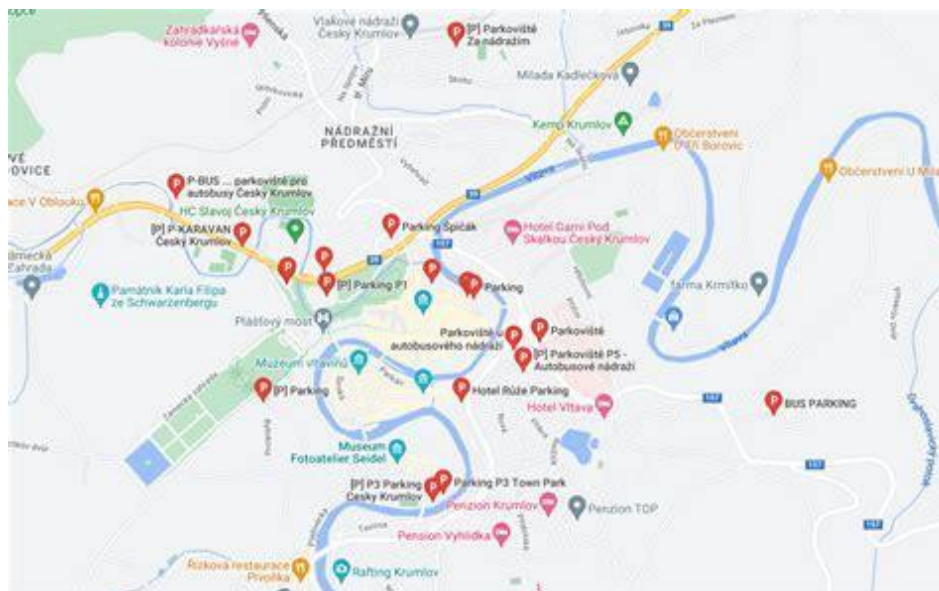


Figure 8: Overview of Municipal Districts and Parking Zone Layout



OPTI-UP

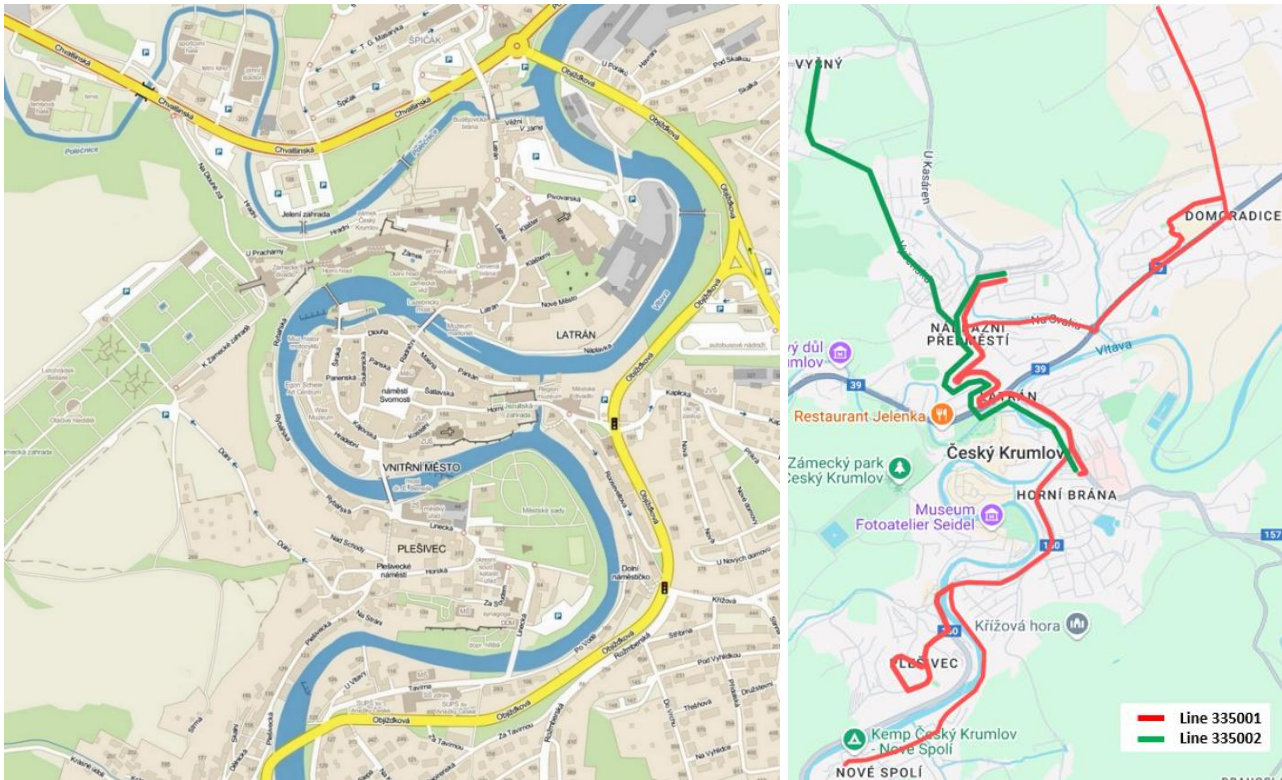


Figure 9: Left - City Map; right - Marking of stops for lines 335001 and 335002



Figure 10: Electric bus route



Departure	Arrival time	Activity	Total time	Line	Trip	Departure stop	Arrival stop
6:27	6:27	Start	0:00			Český Krumlov,	Český Krumlov,
6:30	6:35	Trip	0:05	335001	46	Český Krumlov,	Český Krumlov,
6:39	6:45	Trip	0:06	335001	17	Český Krumlov,	Český Krumlov,
6:46	7:28	Trip	0:42	335002	29	Český Krumlov,	Český Krumlov,
7:32	7:50	Trip	0:18	335002	1	Český Krumlov,	Český Krumlov,
8:00	8:30	Trip	0:30	335002	5	Český Krumlov,	Český Krumlov,
9:00	9:30	Trip	0:30	335002	7	Český Krumlov,	Český Krumlov,
10:00	10:30	Trip	0:30	335002	9	Český Krumlov,	Český Krumlov,
12:00	12:30	Trip	0:30	335002	11	Český Krumlov,	Český Krumlov,
13:00	13:35	Trip	0:35	335002	13	Český Krumlov,	Český Krumlov,
13:45	13:55	Trip	0:10	335001	41	Český Krumlov,	Český Krumlov, Tovární
14:10	14:23	Trip	0:13	335001	40	Český Krumlov, Tovární	Český Krumlov,
14:27	14:50	Trip	0:23	335002	33	Český Krumlov,	Český Krumlov,
17:00	17:30	Trip	0:30	335002	21	Český Krumlov,	Český Krumlov,
18:17	18:22	Deadhead	0:05			Český Krumlov,	Český Krumlov, Spolí,
18:30	18:50	Trip	0:20	335001	25	Český Krumlov, Spolí,	Český Krumlov, U
18:53	19:11	Trip	0:18	335001	26	Český Krumlov, U	Český Krumlov, Spolí,
19:30	19:50	Trip	0:20	335001	27	Český Krumlov, Spolí,	Český Krumlov, U
19:53	20:11	Trip	0:18	335001	28	Český Krumlov, U	Český Krumlov, Spolí,

Area characteristics

The population shows a trend of aging; a significantly higher proportion of seniors is found in districts such as Plešivec and Slupenec. These areas are notably more isolated in terms of public transport accessibility, which is a key factor for the pilot transport solution.

The terrain is rugged, with elevations ranging from 492 m (Plešivec) to 509 m a.s.l. (around the castle). The central part of the town occupies a promontory terrain with narrow cobbled streets and a historic character. The map base reveals significant topographical barriers, which affect the potential for public transport and other infrastructure.

Public transport is primarily bus-based:

- The route network is limited, with peak service focused in the historical centre, while peripheral districts suffer from insufficient coverage, especially outside peak hours.
- There are no integrated regional connections with rail - the main train station is located in Nádražní Předměstí, about 1.5 km from the town centre.
- Parking capacity in the centre is exhausted, and seasonal tourist traffic significantly impacts mobility levels and causes congestion.
- The city centre experiences heavy seasonal visitation, especially during festivals (e.g., Rose Festival, International Music Festival). This creates seasonal traffic peaks, increased pedestrian and vehicle congestion, and shortages of parking spaces.

Based on the Local Plan, the following key challenges were identified:

1. Low public transport accessibility for seniors and mobility-impaired residents in peripheral areas.
2. Inadequate infrastructure nodes - bus stops lack real-time information, and multimodal transfers are missing.
3. Topographical barriers - limited options for pedestrians or cyclists.
4. Seasonal traffic overload in the historic core caused by tourism.



These factors were used in selecting pilot measures, particularly for the introduction of Demand-Responsive Transport (DRT) and electromobility in public transport.

The table below illustrates the basic demographic and transport characteristics of selected pilot areas in Český Krumlov.

District	Population	Share of Senior (%)	PT Frequency(trips/day)	Distance from Center (km)
Plešivec	2100	28	12	1.5
Slupenec	950	31	6	2.5
Domoradice	1800	19	18	1.8
City Center	1200	16	32	0.0

3.1.2. Key issues & objectives of pilot action

This section presents the main PT and accessibility challenges in the pilot area and the objectives set to address them through the pilot action.

Key public transport issue(s) addressed and main causes

The city of Český Krumlov, known for its historic centre and UNESCO World Heritage status, faces specific mobility challenges resulting from its urban structure, topography, and seasonal tourist pressure. The current public transport system is not fully adapted to the needs of residents in peripheral areas nor to those of tourists. The main issues include:

- Low flexibility of existing bus routes.
- Outdated diesel-powered fleet, which burdens the environment and the heritage zone.
- Insufficient accessibility of the city centre for seniors and residents with limited mobility.
- Congestion in the centre due to private car traffic and lack of parking capacity.

Key objectives (future outlook)

The future of urban mobility in Český Krumlov is expected to evolve significantly due to increasing pressure to improve environmental sustainability, rising operational costs in public transport, and the town's specific conditions as a UNESCO site with limited accessibility for individual transport.

Current problems such as fragmented public transport services (insufficient integration between MHD, regional buses and rail), poor accessibility of certain neighbourhoods (especially steep terrain and disconnected areas), low passenger comfort, and seasonal overloading of the transport system due to tourism are likely to persist in the short term unless structural changes are implemented.

However, several factors indicate a potential for substantial improvement:

1. Electromobility trends - Based on national policies and E.ON analysis, electrification of public transport is economically and environmentally viable, particularly in regional and city transit where stop frequency and shorter distances prevail □.
2. Policy support - Increasing availability of EU and national funds for sustainable transport, including charging infrastructure and fleet renewal.
3. Modernization projects - Revitalization of rail infrastructure and new mobility plans (e.g. the Transport Concept and Public Transport Service Plan) propose better intermodal connections and expansion of MHD services.

Future Scenarios:

1. Baseline scenario (no intervention):



- Continued low attractiveness of public transport,
 - Increasing dependence on Individual car transport
 - Persistent inefficiencies and low integration,
 - Growing environmental burden during tourist season.
2. Positive scenario (moderate intervention):
- Gradual electrification of part of the bus fleet,
 - Improved scheduling and partial integration of MHD with regional services,
 - Pilot charging infrastructure implementation,
 - Raised user satisfaction and moderate modal shift.
3. Advanced scenario (full strategic implementation):
- Full fleet electrification,
 - Complete integration of ticketing and timetables,
 - Optimization of routes and frequencies,
 - Inclusion of on-demand services (especially in hilly or less accessible areas),
 - Significant reduction in emissions and private car use.

3.2. Pilot action solution and expected outcomes

3.2.1. Description of Pilot action solution

The implemented pilot action solution is described with a focus on its operational features and its contribution to improving accessibility, connectivity and overall system efficiency.

The pilot action within the OPTI-UP initiative focuses on the deployment of a fully electric bus as an environmentally friendly and accessible public transport solution for the city of Český Krumlov. The pilot operation demonstrates the practical feasibility of integrating zero-emission vehicles into daily public transport services in a historic urban environment with challenging terrain conditions.

The electric bus is deployed on selected urban services connecting residential areas such as Plešivec and Domoradice with the central transport hub at the main bus station and other key urban destinations. The vehicle operates according to a predefined daily schedule, covering approximately **150 km per day** under standard operating conditions. A map of the pilot operation routes and the operational plan are provided in Section 3.1.

Charging is carried out overnight at the public transport operator's depot located at Chvalšinská 242 in Český Krumlov. No daytime charging is required under normal operating conditions, as the battery capacity allows full-day operation. The pilot deployment is organised as a single-vehicle operation with one driver assigned per operational day.

Operational supervision is ensured through the operator's dispatching system and onboard telematics monitoring vehicle performance and energy consumption. In the unlikely event of technical issues or insufficient battery charge, the electric bus service can be substituted by a conventional diesel vehicle to ensure service continuity.

The solution includes:



Deploying an electric bus on a test route connecting residential areas (e.g., Plešivec, Domoradice) with the city centre.

Ensuring operational monitoring, collecting feedback and operational data.

Integration with regional transport (connections to Špičák, Domoradice, and railway links).

Vehicle characteristics

The pilot operation is carried out using a fully electric low entry city bus IVECO E-WAY 12 m. This vehicle represents a modern zero-emission solution suitable for urban environments with high environmental and accessibility requirements, such as historic city centres.

The bus is designed for daily public transport operation with a focus on passenger comfort, energy efficiency and reduced environmental impact. Its electric drivetrain contributes to lower noise levels and elimination of local emissions, which is particularly beneficial in sensitive urban areas.

Technical parameters

Vehicle type: IVECO E-WAY 12 m LE

Length: approx. 12,5 m

Capacity: 27 seats

Floor type: Low Entry

Accessibility: Wheelchair accessible, space for prams

Propulsion: Fully electric

Battery capacity: 346 kWh

Range: approx. 205 - 211 km (operational conditions dependent)

Charging type: Depot charging (plug-in)

Emissions: Zero local emissions

Noise level: Reduced compared to diesel buses



Figure 11: Electric bus IVECO E-WAY 12 m LE

Addressing key objectives

- G1: Increasing the availability and attractiveness of public transport in underserved areas.
- G2: Reducing CO₂ emissions and noise through the use of electric propulsion.
- G3: Promoting the shift from individual car use to public transport.
- G4: Collecting and evaluating operational data to optimize the network and expand solutions.
- G5: Ensuring inclusive transport for seniors and people with reduced mobility.

Expected outcomes/effects of Pilot Action

- To G1: Improving connections between peripheral areas and the city centre, including access to public amenities.
- To G2: Achieving measurable emission reductions along the pilot route; improved air quality in the city centre.
- To G3: Reducing pressure on parking and traffic congestion in the historic zone.
- To G4: Obtaining valid data for further network optimization and potential route extension.
- To G5: Increasing satisfaction among vulnerable population groups; fostering better social inclusion.

3.2.2. Engagement of stakeholders

The table lists the key stakeholders involved in the pilot action, showing their roles, levels of involvement, importance, and influence during the preparation, implementation, and evaluation phases.



Table 8: List of stakeholders involved in pilot project implementation & impact assessment

Stakeholder	Type	Role	Importance	Influence
City of Český Krumlov	Local authority	Project coordinator - decision-making, communication with local authorities	Very important	Very High
Department of Transport and Road Management	Local authority	Route planning - coordination with the public transport operator	Important	High
Transport operator (e.g., ČSAD Autobusy)	Bus public transport operator	Operation of the pilot electric bus line	Medium	Medium
South Bohemian Road Maintenance Authority	Regional development agency	Assessment of transport infrastructure for electric bus deployment	Medium	Medium
Local residents and associations	Public	Target groups - providing feedback	Medium	Low
Local businesses	Public	Coordination with regard to the needs of tourists and employees	Medium	Low
South Bohemian Region - Department of Transport	Local authority	Monitoring of synergies with the regional transport network	Important	High

3.2.3. Risk assessment

The table presents an assessment of potential risks related to the pilot action, showing their probability and impact, along with the measures identified to mitigate them.

Table 9: Identification of potential pilot action implementation risks



Risk	Probability	Impact	Countermeasure
Delay in the delivery of the electric bus or technical malfunctions during commissioning	Medium	High	Provision of an alternative vehicle; contractual enforcement of delivery deadlines
Insufficient utilization of the service by the public	Medium	Medium	Marketing campaign, public information efforts, flexible route planning
Inaccurate data from the monitoring phase	Low	Medium	Combination of manual and digital data collection methods
Shortage of qualified drivers for the electric bus	Low	High	Driver training, early planning of personnel capacity
Negative public reaction to changes in the transport regime	Medium	Low	Participatory planning, public discussions, stakeholder engagement
Technical incompatibility with existing transport infrastructure	Low	Medium	Test runs, consultations with the operator and the South Bohemian Regional Road Administration

3.3. Pilot action implementation activities

The table presents the key activities carried out during the implementation of the pilot action, including a description of how each activity was carried out, along with timelines and monitoring arrangements before, during, and after the pilot period.

Table 10: PA monitoring table of implementation of activities and steps

PLAN				IMPLEMENTATION	
Pilot activity	Brief description	Start	Deadline	When	Comment
Update of public transport information boards	Replacement or addition of printed timetables at key stops	10/2025	12/2025	9/2025	Information materials related to the pilot action were installed at selected key bus stops.
Public transport satisfaction survey	Short questionnaire survey among passengers in both paper and online form	10/2025	12/2025	9-11/2025	A short satisfaction survey was conducted among passengers using both a paper questionnaire and an online form. The feedback focused on user experience and perception of the pilot service.
Public information of the City of Český Krumlov - Residents of all age groups.	City newsletter (printed and online)	10/2025	12/2025	9/2025	Information about the pilot action was disseminated through the websites of the City of Český Krumlov and VŠTE, their social media channels, and through information materials placed at bus stops.
Information for the professional public - students and professionals.	Students could be informed via school channels, social media, and posters.	1/2026	3/2026	2/2026	Information materials were disseminated to students and professionals via schools, social media, and posters as part of the pilot action communication.
Working meeting with the public transport coordinator in the South Bohemian Region (JČK)	One-time working meeting with the regional coordinator (JIKORD)	8/2025	9/2025	09/2025	A working meeting with the regional public transport coordinator (JIKORD) was held to discuss the pilot action, coordination with regional transport services, and potential future integration.
Monitoring of implementation of pilot action activities	Monitoring of tasks and resolution of emerged issues in pilot action	9/2025	9/2025	9-10/2025	Continuous monitoring of the implementation of pilot activities and resolution of any emerging operational and organisational issues was carried out.

PLAN				IMPLEMENTATION	
Pilot activity	Brief description	Start	Deadline	When	Comment
Milestone M2: presentation of interim-results of pilot action Český Krumlov	PPT presentation at workshop (@TM) in Český Krumlov: 1. project scope and objective; 2. solution used; 3. pilot activities carried out; 4. difficulties encountered during implementation and deviation from the real plan	9/2025	9/2025	30/10/2025	The presentation of interim results of the pilot action was delivered in the form of a PPT presentation during the project partners' meeting in Český Krumlov, including a summary of the objectives, applied solutions, and implemented activities.
On-site visit to Český Krumlov	Visit to the pilot action site, during TM	9/2025	9/2025	15/9/2025	A site visit to the pilot action location in Český Krumlov was carried out, focusing on the observation of the real operation of the pilot solution.
Collection of data for KPIs		9/2025	9/2025	9-10/2025	The data collection phase required for the evaluation of the pilot action key KPIs was initiated and carried out.
Users' survey report for pilot project area	Elaboration of a users' survey report by using a template provided by WP2 leader (users' satisfaction with pilot solution and recommendations for improvement)		19/12/2025	19/12/2025	A user satisfaction survey report was prepared based on the template provided by the WP2 leader.
Pilot action report for pilot action Český Krumlov	Elaboration of a report on pilot project implementation by using a report template provided by WP2 leader		19/12/2025	19/12/2025	A final report on the implementation of the pilot action was prepared in accordance with the template provided by the WP2 leader.
3 rd stakeholders meeting for a pilot project area Český Krumlov	Organisation of local stakeholders' meeting and elaboration of a report by using a template provided by WP2 leader (presentation of a pilot action results & collection of 1. recommendation for improvement and financial and operational requirements for scaling up)		7/2026	28/1/2026	The 3 rd local stakeholders' meeting was held to present the pilot action results and gather feedback and recommendations from stakeholders for future development.
Pilot action Český Krumlov monitoring and evaluation report	Data analyses and reporting (statistics, graphs, text) of KPI-s by using a report template provided by WP2 leader	July 2025	19/12/2025	9-12/2025	Data analyses and evaluation of key KPIs were carried out.



3.3.1. PA promotional campaign

The table lists the communication and promotional activities implemented to support the pilot action and raise awareness among users and stakeholders.

Table 11: PA promotion campaign

Date	Purpose of publication	Publication location
27/08/2025	Early information about the upcoming pilot action and planned public transport improvements before implementation	VŠTE website and VŠTE social media channels (Facebook, Instagram)
05/09/2025	Official information about the launch of the pilot action for residents and public transport users	Website of the City of Český Krumlov
09/09/2025	Dissemination of information about the pilot action and its objectives	www.cs-dopravak.cz
12/09/2025	Promotion of the pilot action and awareness raising among transport stakeholders and users	www.elogistika.info
09/2025	On-site communication informing passengers about the pilot action during implementation	Information posters placed at bus stops and inside buses in Český Krumlov

eLogistika.info ZPRÁVY ▾ PROFI AKCE LOGISTICKÝ ADRESÁŘ ▾ LOGISTICKÝ KALENDÁŘ ▾

Projekt OPTI-UP s potěšením oznamuje dokončení a zveřejnění dvou zásadních výstupů: D.1.1.1 Komplexní datová zpráva o stávajících sítích veřejné dopravy a osvědčených postupech a...

[Číst dál](#)

Pilotní akce elektrobus v Českém Krumlově

Vzdělávání 12.9.2025

Od večerejška 10. září do 16. září probíhá v Českém Krumlově pilotní akce v rámci projektu OPTI-UP, během které si cestující mohou vyzkoušet jízdu zapůjčeným elektrobusem.

[Číst dál](#)

Logistický adresář

- Univerzita Pardubice
Dopravní fakulta Jana Pernera
- Reliant Group
- Vysoká škola logistiky o.p.s.
- OLTIS Group a.s.
- Gebrüder Weiss spol. s r.o.

Figure 12: Promotional materials

3.3.2. Promotion of Pilot action results

The results of the **Alternative Fuel pilot action in Český Krumlov** were presented by VŠTE at a stakeholder meeting and at a meeting with VŠTE students held on **28 January 2026 in České Budějovice**. The results were presented in the form of a **PowerPoint presentation** summarising the pilot objectives, implemented



measures, achieved outcomes, identified challenges, and recommendations for further development. The meeting was attended by **representatives of public transport operators** and a representative of the **City of Český Krumlov**.

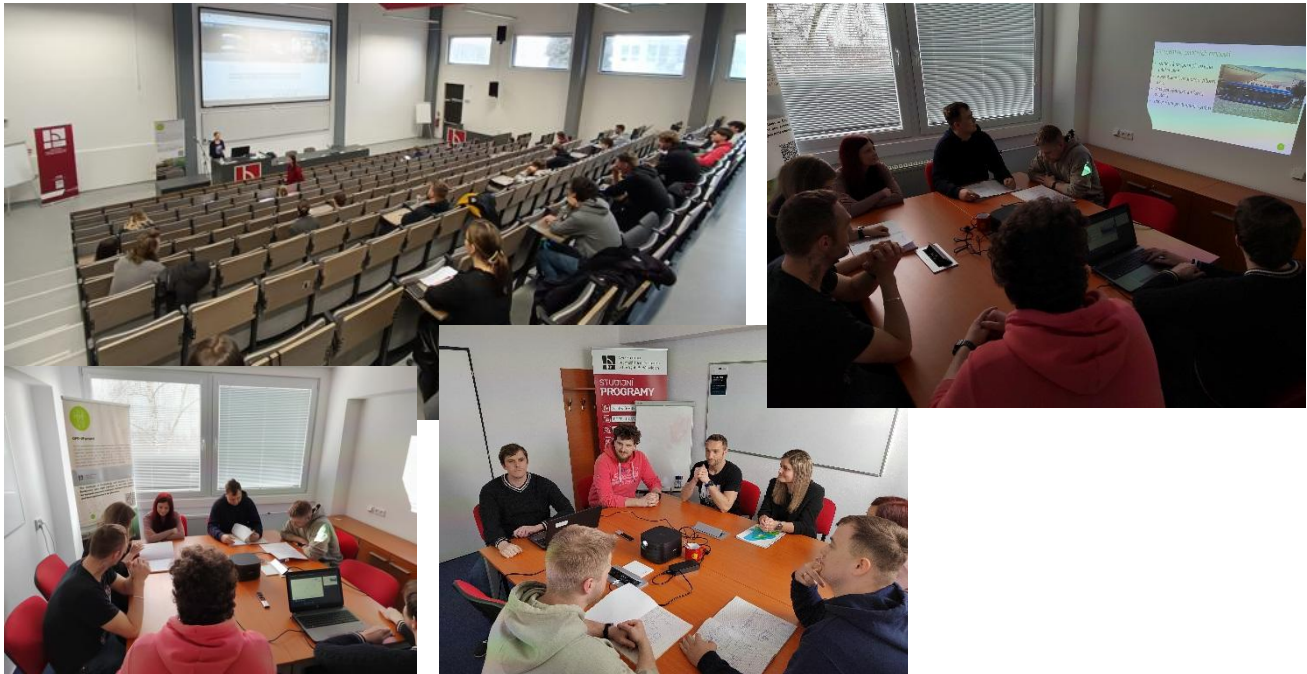


Figure 13: Stakeholders meeting

3.4. Difficulties and deviations from the implementation plan

Difficulties and deviations encountered during the implementation of the pilot action are summarised in the list below.

Table 12: List of difficulties/deviations in implementation of the PA plan

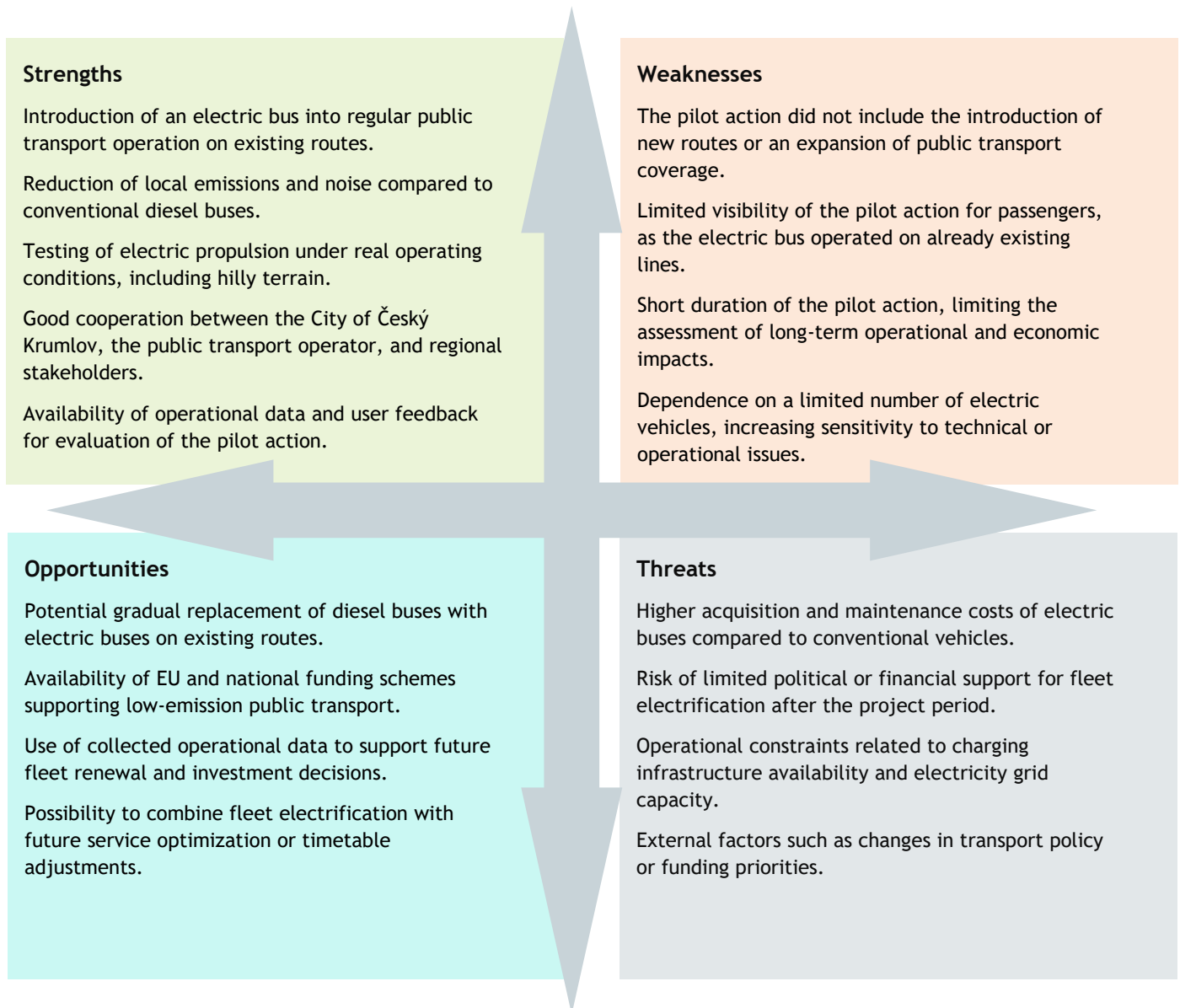
Date	Brief description	Reason	Management/solution	Impact rating
15/09/2025	QR code outage in the questionnaire	Issues caused by the QR code provider	The QR code functionality was restored after a few hours	low

3.5. SWOT analysis of implementation

Key internal and external factors influencing the implementation of the pilot action are summarised through a SWOT analysis, highlighting strengths, weaknesses, opportunities and threats.



Table 13: SWOT analysis of pilot action implementation





3.6. Pilot Action conclusions

The pilot action in Český Krumlov successfully demonstrated the operation of an electric bus within the existing public transport network under real operating conditions. The electric vehicle was deployed on already established routes, allowing for the assessment of electric propulsion without introducing changes to the route structure or service coverage.

The implementation of the pilot action was carried out as planned and without major operational disruptions. Minor technical and organisational issues encountered during the pilot period did not have a significant impact on the overall implementation and were resolved promptly. All planned monitoring and evaluation activities were completed, and the necessary operational and user-related data were collected.

The results confirm that electric buses are technically feasible for operation in the local conditions of Český Krumlov, including hilly terrain and standard service patterns. While the pilot action did not directly increase public transport coverage or accessibility, it provided valuable insights into the environmental and operational performance of electric vehicles in regular service.

The pilot action primarily contributed to the evaluation of alternative fuel technologies rather than to network optimisation. The experience gained and the data collected form a solid basis for future decision-making related to fleet renewal, gradual electrification of public transport, and the identification of suitable conditions for scaling up electric mobility solutions in the city.

3.7. Guidance for future actions for pilot action sustainability

The table below provides guidance for future actions to support the long-term sustainability of the pilot solution, based on the lessons learned and highlighting key steps for continuation and potential scaling.

Table 14: List of activities for achieving sustainability of the implemented pilot solution

Action	Providers	Inputs/resources	Hints
Gradual replacement of diesel buses with electric buses on existing routes	City of Český Krumlov, Public transport operator	Operational data from the pilot action, investment planning documents, funding programmes	Prioritise routes with suitable operational profiles (distance, terrain, charging possibilities).
Evaluation of operational and economic performance of electric buses	Public transport operator, City of Český Krumlov	KPI data, maintenance and energy consumption records, cost analyses	Use pilot results to compare total cost of ownership with conventional vehicles.
Development of charging infrastructure strategy	City of Český Krumlov, Transport operator, Energy provider	Technical feasibility studies, grid capacity analysis, investment funding	Align infrastructure development with long-term fleet renewal plans.
Securing external funding for fleet electrification	City of Český Krumlov	EU and national funding schemes, project documentation	Prepare follow-up projects based on pilot evidence to increase funding success.



Action	Providers	Inputs/resources	Hints
Securing external funding for fleet electrification	City of Český Krumlov, Transport operator	Communication materials, pilot results, environmental impact data	Increase visibility of electric buses to strengthen public acceptance of sustainable transport.
Integration of electric buses into long-term transport planning	City of Český Krumlov, South Bohemian Region	Transport strategies, public transport service plans	Ensure consistency with regional and national mobility policies.



4. Comparison of alternative fuel pilot solutions in Pécs and Český Krumlov

Within the OPTI-UP project, pilot activities related to alternative fuel solutions in public transport were implemented in Pécs and Český Krumlov with the aim of improving environmental performance, increasing sustainability, and testing the operational feasibility of electric mobility in urban contexts.

Both pilots addressed a shared challenge: reducing emissions and car dependency in areas with identified accessibility gaps or environmental burdens, while maintaining reliable and economically viable public transport services.

Although both cities pursued similar overarching objectives—namely reducing CO₂ emissions, promoting sustainable mobility and collecting operational data for future fleet modernisation—they adopted different implementation approaches.

Pécs focused on network expansion combined with electric operation, introducing a new bus line to serve a previously unserved industrial area. Český Krumlov, by contrast, concentrated on fleet modernisation within the existing network, testing an electric bus on already established routes without modifying network coverage.

The following sections present the common characteristics of both pilots, their key differences, shared findings, and key considerations for replication and further development.

4.1. Common characteristics of the pilot activities

Both pilot activities introduced electric buses as a more sustainable alternative to conventional diesel vehicles, contributing to reduced emissions and lower noise levels in urban environments.

In both cases:

- electric propulsion was tested under real operating conditions,
- operational and performance data were systematically collected,
- stakeholder cooperation between municipalities and public transport operators was essential,
- monitoring and evaluation were carried out based on predefined KPIs,
- the pilot actions aimed to provide evidence for future strategic decisions regarding fleet renewal.

The results of both pilots confirm that electric buses are technically feasible in medium-sized cities, including areas with specific topographical or infrastructural challenges.

4.2. Key differences between the pilots

The most significant difference between the two pilots lies in the strategic focus and system integration level.

In Pécs, the pilot action addressed a structural accessibility gap. A new bus line (Line 90) was introduced to connect an underserved industrial area (Diófa utca - Tüskésréti út) to the city's public transport network. The service was operated exclusively by electric buses, supported by existing charging infrastructure located near the terminal. This approach combines environmental objectives with improved accessibility and better access to workplaces.



This represents an approach where alternative fuel technology is integrated into a **new service designed to solve a concrete accessibility problem**.

In **Český Krumlov**, the pilot did not introduce new routes or expand network coverage. Instead, an electric minibus was deployed on existing lines to test its operational feasibility in a historic town with hilly terrain and sensitive heritage areas.

This represents a **technological validation approach**, focused primarily on evaluating environmental performance, operational reliability, and user perception without modifying the transport network structure.

Thus, two conceptually different approaches can be identified:

- a service-expansion approach combined with electrification (Pécs),
- a fleet-modernisation and technology-testing approach within the existing network (Český Krumlov).

4.3. Common findings

Based on the implementation of both pilot activities, the following shared findings can be identified:

- Electric buses are technically suitable for operation in medium-sized urban environments.
- Electrification contributes to measurable reductions in local emissions and noise.
- Operational monitoring and data collection are essential for informed long-term investment decisions.
- User acceptance depends not only on vehicle technology, but also on service quality (frequency, timetable suitability, connectivity).
- Electrification alone does not automatically increase ridership; service design remains a key factor.

In both cases, the pilots provided valuable data for evaluating total cost of ownership, operational constraints (e.g. charging, maintenance), and potential scaling scenarios.

4.4. Opportunities for Improvement

In **Pécs**, further development could focus on:

- optimisation of departure times and service frequency to better match workplace shifts and increase the attractiveness of the service as a competitive alternative to private car use,
- strengthening promotional activities to increase ridership,
- gradual extension of the electric fleet if demand justifies continuation of the service.

In **Český Krumlov**, future improvements could target:

- gradual replacement of additional diesel buses on suitable routes,
- development of a long-term charging infrastructure strategy aligned with fleet renewal plans,
- increased visibility of electric buses to strengthen public awareness and acceptance,
- potential integration of electrification with service optimisation measures (e.g. timetable coordination, multimodal links).

For both cities, long-term sustainability depends on:

- securing external funding for fleet electrification,



- aligning electrification strategies with broader urban mobility plans,
- continuous monitoring of operational and financial performance.

4.5. Common conclusion

Both pilot projects confirm that alternative fuel solutions—particularly electric buses—represent an effective pathway towards more sustainable urban mobility. However, the comparison between Pécs and Český Krumlov clearly demonstrates that electrification can serve different strategic purposes.

In Pécs, electrification was used as a tool to support network expansion and improve accessibility in a previously unserved employment zone. In Český Krumlov, the pilot primarily functioned as a technological and environmental validation measure within the existing transport system.

The first approach links environmental innovation directly with spatial and social accessibility improvements, while the second provides a controlled framework for assessing operational feasibility and preparing gradual fleet renewal.

Both models are transferable, depending on local priorities:

- Cities facing accessibility gaps may combine electrification with service expansion.
- Cities aiming at gradual decarbonisation may start with pilot deployment on existing routes to reduce risk and collect operational evidence.

The experiences gained from both pilots therefore provide practical guidance for cities considering alternative fuel solutions in public transport and contribute to the broader objective of developing low-emission, resilient and sustainable mobility systems.