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OPTI-UP

D.2.2.1 – APPENDIX to Comprehensive evaluation report and recommendations for thematic solutions scaling up

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APPENDIX A: MODENA pilot action

Thematic field: Demand-Responsive Transport (DRT) - focuses on providing flexible public transport (PT) services to low-demand areas, aiming to balance accessibility with financial sustainability.

Pilot action in Modena (Italy): booking of DRT by using a mobile app; based on pre-defined list of available DRT service stop points and bookings the optimal route has been proposed by the app; the passengers are informed on schedules (pick-up time at starting point and drop off at destination point; DRT service is operated by minibus.

A.1. Site visit

A.1.1. Number and types of participants

There was total of 6 participants on the site visit. More information is available upon request.

A.1.2. Situation & challenges of PT in Modena PA area

The PA area

The area selected for the pilot project is predominantly flat, yet it has a lower population density compared to the city centre. This makes it economically unfeasible and unsustainable to serve the area with conventional urban public transport lines. Over the years, what were once primarily rural zones have gradually become inhabited due to lower housing costs, resulting in a portion of the population living far from essential services. This has created the need to develop an on-demand transport service capable of acting as a feeder to the main urban public transport network.

Within the designated area, there are also stops along the Modena–Sassuolo railway line, which provide residents with access to one of the province's key rail connections. Some parts of the area have expanded along major traffic routes, allowing for a minimal level of suburban bus service, particularly for home-to-school and home-to-work travel. However, these connections are largely inadequate during other times of the day.

Ultimately, the area under consideration can be classified as peripheral, as its relatively low population density—especially when compared to other parts of the city—has led to the absence of several essential services. Standard fixed-route public transport does not adequately serve this population, limiting their access to basic services.

PT services

The area is currently served by an established Demand Responsive Transport (DRT) service, which has been operating for several years. Within the area, there are also several urban bus line termini that enable full integration with the urban network through one or more transfers.

During peak times associated with the start and end of high school classes, a few interurban scheduled services are available; however, these services are not competitive during other periods of the day due to their low frequency.

Ultimately, the DRT service is the most suitable solution for meeting mobility needs within the area, as neither urban nor interurban fixed-route lines connect internal points of interest. This is primarily due to the radial organization of routes, which are designed to link the outskirts to the city centre.

PT challenges

The use of a mobile application for booking is expected to facilitate the identification of whether a user will be present at the stop, thanks to reminder notifications that can prompt users to cancel their reservation if necessary.

The introduction of new stop points increases the potential for integrating the service with the existing urban public transport network.

Expanding the number of authorized roads and implementing a routing algorithm may lead to improvements in managing multiple bookings simultaneously, thereby increasing the number of passengers on board.

This solution could prove particularly effective for young people without access to a private vehicle, especially those who already hold an urban transport pass—offered free of charge by the Emilia-Romagna Region.

A.1.3. Operated PA solution

The use of an app capable of managing user requests and generating optimized itineraries can provide greater flexibility in accepting reservations, thereby improving the overall efficiency and utilization of the DRT service.

Moreover, the introduction of new stops near other of interest (POIs) in the area is expected to attract more users, including those traveling outside of peak hours.

The ability to access the service directly via smartphone may also encourage adoption among users who are less inclined to call a call centre, such as younger segments of the population.

For workers as well, the option to book rides through a mobile app can simplify reservation management and promote more consistent use of the service, helping to reduce missed pickups at stops.

A.1.4. Site visit implementation

Visit to the site

The site visit was primarily organized as follows: in the morning, a visit was conducted at the offices of Hola, the company responsible for managing the DRT service through the call centre and, during the pilot phase, for handling the backend operations via the new web application linked to the updated booking system. During this first part of the visit, the new tools implemented at the call centre were presented, and feedback was collected from the call centre manager regarding the use of these tools. In addition to feedback on the tools themselves, input was also requested on the user experience, as the call centre is responsible for resolving booking-related issues and directly interacting with customers.

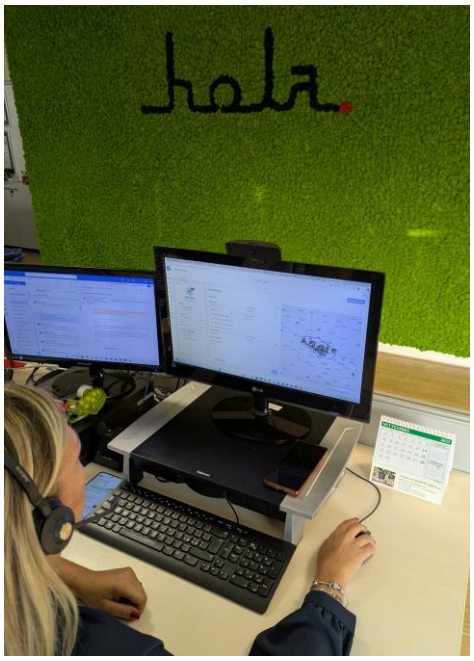


Figure 1: Call centre using the new monitoring web app

The second part of the visit provided an opportunity to gather feedback from drivers. A field visit was carried out at the new "Panni" stop, where the Marketing Manager of the operator SETA was also present. This new stop was introduced to enhance the feeder function of the DRT service towards the regular fixed-route network, as it serves as the terminus of Modena's urban Line 8.

Figure 2: Location of "Panni" stop

The stop was recently upgraded following roadworks that slightly modified the traffic layout. As part of these improvements, a new shelter was installed to increase comfort and convenience for passengers using both services (fixed-route and DRT). During this occasion, an interview was conducted with one of the drivers regarding the new onboard equipment required to access and manage trip assignments.

Figure 3: Panni Bus Stop and Prontobus bus

A.1.5. Insights of PA implementation & feedback (visitors/users)

Below are the feedback and insights provided by the operators responsible for managing the backend of the DRT service:

1) System Responsiveness for Core Operations

   Operations: booking checks, trip plan verification, bus location tracking, data visualization, shift uploads.

   - Pros: Booking checks are highly immediate; the trip plan is visually clear; passenger registration and trip booking are very fast.
   - Cons: Reporting tools are not intuitive or fully functional, particularly for accounting and monitoring purposes.

2) Intuitiveness of Main Functions in VOC

   - Pros: Yes, the user experience on the Agent side is well-organized.

3) Efficiency in Handling User Requests (Call Centre Bookings)

   - Pros: The booking process for users is straightforward and fast.

4) System Usability During Peak Call Volumes

   - There are no significant call peaks for the Prontobus service. However, considering other services, Prontobus bookings are quick and do not interfere with operations on other services.

5) New Functionalities Compared to Previous System

   - Appreciated features include user and driver independence: the ability for users to book autonomously is excellent.
   - The new system has significantly reduced the need for calls and communication between the Agent and drivers, who are now autonomous in managing their trips.
   - The Agent still has real-time monitoring capabilities, allowing location tracking and service supervision without direct contact with drivers.
   - Note: The previous system was more flexible because it did not enforce standard time constraints for users.

Regarding the driver's perspective, feedback on the new system management was generally positive. The new app was considered intuitive and appreciated, as it allows drivers to view the daily trip schedule and includes a navigation feature to reach designated stops.

The main drawback concerns incorrect user behaviour: in some cases, users fail to cancel their bookings, causing frustration for drivers who arrive at the stop without finding passengers. This also impacts the automated system that calculates travel times, which is critical for determining whether new bookings can be accepted. In some cases, these calculated times do not align with real-world experience.

Upon investigation, the provider clarified that travel time estimates are based on Google Maps traffic data from the previous two months. Consequently, during months like October (when the site visit took place), some data may be unreliable because they reflect conditions from August, when traffic patterns differ significantly. Based on this feedback, a request was made to modify this configuration.

A.2. Pilot action performance – KPIs

A.2.1. Plan of performance monitoring and evaluation

A.2.1.1. Identification of key performance indicators (KPIs)

Table 1: Pilot action KPIs

KPI	Brief description	Unit	Target*
KPI_1	Average number of passengers trip	number	1.2
KPI_2	Total number of reservations per week	number	100
KPI_3	Number of no show	number	1
KPI_4	Total hours with users on board	h	50
KPI_5	Percentage of bookings via app	%	50% of total reservations
KPI_6	Number of km travelled per week	km	1200
KPI_7	Number of active users per week	number	22

A.2.1.2. Identification of data sources & tool for KPIs

Table 2: Identification of data sources & tools for KPIs data

KPI	Data list	Methodology	Data source	Data tool
K_1	Bookings registered	Weekly trend	Prontobus Modena e Provincia	Spreadsheet
K_2	Bookings registered	Weekly trend	Prontobus Modena e Provincia	Spreadsheet
K_3	Bookings registered	Weekly trend	Prontobus Modena e Provincia	Spreadsheet
K_4	Bookings registered	Weekly trend	Prontobus Modena e Provincia	Spreadsheet
K_5	Booking registered	Weekly trend	Prontobus Modena e Provincia	Spreadsheet
K_6	Booking registered	Weekly trend	Prontobus Modena e Provincia	Spreadsheet
K_7	Booking registered	Weekly trend	Prontobus Modena e Provincia	Spreadsheet

A.2.2. Analysis of Key Performance Indicators

A.2.2.1. KPI_1: Average passengers per trip

Table 3: Weekly monitoring of the KPI_1 values

KPI_1: Average passengers per trip							
Baseline KPI value [passengers]:1.1							
Target KPI value [passengers]: 1.2							
Week	Monitored KPI values [number of passengers per trip]	Deviation from target value [number of passengers per trip]	Relative deviation from target value [%]	Week	Monitored KPI values [number of passengers per trip]	Deviation from target value [number of passengers per trip]	Relative deviation from target value [%]
W1	1.1	-0.1	-9%	W10	1.0	-0.2	-15%
W2	1.0	-0.2	-14%	W11	1.0	-0.2	-15%
W3	1.0	-0.2	-17%	W12	1.0	-0.2	-17%
W4	1.0	-0.2	-15%	W13	1.0	-0.2	-16%
W5	1.2	0.0	-4%	W14	1.1	-0.1	-12%
W6	1.0	-0.2	-17%	W15	1.1	-0.1	-9%
W7	1.0	-0.2	-14%	W16	1.1	-0.1	-10%
W8	1.0	-0.2	-13%	W17	1.1	-0.1	-10%
W9	1.1	-0.1	-8%	W18	1.1	-0.1	-9%

Table 4: Evaluation of the KPI_1 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	The expectations were that with the automated routing can lead to a bigger share of shared trips among passengers
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☐ Positive impact ☐ Negative impact ☒ Neutral impact	The way the service was used before the pilot action is just similar to the way it was used during the PA, so this KPI doesn't shift from the baseline
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10%	☐ Improvement of previous state ☒ Insignificant change ☐ Worsening of previous state	Even if relative deviation can seem high, the number is quite small, so the deviation can be considered as irrelevant.

No.	Evaluation question	KPI Results	Explanation
	- Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%		
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☐ Good selection ☒ Unsuitable selection	The selected target appears to be appropriate; however, in practice, for a long-term evaluation of the percentage of travelers who have shared their journey with other passengers, it might be more suitable to adopt a different KPI, for example the percentage of shared trips. The choice of this KPI was mainly driven by the data available from the service previously carried out.
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values? Compare the calculated average value of KPI to the baseline and set target:	☐ Successful ☒ Unsuccessful	The service, with regard to the number of passengers per trip, has remained almost stable. The result was slightly below expectations.

A.2.2.2. KPI_2: Total number of reservations on a weekly basis

Table 5: Weekly monitoring of the KPI_2 values

KPI_2: Total number of reservations on a weekly basis							
Baseline KPI value [reservations]:85							
Target KPI value [reservations]: 100							
Week	Monitored KPI values [number of reservations]	Deviation from target value [number of reservations]	Relative deviation from target value [%]	Week	Monitored KPI values [number of reservations]	Deviation from target value [number of reservations]	Relative deviation from target value [%]
W1	84	-16	-16.0%	W10	92	-8	-8.0%
W2	94	-6	-6.0%	W11	121	21	21.0%
W3	88	-12	-12.0%	W12	184	84	84.0%
W4	118	18	18.0%	W13	121	21	21.0%
W5	105	5	5.0%	W14	139	39	39.0%

W6	106	6	6.0%	W15	139	39	39.0%
W7	71	-29	-29.0%	W16	140	40	40.0%
W8	59	-41	-41.0%	W17	160	60	60.0%
W9	73	-27	-27.0%	W18	112	12	12.0%

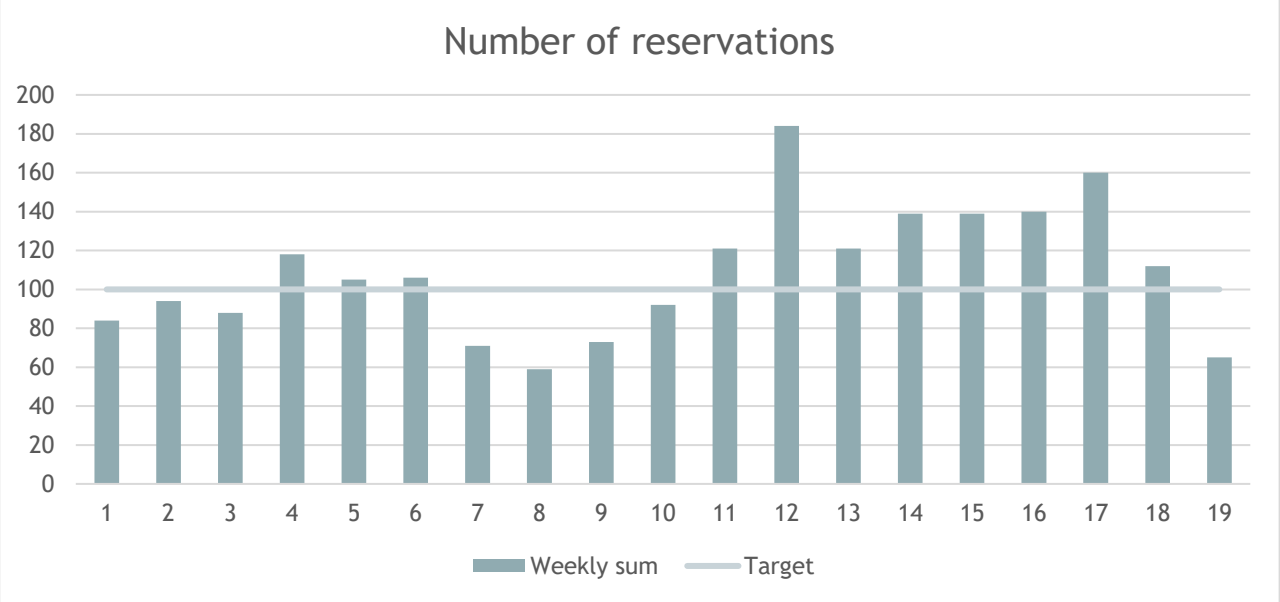


Table 6: Evaluation of the KPI_2 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	The number of bookings was expected to increase due to the greater interest generated by the new booking methodology, but above all because the pilot took place during a seasonal period in which the service is historically less used, namely summer.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☒ Positive impact ☐ Negative impact ☐ Neutral impact	The trend developed positively, mainly driven by seasonality. In some cases, however, the numbers unexpectedly exceeded expectations.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	The reference level was often exceeded by a wide margin during weeks when school services were operating.

No.	Evaluation question	KPI Results	Explanation
	- Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%		
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☒ Good selection ☐ Unsuitable selection	The target was calculated as an average over the period and may therefore have been underestimated, since during the school term the number of bookings was higher than the baseline, even compared with the same period in 2024.
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target: Successful: if average (KPI) has moved in direction of the target Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	Based on this KPI, the pilot action can be considered successful, exceeding 2,000 bookings.

A.2.2.3. KPI_3: Absence of users at the bus stop

Table 7: Weekly monitoring of the KPI_3 values

KPI_3: Absence of users at the bus stop							
Baseline KPI value [passengers]: 3							
Target KPI value [passengers]: 1							
Week	Monitored KPI values [absent passengers]	Deviation from target value [absent passengers]	Relative deviation from target value [%]	Week	Monitored KPI values [absent passengers]	Deviation from target value [absent passengers]	Relative deviation from target value [%]
W1	3	2		W10		-1	
W2		-1		W11		-1	
W3	1	0		W12	1	0	
W4	2	1		W13	1	0	

W5	2	1		W14	2	1	
W6	1	0		W15	2	1	
W7	1	0		W16	2	1	
W8		-1		W17	5	4	
W9	1	0		W18	1	0	

Table 8: Evaluation of the KPI_3 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☐ Increasing trend ☒ Decreasing trend ☐ Stable trend	The expectation was that an easier cancellation process would lead to better booking management and, consequently, to a reduction in no-shows by users who booked a trip but did not actually use it.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☐ Positive impact ☐ Negative impact ☐ Neutral impact	The service did show an overall improvement on average, but in some weeks—those with higher booking volumes—there was also an increase in no-shows.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	Although to a lesser extent than expected, the service showed greater regularity compared to the same period in 2024 and can therefore be considered improved.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☒ Good selection ☐ Unsuitable selection	The choice was appropriate, but the percentage variation is not relevant in this case, as the absolute numbers are very low.
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target:	☒ Successful ☐ Unsuccessful	Compared to the target value, the pilot project was positive, although the use of the application did not eliminate the issue of missed cancellations for trip bookings that users no longer need to use.

No.	Evaluation question	KPI Results	Explanation
	- Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.		

A.2.2.4. KPI_4: Driver hours with passengers on board

Table 9: Weekly monitoring of the KPI_4 values

KPI_4: Diver hours with passengers on board (weekly)							
Baseline KPI value [hours]: 40							
Target KPI value [hours]: 50							
Week	Monitored KPI values [hours]	Deviation from target value [hours]	Relative deviation from target value [%]	Week	Monitored KPI values [hours]	Deviation from target value [hours]	Relative deviation from target value [%]
W1	33	-17	-34%	W10	33	-17	-33%
W2	39	-11	-22%	W11	40	-10	-20%
W3	38	-12	-25%	W12	52	2	3%
W4	45	-5	-10%	W13	49	-1	-3%
W5	42	-8	-15%	W14	47	-3	-6%
W6	48	-2	-4%	W15	45	-5	-10%
W7	32	-18	-36%	W16	53	3	6%
W8	35	-15	-30%	W17	51	1	2%
W9	31	-19	-37%	W18	54	4	8%

Table 10: Evaluation of the KPI_4 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	The expectation was to achieve an increase in the number of hours during which the driver was effectively engaged in providing the DRT service, as a result of the higher number of bookings and by avoiding the many idle periods, caused by a lack of demand, that were recorded before the start of the pilot action.
2.	Does the trend of KPI develop in a positive, negative or	☒ Positive impact	The trend of this value showed an increase thanks to the rise in bookings recorded when moving

No.	Evaluation question	KPI Results	Explanation
	neutral direction in relation to the set target?	☐ Negative impact ☐ Neutral impact	from the summer weeks to the autumn ones, linked to the return to work and school activities.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	Based on what was stated earlier, the service during lower-demand period of the day remained underutilized; consequently, there was no significant increase in the driver's "active" hours compared to the baseline, although they were still higher..
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☒ Good selection ☐ Unsuitable selection	In absolute terms, the identified target value appears to be coherent, as it was achieved only in the final phase of the project, thus representing a credible and realistic objective.
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	In this case as well, the pilot action can be considered successful, as it achieved the target number of hours planned during the final weeks of implementation. Ultimately, however, this KPI should be defined more effectively for long-term monitoring, for example by relating it to the kilometres actually travelled or to the number of passengers, rather than considering only the absolute value.

A.2.2.5. KPI_5: Percentage of bookings via app

Table 11: Weekly monitoring of the KPI_5 values

KPI_5: Percentage of bookings via app							
Baseline KPI value [%]: 5							
Target KPI value [%]: 50							
Week	Monitored KPI values [%]	Deviation from target value [%]	Relative deviation from target value [%]	Week	Monitored KPI values [%]	Deviation from target value [%]	Relative deviation from target value [%]
W1	37%		-13%	W10	51%		1%
W2	55%		5%	W11	71%		21%
W3	60%		10%	W12	72%		22%
W4	58%		8%	W13	72%		22%

W5	50%		0%	W14	72%		22%
W6	58%		8%	W15	85%		35%
W7	55%		5%	W16	79%		29%
W8	31%		-19%	W17	79%		29%
W9	53%		3%	W18	80%		30%

Table 12: Evaluation of the KPI_5 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	This result was both excellent and surprising, as elderly users were expected to account for a much lower share of app-based bookings. The achieved value is already notably high; therefore, no substantial further increase is anticipated in the long term.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☒ Positive impact ☐ Negative impact ☐ Neutral impact	The trend showed growth, but the target had been significantly underestimated.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	Previously, it was not actually possible to book via the app, so there was no true baseline level.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☒ Good selection ☐ Unsuitable selection	The target level was appropriate, although slightly underestimated. In practice, it was already achieved during the first weeks of the pilot phase
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The result for this KPI was particularly positive and encouraging, significantly exceeding the target and showing steady week-by-week growth.

A.2.2.6. KPI_6: Km travelled

Table 13: Weekly monitoring of the KPI_6 values

KPI_6: Km travelled							
Baseline KPI value [km travelled]:1,000							
Target KPI value [km travelled]: 1,200							
Week	Monitored KPI values [veh*km]	Deviation from target value [veh*km]	Relative deviation from target value [%]	Week	Monitored KPI values [veh*km]	Deviation from target value [veh*km]	Relative deviation from target value [%]
W1	730	-270	-27%	W10	702	-298	-30%
W2	845	-155	-15%	W11	847	-153	-15%
W3	906	-94	-9%	W12	1,134	134	13%
W4	1,060	60	6%	W13	1,054	54	5%
W5	997	-3	0%	W14	1,072	72	7%
W6	1,009	9	1%	W15	1,189	189	19%
W7	806	-194	-19%	W16	1,168	168	17%
W8	686	-314	-31%	W17	1,233	233	23%
W9	747	-253	-25%	W18	1,253	253	25%

Table 14: Evaluation of the KPI_6 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	The expectations for this KPI involved two conflicting drivers: an increase fuelled by higher passenger volumes and bookings, offset by a decrease resulting from improved booking optimization. Consequently, this metric may be difficult to interpret in isolation and should be evaluated alongside other monitored data.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☐ Positive impact ☐ Negative impact ☐ Neutral impact	The overall impact is positive, with an upward trend observed from summer to autumn, the period during which the pilot action was implemented. In this case as well, the target was achieved only from September onward.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	There was a slight increase in travelled kilometres, particularly during the final weeks of the pilot phase. For the remainder of the period, the recorded values were broadly in line with those observed under the previous service.

No.	Evaluation question	KPI Results	Explanation
	- Worse: (average (KPI - baseline value) <-10%		
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☐ Good selection ☒ Unsuitable selection	The value itself appears appropriate, but this KPI probably needs to be put into relation with other figures, such as the number of passengers carried, in order to obtain a more direct understanding of the service's efficiency.
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☐ Successful ☒ Unsuccessful	Based on what was specified earlier, we can conclude that this KPI was not relevant for assessing the success of the service; consequently, it can be classified as unsuccessful.

A.2.2.7. KPI_7: Active users

Table 15: Weekly monitoring of the KPI_7 values

KPI_7: Active users							
Baseline KPI value [passengers]:16							
Target KPI value [passengers]: 22							
Week	Monitored KPI values [number of active users]	Deviation from target value [number of active users]	Relative deviation from target value [%]	Week	Monitored KPI values [number of active users]	Deviation from target value [number of active users]	Relative deviation from target value [%]
W1	14	-8	-36%	W10	13	-9	-41%
W2	15	-7	-32%	W11	14	-8	-36%
W3	13	-9	-41%	W12	20	-2	-9%
W4	16	-6	-27%	W13	23	1	4%
W5	18	-4	-18%	W14	20	-2	-7%
W6	16	-6	-27%	W15	20	-2	-7%
W7	16	-6	-27%	W16	24	2	9%
W8	9	-13	-59%	W17	23	1	4%
W9	12	-10	-45%	W18	22	0	0%

Table 16: Evaluation of the KPI_7 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☐ Increasing trend ☐ Decreasing trend ☒ Stable trend	While the project was expected to drive a positive upward trend during its execution, the long-term goal is to achieve stabilized figures sustained by the retention of previously acquired users.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☒ Positive impact ☐ Negative impact ☐ Neutral impact	The trend is anticipated to be positive, driven by the targeted growth in user numbers throughout the pilot phase.
3.	What is it an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	The observed number of active users exceeded the target and is therefore considered an improvement compared to the initial state.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☒ Good selection ☐ Unsuitable selection	The established target was relatively ambitious for the system in question; however, it has proven to be accurate in light of the results.
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	In this case as well, the pilot proved successful, as it attracted new users who continued to use the service beyond their initial experience.

A.2.3. Evaluation of PA performance

Table 17: Aggregative statistics of KPI monitoring evaluation

No	Evaluation question	Metrics	KPI monitoring results							Total
			KPI_1	KPI_2	KPI_3	KPI_4	KPI_5	KPI_6	KPI_7	
1.	Trend of long-term expectation of the PA	Increasing	•	•		•	•	•	•	6
		Decreasing								
		Stable			•					1
2.	Trend of KPI in relation to set target	Positive		•		•	•		•	4
		Negative								
		Neutral	•		•					2
3.	Evaluation of the impact regarding the baseline situation	Improvement		•	•		•	•	•	5
		Insignificant change	•			•				2
		Worsening								
4.	Definition of target value	Very good								
		Good		•	•		•		•	4
		Not good	•			•				2
5.	Successfulness of PA in relation to the baseline and target value	Successful		•	•		•		•	4
		Unsuccessful	•					•		2

A.2.3.1. Summary of evaluation

A.2.3.1.1. Assessment of overall achievement of the Pilot Action (PA) considering all KPIs

Baseline values are indicative and reflect best-available historical data rather than strictly comparable measurement periods. Some KPIs were retained for experimental or learning purposes and are therefore interpreted with limited weight in the overall success assessment.

The pilot project can be considered, in its overall performance, a clear success. This is evidenced not only by the noticeable increase in active users, but also by the exceptionally high percentage of rides booked through the application, which demonstrates both user engagement and a positive reception of the digital tools introduced as part of the service.

From an operational standpoint, however, the actual impact of ride optimization is less straightforward to assess. This is primarily due to the nature of the KPIs selected at the outset, which, in retrospect, have proven not entirely appropriate for capturing the specific dynamics and efficiency gains expected from the optimization process. For instance, although the total number of kilometres travelled has increased, the KPI measuring the average number of passengers per ride does not offer a sufficiently detailed or reliable indication of operational improvements and therefore does not allow for a thorough interpretation of the results.

It is worth noting that the service management software does provide more granular insights, including data on the proportion of bookings that ultimately resulted in shared rides. This indicator showed a progressive increase over time, eventually stabilizing at approximately 30%, suggesting a growing propensity for ride-sharing among users and at least a partial achievement of the intended optimization goals.

However, this figure cannot be meaningfully compared with the data from the 2024 service period. The way historical data was aggregated does not allow for an accurate reconstruction of this specific metric, thereby preventing a direct comparison and limiting the possibility of a longitudinal analysis of the impact of the optimization measures.

A.2.3.1.2. Representation of the selected KPIs

As outlined in the previous section, the most significant indicators for assessing whether the new application has achieved a satisfactory level of success are, first and foremost, the number of active users and the volume of bookings made through the app. These parameters are, more than any others, those that most effectively reflect the users' appreciation of the service and their willingness to adopt the digital tools provided.

The KPIs more closely related to the operational performance of the service, and specifically to the efficiency gains expected from improved booking optimization and from the effective deployment of drivers relative to their available working hours, would likely benefit from further refinement. At present, these indicators do not fully capture the nuances of service optimization, nor do they provide a sufficiently clear picture of how well operational resources are being utilized.

A.2.3.1.3. Availability and sustainability of data sources

With regard to data availability and long-term sustainability, it is important to clarify that the KPIs used during the pilot phase represent only a subset of the full range of indicators provided by the app's service provider for monitoring operations. Consequently, the accessibility of these metrics is very high, and the possibility of adjusting or expanding the KPI set—by identifying which indicators may prove more meaningful in the period following the pilot—remains entirely feasible. This flexibility ensures that future monitoring activities can rely on a more tailored and insightful set of performance measures.

The data are readily accessible through charts and tables within the management application and can be exported to Excel for further analysis. This enables additional processing, cross-referencing of variables, and deeper exploration of relationships and dependencies among KPIs, supporting more robust performance evaluations.

A.2.3.1.4. List of essential KPIs

As previously mentioned, valuable insights into the optimization of the service could derive, for example, from monitoring how many rides were actually shared and from assessing the number of empty kilometres travelled by drivers to reach passengers. More broadly, it would be advisable to focus on KPIs that already represent an elaboration or synthesis of multiple underlying data points, rather than relying solely on basic indicators such as total kilometres travelled or total service hours. When taken in isolation, these baseline metrics risk obscuring important aspects of how the service operates and may fail to capture the actual efficiency or quality improvements achieved. For this reason, main KPIs for the long-term monitoring would be KP_1, KP_2, KP_7 and KP_5. The first KPIs indicate the actual growth of the service and the increase in ride sharing, which is an important aspect of collective public transport, while the last one reflects the efficiency of introducing the smartphone application.

A.2.3.1.5. Proposed target values for monitoring of KPIs

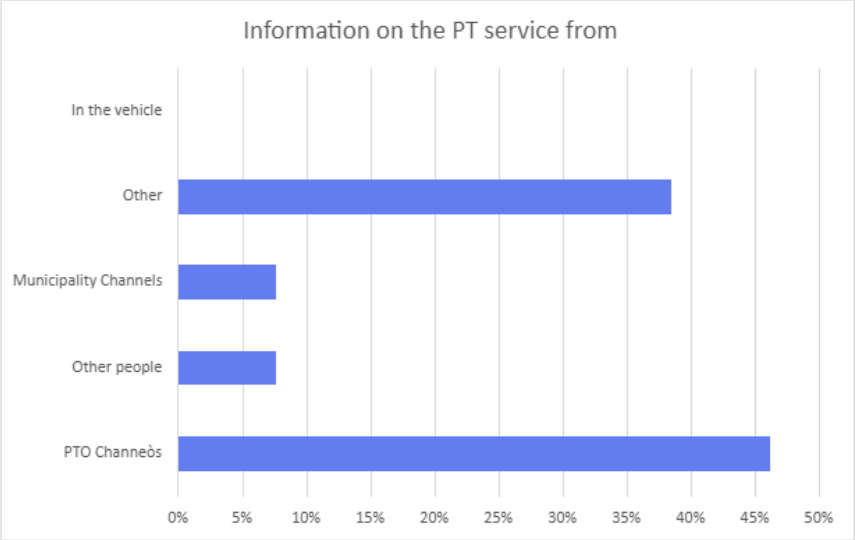
Name	Description	Target value
KPI_1	Average passengers per trip	1.2
KPI_2	Total number of reservations on a weekly basis	120
KPI_3	Absence of users at the bus stop	0
KPI_4	Driver hours with passengers on board	50
KPI_5	Percentage of bookings via app	85%
KPI_6	Km travelled	1,500
KPI_7	Active users	35

A.3. Users-survey

A.3.1. General questions

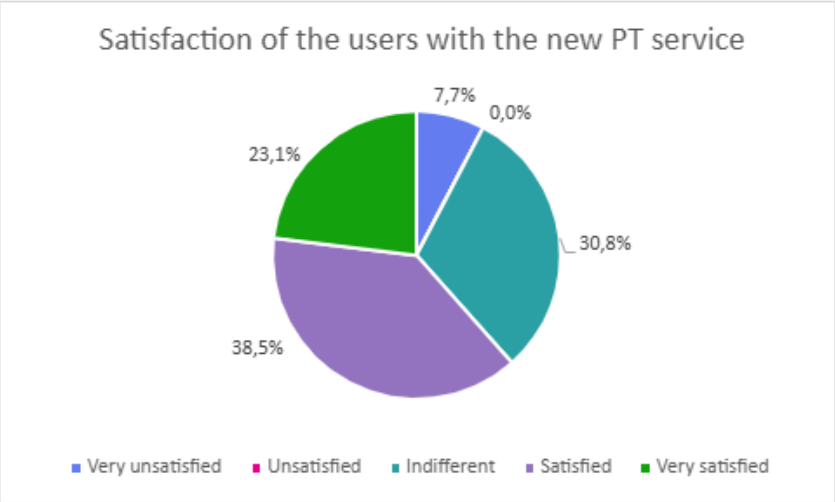
1. How were you informed about this service?

Category	Respondents	%
Other	5	38.5%
Other people	1	7.7%
In the vehicle	0	0%
PTO channels	6	46.1%
Municipality channels	1	7.7%



2. How were you satisfied with the new service?

Category	Respondents	%
Very unsatisfied	1	7.7%
Unsatisfied	0	0%
Indifferent	4	30.8%
Satisfied	5	38.5%
Very satisfied	3	23.1%

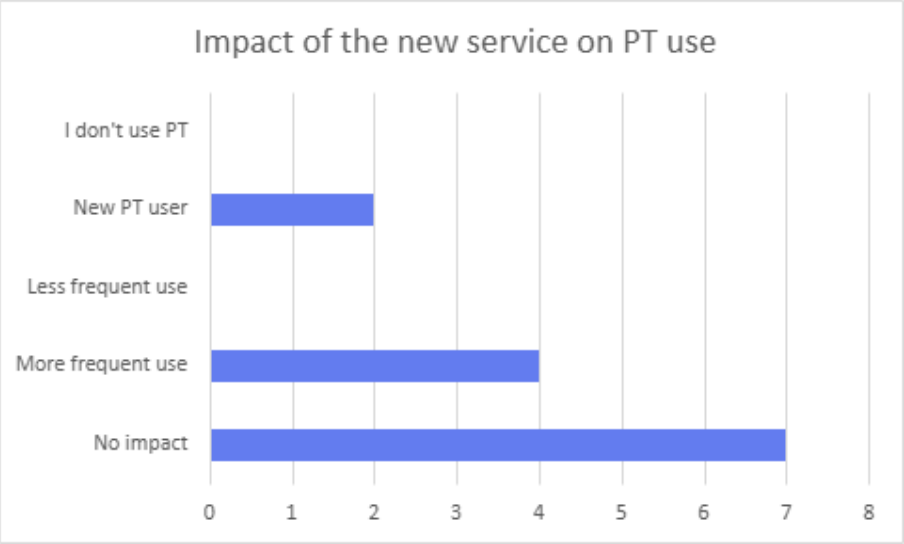


3. ***Does the new service in your opinion contribute to improvement of environmental performance of PT?***

Category	Respondents	%
Yes	11	84.6%
No	2	15.4%

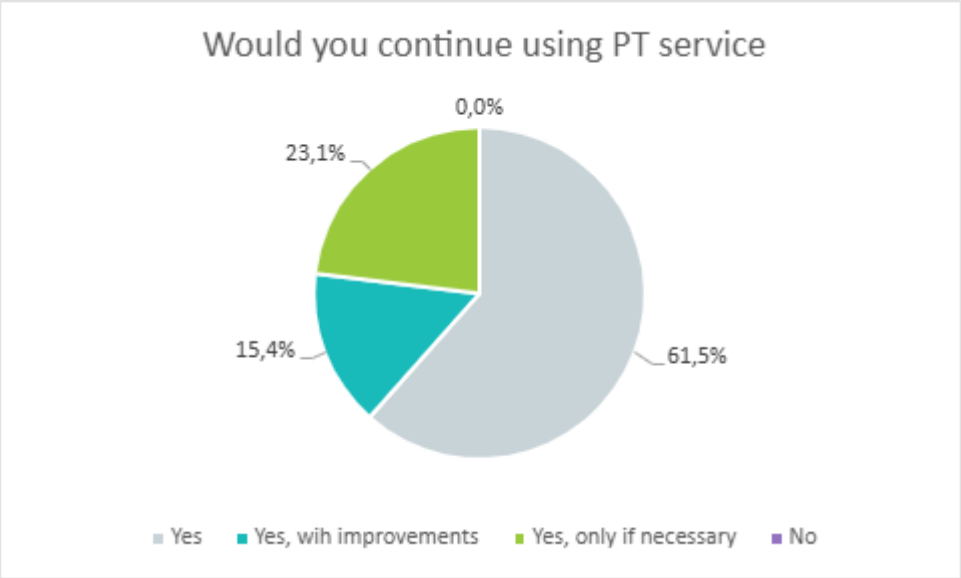
4. ***How did implementation of the new service impact your use of PT?***

Category	Respondents
No impact	7
More frequent use	4
Less frequent use	0
New PT user	2
I don't use PT	0



5. Would you continue using the new PT service?

Category	Respondents	%
Yes	7	33.3%
Yes, with improvements	6	28.6%
Yes, only if necessary	3	14.3%
No	5	23.8%



6. Would you recommend the new or changed PT service to the ones who don't use the PT?

Category	Respondents	%
Yes	11	84.6%
No	2	15.4%

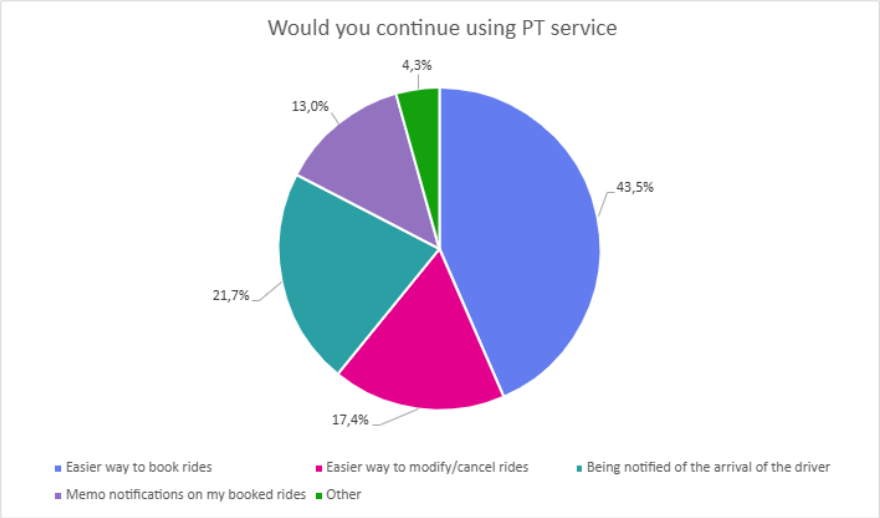
A.3.2. Specific questions

1. Do you prefer the new method to reserve rides via smartphone or the former system?

Category	Respondents	%
Yes	10	76.9%
No	3	23.1%

2. What are the best new features of the service?

Category	Respondents	%
Easier way to book rides	10	43.5%
Easier way to modify/cancel rides	4	17.4%
Being notified of the arrival of the driver	5	21.7%
Memo notifications on my booked rides	3	13.0%
Other	1	4.3%



3. *Feedback from the app*

Users were able, on a voluntary basis, to rate their level of satisfaction with each individual trip taken. In addition to giving a score from 0 to 5, they could also indicate the main aspects that motivated their rating (for example, the punctuality of the trip, the driver's courtesy, the chosen route, etc.).

The figure shows a summary of the evaluations collected during the pilot period, indicating that for 45 rides, about 3.1% of all rides, users actually provided feedback. The resulting average rating is 4.2, and the main reasons motivating a 5/5 score include travel speed and smooth routing.

The last histogram highlights, using different colours, the various ratings collected over the days (with green corresponding to 5 and red to 1).

These feedback entries complement the evaluations gathered through the questionnaires and confirm a positive outcome of the initiative from the users' perspective.

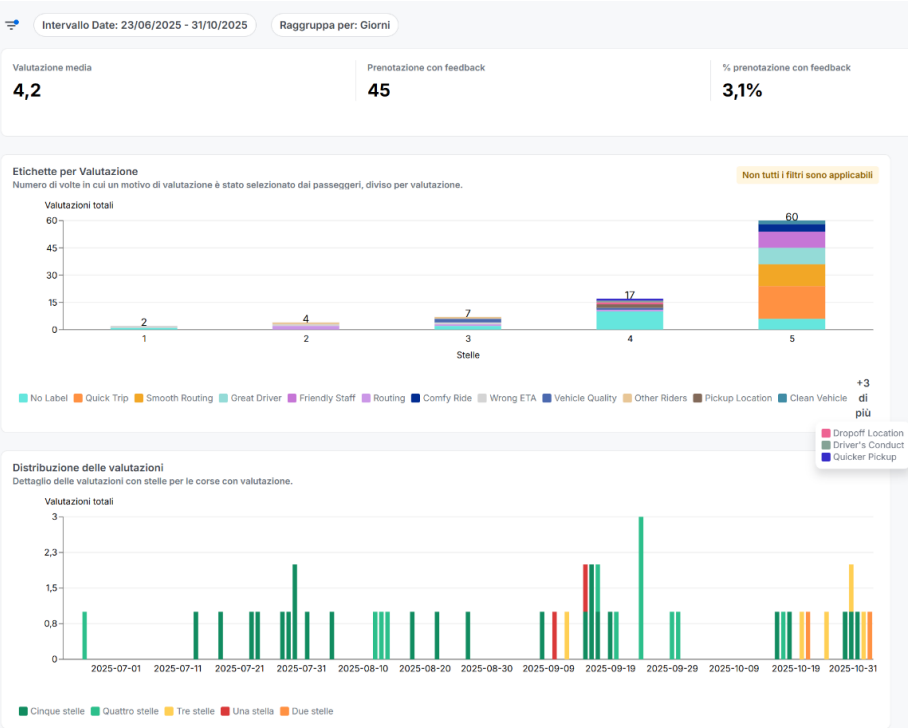


Figure 4: Screenshot from the App control Dashboard regarding users' feedback

A.4. Stakeholders' consultation

Name of the PP: **aMo**

Date of the meeting: **09/02/2026**

Venue of the meeting: **Municipality of Modena Office, via Santi, 40 - Modena**

A.4.1. Number and types of participants

There was total of 7 participants on the stakeholders' consultation. More information is available upon request.

A.4.2. A short summary of the PA presentation

ToC of PPT presentation:

- Purpose and objectives of the OPTI-UP project
- OPTI-UP approach to public transport optimization (D.1.2.1 & D.1.3.2)
    - Development of local plans on public transport optimization in small and medium-sized cities
- Local plan on public transport improvement for Modena
    - Transport model simulation scenarios for activities
    - Implementation of transport modelling in PTV VISUM
- Pilot activity
    - Goals and objectives
    - Concept of implementation
    - Implementation process
    - KPI monitoring results
    - Summary of results, findings, and recommendations
- Discussion
    - Stakeholder insights and recommendations

A.4.3. Insights and feedback from stakeholders

A.4.3.1. Outcomes of LUTI & transport modelling scenarios

1. How do you evaluate the validity and usefulness of the outcomes of transport scenario simulations?

   Answer: The use of LUTI models is certainly valuable, but it is unlikely that high-impact decisions affecting citizens' mobility habits can be based on them alone. More realistically, they serve as a preliminary tool to identify which scenarios warrant deeper analysis. Transport models, by contrast, are already well established in the technical studies carried out by public administrations. However, they still tend to focus primarily on private transport, while for public transport they often rely on broad generalisations that make it difficult to recreate conditions that truly reflect those simulated.

   In the specific case of DRT analysis, the tool integrated into Visum has limitations: it assesses performance mainly from an operational standpoint and does not adequately account for the interaction between supply and demand. As a result, it fails to capture potential benefits in terms of new ridership, which must instead be evaluated through more traditional methods such as surveys.

2. How do you assess use of transport modelling in planning of measures for improvement of public transport, including the presented method of the model implementation and finetuning in view of its potential for use at the local level?

   Answer: Modelling is certainly a highly useful tool for decision-makers, as it allows them to assess potential scenarios without necessarily implementing them. However, it is essential to understand that the outcomes of these analyses are fundamentally tied to the quality of the input data. Consequently, to obtain reliable tools, it is necessary to start from a high-quality and, ideally, constantly updated data base. Moreover, based on the experiences of the Municipality of Modena, studies involving modelling analyses have the great advantage of enabling comparisons between scenarios, but it is not always appropriate to consider absolute values as fully reliable; the comparison between scenarios is generally more dependable.

   At the local level, its main use could be to evaluate a system or a transport network that is significantly different from the current one, so as to provide a foundation for subsequent assessments, including those carried out in collaboration with the community.

A.4.3.2. Operational implications of PA

1. What are the necessary planning steps in order to replicate the pilot solution (documentation, strategies, plans, funds, stakeholders, purchase of additional vehicles) and which steps take the most time?

   Answer: In the case of Modena, the system introduced constitutes an enhancement primarily related to the service management software. Consequently, both the financial resources and the personnel required for service delivery were already in place. The budget allocated for this type of service is defined within the existing agreements between the operator and the PTA. Moreover, given the social relevance of providing mobility options in low-demand areas, the municipality already contributes to covering the associated operational costs. For these reasons, the implementation of the new system does not substantially alter the overall expenditure previously sustained for the service.

   Furthermore, the software developed within the project has been designed with scalability in mind. Its architecture allows, with minimal configuration expenditure, the potential management of additional DRT services operating within the province and already included in the current service contract.

2. Who are the main stakeholders that need to be involved in planning and implementation in order to replicate the pilot solution?

   Answer: The primary stakeholders involved are the operator and the municipality, as they are respectively responsible for delivering the service and commissioning it. Their roles are central to both the operational management and the strategic oversight of the system.

   The effectiveness and uptake of the service could likely be improved through more extensive and targeted communication within the areas where it is currently available. Increasing the visibility of the service offer, particularly in low-demand zones, may contribute to greater user awareness and, consequently, higher utilisation levels.

3. Where do you see the main issues or what are the prerequisites for successful replication of the pilot solution?

   Answer: One of the main challenges identified has been the effective promotion of the service, as communication activities are non-technical in nature and require a specialised and experienced working group. Nonetheless, demand-responsive transport inherently serves a limited user base, and therefore a substantial investment in communication may not be advisable.

   In general, it has also been observed that some long-standing users may feel disoriented when they cannot rely on fixed schedules for journeys they regularly make. This is due to the route-optimisation algorithm, which may adjust departure times based on the presence of other bookings.

4. What are the criteria to decide whether to continue or close the pilot action (why did you decide to continue or close the PA activities?)

   Answer: In the case of the Municipality of Modena, the objective was to facilitate access to the service through an app complementing the call-centre booking system, thereby supporting a potential increase in the number of users. As previously noted, the service has primarily a social function, enabling residents living farther from the central urban areas to access a mobility option capable of integrating with the urban transport network. In this sense, its social value remains intact, and the additional cost associated with the new software is marginal compared to the financial commitment already foreseen by the municipality.

   Furthermore, over the past year the service has been enhanced through the introduction of new minivan vehicles, demonstrating the operator's confidence in the value and relevance of this service.

A.4.3.3. Financial implications

1. What are the main costs for implementation of the pilot solution?

   Answer: In the case of our pilot project, the largest cost was the one covered by OPTI-UP for the development and configuration of the new user app, which is integrated with the service management system. However, this represents a one-off expense, while the ongoing cost is limited to a monthly fee based on the number of vehicles used. This is a cost that is significantly lower than the initial configuration investment.

   For services already operating in the area, the implementation would therefore benefit from not requiring full configuration from scratch, but only incremental expansion, thereby supporting the scalability of the system. Conversely, in municipalities where DRT services are not currently provided, the costs would be substantially higher, as they would also need to cover personnel and vehicle expenses.

   At present, aMo is able to absorb the additional costs associated with software implementation, while the establishment of a completely new service would certainly require financial commitment from the municipality involved. The intention is nonetheless to make this tool available within the framework of the upcoming tender that will determine the next service operator.

2. What are the main funds for implementation of the pilot action?

   Answer: As mentioned in the previous response, the funds required to maintain the system can be covered by aMo through the annual financing received from the Emilia-Romagna Region. The Region provides funding to cover the costs of the services included in the current service contract, and the cost of this software can be classified as an eligible expense. Unfortunately, this service will likely remain structurally loss-making, as it is unrealistic to expect a break-even point given the current volume of users.

3. Do you see any other possibilities to finance upkeeping of the pilot action?

   Answer: Unfortunately, given the current planning of the service, there is no realistic potential for increasing ridership to a level that would allow operating costs to be covered through ticket revenue. As a result, the viability of the service depends entirely on the municipality's commitment to maintaining it as a socially valuable provision, rather than on its economic sustainability for the operator.

4. How can expansion of the pilot activity in the same area or in other areas impact the costs (e.g. optimisation of personnel, vehicle fleet…)?

   Answer: With respect to the Modena area, the pilot was carried out in the southern part of the city. However, the administration has already considered extending the use of the new management tool and the associated user app to the equivalent service operating in the northern area, due to the product's straightforward scalability. As noted, the initial costs had already been covered through the pilot action, and consequently the cost of expanding the service was relatively limited.

Naturally, in the case of a structural enhancement of the service, meaning additional vehicles and drivers, the associated costs would necessarily be higher and, at present, cannot be covered.

5. What funds do you see for replication of the pilot solution to other areas in the country or other regions?

   Answer: Specific funding streams dedicated to so-called low-demand areas could also be used to develop DRT systems, which may be better suited to local needs compared to the standard services currently offered. However, with equivalent budgets, these systems typically provide a lower number of trips and result in less extensive territorial coverage. More generally, national funding schemes aimed at supporting the development of digital tools to improve accessibility, or that can be allocated to the implementation of DRT services, have become increasingly available in recent years through various state financing programmes.

A.4.3.4. Recommendations for improvement and up-scaling

1. Do you see in your county other locations, municipalities, regions where similar solution could be applied?

   Answer: There are certainly several areas in which DRT services can be successfully developed, as also illustrated in the best practices presented in the previous OPTI-UP documents. Specifically, dedicated apps for service management represent a clear added value for the success of such services, while still acknowledging the need to provide diversified access methods to ensure more practical solutions for elderly users.

   All defined low-demand areas across the Italian territory could potentially consider a DRT service, while an increasing number of medium-sized and small cities are developing similar services to provide, for example, night-time transport or shuttle connections for commuting to industrial or artisanal zones. In this sense, DRT services, thanks to their flexibility, offer several operational configurations that can be effective across multiple contexts.

2. How do you see long-term optimisation of the PA (e.g. leverage of bigger vehicle fleet, more users, re-distribution of drivers, engagement of licensed drivers, capacity of vehicles, stability of financing, reinventing of passenger services with other options, development of SW support…)?

   Answer: The pilot action can deliver substantial improvements only within a context where the entire transport network and its operating model are reconsidered, introducing a hierarchy of routes and strengthening DRT services in the peripheral areas of the network. In this way, the optimisation of vehicles and drivers would make it possible to establish high-frequency lines in the more densely populated zones, while DRT would serve as an ideal feeder service, ensuring access to a more efficient and frequent core network while reducing route lengths and mitigating delay propagation.

   Another potential development pathway for the existing DRT framework would be to leverage the same tools to redesign selected services, such as evening or night-time transport, for which no dedicated provision currently exists in the city. A pilot deployment using DRT vehicles would likely be far less costly than extending standard bus operations on certain routes during late-evening or night hours.

3. What is needed in terms of formal procedures for easier expansion of the solution (speeding the process) and upkeeping it (e.g. who finances, decides on additional schedule departures or line layout modification – what are limitations)?

   Answer: The main limitations are linked to the fact that current services are partly financed through regional funding allocated to ensure their continuity. New services would therefore require direct investment from local administrations, potentially at a higher level than what is currently provided in municipalities where a DRT service has already been introduced.

   In the present context, where recruiting new drivers is particularly challenging, the most significant constraint, beyond the identification of suitable funding, is the actual availability of drivers. At the moment, drivers are considerably more valuable when assigned to services with higher load factors and utilisation rates than those typically associated with a DRT service.

4. How do you see possibilities given by the national (regional) legislation to introduce pilot actions into existing operations of the PT (e.g. 6 months change of the granted PSO on PT) – what are the needed actions to make pilot actions easier to implement and measure their success?

   Answer: Pilot actions face significant challenges when introduced within existing service contracts between operators and the PTA. In the specific case of Modena, the technical feasibility of implementing the pilot was facilitated by the fact that the service already existed.

   Operating within the constraints of an active service contract is far from straightforward when it comes to introducing pilot initiatives. Such actions require considerable effort from the operator, yet they are limited to a predetermined — and typically short — time frame. These conditions inevitably make operators less inclined to engage in pilot projects, especially when they are not formally part of the project itself (i.e., not acting as project partners).

5. Do we need a standardized methodology for identifying resident's (passengers') needs that would differently address big agglomerations and smaller settlements, regular services and DRT… – how do you identify the needs today?

   Answer: In recent years, the role of the mobility manager has become increasingly widespread and, consequently, potentially more valuable. This figure, typically an employee within an organisation, acts as a link between the mobility needs of colleagues and the municipal technical departments responsible for mobility planning. Their widespread presence makes it possible to collect more detailed information, particularly in companies with large numbers of employees, and can facilitate the identification of mobility needs not only at the level of individual workplaces but also across entire urban districts.

   Naturally, this approach is particularly useful for commuting-related needs; however, it does not address travel demands that are not linked to systematic home-to-work movements. Overall, there is a clear need to develop a standardised system in this area.

6. What is the drive (incentive) for selection of alternative fuel vehicles in the operator's vehicle fleet?

   Answer: From the operator's perspective, the main driver in choosing alternative fuels is undoubtedly the operational cost of both the vehicles and the fuel itself. Consequently, from the operator's point of view, the most advantageous option is typically the least expensive one. It is therefore the responsibility of the transport authority to use the levers available within service contracts to encourage the adoption of more environmentally sustainable solutions, even before economically favourable ones, potentially by rewarding operators who opt for more sustainable vehicles.

   State investment is essential to support the uptake of emerging technologies, especially in the early stages. This is particularly true when technological maturity has not yet been fully achieved. The case of Modena is an example: a hydrogen refuelling station has been built and the first vehicles have been purchased with the intention of developing a local production chain in the future. This decision was largely political, and such political commitment is likely the only effective way to introduce these types of technologies in their early phases.

7. Do you provide support for transport operations on the basis of a commercial or custom-designed SW. Would you be ready to use an openly adaptable EU solution (e.g. for DRT service) to assure standardisation and easier cross-border integration of services?

   Answer: A standardized tool, widely adopted across multiple regions, open-source and certified as an EU product, would certainly be a desirable solution. However, based on the experience gained from the various services currently operating across the territory, the system's custom design should allow for significant flexibility in configuration in order to be truly usable in all contexts.

APPENDIX B: GROSUPLJE pilot action

Thematic field: Demand-Responsive Transport (DRT) - focuses on providing flexible public transport (PT) services to low-demand areas, aiming to balance accessibility with financial sustainability.

Pilot action in Grosuplje (Slovenia): DRT is operated on a fixed schedule – fixed trips; the trip is operated if at least one passenger has been registered through the call centre; the operated PT vehicle is selected according to the number of registered users: bus, van or car; van and car are electrically propelled.

B.1. Site-visit

Name of the PP:	PIL – Prometni institut Ljubljana d.o.o.
Date:	02.07.2025
Venue:	Municipality of Grosuplje, line 72

B.1.1. Number and types of participants

There was total of 5 participants on the site visit. More information is available upon request.

B.1.2. Situation & challenges of PT in Grosuplje PA area

The PA area

The pilot area lies within the municipality of Grosuplje, Slovenia, and takes up the area along the bus line 72, that connects the municipality centre of Grosuplje to a settlement of Polica.

The municipality of Grosuplje is a medium-sized Slovenian municipality located on the south-eastern edge of the Slovenian capital of Ljubljana. It is 134 km^2 in size and has 18,808 inhabitants. It is known above all for its rich cultural and historical heritage and as a developed craft and industrial city, which is only a good twenty-minute drive by car from Ljubljana on the highway in the direction of Zagreb (Croatia).

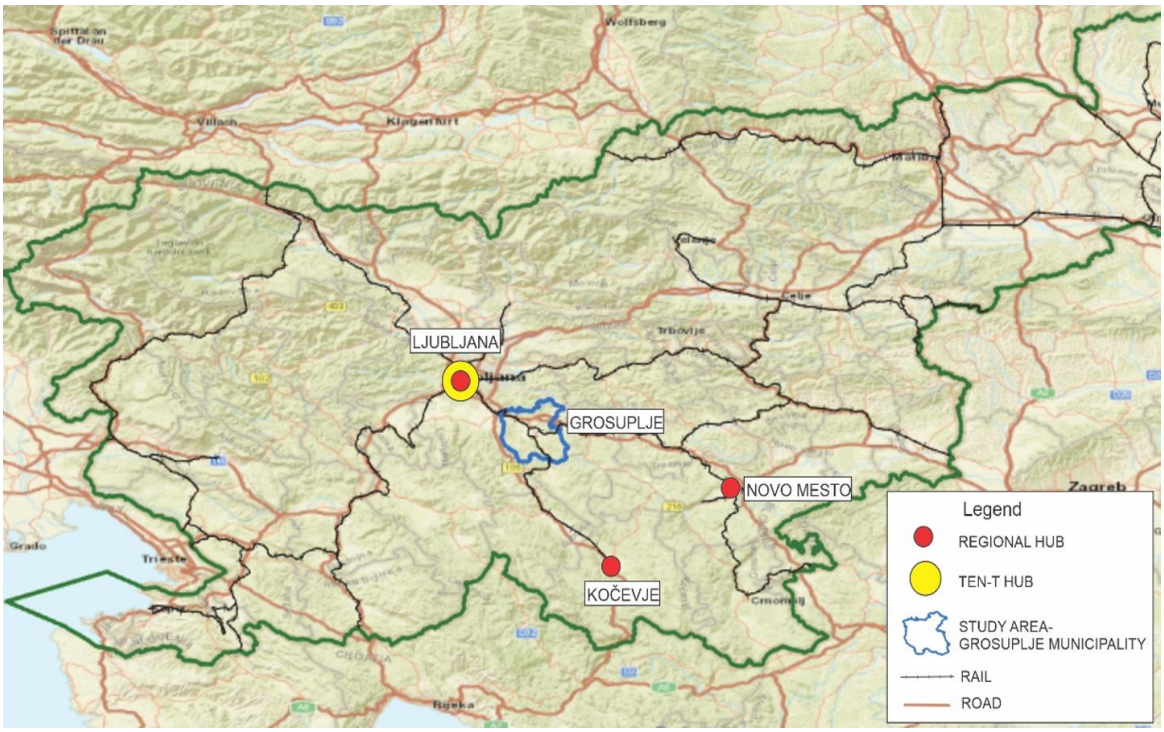


Figure 5: Overview of pilot area of municipality of Grosuplje on national map of Slovenia, Grosuplje municipality, located in NE of capital of Ljubljana

Today, Grosuplje is an administrative, economic and traffic centre, comprising several settlements, among them Polica settlement in NE of the municipality, which is a focus of the PA.

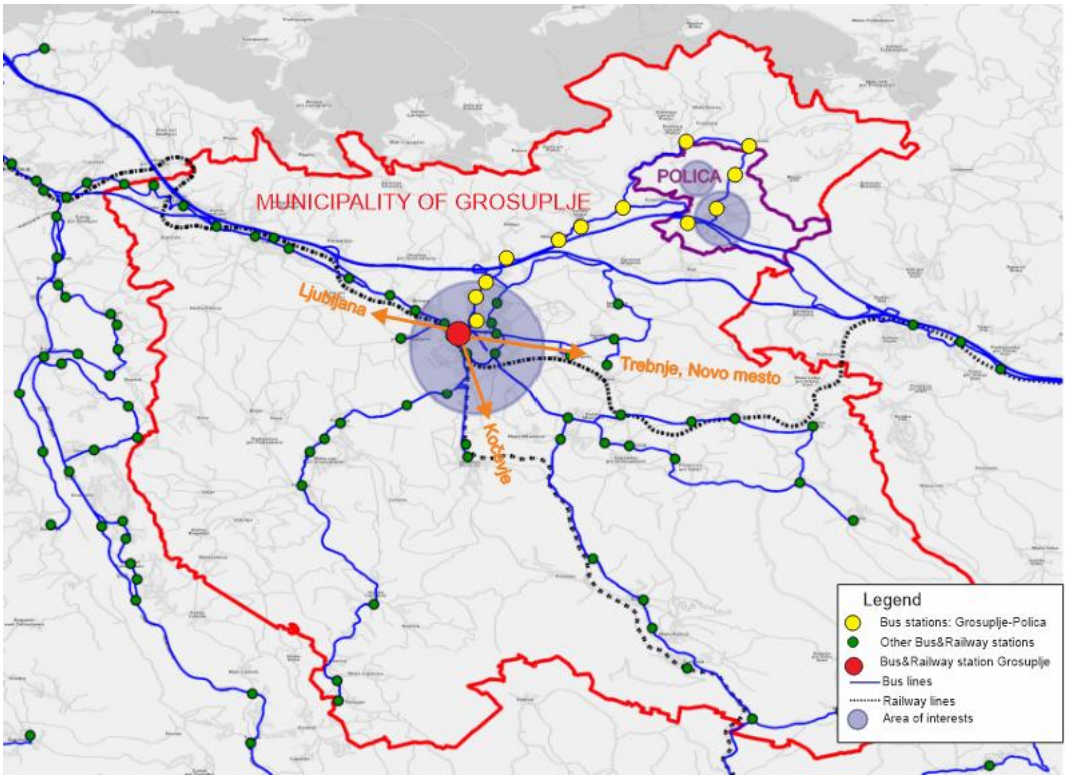


Figure 6: Municipality of Grosuplje and Polica settlement (PA)

Figure 7: Premises of Municipality of Grosuplje (left) & health centre

PT services

PT in Grosuplje mainly connects relatively small settlements around the centre, to the main transport hub in the centre, where the main bus and railway stations are located.

- **7 railway stops and a railway station Grosuplje**

  Junction station towards Ljubljana, Novo mesto and Kočevje; non-electrified tracks; unmanned – ticket can be bought at ticket vending machines; renovated in 2022 with two new passenger platforms and an underground passenger access with staircases and elevators.

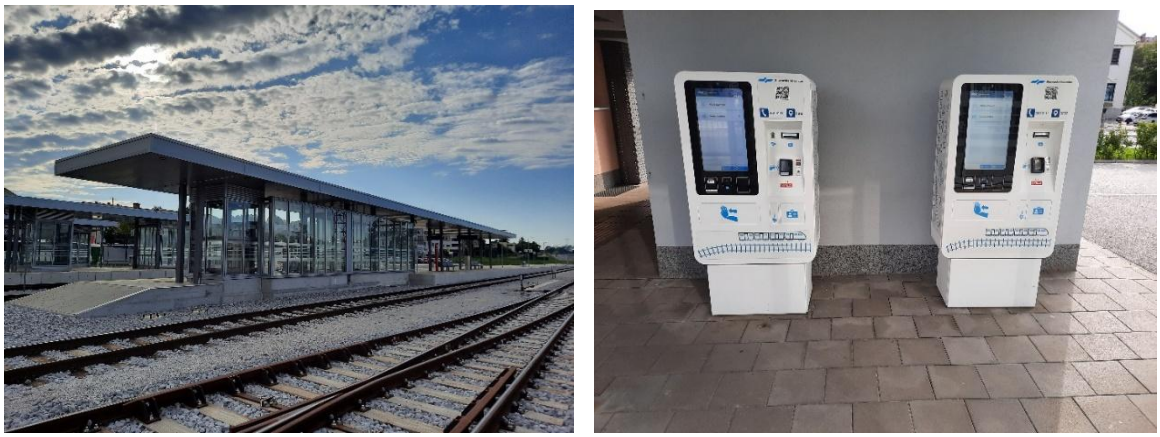


Figure 8: Grosuplje railway station & ticket vending machines

- **The Grosuplje main bus station**

  Located next to the railway station, three passenger platforms and a passenger shelter with seats; tickets available from the ticket vending machine; the station serves intercity buses and a 3G Ljubljana city bus line.

Figure 9: Grosuplje bus station & ticket vending machines/information kiosk

- **P+R garage**

  Put in operation in September 2020; 161 parking P+R lots, 61 for other customers, 10 electric vehicle charging posts; next to the garage: a bicycle shelter – capacity 40 bicycles.

Figure 10: Grosuplje P+R garage at railway/bus station & bicycle shelter next to the garage

- **Bus network**

  Grosuplje municipality public transport is organised as a 3rd zone of Ljubljana city transport (city bus line no. 3G connects Grosuplje to Ljubljana regional centre) and with 3 regional lines , no. 71, 72 and 73, that circulate only inside the municipality; there are several other regional, national and international bus lines passing Grosuplje; organisation of bus transport is shared among City of Ljubljana and national PTA (i.e. DUJPP).

- **DRT & hail transport**

  DRT and hail transport are organised as complimentary transport for elderly and people with disabilities; The "Grosupeljčan" electric DRT car service offers a free ride between 7:00 a.m. and 5:00 p.m. within the municipality and beyond while the "Zapeljivec" DRT/hail service uses a specially designed electric car for personal transport in municipality centre.

Figure 11: The "Grosupeljčan" DRT service (left) & the "Zapeljivec" DRT/hail service (right)

PT challenges

Grosuplje public transport, **the same as the municipal line 72**, is faced with low ridership out of the morning and afternoon peak hours, when primary school students fully occupy the service. Big 50-seater diesel-propelled buses run with low occupancy out of peak hours. Therefore, the lines in Grosuplje, connecting the settlements around the municipality centre to the regional transport hub, are not profitable and have negative impact on the environment on the account of operation of low occupied trips by too big buses.

The low ridership of municipality public transport can also be attributed to inefficiency or low coordination with regional and national transport. Namely, the local transport merely provides feeder lines for regional transport to Ljubljana urban hub.

Public transport in Grosuplje suffers from poor connections of surrounding settlements with Grosuplje centre, insufficient harmonisation of train and regional bus timetables to achieve regular-interval timetable of the regional transport, too few train departures during the weekdays and no weekend service (in particular on Saturdays). More attention should be paid to improving reliability and punctuality of regional buses, and making faster, punctual as well as affordable train service.

B.1.3. Operated PA solution

A pilot solution in Grosuplje re-defines the existing 72 municipal bus line from a regular to a combined regular/DRT line and is focused on:

- Improvement of efficiency of PT operations by DRT,
- Reduction of CO_2 emissions and
- Promotion of digitization and smart mobility.

All journeys (departures) of the 72-line service are operated in line with the **predefined timetable** and by using the **predefined 72-bus line route**.

A pilot action, employing the proposed solution will be operating between July and October 2025. Provided ridership analysis, 3 pairs of daily journeys (departures) are defined to operate as DRT between July and August, while **4 pairs of daily trips** will be running as DRT in September and October.

In June, before starting PA the passengers were informed about the change of regime of operation of the line 72 in Grosuplje and were presented the reorganised timetable as well as instructed about using the DRT service. The information was published in Grosuplje municipal gazette, municipal FB channel and by leaflets in the buses.

The DRT journeys is only operated if a request by the passengers has been registered at least 2 hours before DRT service journey. The transport requests are registered via a call centre that is operated by PTO (LPP public transport operator). PTO has prepared a database to manage the calls.

Registrations are communicated with the traffic operator in order to decide if a particular journey will be operated and select the type of the vehicle and assign the journey to the driver. DRT journeys with low demand are operated by electric van (8-seater) to replace 20 or even 50-seater diesel buses. This way, the occupancy of the vehicles has been increased, and the negative environmental impact has been improved by reduction of CO_2 emissions.

B.1.4. Site visit implementation

Preparatory activities

Site visit to Grosuplje pilot area was organised on 2nd of July, the second day after inception of the pilot action.

Given that DRT in Grosuplje is operated according to the fixed schedule and the journey is implemented if at least one passenger has been registered, a transfer of 4 passengers was registered at the LPP call centre a few days before. For registration was specified:

- Date of registration: 24th June 2025
- Date of transport: 2.7.2025
- Journey: 1. line 72, dep. from Grosuplje at 11:20; 2. line 72, dep. from Polica at 11:40
- Boarding stop: 1. Grosuplje; 2. Polica
- Alighting stop: 1. Police; 2. Grosuplje
- Number of passengers: 4
- Phone number: (*to notify passengers on eventual changes*).

To see around Grosuplje, in particular public facilities, a DRT/hail „Zapeljivec" service was booked through the call centre as well, but the visitors were asked only to join the ride in direction asked for by the dedicated users.

Visit to the site

The trip to the site visit started on 2nd July at 9:00 in Ljubljana.

A **train was taken from Ljubljana main station to Grosuplje** railway station.

On the train, the **visitors were given documentation** on the planned pilot action in Grosuplje, shortly presented Grosuplje, the pilot action and the pilot site – the line 72) as well as transport modelling scenarios that helped shaping the DRT pilot action.

Figure 12: The renovated Grosuplje railway station and visitors' welcome by local authority representative

After arrival to Grosuplje mayor of Grosuplje welcomed the visitors and **showed around Grosuplje railway station** and the new P+R garage in the vicinity as well as explained PT operations in Grosuplje and the renovation project of the station.

Following the visit of the station a **ride on DRT/hail „Zapeljivec"** electric car was taken, to visit public facilities, mostly visited by the disabled service users: shopping centres, Health centre, education institutions, cemetery, etc.).

Once the ride with the "Zapeljivec" had finished it was time to take a **ride with the OPTI-UP pilot action electric van on line 72**, starting at 11:20 from Grosuplje to Polica (end stop). The returning ride from Polica started at 11:40 to be finished at 12:00 in Grosuplje. On both journeys 6 passengers took the ride (4 site visitors & 2 other passengers).

Figure 13: Tour around municipality centre with "Zapeljiivec" DRT/hail electric car

Figure 14: Electric van on an OPTI-UP pilot line 72

To return back from Grosuplje to Ljubljana, visitors took a **Ljubljana city bus line 3G**. This is an integrated line that operates under specific terms. The integrated (city + sub-urban) line that operates in Ljubljana city zone system, where a Grosuplje is lying in the 3rd Ljubljana city transport zone. The line is co-financed by a city of Ljubljana, national funds and Grosuplje municipality.

Figure 15: Integrated Ljubljana city transport line 3G from Grosuplje to Ljubljana

The site visit finished in Ljubljana.

B.1.5. Insights of PA implementation & feedback (visitors/users)

1) The pilot line operates fully in line with the pilot action plan. Until to date no complaints have been registered by the transport operator.
2) During the ride on the 72-pilot line we asked the other passengers how they see the new DRT regime on this line and where they learned about it:
    - The interviewed passengers were younger generation.
    - The passengers liked the new service and were happy because the call centre accepted transport registration even later than 2 hours before the scheduled journey.
    - The passengers would prefer to use an app instead of the call centre.
    - The passengers obtained the information about the new 72-line regime on the leaflets put in the bus before the pilot action started.
    - The passengers would like to see Grosuplje DRT service more flexible in terms of possibility to order transport irrespective of the schedule and the number of journeys; they wished more journeys and adaptable departure times.
3) The Grosuplje mayor pointed out that not all Inhabitants fully understand DRT service operation. Some people mix the DRT line service with “Grosupeljčan” and “Zapeljivec” car services that operate out of the schedule, are complimentary and are intended for disabled people and have more personal service character. DRT line service needs to be allocated a new more distinguishable name.
4) Call centre collects information on boarding and alighting stops of the passengers therefore a traffic operator may decide to even shorten the operated journey and return back at the stop, where the last passengers have alighted. The operator always checks if there is no registered transport in the opposite direction. By shortening the journey, additional costs can be saved.
5) Tickets are validated by using handheld (portable) validator. The validator needs to be upgraded to allow payments with credit cards and for using group tickets on a chip card.

B.1.6. Additional photos

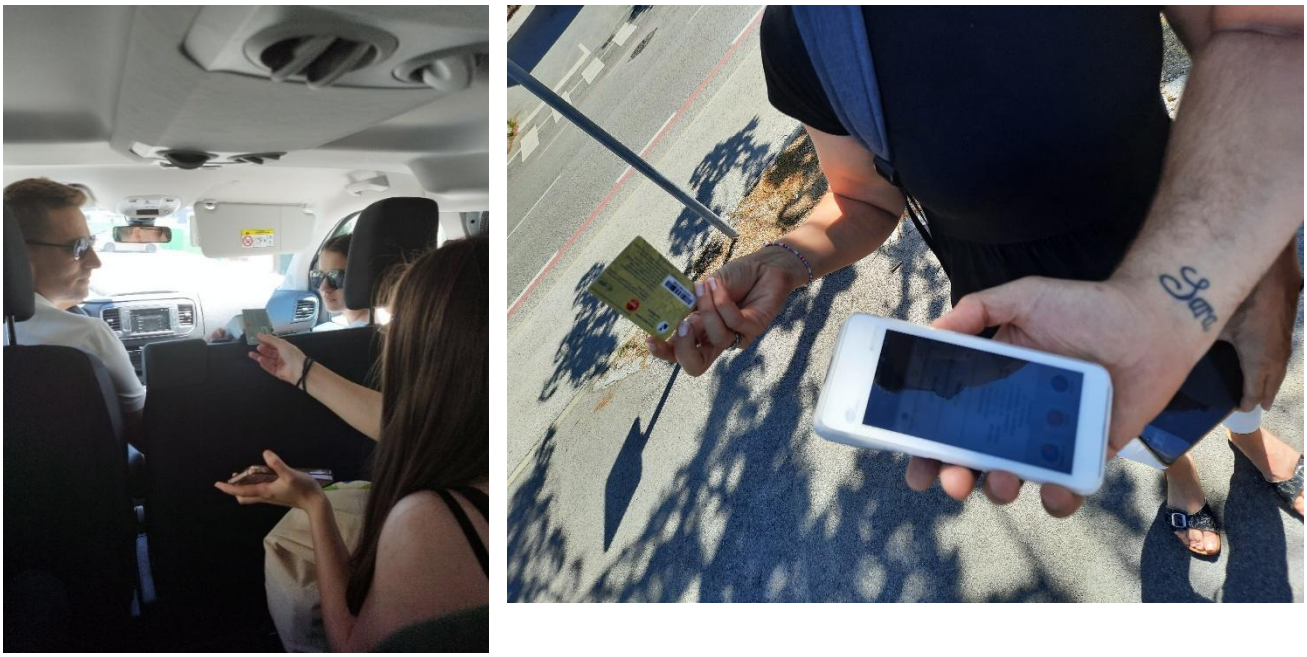


Figure 16: Handheld ticket validation terminal used in the electric van on line 72

Figure 17: Grosuplje bus station

B.2. Pilot action performance – KPIs

B.2.1. Plan of performance monitoring and evaluation

The section relates to OPTI-UP Activity 2.2 and outlines the monitoring and evaluation plan, specifying how key performance indicators (KPIs) will be used to assess the achievement of the pilot project's objectives. The plan identifies the pilot KPIs, the required input data, the tools and methodology for KPI calculation, and the overall evaluation process, including the assessment of results.

B.2.1.1. Identification of key performance indicators (KPIs)

Table 18: Pilot action KPIs

KPI	Brief description	Unit	Target
KPI_1	Average number of registrations of DRT service per week	number of calls (per week)	15 (during the summer holidays), 23 (outside the summer holidays)
KPI_2	Cost of energy consumption per passenger km	EUR/100 pkm (per week)	< 15
KPI_3	Average total eligible concession cost per km	EUR/km	< 2.27
KPI_4	Share of trips with excessive capacity	% of runs (per week)	< 10
KPI_5	Share of trips with 0 validations among operated trips: Average number of empty runs per working day on line 72	% of runs (per week)	< 15
KPI_6	Number of DRT trips without any passenger registrations per week	% of runs (per week)	> 50
KPI_7	Occupancy of vehicles	% of total capacity	>40
KPI_8	Number of complaints of passengers on PT operation per week	number of complaints/ week	< 10/week
KPI_9	Number of commendations of passengers to the PT operation per week	number of commendations/week	1/week
KPI_10	Amount of emitted CO_2 per kilometre	kg/km	<30
KPI_11	CO_2 emissions per passenger km	kg/passenger	<0.6
KPI_12	Share of needed B driver's licenses for operation of DRT	% of licenses	>50

B.2.1.2. Identification of data sources & tool for KPIs

A total of 12 KPIs are used to assess the performance of the Grosuplje pilot action.

Table 19: Identification of data sources & tools for KPIs data

KPI	Data list	Methodology	Data source	Data tool
KPI_1	- Number of DRT service registrations received weekly (for line 72)	Weekly trend: [number of calls per week]	PTO (LPP)	Excel
KPI_2	- Number of km travelled on line 72 - Average consumption of diesel [l/km] - price of diesel [EURO/l] - weekly cost on electric charging station for the electric van on line 72 - number of passengers (count of validations) on line 72	Weekly trend: [cost of fuel + cost of electricity]/([travelled kms]*[number of passengers])	PTO (LPP)	Excel
KPI_3	- Number of bus km travelled on the line 72 Number of van km travelled on the line 72	Weekly trend: ([bus km]*2,27+[van km]*1,30)/ ([bus km]+[van km])	PTO (LPP)	Excel
KPI_4	- Number of validations per run on line 72 Type of vehicle (bus or van) per run on line 72	Weekly trend: ([number of van runs with 0 validations]+[number of bus runs with less than 8 passengers])/([number of van runs]+[number of bus runs])	PTO (LPP)	Excel
KPI_5	Number of validations per run on line 72	Weekly trend: [number of runs with 0 validations]/[number of all runs]	PTO (LPP)	Excel
KPI_6	for each DRT run mark if it was operated or not (line 72)	Weekly trend: [number of operated DRT runs]/[number of planned DRT runs]	PTO (LPP)	Excel
KPI_7	- type of operated vehicle per run - capacity of operated vehicle per run number of validations per run (line 72)	Weekly trend: weekly average across all runs([number of validations per run]/[capacity of operated vehicle per run])	PTO (LPP)	Excel
KPI_8	- list of complaints on line 72 reason of complaint	Weekly trend: total number of complaints on PT operation in a week	PTO (LPP)	Excel
KPI_9	- list of commendations on line 72 reason of commendation	Weekly trend: total number of commendations on PT operation in a week	PTO (LPP)	Excel
KPI_10	- length of each run - km on line 72 type of vehicle on each run	Weekly trend: [number of kms by BUS]*0,00025 tonnes/km	PTO (LPP)	Excel
KPI_11	- length of each run - km on line 72 - type of vehicle on each run number of validations per each run	Weekly trend: [number of kms by BUS]*0,00025 tonnes/km/[number of passengers]	PTO (LPP)	Excel

KPI	Data list	Methodology	Data source	Data tool
KPI_12	type of vehicle on each run on line 72	Weekly trend: [number of DRT runs per week operated by VAN]/[number of all DRT runs per week]	PTO (LPP)	Excel

B.2.2. Analysis of Key Performance Indicators

The assessment considers a total of 12 KPIs, of which two (KPI_8 and KPI_9) were analysed only descriptively, as they relate to complaints and commendations. The remaining 10 KPIs are analysed in detail using tables and charts.

KPI_8 measures the number of passenger complaints per week related to the operation of line 72. The analysis includes complaints categorized as Operational, Organisational, and Other, with a weekly target of fewer than 10 complaints. Throughout the 17-week period, there were a total of 8 complaints. Passengers have expressed a need for greater flexibility in the DRT service, such as changing the direction of the circular part of the route or adding additional afternoon trips to facilitate access home after work or training. Some have suggested introducing regular scheduled trips at specific times instead of only on-demand services. Occasionally, vehicle capacity was insufficient when passengers were not registered. There have also been proposals to add more trips to make public transport genuinely usable for people working until 16:00–17:00.

KPI_9 monitors the number of positive passenger commendations per week for Line 72. The target value was set at a minimum of 1 commendation per week. During the observation period, only one commendation was recorded, expressing appreciation for the LPP telephone support staff for their understanding approach and consistent efforts to resolve issues to the best.

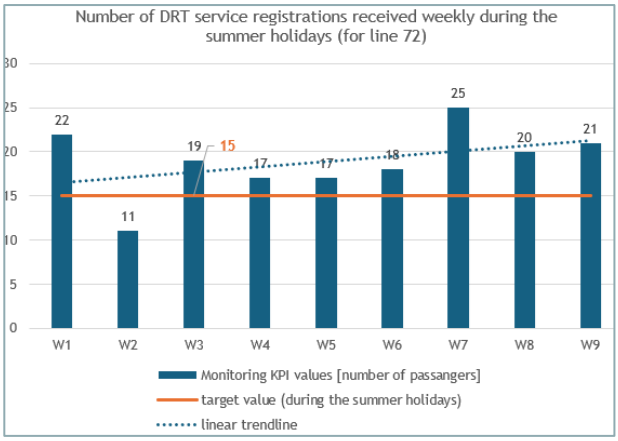
The pilot activity was implemented during the school holiday period (W1–W9) and outside the school holidays (W10–W17). In addition, at the beginning of the pilot implementation, trips were operated by bus due to initial uncertainty regarding the provision of sufficient vehicle capacity. In the final weeks, one pair of scheduled departures was operated exclusively by bus, regardless of the number of registrations. Segmentation of the analysis influenced the selection of the target line, baseline, and the calculation of the trendline. Where appropriate, analysis was segmented into distinct periods (e.g. holiday versus non-holiday periods or initial and final pilot periods during which diesel buses were temporarily deployed).

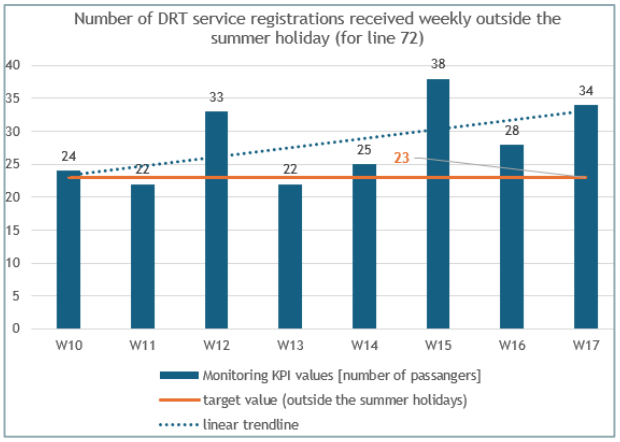
The cost analysis applied in the assessment of KPI_3 (average total eligible concession cost per kilometre on Line 72) includes only operational costs directly related to the provision of the DRT service. Costs associated with vehicles and category D-licensed drivers maintained on standby to ensure sufficient vehicle capacity are excluded. With the transition to regular operation of the on-demand line and the planned expansion of the service to additional lines, these standby-related costs are expected to be eliminated through operational optimisation and synergies across multiple lines.

B.2.2.1. KPI_1: Number of DRT service registrations received weekly (for line 72)

Table 20: Weekly monitoring of number of passengers

KPI_1: Number of DRT service registrations received weekly (line 72)							
Baseline KPI value [passengers]: 15 (during the summer holidays), 23 (outside the summer holidays) (based on the validation of representative days)[1]							
Target KPI value [passengers]: 15 (during the summer holidays), 23 (outside the summer holidays)							
Week	Monitored KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]	Week	Monitored KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]
W1	22	7	47	W10	24	1	4
W2	11	-4	-27	W11	22	-1	-4
W3	19	4	27	W12	33	10	43
W4	17	2	13	W13	22	-1	-4
W5	17	2	13	W14	25	2	9
W6	18	3	20	W15	38	15	65
W7	25	10	67	W16	28	5	22
W8	20	5	33	W17	34	11	48
W9	21	6	40				
KPI average:		23	KPI STD:		6.9		
Relative KPI average:		24%	Relative KPI STD:		25.5%		





[1] Values obtained based on validations of representative days

Table 21: Evaluation of monitoring of number of passengers

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of number of passengers?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	The results are presented in two separate graphs (during the summer holidays and outside the summer holidays). The trend line indicates a long-term increase in the DRT service use in both periods.
2.	Is the trend line in passenger numbers positive, negative, or neutral in relation to the target value?	☒ Positive impact ☐ Negative impact ☐ Neutral impact	The trend line shows an overall increase in passenger numbers, with average values meeting or exceeding the target. This indicates a positive impact in relation to the target value.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	The average KPI value is higher than the baseline value, and the average relative deviation is +24%, which is well above the +10% threshold. This indicates a clear improvement compared to the baseline state rather than an insignificant change or a worsening of performance.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☒ Good selection ☐ Unsuitable selection	The relative KPI standard deviation is 25.5%, which falls within the range of 20% to 40%. This indicates that the target value was selected appropriately, allowing for normal variability in weekly passenger numbers while still being achievable and meaningful.
5.	Has the pilot action proven successful or unsuccessful in relation to the baseline and the defined target values? - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The pilot action has proven successful in relation to both the baseline and the defined target values. When considering the two baseline values (during the summer holidays and outside the summer holidays), the average KPI value has moved in the direction of the respective target values. Overall passenger numbers meet or exceed the baseline levels, indicating increased uptake of the DRT service compared to the initial state.

B.2.2.2. KPI_2: Cost of energy per 100 passenger km (for line 72)

Table 22: Weekly monitoring of the KPI_2 values

KPI_2: Cost of energy per 100 passenger km (for line 72)

Baseline KPI value [EUR/100 pkm]: 25 (based on the validation of representative days)

Target KPI value [EUR/100 pkm]: <15

Week	Monitored KPI values [EUR/100 pkm]	Deviation from target value [EUR/100 pkm]	Relative deviation from target value [%]	Week	Monitored KPI values [EUR/100 pkm]	Deviation from target value [EUR/100 pkm]	Relative deviation from target value [%]
W1	21.82*	6.82	45	W10	2.43	-12.57	-84
W2	37.80*	22.80	152	W11	3.44	-11.56	-77
W3	2.00	-13.00	-87	W12	4.12	-10.88	-73
W4	1.82	-13.18	-88	W13	6.85	-8.15	-54
W5	1.64	-13.36	-89	W14	11.95	-3.05	-20
W6	1.82	-13.18	-88	W15	13.60*	-1.40	-9
W7	4.16	-10.84	-72	W16	19.20*	4.20	28
W8	9.56	-5.44	-36	W17	10.63*	-4.37	-29
W9	1.61	-13.39	-89				
KPI Average:		9	KPI STD:		9.7		
Relative KPI average:		-39%	Relative KPI STD:		64.9%		

*** at the beginning of the pilot implementation, trips were operated by bus due to initial uncertainty regarding the provision of sufficient vehicle capacity. In the final weeks, one pair of scheduled departures was operated exclusively by bus, regardless of the number of registrations.**

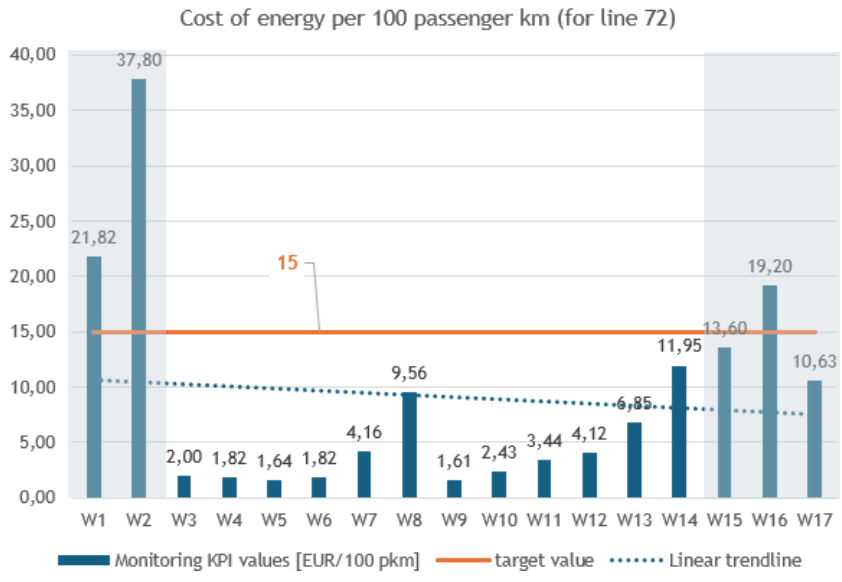


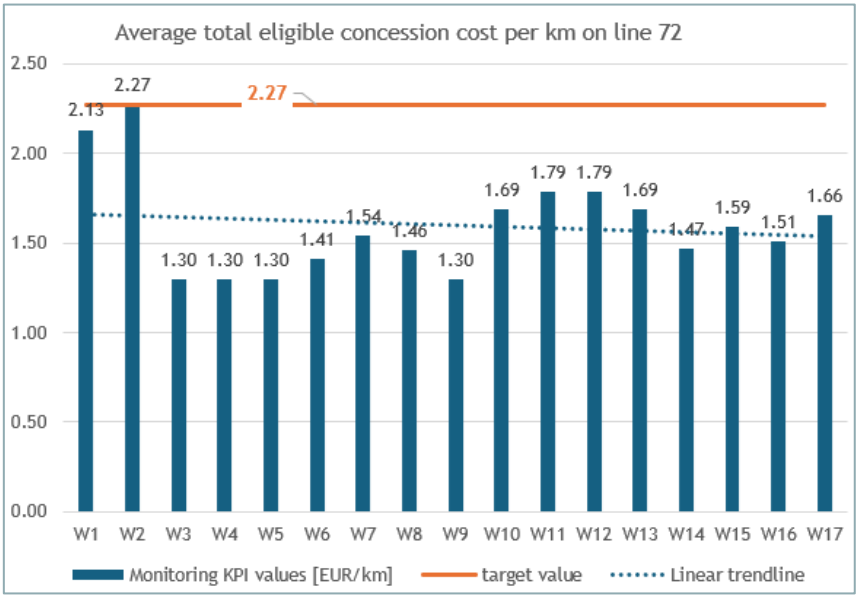
Table 23: Evaluation of the KPI_2 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of cost of energy per passenger kilometre?	☐ Increasing trend ☒ Decreasing trend ☐ Stable trend	The weekly trend of the cost of energy per passenger kilometre clearly shows a decrease of cost over time of the monitoring period from week 3 to week 14.
2.	Is the trend line of KPI positive, negative, or neutral in relation to the target value?	☒ Positive impact ☐ Negative impact ☐ Neutral impact	The cost of energy per 100 passenger-km remains well below the set target in most weeks, indicating a positive impact, except for the weeks marked in grey.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >-10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	The pilot action has a strong positive impact compared to the baseline state: the baseline cost was 25 EUR/100 pkm, while during the pilot the cost was substantially lower in most weeks (except for the weeks marked in grey).
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☐ Good selection ☒ Unsuitable selection	Given the weekly KPI values, the target could have been set even lower, closer to the actual average of 9 EUR/100 pkm, to provide a more realistic and meaningful benchmark for performance.
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ successful ☐ unsuccessful	Since the average moved well in the direction from the baseline to the target, which is lower (lower cost is better), the pilot action can be considered successful.

B.2.2.3. KPI_3: Average total eligible concession cost per km on line 72

Table 24: Weekly monitoring of the KPI_3 values

KPI_3: Average total eligible concession cost per km on line 72							
Baseline KPI value [EUR/km]: 2.27							
Target KPI value [EUR/km]: <2.27							
Week	Monitored KPI values [EUR/km][2]	Deviation from target value [EUR/km]	Relative deviation from target value [%]	Week	Monitored KPI values [EUR/km]	Deviation from target value [EUR/km]	Relative deviation from target value [%]
W1	2.13	-0.14	-6	W10	1.69	-0.58	-26
W2	2.27	0.00	0	W11	1.79	-0.49	-21
W3	1.30	-0.97	-43	W12	1.79	-0.49	-21
W4	1.30	-0.97	-43	W13	1.69	-0.58	-26
W5	1.30	-0.97	-43	W14	1.47	-0.80	-35
W6	1.41	-0.86	-38	W15	1.59	-0.68	-30
W7	1.54	-0.73	-32	W16	1.51	-0.76	-34
W8	1.46	-0.81	-36	W17	1.66	-0.61	-27
W9	1.30	-0.97	-43				
KPI Average:		1.6	KPI STD:		0.3		
Relative KPI average:		30%	Relative KPI STD:		12.4%		



[2] The cost covers only the operational costs related to the provision of the DRT service. Costs related to vehicles and drivers holding a category D licence that remain on standby in order to ensure adequate vehicle capacity are not included.

Table 25: Evaluation of the KPI_3 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of eligible concession cost per kilometre?	☐ Increasing trend ☒ Decreasing trend ☐ Stable trend	On average, the eligible concession cost per kilometre shows a decreasing trend, indicating that operational costs have been reduced and continue to decline. In the long term, the KPI is expected to stabilize around 1.6–1.8 EUR/km.
2.	Is the trend line of KPI positive, negative, or neutral in relation to the target value?	☒ Positive impact ☐ Negative impact ☐ Neutral impact	The KPI shows a clear positive impact on total concession cost by going below the baseline value of 2,27 EUR/km by 30% on average.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	The pilot action resulted in a significant improvement compared to baseline cost levels, with the average KPI value decreasing by approximately 12%.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☒ Very good selection ☐ Good selection ☐ Unsuitable selection	The target value was well defined, with low KPI variability around it (STD ≈ 13%).
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values? Compare: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	A clear shift in the concession cost per kilometre from the baseline toward the target, indicating the success of the pilot action (PA).

KPI_4: Share of trips with excessive capacity

Table 26: Weekly monitoring of the KPI_4 values

KPI_4: Share of trips with excessive capacity on line 72

Baseline KPI value [%]: 90 (estimation)

Target KPI value [%]: 10

Week	Monitored KPI values [%]	Deviation from target value [%]	Relative deviation from target value [%]	Week	Monitored KPI values [%]	Deviation from target value [%]	Relative deviation from target value [%]
W1	33.33*	23.3	23.3	W10	0.0	-10.0	-10.0
W2	30.0*	20.0	20.0	W11	2.5	-7.5	-7.5
W3	0.0	-10.0	-10.0	W12	7.5	-2.5	-2.5
W4	0.0	-10.0	-10.0	W13	5.0	-5.0	-5.0
W5	0.0	-10.0	-10.0	W14	2.5	-7.5	-7.5
W6	3.3	-6.7	-6.7	W15	19.6*	9.6	9.6
W7	12.5	2.5	2.5	W16	17.5*	7.5	7.5
W8	10.0	0.0	0.0	W17	30.0*	20.0	20.0
W9	0.0	-10.0	-10.0				

* at the beginning of the pilot implementation, trips were operated by bus due to initial uncertainty regarding the provision of sufficient vehicle capacity. In the final weeks, one pair of scheduled departures was operated exclusively by bus, regardless of the number of registrations.

KPI Average:	3.6	KPI STD:	4.3
Relative KPI average:	-6.4%	Relative KPI STD:	4.3%

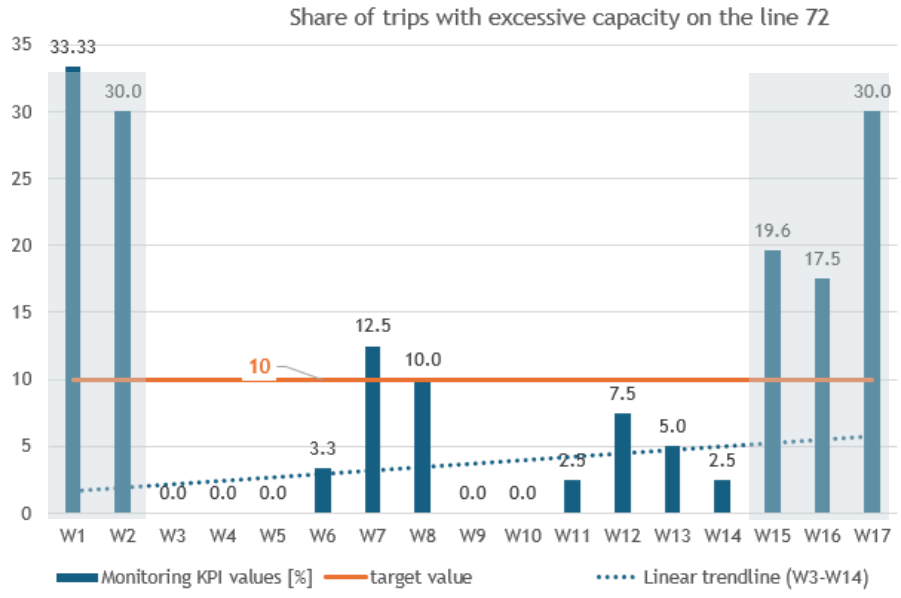


Table 27: Evaluation of the KPI_4 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of share of trips with excessive capacity?	☐ Increasing trend ☐ Decreasing trend ☒ Stable trend	While the overall trend during the monitored period from W3 to W14 has stabilised, significant fluctuations remain due to periods of van unavailability and the resulting bus operations.
2.	Is the trend line of KPI positive, negative, or neutral in relation to the target value?	☒ Positive impact ☐ Negative impact ☐ Neutral impact	By remaining below the target value on average and achieving an average reduction of 86.4% from the baseline, the excessive capacity KPI demonstrates a clear improvement in transport efficiency.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	The pilot action has significantly improved the excessive capacity decreased significantly, the average relative deviation from the baseline is 86.4% (far more than the 10% limit).
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☒ Very good selection ☐ Good selection ☐ Unsuitable selection	The target was appropriately defined, as the average relative deviations from the target do not exceed 4.3%.
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The pilot action has successfully reduced excessive vehicle capacity. Average excessive capacity decreased from 90% at baseline to 3.6% during the monitoring period, representing a significant improvement.

B.2.2.4. KPI_5: Share of operated trips with no passengers

Table 28: Weekly monitoring of the KPI_5 values

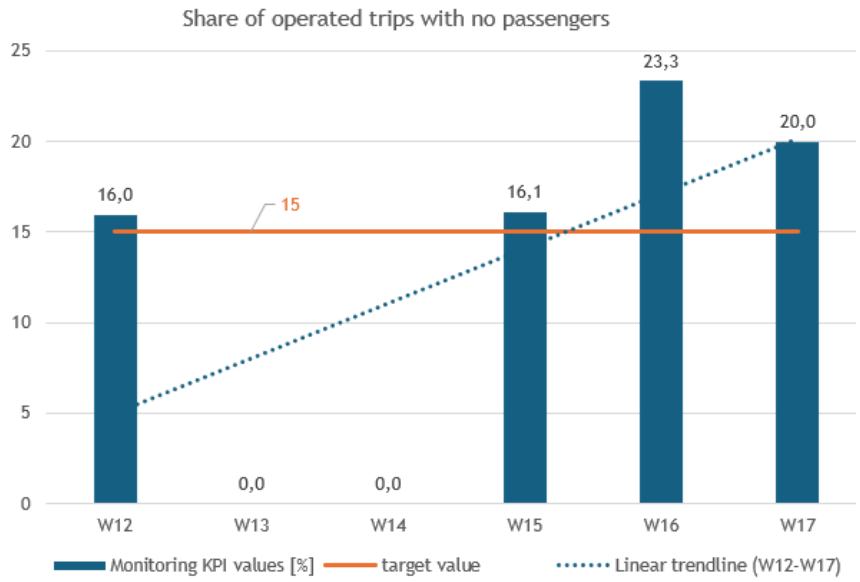
KPI_5: Share of operated trips with no passengers[3]

Baseline KPI value [%]: 80% (estimation)

Target KPI value [%]: 15

Week	Monitored KPI values [%]	Deviation from target value [%]	Relative deviation from target value [%]	Week	Monitored KPI values [%]	Deviation from target value [%]	Relative deviation from target value [%]
W1	0.0 (28.6)	-15.0	-100	W10	0.0 (50.0)	-15.0	-100
W2	0.0 (50.0)	-15.0	-100	W11	0.0 (50.0)	-15.0	-100
W3	0.0 (46.2)	-15.0	-100	W12	16.0 (40.9)	1.0	6.7
W4	0.0 (50.0)	-15.0	-100	W13	0.0 (50.0)	-15.0	-100
W5	0.0 (50.0)	-15.0	-100	W14	0.0 (39.1)	-15.0	-100
W6	0.0 (50.0)	-15.0	-100	W15	16.1 (35.0)	1.1	7.3
W7	0.0 (50.0)	-15.0	-100	W16	23.3 (41.0)	8.3	55.3
W8	0.0 (45.8)	-15.0	-100	W17	20.0 (36.8)	5.0	33.3
W9	0.0 (36.8)	-15.0	-100				

KPI Average:	12.6 (40) † (14(44.1%)†	KPI STD:	10.1 (5.2)†
Relative KPI average:	-16.2%*	Relative KPI STD:	10.1%*



*Relative deviation from the target value

† taking into account return trips to base station in Grosuplje

[3] At the beginning of the pilot, we only collected data on trips with passengers, not on empty trips that were carried out. Therefore, the relevant data start from week 12 onwards.

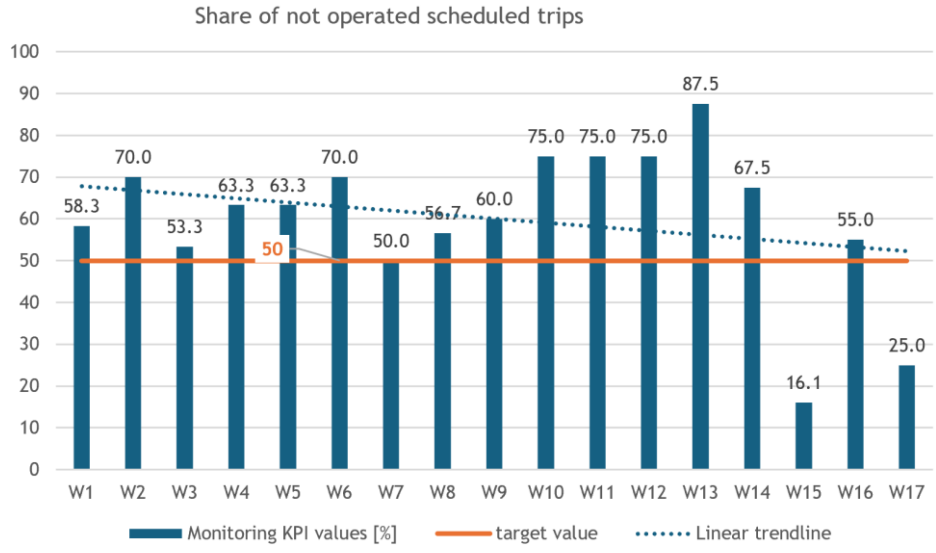
Table 29: Evaluation of the KPI_5 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of share of operated trips with no passengers?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	The trendline for empty trips indicates an increase in empty runs toward the end of the monitoring period from W12 to W17, suggesting pronounced one-way demand during certain times of the day. These empty runs correspond to return trips.
2.	Is the trend line of KPI positive, negative, or neutral in relation to the target value?	☒ Positive impact ☐ Negative impact ☐ Neutral impact	The impact of PA is positive in relation to the 80% baseline, with weekly share of empty trips exceeding the 15% target.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	The relative reduction in empty trips by 67%, represents a significant improvement compared to the baseline.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☒ Good selection ☐ Unsuitable selection	The target selection is relatively good, with an average deviation of excessive trips of only 10.1% across all monitored weeks. However, the target was exceeded in approximately two-thirds of the weeks.
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values? Compare: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The pilot action has proven **highly successful** compared to the baseline by average drop of 67% on average.

B.2.2.5. KPI_6: Share of not operated scheduled trips

Table 30: Weekly monitoring of the KPI_6 values

KPI_6: Share of not operated scheduled trips							
Baseline KPI value [%]: 0							
Target KPI value [%]: >50							
Week	Monitored KPI values [%]	Deviation from target value [%]	Relative deviation from target value [%]	Week	Monitored KPI values [%]	Deviation from target value [%]	Relative deviation from target value [%]
W1	58.3 (41,7)	28.3	16.6	W10	75.0 (50.0)	45.0	50.0
W2	70.0 (40.0)	40.0	40.0	W11	75.0 (50.0)	45.0	50.0
W3	53.3 (13.3)	23.3	6.6	W12	75.0 (50.0)	45.0	50.0
W4	63.3 (26.7)	33.3	26.6	W13	87.5 (75.0)	57.5	75.0
W5	63.3 (26.7)	33.3	26.6	W14	67.5 (42.5)	37.5	35.0
W6	70.0 (40.0)	40.0	40.0	W15	16.1 (0.0)	-13.9	-67.8
W7	50.0 (0.0)	20.0	0.0	W16	55.0 (30.0)	25.0	10.0
W8	56.7 (20.0)	26.7	13.4	W17	25.0 (5.0)	-5.0	-50.0
W9	60.0 (36.7)	30.0	20.0				
KPI Average:		60 (32)†		KPI STD:	17.8 (20.2)†		
Relative KPI average:		20.1%*		Relative KPI STD:	35,5%*		



*Relative deviation from the target value

† taking into account return trips to base station in Grosuplje

Table 31: Evaluation of the KPI_6 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of share of not operated scheduled trips?	☐ Increasing trend ☒ Decreasing trend ☐ Stable trend	The trend of not requested DRT trips shows a stable share during vacation and school periods, with some drops due to higher transport demand during the school year.
2.	Is the trend line of KPI positive, negative, or neutral in relation to the target value?	☒ Positive impact ☐ Negative impact ☐ Neutral impact	Scheduled trips that were not operated remain consistently above the target, demonstrating the benefit of the DRT service, in which some trips go unrequested.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	The pilot action delivered a substantial improvement, achieving an average operational efficiency gain of 60% (comparing to 0% baseline) by advance identification of empty (not requested) trips. that were not requested.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☐ Good selection ☒ Unsuitable selection	The average deviation of non-operated DRT trips from the target value below 20% indicates good target selection, although weekly fluctuations in not requested/not operated trips remain high.
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values? Compare: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The pilot action is considered successful, demonstrating a consistent share of around 60% of DRT trips that were not requested and therefore were not operated, which reduces costs and environmental impact.

B.2.2.6. KPI_7: Occupancy of vehicles on line 72

Table 32: Weekly monitoring of the KPI_7 values

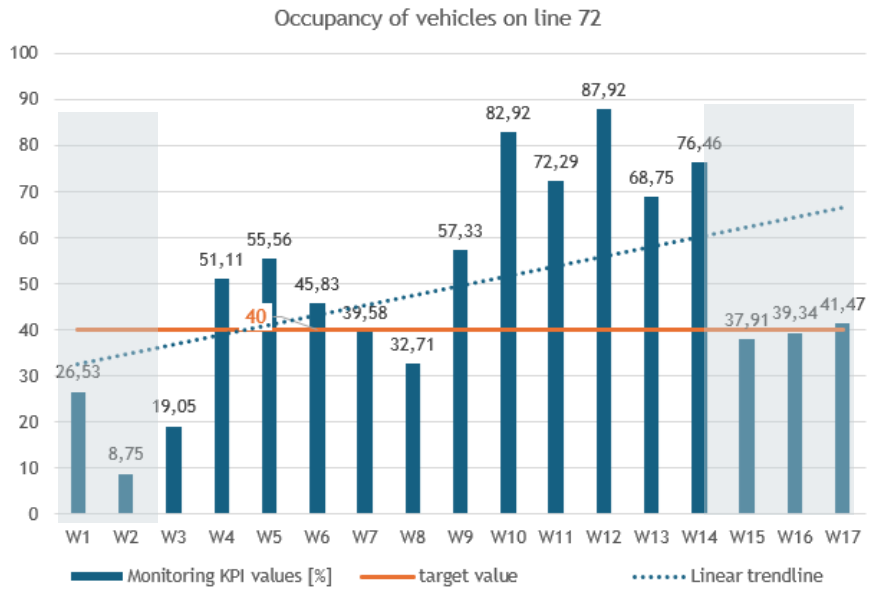
KPI_7: Occupancy of vehicles on line 72

Baseline KPI value [%]: 17

Target KPI value [%]: >40

Week	Monitored KPI values [%]	Deviation from target value [%]	Relative deviation from target value [%]	Week	Monitored KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]
W1	26.5 (19.3)	-13.5	-34	W10	82.9 (41.5)	42.9	107
W2	8.8 (4.4)	-31.3	-78	W11	72.3 (36.2)	32.3	81
W3	19.1 (10.5)	-21.0	-52	W12	87.9 (44.0)	47.9	120
W4	51.1 (25.6)	11.1	28	W13	68.8 (34.4)	28.8	72
W5	55.6 (27.8)	15.6	39	W14	76.5 (42.4)	36.5	91
W6	45.8 (22.9)	5.8	15	W15	37.9 (28.9)	-2.1	-5
W7	39.6 (19.8)	-0.4	-1	W16	39.3 (26.2)	-0.7	-2
W8	32.7 (17.4)	-7.3	-18	W17	41.5 (32.5)	1.5	4
W9	57.3 (33.9)	17.3	43				

KPI Average:	57% (27.5%)†	KPI STD:	21.0% (11.1%)†
Relative KPI average:	43.7%*	Relative KPI STD:	52.6%*



*Relative deviation from the target value

† taking into account return trips to base station in Grosuplje

Table 33: Evaluation of the KPI_7 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of vehicle occupancy?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	Weekly trends indicate a positive long-term outlook for average vehicle occupancy, even after considering empty return trips. Lower occupancy during the summer vacation period is expected.
2.	Is the trend line of KPI positive, negative, or neutral in relation to the target value?	☒ Positive impact ☐ Negative impact ☐ Neutral impact	Vehicle occupancy is steadily above the 17% baseline and mostly even exceeded the target value of 40%, representing a clear improvement.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	During the observation period, average occupancy rose by 43.7%, demonstrating a significant improvement of ridership.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <60%), - Unsuitable (STD>60%)?	☐ Very good selection ☒ Good selection ☐ Unsuitable selection	The discrepancy between actual occupancy and the target value over the observation period is moderate, suggesting that the target could be set more ambitiously, at a level higher than 40%.
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values? Compare: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The average occupancy over the entire pilot monitoring period exceeded 57%, which is significantly higher than the baseline value of 17%, confirming the successful implementation of the DRT service.

B.2.2.7. KPI_10: Amount of emitted CO_2 on line 72

Table 34: Weekly monitoring of the KPI_10 values

KPI_10: Amount of emitted CO_2 on line 72

Baseline KPI value [kg/km]: 117

Target KPI value [kg/km]: <30

Week	Monitored KPI values [kg/km]	Deviation from target value [kg/km]	Relative deviation from target value [%]	Week	Monitored KPI values [kg/km]	Deviation from target value [kg/km]	Relative deviation from target value [%]
W1	41.7*	11.7	39	W10	27.8	-2.2	-7
W2	62.5*	32.5	108	W11	34.7	4.7	16
W3	0.0	-30.0	-100	W12	34.7	4.7	16
W4	0.0	-30.0	-100	W13	13.9	-16.1	-54
W5	0.0	-30.0	-100	W14	13.9	-16.1	-54
W6	6.9	-23.1	-77	W15	41.7*	11.7	39
W7	20.8	-9.2	-31	W16	20.8*	-9.2	-31
W8	13.9	-16.1	-54	W17	48.6*	18.6	62
W9	0.0	-30.0	-100				

* at the beginning of the pilot implementation, trips were operated by bus due to initial uncertainty regarding the provision of sufficient vehicle capacity. In the final weeks, one pair of scheduled departures was operated exclusively by bus, regardless of the number of registrations.

KPI Average:	22	KPI STD:	-19.1
Relative KPI average:	-25%	Relative KPI STD:	63.7%

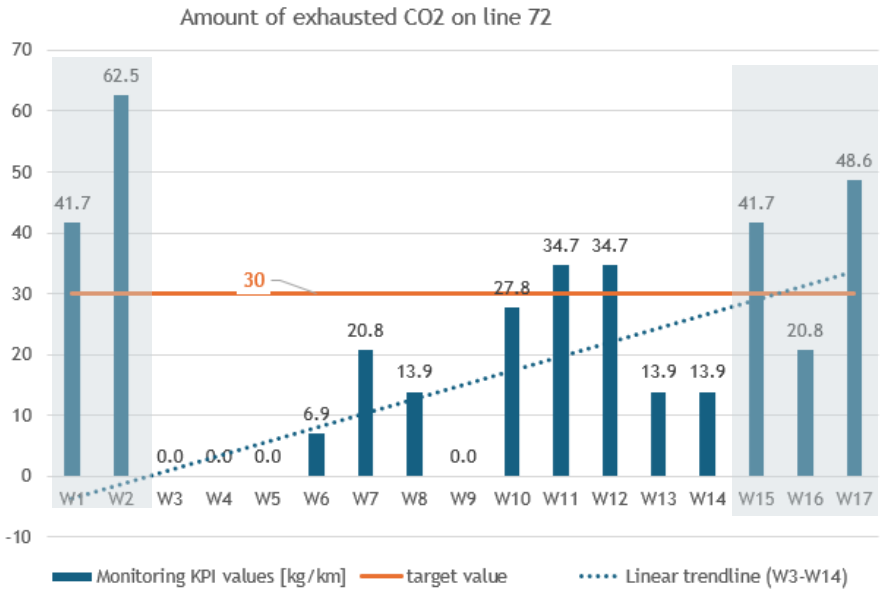


Table 35: Evaluation of the KPI_10 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of amount of emitted CO_2?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	After an initial decrease in CO_2 emissions on line 72, a steady increase is observed in the second half of the pilot action, resulting from the deployment of a service operated exclusively by diesel buses on two scheduled DRT trips.
2.	Is the trend line of KPI positive, negative, or neutral in relation to the target value?	☒ Positive impact ☐ Negative impact ☐ Neutral impact	The average CO_2 emission level of 13.9 kg/km recorded during the monitoring period remains well below the target threshold of 30 kg/km, which is very positive, although emissions exceed the target value in some individual weeks.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	An excellent 53% reduction in average CO_2 emissions was achieved relative to the baseline of 117 kg/km, primarily due to fewer trips and the replacement of diesel buses with electric vehicles.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☒ Very good selection ☐ Good selection ☐ Unsuitable selection	The target value is relatively unstable due to significant changes in the operating vehicle fleet; nonetheless, the set target remains very good, as emissions stay below the defined threshold in most weeks.
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values? Compare: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The average CO_2 emissions have improved significantly, falling below both the baseline and the target values. This demonstrates the success of the pilot action in achieving its environmental objectives.

B.2.2.8. KPI_11: CO_2 emissions per passenger on line 72

Table 36: Weekly monitoring of the KPI_11 values

KPI_11: CO_2 emissions per passenger on line 72							
Baseline KPI value [kg/passenger]: 4.7							
Target KPI value [kg/passenger]: <0.6							
Week	Monitored KPI values [kg/passenger]	Deviation from target value [kg/passenger]	Relative deviation from target value [%]	Week	Monitored KPI values [kg/passenger]	Deviation from target value [kg/passenger]	Relative deviation from target value [%]
W1	0.9*	0.3	49	W10	0.2	-0.4	-67
W2	2.4*	1.8	301	W11	0.3	-0.3	-50
W3	0.0	-0.6	-100	W12	0.3	-0.3	-50
W4	0.0	-0.6	-100	W13	0.5	-0.1	-17
W5	0.0	-0.6	-100	W14	0.2	-0.4	-67
W6	0.2	-0.4	-64	W15	0.6*	0.0	0
W7	0.4	-0.2	-33	W16	0.5*	-0.1	-17
W8	0.6	0.0	0	W17	0.5*	-0.1	-17
W9	0.0	-0.6	-100				
* at the beginning of the pilot implementation, trips were operated by bus due to initial uncertainty regarding the provision of sufficient vehicle capacity. In the final weeks, one pair of scheduled departures was operated exclusively by bus, regardless of the number of registrations.							
KPI Average:	0.23	KPI STD:	0.21				
Relative KPI average:	-63%	Relative KPI STD:	34.2%				

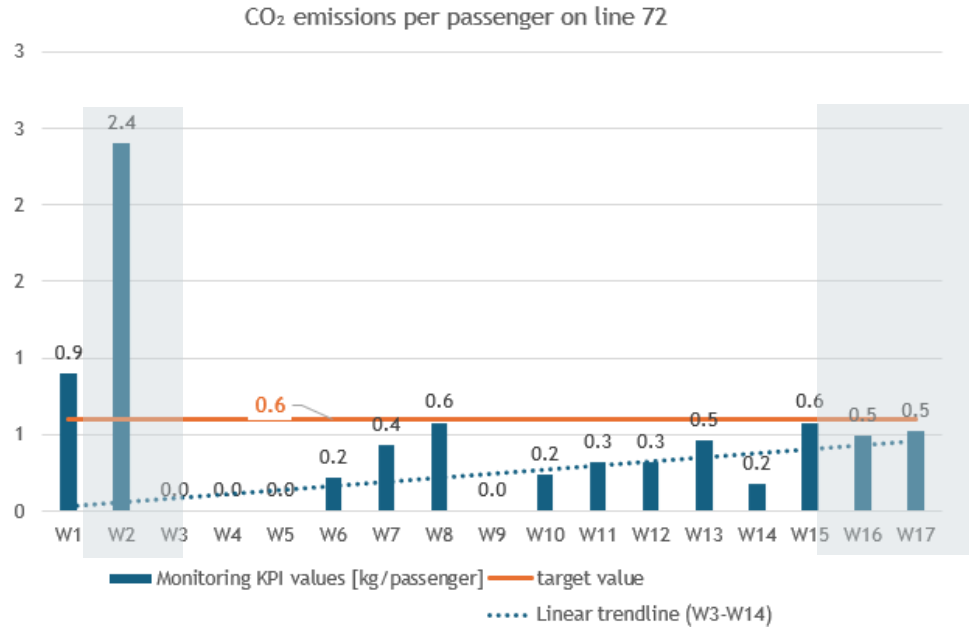


Table 37: Evaluation of the KPI_11 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of amount of emitted CO_2?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	The pilot has effectively reduced CO_2 emissions per passenger compared to the baseline. Although emissions appear to increase slightly over time, this is largely attributable to near-zero emissions at the beginning of the summer holidays, when many trips were not operated.
2.	Is the trend line of KPI positive, negative, or neutral in relation to the target value?	☒ Positive impact ☐ Negative impact ☐ Neutral impact	CO_2 emissions are steadily below the baseline and the set target value of 0.6 kg, reflecting improved environmental performance.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	The average KPI declined from 4.47 kg/passenger (baseline) to 0.23 kg/passenger, corresponding to an approximate 95% reduction, substantially exceeding the 10% improvement threshold.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☒ Good selection ☐ Unsuitable selection	The target value of 0.6 kg of emissions per passenger is assessed as well selected, as its variability during the monitored weeks remains within the 40% threshold.
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values? Compare: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	During the pilot, average CO_2 emissions were 0.23 kg per passenger, below the target of 0.6 kg and substantially lower than the baseline of 4.7 kg per passenger. This significant reduction demonstrates the success of the pilot action in improving per-passenger emissions.

B.2.2.9. KPI_12: Share of trips covered by B-licensed drivers

Table 38: Weekly monitoring of the KPI_12 values[4]

KPI_12: Share of trips covered by B-licensed drivers for operation of DRT (line 72)

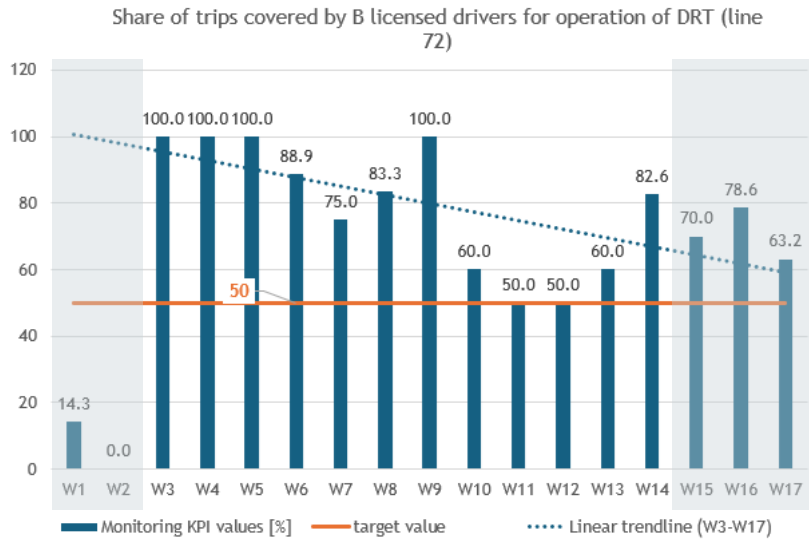
Baseline KPI value [%]: 0

Target KPI value [%]: >50

Week	Monitoring KPI values [%]	Deviation from target value [%]	Relative deviation from target value [%]	Week	Monitoring KPI values [%]	Deviation from target value [%]	Relative deviation from target value [%]
W1	14.3*	-35.7	-71	W10	60.0	10.0	20
W2	0.0*	-50.0	-100	W11	50.0	0.0	0
W3	100.0	50.0	100	W12	50.0	0.0	0
W4	100.0	50.0	100	W13	60.0	10.0	20
W5	100.0	50.0	100	W14	82.6	32.6	65
W6	88.9	38.9	78	W15	70.0*	20.0	40
W7	75.0	25.0	50	W16	78.6*	28.6	57
W8	83.3	33.3	67	W17	63.2*	13.2	26
W9	100.0	50.0	100				

*** at the beginning of the pilot implementation, trips were operated by bus due to initial uncertainty regarding the provision of sufficient vehicle capacity. In the final weeks, one pair of scheduled departures was operated exclusively by bus, regardless of the number of registrations.**

KPI Average:	79.1	KPI STD:	19.8
Relative KPI average:	58.0%	Relative KPI STD:	39.6%



[4] The KPI_12 measures the proportion of total car and van trips relative to the trips covered.

Table 39: Evaluation of the KPI_12 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of Share of needed B-licensed drivers for operation of DRT?	☐ Increasing trend ☒ Decreasing trend ☐ Stable trend	Although the share of trips covered by B-licensed drivers stabilizes at around 60-70%, a slight downward trend is observed due more buses operated at the end of monitoring phase.
2.	Is the impact of KPI positive, negative, or neutral in relation to the target value?	☒ Positive impact ☐ Negative impact ☐ Neutral impact	The impact of the pilot action is positive clearly positive as before all drivers required D-license for bus operation.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	Since the baseline value was zero, the fact that 79% of all operated trips require only B-licensed drivers represents a significant improvement over the previous situation.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☐ Good selection ☒ Unsuitable selection	The target value of a 50% share of trips operated by B-licensed drivers is very good, as observed values fluctuate around the target and remain within the established 20% tolerance limits.
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values? Compare: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The share of trips that can be operated by B-licensed drivers has increased from 0% to an average of 79%, indicating the success of pilot action implementation.

B.2.3. Evaluation of PA performance

Table 40: Aggregative statistics of KPI monitoring evaluation

No	Evaluation question	Metrics	KPI monitoring results										Total
			KPI_1	KPI_2	KPI_3	KPI_4	KPI_5	KPI_6	KPI_7	KPI_10	KPI_11	KPI_12	
1.	Trend of long-term expectation of the PA	Increasing	•				•		•	•	•		5
		Decreasing		•	•			•				•	4
		Stable				•							1
2.	Trend of KPI in relation to set target	Positive	•	•	•	•	•	•	•	•	•	•	10
		Negative											0
		Neutral											0
3.	Evaluation of the impact regarding the baseline situation	Improvement	•	•	•	•	•	•	•	•	•	•	10
		Insignificant change											0
		Worsening											0
4.	Definition of target value	Very good			•	•				•			3
		Good	•				•		•		•		4
		Unsuitable		•				•				•	3
5.	Successfulness of PA in relation to the baseline and target value	Successful	•	•	•	•	•	•	•	•	•	•	10
		Unsuccessful											0

B.2.3.1. Summary of evaluation

B.2.3.1.1. Assessment of overall achievement of the Pilot Action (PA) considering all KPIs

Baseline values are indicative and reflect best-available historical data rather than strictly comparable measurement periods. Some KPIs were retained for experimental or learning purposes and are therefore interpreted with limited weight in the overall success assessment.

Key Performance Indicators show that the overall performance of the pilot action (PA) can be considered highly successful. Key findings supporting this conclusion include:

Environmental Performance:

- CO_2 emissions per km (KPI_10) decreased by 53% from the baseline, and per-passenger emissions (KPI_11) decreased by ~95%, falling well below the target values.
- The reductions indicate that the PA effectively minimized environmental impact, particularly through the substitution of diesel buses with smaller electric vehicles and optimized trip scheduling.

Operational Efficiency:

- The share of trips with excessive capacity (KPI_4) fell from 90% to 3.6%, while the share of trips with no passengers (KPI_5) dropped from 80% to 12.6%, demonstrating significant improvements in vehicle utilization.
- Vehicle occupancy (KPI_7) increased from 17% to 57%, confirming that demand-responsive transport (DRT) enhanced service efficiency.
- The capacity of the van with seven passengers was exceeded only 16 times over the entire period, and only on the 15:35 departure. The van's capacity would not be exceeded if an additional afternoon departure were introduced, for example at 15:00, as also suggested by the survey respondents. In this case, there would be no need for bus operation at all.
- In a DRT context, non-operated trips do not represent service withdrawal, but demand-responsive optimisation, avoiding inefficient supply.

Cost and Economic Performance:

- Eligible concession cost per km (KPI_3) was reduced by ~30%, while energy cost per 100 passenger-km (KPI_2) dropped from 25 EUR to 9 EUR on average.
- The improvements indicate that PA delivered substantial cost savings and operational sustainability.

Service Coverage and Staffing:

- The average share of trips operated by B-licensed drivers (KPI_12) increased from 0% to 79%, exceeding the target and demonstrating flexible staffing efficiency.

Schedule Optimization:

- The share of not-operated scheduled trips (KPI_6) consistently exceeded the target of 50%, reflecting effective elimination of unneeded trips and reduced operational burden.

Users' adoption:

- DRT registrations (KPI_1) remained stable or increased relative to baseline, indicating successful user adoption.
- The analysis of user feedback indicators (KPI_8 and KPI_9) suggests that **users have generally accepted the new DRT service on line 72**, with a low level of dissatisfaction and limited but meaningful positive feedback.

- With regard to passengers, it can be concluded that they do not oppose the demand-responsive transport service per se; however, they expect additional measures aimed at improving the accessibility of public passenger transport.

B.2.3.1.2. Representation of the selected KPIs

The 12 selected KPIs provide a relevant and credible picture of the PA performance from the different perspectives addressed by the pilot action:

- Technical perspective: environmental performance, operational efficiency, cost and economic performance, service coverage and staffing, and schedule optimisation; and

- User adoption.

The data used for KPI monitoring were collected continuously on a weekly basis in an efficient and unbiased manner, thereby ensuring the reliability and credibility of the calculated KPIs.

B.2.3.1.3. Availability and sustainability of data sources

The main data source was transport operator that provided operational data on:

- Number of passengers per trip
- Operation per trip (type of used vehicle, if the trip was implemented)
- Registrations of passengers per each trip at the call centre
- List of commendations and complaints.

The data were collected weekly in the Excel spreadsheet, via e-mail and were processed in another Excel spreadsheet tool for calculation of KPI-s. This is an efficient method for small amount of data.

In the case of monitoring multiple lines with higher passenger volumes and vehicle numbers, the implementation of a web-based mobile passenger registration system with automatic data export is recommended. For operational data collection, data from automatic ticket validation machines should be collected to ensure reliable and consistent data acquisition. All collected data should be transferred from the ticket validation database to the data processing database (RDBMS) via web services. The same process approach should be applied to vehicle assignment data. Before processing, all acquired datasets should be verified and subsequently transferred for periodic or sporadic processing in custom designed application.

B.2.3.1.4. List of essential KPIs

This is the list the essential KPIs (out of the full proposal of 12 KPIs) in case the PA solution has been applied for long-term implementation: KPI_1, KPI_2, KPI_6, KPI_7, KPI_11.

We propose to monitor the essential KPIs each 6 month or during summer (months 7-8), spring (months 4-6) and autumn/winter periods (months 10-2).

B.2.3.1.5. Proposed target values for monitoring of KPIs

Table 41: Proposed target values for the selected KPIs

Name	Description	Target value
KPI_1	Number of DRT service registrations received weekly	23 passengers
KPI_2	Cost of energy per 100 passenger km	15 EUR/100pkm
KPI_3	Average total eligible concession cost per km	2.27 EUR/km

KPI_4	Share of trips with excessive capacity	10 %
KPI_5	Share of operated trips with no passengers	15 %
KPI_6	Share of not operated scheduled trips	>30 %
KPI_7	Occupancy of vehicles	>40 %
KPI_10	Amount of emitted CO_2	<30 kg/km
KPI_11	CO_2 emissions per passenger	<0.6 kg/passenger
KPI_12	Share of trips covered by B-licensed drivers for operation of DRT	>50 %

B.3. Users-survey

This document is a report on users' satisfaction with the implementation of the pilot action at the Municipality of Grosuplje.

The survey collects the general and the very specific information on users' satisfaction.

The general information brings the analysis in Grosuplje on the same denominator with other pilot actions (PA) and allows for comparative analysis of different OPTI-UP pilot actions, whereas the specific information brings the additional, specific insight of the pilot action (PA) implementation.

The specific questions are adapted to the contents and focus of Grosuplje pilot area in order:

- to provide specific information that shows highlights and drawbacks of the Grosuplje PA as well as
- to provide inputs for elaboration of an OPTI-UP deliverable on DRT final thematic solution.

The survey was published online and advertised in Municipality gazette, online social media and as leaflets in the buses running in the municipality. This has assured the survey reached the users of the PA services as well as potential users. Additionally, it has allowed obtaining feedback in the form, suitable for efficient processing of survey results.

The contents of the general questions in Grosuplje remained the same as for other PA. The specific questions were aligned with the aim of the pilot action that had been described in the Grosuplje Pilot Action plan.

The questionnaire was translated to the Slovene language.

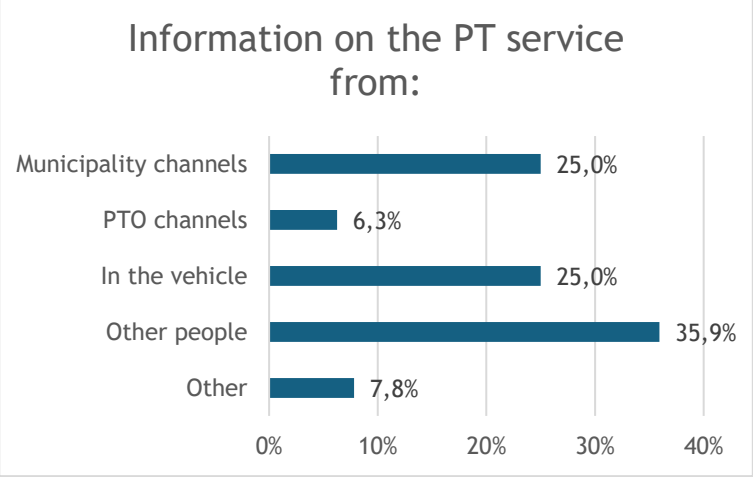
The survey was conducted in the final month of the pilot action in October 2025, giving users time to gain experience with the new services in Grosuplje and, in turn, providing relevant feedback.

The following section provides the analysis of the uses' satisfaction survey's results in Grosuplje.

B.3.1. General questions

1. How were you informed about the DRT service on line 72 in Grosuplje?

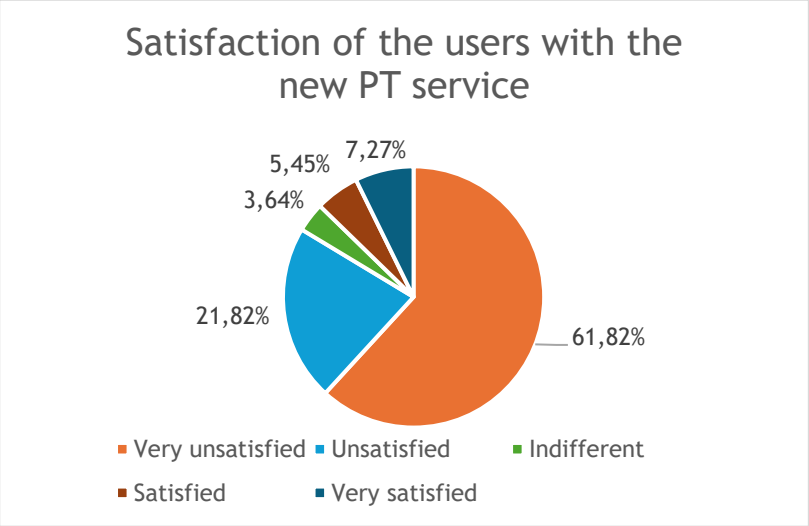
Category	Respondents	%
Other	5	7.8%
Other people	23	35.9%
In the vehicle	16	25.0%
PTO channels	4	6.3%
Municipality channels	16	25.0%



Users of the new DRT service were **well informed before its inception** from dedicated information channels by the Municipality and PTO (56%) or from other people in 36%.

2. ***How were you satisfied with the new service?***

Category	Respondents	%
Very unsatisfied	34	61.82%
Unsatisfied	12	21.82%
Indifferent	2	3.64%
Satisfied	3	5.45%
Very satisfied	4	7.27%



More than 83% of users are not satisfied with the new DRT service as the users need to register their trip in advance. Based on discussions with users in the field during the implementation of the pilot activity, as well as on the suggestions provided by survey respondents regarding improvements to the introduced service, it can be concluded that the actual dissatisfaction does not stem from the introduction of the demand-responsive transport service itself, even though it requires prior booking. Instead, dissatisfaction is primarily related to the existing public transport services on this line, particularly in terms of an insufficient number of departures, lack of weekend operation, and poor coordination between bus and rail services. This means users dissatisfaction relates mainly to service availability, and procedure, not to the DRT concept itself.

3. ***Does the new service in your opinion contribute to improvement of environmental performance of PT?***

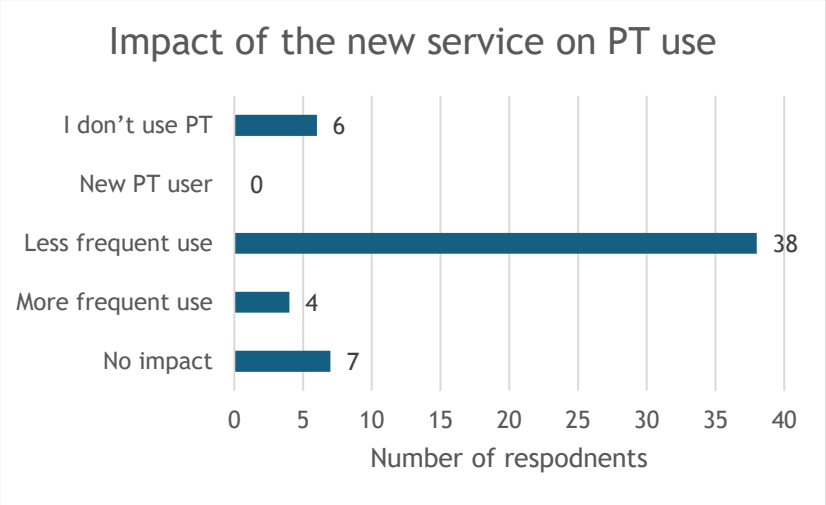
Category	Respondents	%
Yes	18	32.73%
No	37	67.27%

Still, almost one third of the users see that introduction of DRT service positively impact the environment.

4. ***How did implementation of the new service impact your use of PT?***

Category	Respondents
No impact	7
More frequent use	4
Less frequent use	38
New PT user	0

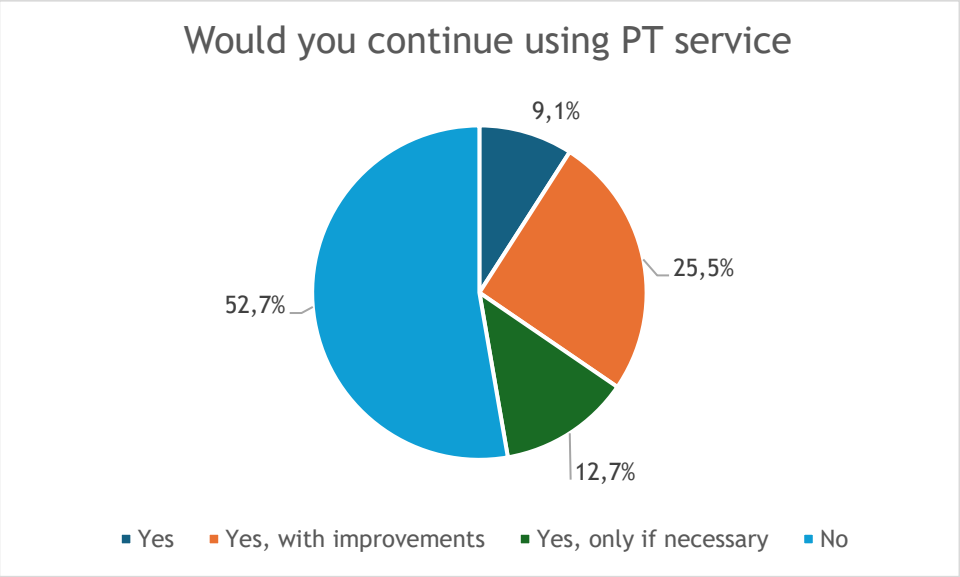
I don’t use PT	6



Majority of respondents anticipate less frequent use of PT due to introduction of DRT service; the actual monitoring of occupation didn’t show drop of use.

5. Would you continue using the new PT service?

Category	Respondents	%
Yes	5	9.09%
Yes, with improvements	14	25.45%
Yes, only if necessary	7	12.73%
No	29	52.73%



More than 52% have anticipated than they would not use the new DRT service; the actual monitoring of occupation didn’t show drop of use.

6. Would you recommend the new PT service to the ones who don't use the PT?

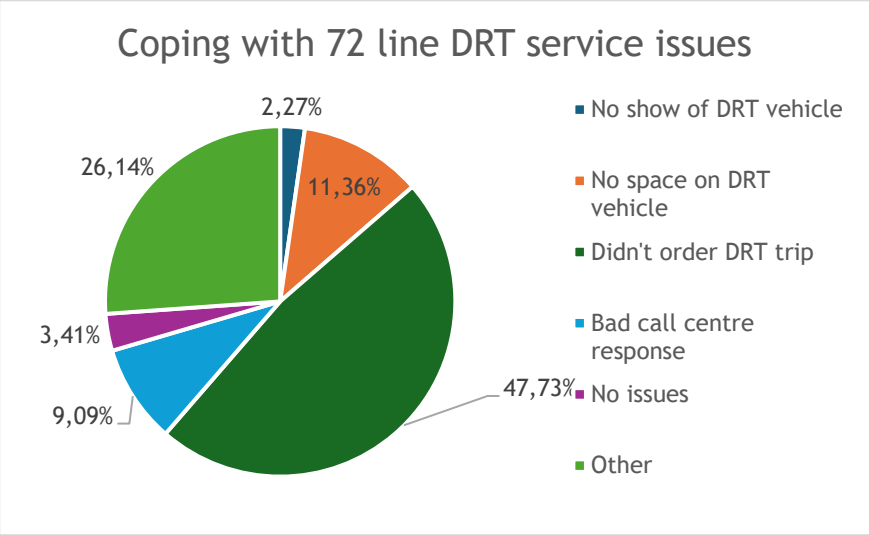
Category	Respondents	%
Yes	19	34.5%
No	36	65.5%

Most users of DRT service wouldn't recommend the DRT service to others.

B.3.2. Specific questions

1. Coping with issues during use of the 72-line DRT service

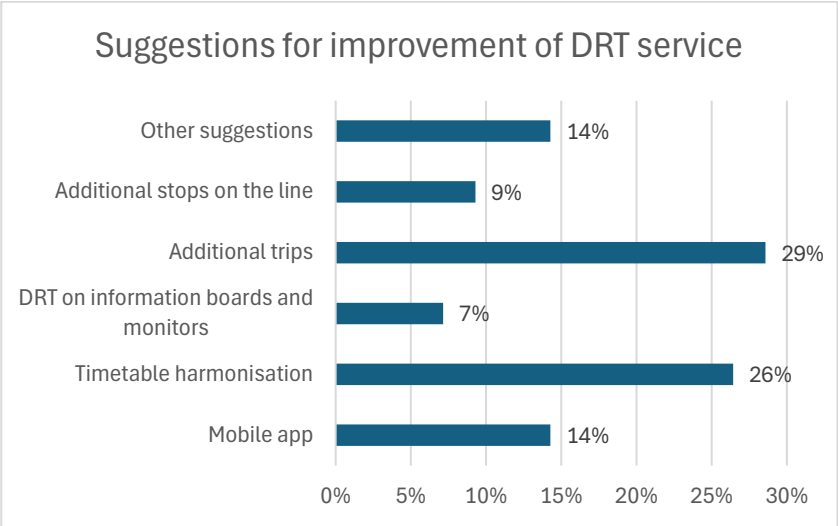
Category	Respondents	%
No show of DRT vehicle	2	2.27%
No space on DRT vehicle	10	11.36%
Didn't order DRT trip	42	47.73%
Bad call centre response	8	9.09%
No issues	3	3.41%
Other	23	26.14%



Almost 42% of users reported they didn't order the trip. It implies they just joined the ride. Mostly the users don't report the specific issues. Around 10% comply about the response of the call centre. Another 10% complained about the limited space, which may be attributed to not having registered their trip.

2. Suggested improvements of the 72-line DRT service

	Respondents	%
Mobile app	20	14%
Timetable harmonisation	37	26%
DRT on information boards and monitors	10	7%
Additional trips	40	29%
Additional stops on the line	13	9%
Other suggestions	20	14%



Almost one-third of 72-line users suggested scheduling more trips on the line, while 26% would like to see better timetable coordination. Additionally, 14 % expressed interest in using an online app to register for and monitor the DRT service.

3. Population specific attitude to the new 72-line DRT service

Users expressed dissatisfaction with the introduction of the on-demand transport system, as they believe it reduces the accessibility and usefulness of public transport. They obviously find positive environmental impacts not enough relevant.

Users of the 72-line particularly complain about the complete lack of public transport on weekends and holidays.

Therefore, the respondents frequently emphasized the need to reinstate regular bus lines or at least increase the number of departures, which could be operated with smaller vehicles such as vans or minibuses.

Respondents also highlighted the importance of better coordination with train schedules, school and afternoon activities, as well as a more flexible system that does not require advance booking. This could be addressed by adding trips in the late afternoon and by using a mobile app that would allow users to register rides via their own smartphones.

B.4. Stakeholders' consultation

Name of the PP:	**Prometni institute Ljubljana d.o.o.**
Date of the meeting:	**14 January 2026**
Venue of the meeting:	**Kolodvorska 11, Ljubljana**

Figure 18: Stakeholders meeting at PIL

B.4.1. Number and types of participants

There was total of 10 participants on the stakeholders' consultation. More information is available upon request.

B.4.2. A short summary of the PA presentation

The meeting began with a presentation, followed by a discussion of stakeholders on the replication and scaling up of the PA solution in Grosuplje.

The presentation provided a comprehensive overview of the OPTI-UP project and its practical application in public transport optimisation, with a particular focus on local-level planning and pilot implementation of demand-responsive transport (DRT) in Grosuplje. The presentation included the following key elements:

- Purpose, objectives and results of the OPTI-UP project,
- OPTI-UP approach to public transport optimisation (D.1.2.1 & D.1.3.2) through development of Local public transport optimisation plans for small and medium-sized cities in line with the Strategy for optimisation of PT networks,
- Comprehensive Strategy for optimisation of public transport networks (D.1.3.2),
- Local public transport improvement plan for Grosuplje, comprising:
  - Analysis of public transport data,
  - Public transport users' opinion survey,
  - SWOT analysis,
  - Definition of transport measures and activities,

- Vision and strategic goals,
- List of key performance indicators (KPIs),
- Transport model simulation scenarios for proposed activities,
- Implementation of transport modelling using PTV VISUM,

- Pilot implementation of demand-responsive transport (DRT) in Grosuplje area, including:
  - Goals and objectives,
  - Implementation baseline, with analysis of the current situation and available resources,
  - Survey of users' needs on the pilot bus line,
  - Concept and process of implementation,
  - Site visit,
  - User satisfaction survey following the introduction of the DRT service,
  - KPI monitoring results,
  - Summary of results, key findings and recommendations
- Discussion, focusing on stakeholder insights and recommendations.

B.4.2.1. High level conclusions of the presentation

The presented planning, development and implementation results on PA on demand-responsive transport (DRT) in the Grosuplje area has demonstrated effectiveness across several dimensions.

Performance indicators confirm improved environmental, operational and economic efficiency, alongside better resource optimisation, including the use of category B drivers and reallocation of vehicles and staff. Users generally accept the DRT service, while expecting additional measures to further improve public transport accessibility. Overall, the pilot shows that DRT enhances service quality, optimises resources and supports more sustainable public transport operations.

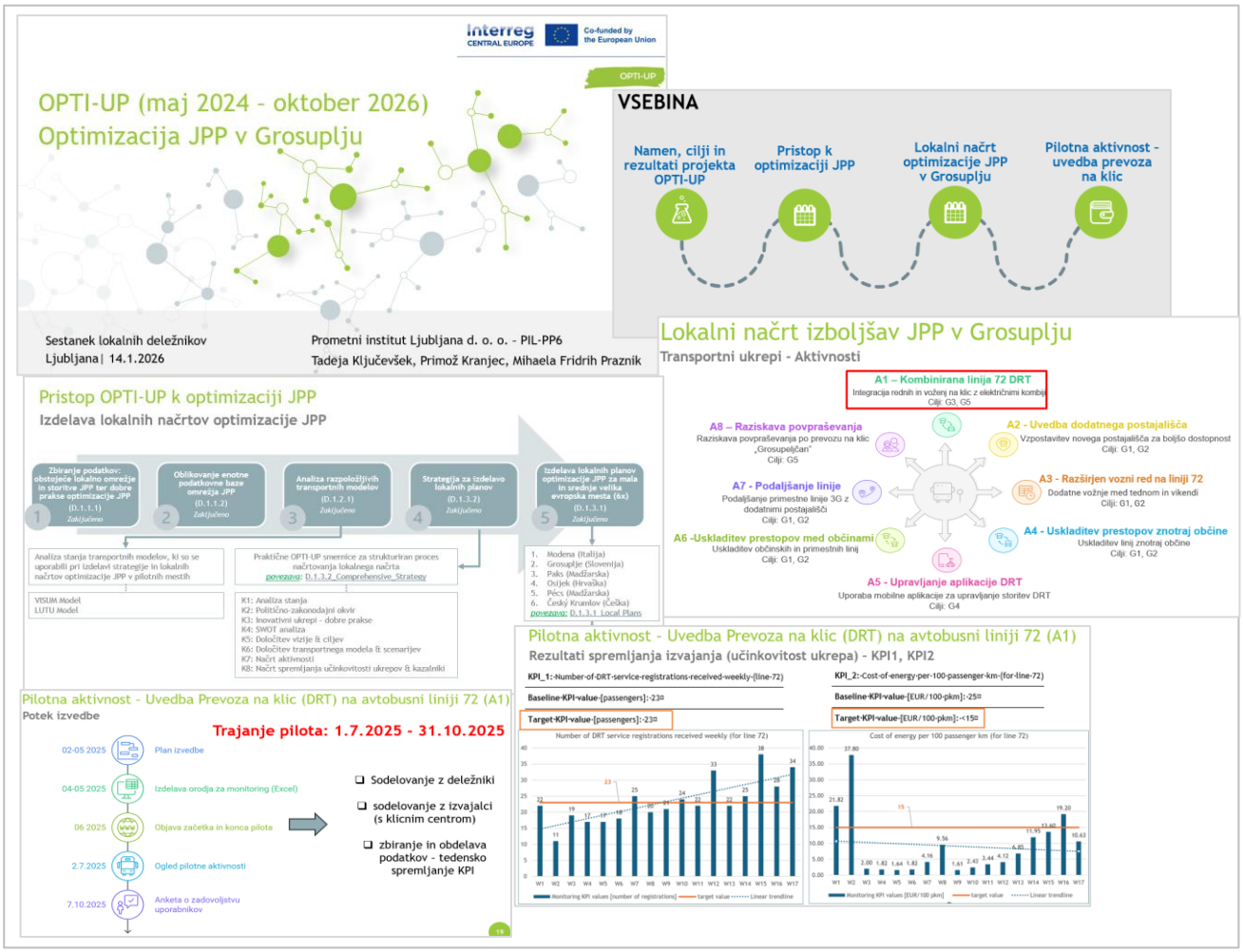


Figure 19: Main slides of the presentation presented during the stakeholder meeting

B.4.3. Insights and feedback from stakeholders

The stakeholder discussion was organised around a predefined set of questions presented to participants.

B.4.3.1. Outcomes of LUTI & transport modelling scenarios

Discussion of the results of transport modelling scenarios for Grosuplje.

1. How do you evaluate the validity and usefulness of the outcomes of transport scenario simulations?

   Transport scenario simulations are a useful supporting tool for assessing impacts of PT measures and comparing alternatives. However, they should not be used as the sole basis for decision-making, as real demand and operational constraints are better captured through field data (measuring actual response), pilot projects and direct user feedback. Their greatest value lies in combination with operational data and real-life testing.

2. How do you assess use of transport modelling in planning of measures for improvement of public transport, including the presented method of the model implementation and finetuning in Grosuplje in view of its potential for use at the local level?

   Transport modelling is assessed as a useful supportive tool for planning public transport improvements at the local level. The Grosuplje case shows that a locally adapted and fine-tuned

model can help identify low-demand services, test improvement scenarios, and estimate impacts on costs, utilisation and emissions.

However, transport modelling should be used as decision support rather than a standalone decision tool. Final decisions must also account for operational, financial and contractual conditions and local stakeholder knowledge. Overall, the approach used in Grosuplje demonstrates good potential for practical local-level application when combined with real operational data and stakeholder input.

B.4.3.2. Operational implications of PA

1. What are the necessary planning steps in order to replicate the Grosuplje pilot solution (documentation, strategies, plans, funds, stakeholders, purchase of additional vehicles) and which steps take the most time?

   Replicating the Grosuplje pilot requires a clear understanding of the existing public transport system, with a focus on identifying routes or departures with persistently low passenger occupancy. This includes analysing operational data, demand patterns, vehicle availability, driver shortages, and transfer accessibility, supported where relevant by transport modelling and scenario testing.

   Based on this analysis, suitable services are selected for conversion to demand-responsive transport (DRT), while essential fixed services, such as school trips, remain unchanged. Operational rules must be defined, including booking procedures, vehicle assignment, and service integration with the existing public transport network.

   Successful replication depends heavily on early and continuous coordination with key stakeholders, particularly the public transport authority, operators, and municipalities. Aligning concession contracts, cost structures, and responsibilities is essential, especially if cross-municipal operation is considered to achieve financial and operational synergies.

   Securing funding is one of the most critical steps, covering vehicles, operating costs, and booking and monitoring systems. Vehicle procurement and the setup of call-centre or digital booking solutions follow once funding, and institutional arrangements are in place.

   Finally, clear communication with users, ongoing monitoring of key performance indicators, and collection of user feedback are necessary to ensure service acceptance and to support further scaling.

   The most time-consuming steps are typically stakeholder coordination, funding approval, and the adjustment of institutional and contractual frameworks.

2. Who are the main stakeholders that need to be involved in planning and implementation in order to replicate the Grosuplje pilot solution?

   The replication of the Grosuplje pilot solution requires the involvement of key stakeholders at both local and national levels. These include the public transport authority, which is responsible for planning, funding, and integration into the public transport system; municipalities, which identify local mobility needs and may support financing; and public transport operators, who manage daily operations, vehicles, and drivers. In addition, booking system providers (call centre or digital platforms), passengers as end users, and national ministries or funding bodies play an important role in ensuring regulatory support, financing, and overall feasibility of the solution.

3. Where do you see the main issues or what are the prerequisites for successful replication of the Grosuplje pilot solution?

   Successful replication of the Grosuplje pilot depends on several key factors. The local context must allow for demand-responsive transport, meaning there are routes or departures with low passenger

numbers where smaller vehicles can operate efficiently without reducing access. Institutional support and flexible concession rules are essential to allow operators to use these smaller vehicles and adapt services as needed. Reliable funding is needed for vehicles, operations, and booking systems. Equally important is ensuring passengers understand and accept the service, with clear booking options and smooth connections to existing public transport. Finally, strong collaboration between public authorities, transport operators, and municipalities—sometimes across neighbouring areas—is crucial to make the service financially and operationally sustainable.

4. What are the criteria to decide whether to continue or close the pilot action (why did you decide to continue or close the PA activities?

The Grosuplje pilot was closed mainly due to financial constraints, driven by existing regulatory and contractual limitations, as maintaining a large bus and driver on standby would have required additional funding. Despite this, the pilot demonstrated operational and environmental benefits, including increased vehicle occupancy, fewer empty trips, and reduced emissions through the use of smaller vehicles. User feedback was generally positive about the service itself, although passengers noted issues with booking, limited trips, and integration with other transport modes. While the pilot was effective, it was not financially sustainable under the existing conditions. Financial sustainability could be achieved by extending the service to other low-demand lines, including in neighbouring municipalities, combined with appropriate contractual arrangements.

B.4.3.3. Financial implications

6. What are the main costs for implementation of the Grosuplje pilot solution?

The main costs of implementing the Grosuplje pilot were primarily linked to ensuring the demand-responsive service could operate smoothly and efficiently. This included operational costs such as fuel, vehicle maintenance, and driver wages, including standby time for vehicles and drivers. Additional costs were related to the provision of suitable vehicles, such as smaller buses, vans, or cars, to serve low-demand trips efficiently. The pilot also made use of the existing call centre to coordinate trips and communicate with passengers.

7. What are the main funds for implementation of the DRT pilot action?

The main funds for implementing the pilot come from several sources. Public transport budgets managed by DUJPP provide core financing within existing concession and PSO frameworks. Additional support can be secured through national and EU funding mechanisms, particularly the Social Climate Plan 2026–2032, which enables access to the Social Climate Fund for nationwide DRT implementation, and Eko Fund subsidies, covering a significant share of environmentally friendly vehicle costs. Municipal contributions are also important, especially in areas where local authorities co-finance public transport services, ensuring alignment with local mobility needs.

8. Do you see any other possibilities to finance upkeeping of the Grosuplje DRT pilot action?

Additional possibilities to finance the ongoing operation of the pilot include reallocating existing public transport funds, for example shifting resources from school transport to DRT services where operationally justified. Joint co-financing by neighbouring municipalities can support cross-boundary services, while operational optimisation—such as reducing the use of large buses on low-demand routes and deploying drivers and vehicles more efficiently—can generate savings. Finally, integrating the DRT service into the regular public transport network can provide stable, long-term financing as part of standard public transport operations.

9. How can expansion of the pilot activity in the same area or in other areas impact the costs (e.g. optimisation of personnel, vehicle fleet…)?

Expanding the pilot activity, either within the same area or to neighbouring areas, can improve cost efficiency and reduce average costs per trip. This is achieved through better utilisation of the vehicle fleet, optimising personnel deployment (e.g., using category B drivers where suitable), and creating more flexible schedules that reduce idle time and unnecessary mileage. Expansion also allows economies of scale, as shared services across municipalities spread operational and IT costs, including call-centre and booking systems, over a larger area. Overall, scaling up the pilot supports system-level optimisation rather than focusing on isolated savings for individual routes.

10. What funds do you see for replication of the pilot solution to other areas in the country or other regions?

For replicating the pilot in other areas or regions, key funding sources include the Social Climate Fund, provided through the national Social Climate Plan 2026–2032, which specifically supports demand-responsive transport across Slovenia. Additional financing can come from public transport budgets managed by DUJPP, redirected to DRT where it offers a cost-effective solution, as well as municipal or inter-municipal co-financing, particularly in rural or low-density areas. Eko Fund subsidies can further support the purchase of low-emission vehicles needed for DRT operations. Combined, these funding sources create a solid and realistic foundation for scaling up and replicating the pilot at national and regional levels.

B.4.3.4. Recommendations for improvement and up-scaling

8. Do you see in your county other locations, municipalities, regions where Grosuplje pilot solution could be applied?

The DUJPP already successfully introduced DRT for mobility-impaired persons in Maribor, Ljubljana and Nova Gorica, mainly in areas where regular public transport was not available or was very limited.

The Grosuplje pilot solution can be applied in areas with low-frequency, insufficient, or missing public transport, often identified as transport-poor areas. Positive results in Grosuplje and DRT services for mobility-impaired users in Maribor, Ljubljana, and Nova Gorica indicate strong potential for replication in smaller municipalities and rural areas, including cross-municipal services.

The positive results of this measure indicate strong potential for expansion to other municipalities and regions, especially smaller and rural areas, as well as for cross-municipal implementation (e.g. Grosuplje, Ivančna Gorica, Škofljica, Videm Dobrepolje).

9. How do you see long-term optimisation of the Grosuplje PA (e.g. leverage of bigger vehicle fleet, more users, re-distribution of drivers, engagement of licensed drivers, capacity of vehicles, stability of financing, reinventing of passenger services with other options, development of SW support…)?

Long-term optimisation of DRT can be achieved through several complementary strategies. Expanding services to neighbouring municipalities increases the operational area, allowing better utilisation of the vehicle fleet and more efficient redistribution of drivers. Using smaller vehicles on low-demand routes, integrating DRT with school transport outside school hours, and engaging category B drivers help reduce costs and alleviate driver shortages. Flexible operations based on real passenger demand improve efficiency, while national digital support for booking, dispatching, and monitoring ensures smooth service management. The Grosuplje pilot demonstrated that combining these measures can maintain or improve service quality while lowering operational costs, particularly when implemented on a larger regional scale.

10. What is needed in terms of formal procedures for easier expansion of the Grosuplje pilot solution (speeding the process) and upkeeping it (e.g. who finances, decides on additional schedule departures or line layout modification – what are limitations)?

For the easier expansion and sustainable operation of DRT, a stable financing framework is needed. It can be arranged within the Social Climate Plan 2026–2032, providing the basis for implementation in areas with limited public transport. The national authority, DUJPP, is expected to take on a central role in managing funds and coordinating services. It is recommended that financial management be flexible, allowing reallocation of budgets, for example from school transport to DRT where justified. Line layouts and schedules should be adjustable based on real demand and operational data, while cross-municipal agreements can facilitate co-financing and coordinated service provision. Finally, operational studies using actual data should guide implementation, ensuring that pilot actions can be effectively scaled and integrated into the wider public transport network.

11. How do you see possibilities given by the national (regional) legislation to introduce Grosuplje pilot action solution into existing operations of the PT in Slovenia (e.g. 6 months change of the granted PSO on PT) – what are the needed actions to make pilot actions easier to implement and measure their success?

    The Slovenian Road Transport Act allows the implementation of demand-responsive transport, so no legislative changes are needed to introduce pilot actions. However, existing concession contracts and cost structures can limit flexibility, as they often require permanent availability of large buses and drivers and may exclude standby costs. To facilitate pilots, temporary flexibility within PSO contracts should be allowed, pilot frameworks should be clearly defined with measurable indicators, and cost structures adapted to DRT operations.

12. Do we need a standardized methodology for identifying resident's (passengers') needs that would differently address big agglomerations and smaller settlements, regular services and DRT… – how do you identify the needs today?

    Understanding passengers' needs requires a standardised yet adaptable methodology that can It is recommended to apply a standardised yet flexible methodology for identifying passengers' needs, capable of addressing different contexts, from large urban agglomerations to smaller settlements, and from regular public transport services to DRT. This methodology should be based on a balanced combination of quantitative data—such as ridership, operational performance and accessibility indicators—and qualitative insights gathered directly from users through call centres and local engagement.

    Today, passenger needs are primarily identified through a combination of **direct feedback, operational monitoring, and local engagement**. Feedback comes from call centres, surveys, and conversations with passengers during trips, providing insights into travel patterns, preferences, and challenges.

13. What is the drive (incentive) for selection of alternative fuel vehicles in the operator's vehicle fleet?

    The main incentives for selecting alternative fuel vehicles in the operator's fleet are **environmental and regulatory requirements**. Operators are encouraged to reduce emissions and meet national carbon-neutrality targets, which promotes the use of low- and zero-emission vehicles. Financial support, such as co-funding schemes from the Eko Fund covering up to 80% of vehicle costs, further facilitates the acquisition of environmentally friendly vehicles. Although higher purchase and leasing costs—particularly when municipalities own the vehicles and operators pay rent—pose challenges, alternative fuel vehicles are strategically advantageous for flexible, low-demand services like DRT, providing both environmental benefits and operational suitability.

14. Do you provide support for transport operations on the basis of a commercial or custom-designed SW. Would you be ready to use an openly adaptable EU solution (e.g. for DRT service) to assure standardisation and easier cross-border integration of services?

It is recommended to support DRT operations through a unified, adaptable software platform. While current operations rely on custom-designed and commercial solutions, a national platform would enable streamlined booking and management of DRT services, integration into the official public transport system, and improved coordination between operators and municipalities. Developing such a platform, as planned by DUJPP and MOPE, would also allow compatibility with an open, EU-adaptable solution, thus promoting standardisation and facilitating potential cross-border service integration.

APPENDIX C: PAKS pilot action

Thematic field: Public Transport (PT) Network Optimization - involves adjusting the routes and schedules of the existing PT system.

Pilot action in Paks (Hungary): introduction of a new bus line between Gesztenyés utca stop and the newly established "PK telephely" stop in the Paks, serving three intermediate stops, in order to connect residential & office area, previously not connected to the city's PT network.

C.1. Site-visit

Name of the PP:	Paks Transportation l.l.c.
Date:	01.09.2025
Venue:	The headquarters of Paks Transportation l.l.c. and stops of the Line 5

C.1.1. Number and types of participants

There was total of 3 participants on the site visit. More information is available upon request.

C.1.2. Situation & challenges of PT in Paks PA area

The PA area

The city of Paks, with 17.500 citizens is located in Tolna County, on the right bank of the Danube River, about 100 kilometres south of Budapest. Its history dates back several centuries, and the area was already inhabited during the Roman era. Today, Paks has become one of the key centres of the region, playing an important role both economically and culturally.

One of Hungary's most well-known nuclear power plants, the Paks Nuclear Power Plant, is situated here, providing a significant share of the country's electricity production. This not only makes the city outstanding from an energy perspective but also contributes greatly to job creation and the economic development of the area. Over the past decades, Paks has seen continuous growth, with its infrastructure and services adapting to modern needs.

At the same time, Paks is not only recognized for its industry but also for its rich cultural life. The city offers museums, exhibitions, and events, as well as numerous sports and leisure opportunities for residents and visitors alike. The beauty of the Danube riverside, the natural values of the surrounding area, and the welcoming local community all make Paks an attractive place for both tourists and those who live here.

PT services

Public transport is bus-based, coordinated through a central station. Coverage is generally adequate, though some outlying neighbourhoods lack direct access. The local transport company (PP5 in CE OPTI-UP project) provides urban services, while interurban routes are handled by national operator (MÁV Személyszállítási Zrt.). Rail links exist through the 42 Pusztaszabolcs–Dunaújváros–Paks line, but passenger services have been suspended since 2009. The line remains strategically important for freight, particularly for the nuclear power plant and the port, and has recently been refurbished to support future logistics tied to the Paks II project

PT challenges

Although Paks has good transport links (the M6 motorway, connection to the Danube, public transport services), its administrative area is large and the outlying areas are difficult to access, with no public transport links at all.

Due to the expected growth in motorization, the number of people traveling by private car will continue to increase in the future, resulting in further traffic jams and congestion, which will lead to longer travel times for both private motorized and public transport, as well as soft modes of transport. As a result of this process, on the one hand, the proportion of residents dissatisfied with transport services will increase, and on the other hand, the large number of vehicles will lead to more frequent accidents.

C.1.3. Operated PA solution

Paks Transportation LLC expanded its services on September 1, 2025, when it began operations (Pilot Action). A new line was introduced on the first day of the school season, which was designated as line 5. Services on this line transported passengers between the Gesztenyés utca stop and the newly included "PK telephely" stop in the Paks Transportation l.l.c. transport network. Between the two terminals, the stops named Jedlik Ányos utca, Költségvetési üzem, and Szőlőhegy were served in both directions.

The new line has been designed to take into account the objectives set out in the project preparation (AF):

- improving the efficiency of existing local transport;
- coordinating transport with settlements in the city's agglomeration;
- improving access to areas of the city that are not currently served by local public transport;
- the planning of PT needs to fit to the future approach of the dynamically expanding city.

C.1.4. Site visit implementation

Preparatory activities

The preparatory activity concerned the development of the site visit methodology. The staff conducting the site visit formed a group (Ms Rita Véhma-Kósa, Mr Barnabás Weller, Mr Sebő Sánta) and determined the method of monitoring the pilot's operation:

- personal journey on the new line (Ms. Rita Véhman-Kósa);
- checking the stops on the line availability of passenger information (Barnabás Weller & Sebő Sánta);
- analysis of traffic data (number of delays and cancelled services (Barnabás Weller & Sebő Sánta);
- personal feedback from Line 5 operating Staff (Barnabás Weller & Sebő Sánta).

Visit to the site

- On the new line, from the starting station to the terminus, the service was punctual, the audio passenger information was adequate, and the new stops were already included.
- New passenger information boards were installed along the entire line, which already included the timetable for line 5.
- There were no delays or cancellations on line 5 until 1:30 p.m.
- According to the operational staff report, the service is functioning properly and as planned.

Figure 20: Project team members participating in the site visit

Figure 21: Bus just leaving the new stop of Line 5 “PK telephely”

Figure 22: Passenger information table with the schedule of Line 5 in stop “Jedlik Ányos”

C.1.5. Insights of PA implementation & feedback (visitors/users)

The operations manager and traffic control officer confirmed that there were no delays or cancellations on the new line until 1:30 pm on the first day.

According to the driver working on the line, there are very few passengers compared to other lines, but he attributed this to the fact that the line is brand new and passengers are not yet accustomed to it. The line is easy to drive, with no traffic obstacles or bottlenecks.

C.1.6. Additional photos

When designing the new line, one of the considerations was to provide a transfer option to the city centre for those arriving from other towns in the north by private car or intercity bus. There is a car park right next to the new stop “PK Telephely”, so many people only use their cars to get here and then transfer to the bus service (new local and intercity services).

Figure 23: Cars are parking next to new stop of Line 5 “PK telephely”

C.2. Pilot action performance - KPIs

C.2.1. Plan of performance monitoring and evaluation

C.2.1.1. Identification of key performance indicators (KPIs)

Table 42: Pilot action KPIs

KPI	Brief description	Unit	Target
KPI_1	Number of daily passengers; Average daily ridership on the 5th Line	passenger/ day (on weekly base)	>= 19.2
KPI_2	Single tickets sold; Weekly number of tickets sold on Line 5	Number of tickets sold (per week)	>= 50
KPI_3	Percentage of delayed services; Weekly percentage of runs delayed by more than 5 minutes relative to total services	% of delayed runs (per week)	< 1%
KPI_4	Operational costs/passenger; Average operating cost per passenger on Line 5, based on weekly averages	HUF/passenger (average on weekly base)	< 3,600 Ft
KPI_5	Total kilometres operated; Total weekly kilometres operated on Line 5	Km/(total on weekly base)	550.6 km

C.2.1.2. Identification of data sources & tool for KPIs

Table 43: Identification of data sources & tools for KPIs data

KPI	Data list	Methodology	Data source	Data tool
KPI_1	- -Number of passengers on Line 5	Weekly trend: weekly aggregated data divided by the number of days	PK	Excel
KPI_2	- Number of sold tickets on Line 5	Weekly trend: weekly aggregated data	PK	Excel
KPI_3	- Number of runs delayed more than 5 minutes on Line 5	Weekly trend: weekly aggregated data divided by the number of days	PK	Excel
KPI_4	- Average of costs/km before starting line 5 - Total number of passengers - Total kilometres run	Weekly trend: weekly aggregated data divided by the number of days	PK	Excel
KPI_5	- Total kilometres operated weekly on Line 5	Weekly trend: weekly aggregated data	PK	Excel

C.2.2. Analysis of Key Performance Indicators

C.2.2.1. KPI_1: Number of daily passengers

Table 44: Weekly monitoring of the KPI_1 values

KPI_1: Average number of daily passengers, on weekly base (line 5)							
Baseline KPI value [passengers]: 0							
Target KPI value [passengers]: 19.2 VISUM model ST1							
Week	Monitoring KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]	Week	Monitoring KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]
W1	1.48	-17.72	-92.29%	W10	21.68	2.48	12.93%
W2	4.44	-14.76	-76.88%	W11	22.64	3.44	17.94%
W3	13.32	-5.88	-30.63%	W12	22.35	3.15	16.40%
W4	14.8	-4.40	-22.92%	W13	29.16	9.96	51.85%
W5	19.24	0.04	0.21%	W14	34.04	14.84	77.29%
W6	15.54	-3.66	-19.06%	W15	37.00	17.80	92.71%
W7	17.76	-1.44	-7.50%	W16	35.96	16.76	87.31%
W8	20.72	1.52	7.92%	W17	44.25	25.05	130.48%
W9	18.204	-1.00	-5.19%	W18	28.12	8.92	46.46%
Average:		22.26	Standard deviation:		11.08		

	15.95%		57.72%	

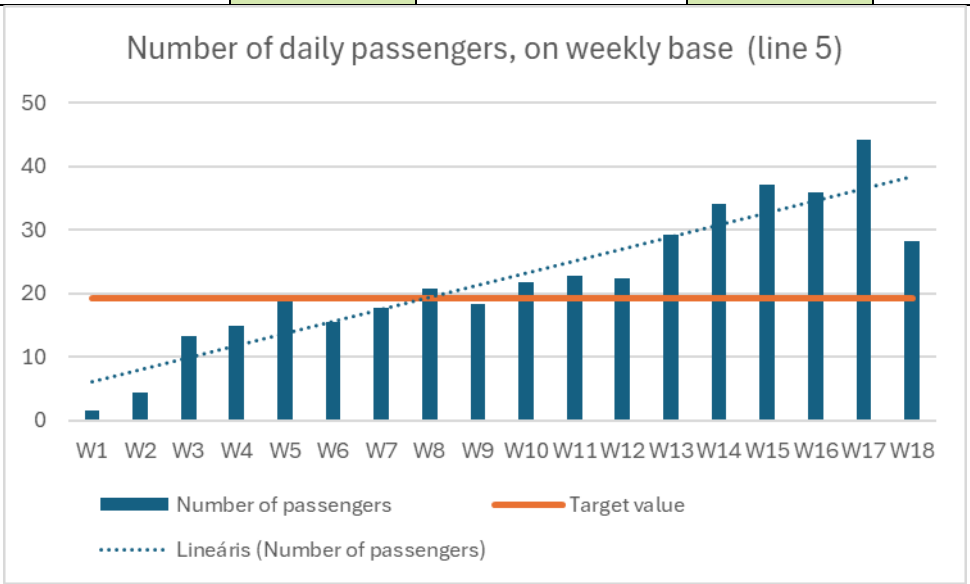


Table 45: Evaluation of the KPI_1 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☒ Stable trend	A slow, steady increase can be observed, with deviations occurring only in those weeks when the number of working days was lower than the average (5).
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☒ Positive impact ☐ Negative impact ☐ Neutral impact	In the second half of the observed period, the target had already been achieved and exceeded the expected value.
3.	What is an impact of PA to the baseline state?	☒Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	As this is a new service and a service expansion, an improvement can in any case be demonstrated compared to the baseline.
4.	Was the target value selected correctly?	☐ Very good selection ☒ Good selection ☐ Unsuitable selection	The selected target value was determined during the modelling process. Taking the actual data into account, the target value is considered relevant.
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values?	☒ Successful ☐ Unsuccessful	The PA proved successful during the first four months of operation, as passengers began using the services in adequate numbers.

C.2.2.2. KPI_2: Single tickets sold

Table 46: Weekly monitoring of the KPI_2 values

KPI_2: Single tickets sold on weekly base (line 5)							
Baseline KPI value [passengers]: 0							
Target KPI value [passengers]: 50							
Week	Monitoring KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]	Week	Monitoring KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]
W1	4	-46.27	-92,54%	W10	55	4.64	9.28%
W2	11	-38.81	-77,62%	W11	57	7.06	14.13%
W3	34	-16.43	-32,87%	W12	56	6.32	12.63%
W4	37	-12.70	-25,41%	W13	73	23.47	46.95%
W5	48	-1.52	-3,03%	W14	86	35.78	71.56%
W6	39	-10.84	-21,68%	W15	93	43.24	86.48%
W7	45	-5.24	-10,49%	W16	91	40.63	81.26%
W8	52	2.21	4,43%	W17	112	61.52	123.03%
W9	46	-4.13	-8,25%	W18	71	20.86	41.72%
Average:		56.10	Standard deviation:		27.93		
		12.20%			55.86%		

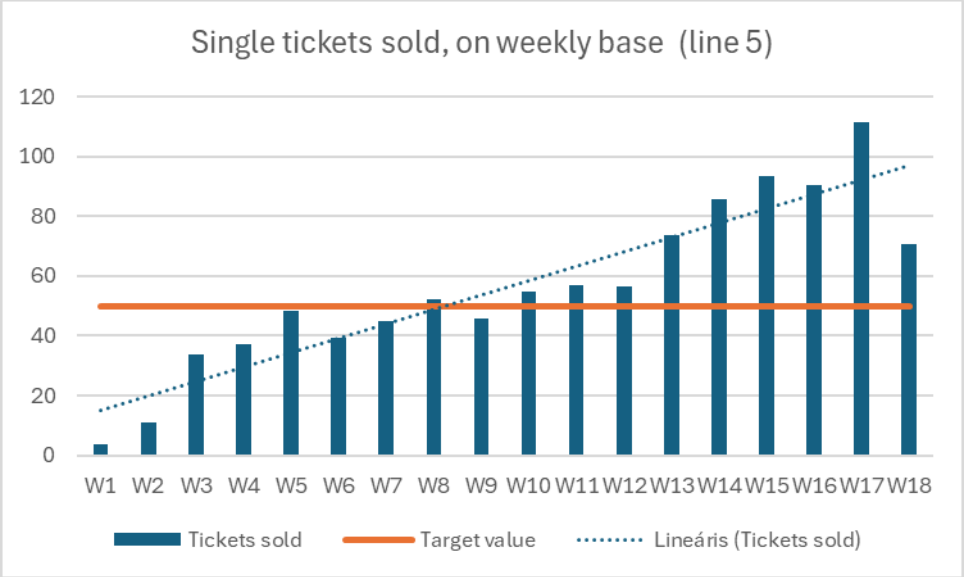


Table 47: Evaluation of the KPI_2 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	Ticket sales show a slow increase in line with passenger numbers and have reached the defined target value.
2.	Does the trend of KPI develop in a positive, negative or	☒ Positive impact ☐ Negative impact	The increase in ticket sales is positive, although its impact on the

No.	Evaluation question	KPI Results	Explanation
	neutral direction in relation to the set target?	☐ Neutral impact	company's economic performance is currently marginal.
3.	What is an impact of PA to the baseline state?	☐ Improvement of previous state ☒ Insignificant change ☐ Worsening of previous state	Since Route 5 did not exist before its launch, the impact is irrelevant in this case.
4.	Was the target value selected correctly?	☐ Very good selection ☒ Good selection ☐ Unsuitable selection	Ticket sales are closely correlated with passenger numbers; although the increase is smaller in this case, the target value has overall been set appropriately.
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values?	☐ Successful ☒ Unsuccessful	The PA was successful due to the increase in revenue generated; however, when compared with the costs, it currently has a negative impact on the company's financial performance.

C.2.2.3. KPI_3: Percentage of delayed runs

Table 48: Weekly monitoring of the KPI_3 values

KPI_3: Percentage of delayed runs, on weekly base (line 5)							
Baseline KPI value [passengers]: 0							
Target KPI value [passengers]: Maximum 1%							
Week	Monitoring KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]	Week	Monitoring KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]
W1	0.89%	-0.11%	-11.38%	W10	0.87%	0.00	-12.60%
W2	0.70%	-0.30%	-30.21%	W11	0.73%	0.00	-26.83%
W3	0.18%	-0.82%	-82.07%	W12	0.77%	0.00	-22.59%
W4	0.76%	-0.24%	-23.80%	W13	0.65%	0.00	-34.72%
W5	0.46%	-0.54%	-54.33%	W14	0.66%	0.00	-34.43%
W6	0.99%	-0.01%	-0.96%	W15	0.65%	0.00	-35.12%
W7	0.82%	-0.18%	-18.33%	W16	0.36%	-0.01	-63.53%
W8	0.49%	-0.51%	-50.72%	W17	0.99%	0.00	-1.46%
W9	0.91%	-0.09%	-8.76%	W18	0.04%	-0.01	-95.67%
Average:		0.01% -33.75%	Standard deviation:		0.00% 26.55%		

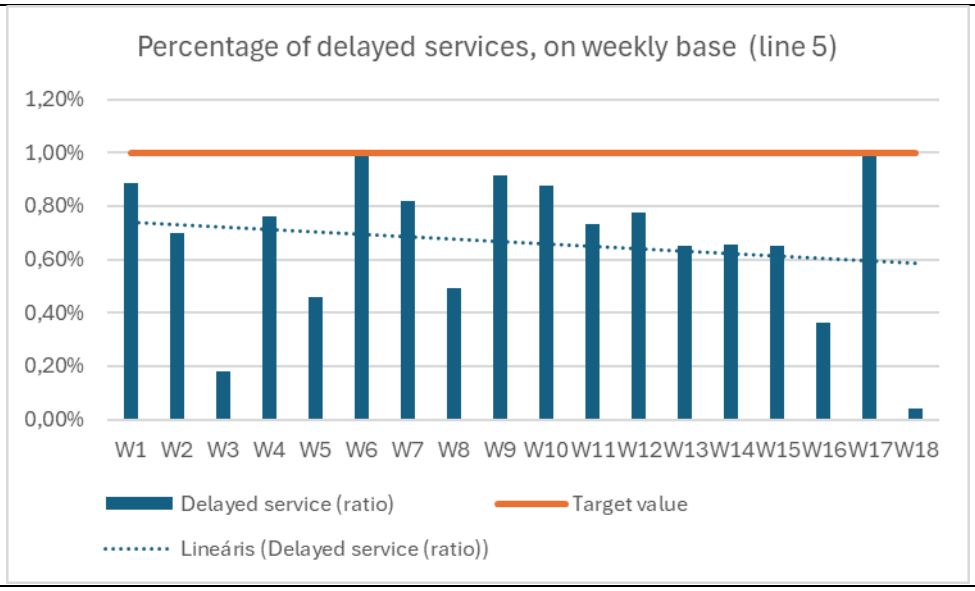


Table 49: Evaluation of the KPI_3 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☒ Decreasing trend ☒ Stable trend	Runs delays remain consistently below the threshold value.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☐ Positive impact ☐ Negative impact ☒ Neutral impact	The trend is stable and affects neither the company's operations nor Route 5. The value is in line with the company average.
3.	What is an impact of PA to the baseline state?	☐ Improvement of previous state ☒ Insignificant change ☐ Worsening of previous state	The development of the KPI is not significant for either Line 5 or the company's operations.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☒ Very good selection ☐ Good selection ☐ Unsuitable selection	The target value was determined very accurately, supported by the availability of data for the transport company as a whole.
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values? Compare the calculated average value of KPI to the baseline and set target:	☒ Successful ☐ Unsuccessful	In this respect, the PA can be considered successful, as the proportion of delays on the new route did not exceed the overall figures for the transport company to any significant extent.

No.	Evaluation question	KPI Results	Explanation
	- Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.		

C.2.2.4. KPI_4: Operational costs/passenger

Table 50: Weekly monitoring of the KPI_4 values

KPI_4: Operational costs/passenger, on weekly base (line 5)							
Baseline KPI value [passengers]: 0							
Target KPI value [passengers]: 3.600 HUF							
Week	Monitoring KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]	Week	Monitoring KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]
W1	80 606 Ft	77 006 Ft	2139.05%	W10	5 502 Ft	1 902 Ft	52.84%
W2	26 869 Ft	23 269 Ft	646.35%	W11	5 268 Ft	1 668 Ft	46.34%
W3	8 956 Ft	5 356 Ft	148.78%	W12	5 338 Ft	1 738 Ft	48.28%
W4	8 061 Ft	4 461 Ft	123.91%	W13	4 092 Ft	492 Ft	13.66%
W5	6 200 Ft	2 600 Ft	72.23%	W14	3 505 Ft	-95 Ft	-2.65%
W6	8 133 Ft	4 533 Ft	125.91%	W15	3 416 Ft	-184 Ft	-5.12%
W7	5 919 Ft	2 319 Ft	64.42%	W16	3 317 Ft	-283 Ft	-7.86%
W8	5 758 Ft	2 158 Ft	59.93%	W17	2 216 Ft	-1 384 Ft	-38.46%
W9	6 553 Ft	2 953 Ft	82.04%	W18	3 990 Ft	390 Ft	10.85%
Average:		10.761 Ft 198.92%		Standard deviation:	18.238 Ft 506.62%		

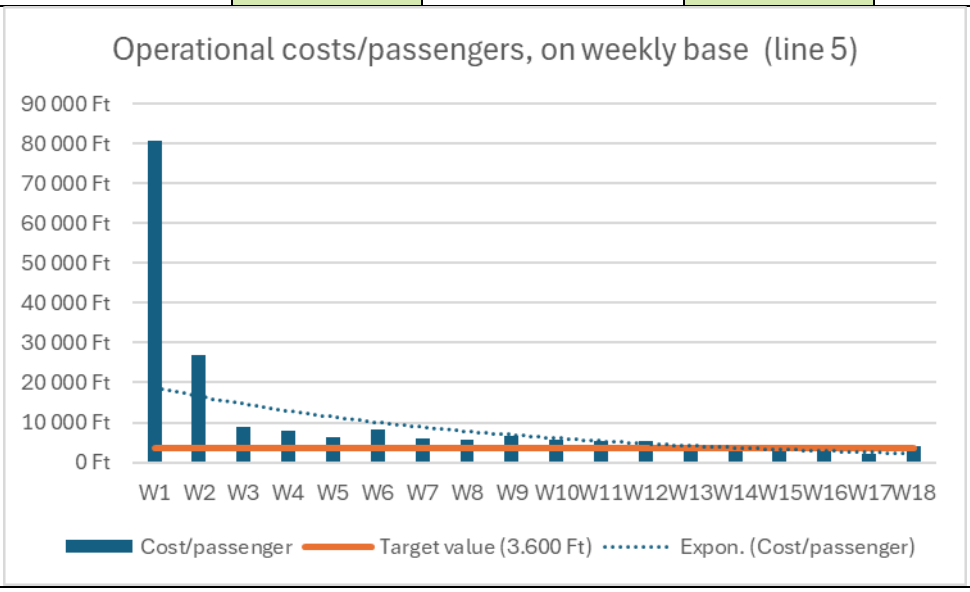


Table 51: Evaluation of the KPI_4 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☒ Decreasing trend ☐ Stable trend	At the start of the PA, passenger numbers were very low, which resulted in very high operating costs for the service. During the implementation of the PA, the trend turned positive and the cost per passenger began to decrease; however, it still remains above the target value.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☐ Positive impact ☒ Negative impact ☐ Neutral impact	The emerging trend is developing in a favourable direction as passenger numbers increase, since operating costs can be considered approximately fixed. The final result can be determined upon the closure of the PA in July 2026. Due to the high operating costs, it is uncertain whether the municipal client will wish to continue operating Line 5. This makes the long-term sustainability of similar actions risky.
3.	What is an impact of PA to the baseline state?	☐ Improvement of previous state ☐ Insignificant change ☒ Worsening of previous state	Although a decline in per-passenger costs can be observed, the excessively high cost clearly has a negative impact on the transport company's overall financial performance.
4.	Was the target value selected correctly?	☐ Very good selection ☐ Good selection ☒ Unsuitable selection	The per-passenger operating value was set too low during the planning phase. The negative effects of the low passenger numbers observed at the beginning of the PA were underestimated.
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☐ Successful ☒ Unsuccessful	The PA did not meet expectations from a financial perspective during the first four months of operation.

C.2.2.5. KPI_5: Total kilometres operated

Table 52: Weekly monitoring of the KPI_5 values

KPI_5: Total kilometres operated on weekly base (line 5)							
Baseline KPI value [passengers]: 0							
Target KPI value [passengers]: 550.6							
Week	Monitoring KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]	Week	Monitoring KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]
W1	550.6	0.00	0.00%	W10	550.6	0.00	0.00%
W2	550.6	0.00	0.00%	W11	550.6	0.00	0.00%
W3	550.6	0.00	0.00%	W12	550.6	0.00	0.00%
W4	550.6	0.00	0.00%	W13	550.6	0.00	0.00%
W5	550.6	0.00	0.00%	W14	550.6	0.00	0.00%
W6	583.3	32.70	5.94%	W15	583.3	32.70	5.94%
W7	485.2	-65.40	-11.88%	W16	550.6	0.00	0.00%
W8	550.6	0.00	0.00%	W17	452.5	-98.10	-17.82%
W9	550.6	0.00	0.00%	W18	517.9	-32.70	-5.94%
Average:	543.33		Standard deviation:	30.83			
	-1.32%			5.60%			

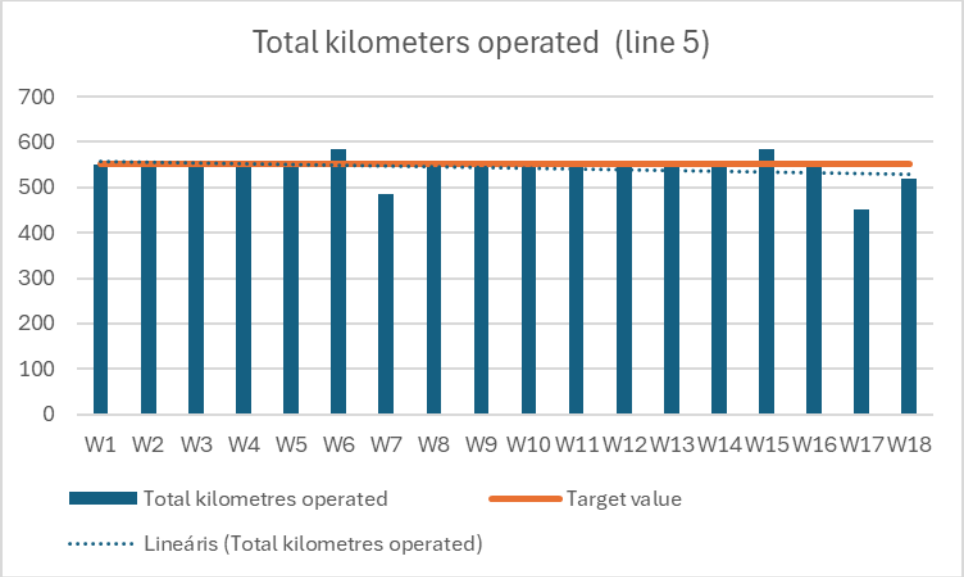


Table 53: Evaluation of the KPI_1 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☒ Stable trend	No major fluctuations can be observed in the KPI; only public holidays and days off affect operations.
2.	Does the trend of KPI develop in a positive, negative or	☒ Positive impact ☐ Negative impact	The KPI is highly measurable and predictable, and it did not affect implementation.

No.	Evaluation question	KPI Results	Explanation
	neutral direction in relation to the set target?	☒ Neutral impact	
3.	What is an impact of PA to the baseline state?	☐ Improvement of previous state ☒ Insignificant change ☐ Worsening of previous state	Line 5 has been introduced as a new service within the service portfolio of PAKS Transportation Ltd.; from this perspective, the additional kilometres operated are insignificant.
4.	Was the target value selected correctly?	☐ Very good selection ☒ Good selection ☐ Unsuitable selection	Compared with the established 1% threshold value, the PA performed very well; fluctuations consistently remained below and did not exceed this level.
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The PA performed very well, and a reliable service was successfully provided on Route 5. The proportion of delays was very low not only in comparison with the corresponding figures of Paks Transportation Ltd., but also relative to the industry average.

C.2.3. Evaluation of PA performance

Table 54: Aggregative statistics of KPI monitoring evaluation

No	Evaluation question	KPI monitoring results						Total
		Metrics	KPI_1	KPI_2	KPI_3	KPI_4	KPI_5	
1.	Trend of long-term expectation of the PA	Increasing	•	•				2
		Decreasing				•		1
		Stable			•		•	2
2.	Trend of KPI in relation to set target	Positive	•	•				2
		Negative				•		1
		Neutral			•		•	2
3.	Evaluation of the impact regarding the baseline situation	Improvement	•					1
		Insignificant change		•	•		•	3
		Worsening				•		1
4.	Definition of target value	Very good			•			1
		Good	•	•			•	3

		Not good				•		1
5.	Successfulness of PA in relation to the baseline and target value	Successful	•	•	•		•	4
		Unsuccessful				•		1

C.2.3.1. Summary of evaluation

C.2.3.1.1. Assessment of overall achievement of the Pilot Action (PA) considering all KPIs

Baseline values are indicative and reflect best-available historical data rather than strictly comparable measurement periods. Some KPIs were retained for experimental or learning purposes and are therefore interpreted with limited weight in the overall success assessment.

Overall, the Pilot Action can be assessed as largely successful, although the results are mixed across the monitored performance areas. Passenger demand on Line 5 developed positively during the monitored period. The average number of daily passengers showed a clear upward trend and, in the second half of the observation period, the monitored values reached and exceeded the target level. Ticket sales followed a similar pattern, increasing gradually in line with passenger numbers and reaching the defined target value in several weeks. These results indicate that the new line has been accepted by users and that the service responds to a real transport need in the pilot area.

From the operational perspective, the Pilot Action also performed well. The percentage of delayed runs remained consistently below the defined threshold of 1%, indicating a reliable and stable service. Likewise, the total kilometres operated remained highly stable during the monitoring period, with only minor deviations caused by holidays and reduced working days. These findings confirm that the implementation of the new service did not create notable operational instability and that the service could be delivered in a predictable manner.

The main weakness of the Pilot Action is related to financial performance. Although operational cost per passenger showed a favourable decreasing trend as ridership increased, the KPI remained above the target value for most of the observed period, and the average value was still significantly higher than planned. This means that, despite improving demand and good operational reliability, the service has not yet achieved the desired level of cost efficiency. Therefore, the Pilot Action can be regarded as operationally and functionally successful, but only partially successful from a financial perspective at this stage. The final assessment of financial sustainability should be made after a longer period of operation, as indicated in the monitoring report.

C.2.3.1.2. Representation of the selected KPIs

The selected KPIs provide a relevant and balanced picture of Pilot Action performance. Together, they cover the most important dimensions of assessment: demand generation, revenue-related performance, operational reliability, cost efficiency, and service output. KPI_1 (Number of daily passengers) is the most representative indicator for the implemented solution, because the primary purpose of the Pilot Action was to introduce a new line and attract users to it. The upward trend in passenger numbers therefore reflects most directly whether the action is fulfilling its purpose. KPI_2 complements this by showing monetised user uptake through ticket sales, while KPI_3 and KPI_5 confirm that the service is delivered reliably and according to plan. KPI_4 is essential for determining whether the achieved demand is sufficient to justify the cost of operation.

No KPI should be removed, as each contributes to understanding a different aspect of performance. However, for future monitoring it could be useful to add one complementary indicator related to passenger structure or trip purpose, for example the proportion of regular users or the share of commuters using the new line. Such an indicator would help explain whether demand growth is temporary or likely to remain

stable in the longer term. This would further strengthen the evaluation framework without changing the core KPI set already established in the report.

C.2.3.1.3. Availability and sustainability of data sources

The data sources used for KPI monitoring were available and sufficient for the purposes of the Pilot Action. The monitoring system relied on data provided by PK and processed in Excel, which proved adequate for weekly KPI calculation. The data structure was simple and practical, and the required information could be obtained for all selected indicators. This is particularly important for KPI_1, KPI_2, KPI_3, and KPI_5, where the monitored values show clear weekly continuity and consistency. The accuracy of KPI_3 was also supported by the availability of company-wide operational data, which made it possible to define an appropriate threshold value.

For long-term sustainable monitoring, it would be advisable to reduce manual processing as much as possible. In the future, data collection could be supported through direct export from ticketing, dispatching, and vehicle operation systems into a structured digital database, while Excel could remain a reporting interface rather than the main calculation tool. Automated or semi-automated data transfer would improve efficiency, reduce the risk of manual errors, and make regular monitoring easier if the service is continued after the Pilot Action. If available, a dedicated database or dashboard-based monitoring tool would be preferable for long-term use.

C.2.3.1.4. List of essential KPIs

In case of continuation or replication of the pilot solution, the most essential KPIs for long-term monitoring would be:

- KPI_1: Number of daily passengers
- KPI_3: Percentage of delayed services
- KPI_4: Operational costs/passenger

These three indicators provide the clearest view of whether the service is attracting users, whether it operates reliably, and whether it can become financially sustainable. KPI_2 (Single tickets sold) should also remain part of the monitoring framework, as it provides additional insight into the commercial effects of ridership growth. KPI_5 (Total kilometres operated) is useful mainly as a control indicator to verify that service output remains consistent over time.

In case of continuation or replication of the PILOT SOLUTION, what is the frequency of long-term monitoring you would suggest for the selected KPIs (representative & additional KPIs)?

C.2.3.1.5. Proposed target values for monitoring of KPIs

Based on the monitored results, the following target values are proposed for long-term monitoring:

KPI_1: Number of daily passengers – at least 19.2 passengers/day as a minimum reference threshold; in the longer term, a higher operational target may be set based on the achieved upward trend.

KPI_2: Single tickets sold – at least 100 tickets/week as a minimum target, subject to revision if passenger demand continues to grow.

KPI_3: Percentage of delayed services – below 1%, which proved realistic and appropriate during the monitored period.

KPI_4: Operational costs/passenger – below 2,000 HUF/passenger should remain the strategic target, but the monitoring results suggest that this value may need to be reviewed if passenger growth stabilises below the originally expected level. This cost level could ensure the long-term operation of Route 5.

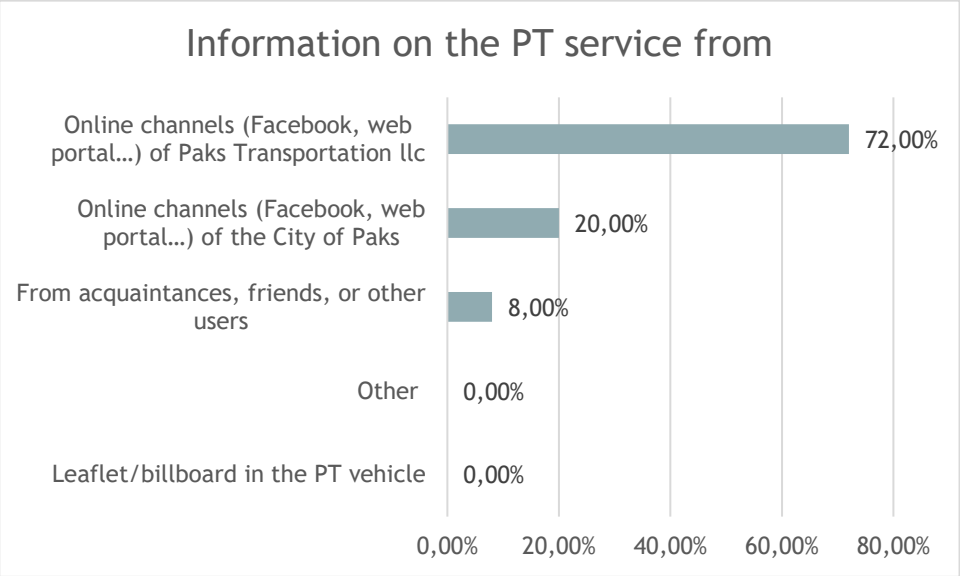
KPI_5: Total kilometres operated – around 550.6 km/week (normal working day), allowing only minor deviations related to calendar effects, holidays, and service schedule adjustments.

C.3. Users-survey

C.3.1. General questions

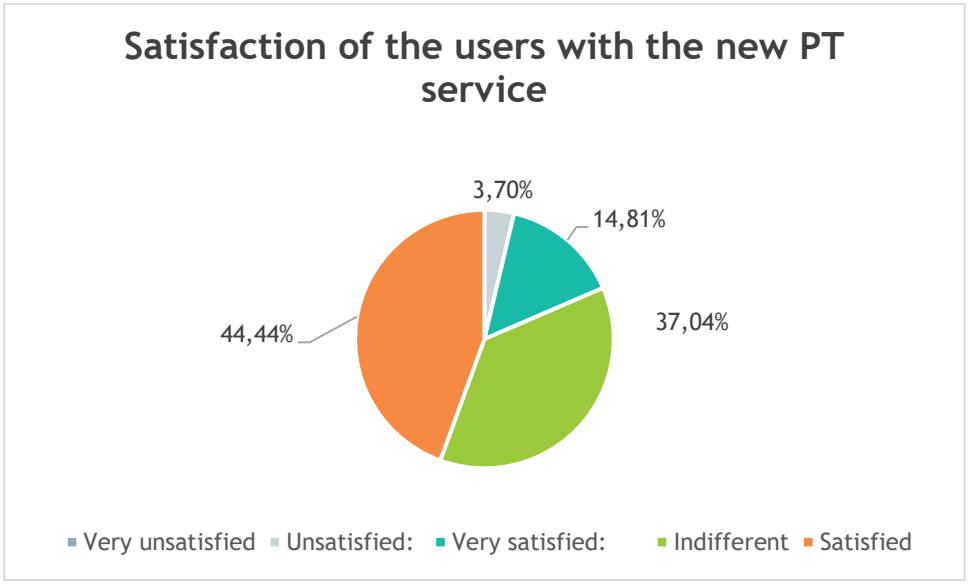
1. How were you informed about this service?

Category	Respondents	%
Other	0	0.00%
Other people	2	8.00%
In the vehicle	0	0.00%
PTO channels		72.00%
Municipality channels		20.00%



2. How were you satisfied with the new service?

Category	Respondents	%
Very unsatisfied	0	0.0%
Unsatisfied	1	3.70%
Indifferent	10	37.04%
Satisfied	12	44.44%
Very satisfied	4	14.81%

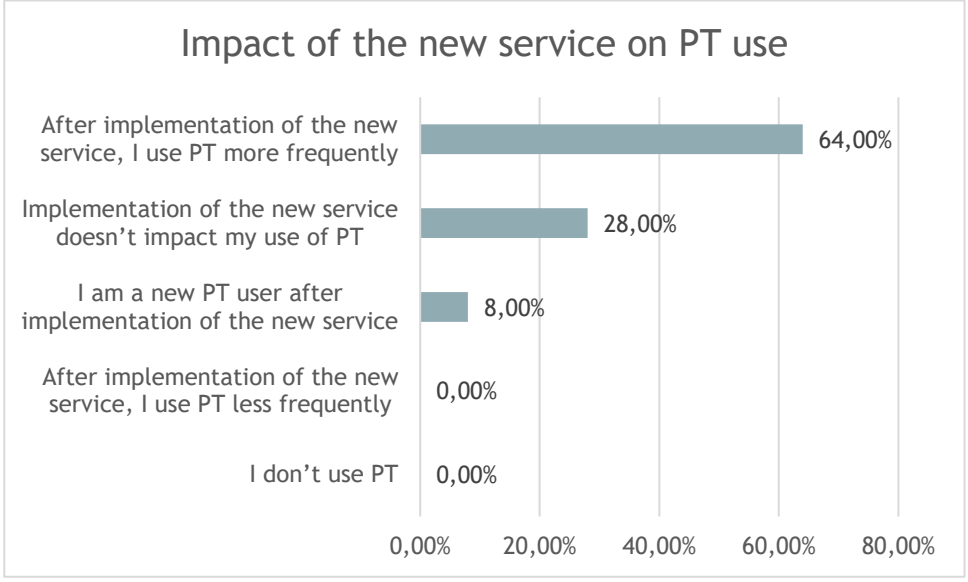


3. ***Does the new service in your opinion contribute to improvement of environmental performance of PT?***

Category	Respondents	%
Yes	21	87.50%
No	3	12.50%

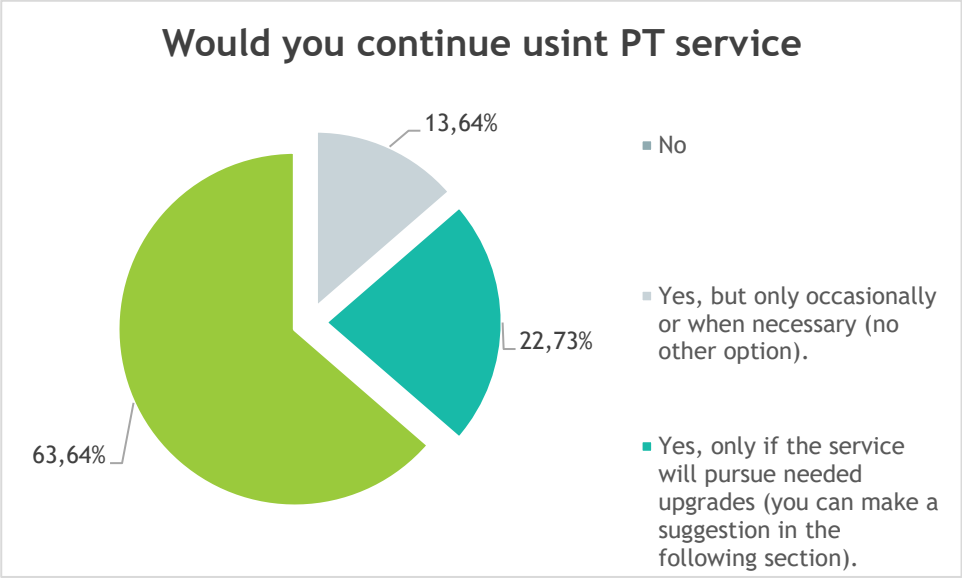
4. ***How did implementation of the new service impact your use of PT?***

Category	Respondents
No impact	7
More frequent use	16
Less frequent use	0
New PT user	2
I don't use PT	0



5. Would you continue using the new PT service?

Category	Respondents	%
Yes	14	63.64%
Yes, with improvements	5	22.73%
Yes, only if necessary	3	13.64%
No	0	0.0%



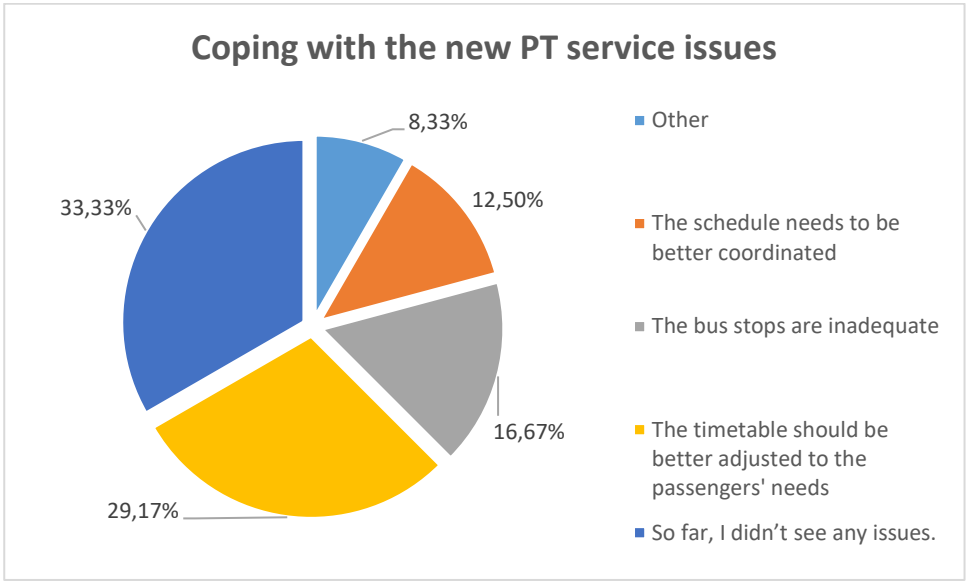
6. Would you recommend the new or changed PT service to the ones who don't use the PT?

Category	Respondents	%
Yes	17	94.44%
No	1	5.56%

1.1. Specific questions

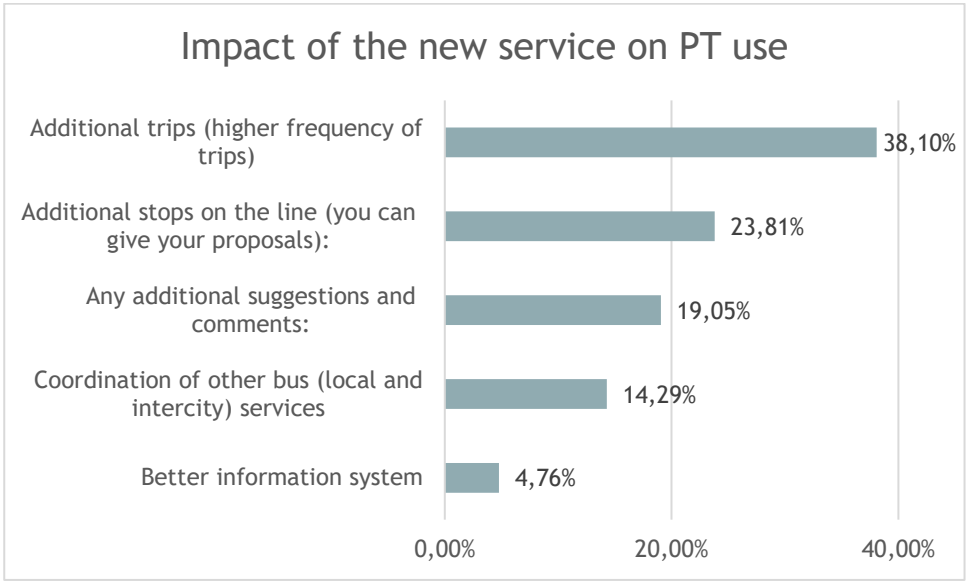
1. Coping with issues during the new PT service use

Category	Respondents	%
The schedule needs to be better coordinated	3	12.50%
The bus stops are inadequate	4	16.67%
The timetable should be better adjusted to the passengers' needs	7	29.17%
No issues	8	33.33%
Other	2	8.33%



2. Suggested improvements of the new service

Category	Respondents	%
Coordination of other bus (local and intercity) services	3	14.29%
Better information system	1	4.76%
Additional trips (higher frequency of trips)	8	38.10%
Additional stops on the line (you can give your proposals):	5	23.81%
Any additional suggestions and comments:	4	19.05%



C.4. Stakeholders' consultation

Name of the PP: **PAKS LLC**

Date of the meeting: **28th January 2026.**

Venue of the meeting: Paks Transportation llc's Central Depot

C.4.1. Number and types of participants

There was total of 14 participants on the stakeholders' consultation. More information is available upon request.

C.4.2. A short summary of the PA presentation

At the stakeholder meeting, Project Manager of CE OPTI-UP project presented the content and goals of the OPTI-UP project to those present. Then, Professional Leader explained the process of planning the pilot action and the steps of its implementation:

The project responds to rising car use and congestion, aiming to improve accessibility, reduce dissatisfaction with transport services, and enhance safety.

The pilot's main objectives were:

- Connecting new outer areas to city public transport
- Improving access to the functional city centre
- Better coordination between local and intercity bus services
- Increasing operational efficiency

Implemented within the OPTI-UP project, Line 5 was assessed using traffic modelling (VISUM), operational performance indicators, and financial impacts. The presentation reviews early results, discusses operational and budgetary consequences, and concludes with proposals for further development and possible expansion of the service based on observed outcomes.

Afterwards, PAKS l.l.c. staff evaluated the results of the Pilot Action to date together with the stakeholders present, along four main topics.

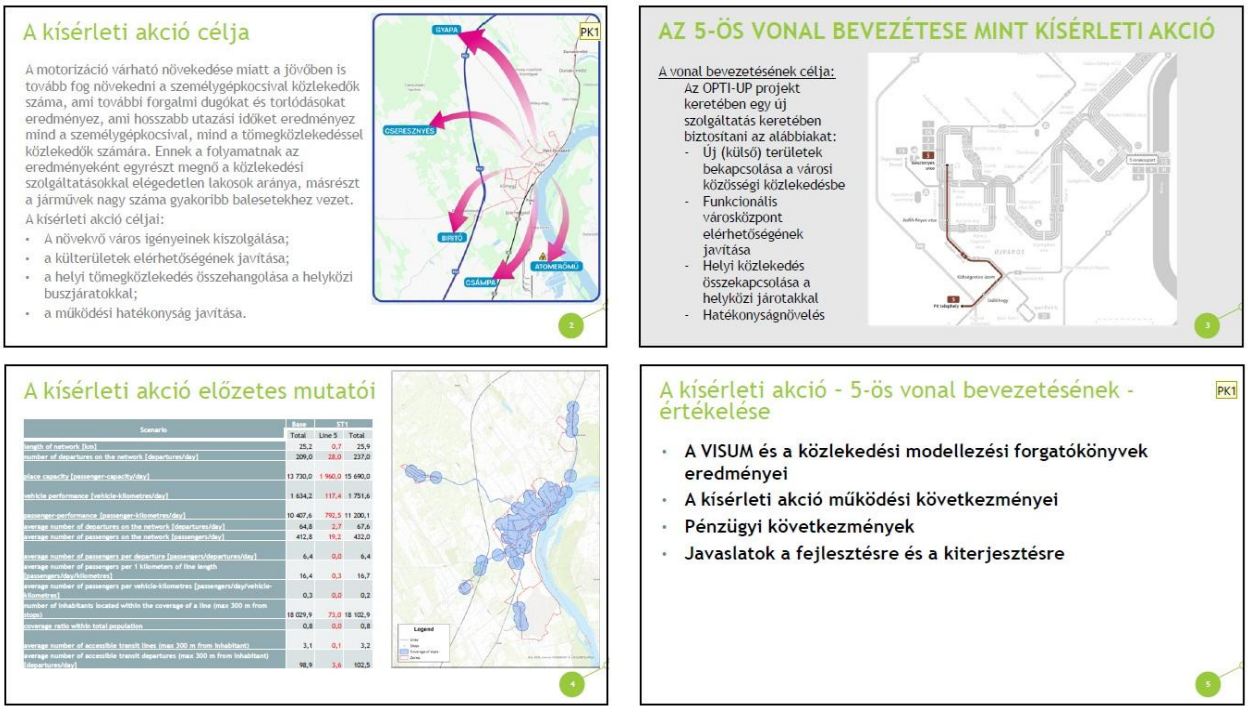


Figure 24: Main slides of the presentation presented during the stakeholder meeting

C.4.3. Insights and feedback from stakeholders

C.4.3.1. Outcomes of VISUM & transport modelling scenarios

1. How do you evaluate the validity and usefulness of the outcomes of transport scenario simulations?

   Answer: Transport scenario simulations are a useful and modern tool in supporting planning and decision-making processes, as they provide an opportunity to compare the expected impacts of different development alternatives numerically. The models can be used to predict traffic re-arrangements, capacity problems, and changes in travel times and loads, which significantly contributes to more informed decision-making.

   However, the validity of the results depends largely on the quality of the input data used, the calibration of the model, and the reality of the assumptions, i.e. the extent to which the modal split is based on real data. Simulations necessarily simplify real transport processes, and therefore the results should be interpreted as guidelines rather than precise predictions. Accordingly, it is justified to handle the results carefully, apply sensitivity analyses and supplement them with other professional methods. Overall, scenario simulations are a valuable decision-support tool, but they can only be considered a reliable basis with appropriate professional control.

   This is also true for the pilot project implemented at Paks Transportation l.l.c. It was therefore of utmost importance to precisely define the number and range of potential passengers in order to accurately model the expected use.

   It is important to mention that the Company intends to maintain the pilot project in the future, not only during the maintenance period, as it always announces its timetable for the timetable year, on the one hand, because based on experience, it takes 7-8 months for travel habits to change in Paks, and on the other hand, because the number of stops affected by the service is intended to be expanded in the near future - which will also have a route-changing effect - in accordance with the public demands received in the meantime regarding the new line.

2. How do you assess use of transport modelling in planning of measures for improvement of public transport, including the presented method of the model implementation and finetuning in view of its potential for use at the local level?

   Answer: The use of transport modelling and specifically the VISUM model in the planning of public transport developments is a justified and professionally sound approach, as it enables the preliminary assessment of the effects of network and operational changes, as well as the comparability of measures. The presented methodology provides a structured framework for examining planning alternatives and supports data-driven, transparent decision-making. In the case of Paks Transportation l.l.c., this significantly facilitated convincing the schedule customer during the licensing of the new line, as it was possible to predict its passenger attraction effect in advance. Since the city is committed to prioritising public transport at the expense of individual transport, the passenger numbers estimated by the model – supplemented by the quantification of expected costs – greatly facilitated decision-making.

   Nevertheless, the appropriate level of detail, up-to-date database and continuous refinement of the model are of paramount importance for its applicability at the local level. If these are not available, the results of the model may be distorted and may reflect local characteristics, travel habits or operating conditions to a limited extent. In addition, it must be taken into account that modelling alone does not replace field experiences, traffic counts and stakeholder consultations, but together with them, by continuously incorporating them into the model and updating the results, it can be used effectively as a complex planning tool. The result of the continuous consultation with the population and businesses operating in the settlement is that in the next timetable period, Paks Transportation l.l.c. will initiate a route modification for the route announced as part of the pilot project, as a result of which the service quality of new areas will improve.

   Overall, the modelling method can be well applied to base local and regional transport development decisions with appropriate professional preparation and regular review, but at the same time, critical interpretation of the results and multi-aspect validation are justified when using it.

C.4.3.2. Operational implications of PA

1. What are the necessary planning steps in order to replicate the pilot solution (documentation, strategies, plans, funds, stakeholders, purchase of additional vehicles) and which steps take the most time?

   Answer: In order to replicate the pilot solution, it is primarily necessary to document the experiences and results in detail, as well as to prepare feasibility and impact assessments based on professional evaluation. This is followed by specifying the strategic goals, developing operational and network plans, and financial and resource planning, including possible vehicle and equipment purchases. The involvement of relevant organizations and partners, conducting licensing processes, and planning communication and public information tasks are of paramount importance, as real and effective results can only be expected if potential passengers have been properly informed before the introduction of new network elements, and even feel that they have been involved in the planning process and that “their opinion counts”.

   All this means that the experiences gained in Paks cannot be applied one-to-one to a small town with similar characteristics, since specific needs must be taken into account in each case. However, it is clearly visible that the VISUM model can significantly reduce the latency that is so characteristic of public transport needs.

   In terms of time requirements, the biggest challenges are typically the funding, public procurement and acquisition procedures, and the permitting and construction processes related to the development of vehicles and infrastructure. Especially in light of the fact that those intending to

travel only see one flight in connection with the developments, but not the planning and organizational processes taking place in the background. Thus, organizational consultations and the establishment of consensus between stakeholders can also require a significant investment of time. Overall, due to the complexity of the planning and preparation phase, repetition can only be implemented effectively with appropriate scheduling and gradual introduction. However, we would like to emphasize that the appropriate delimitation of the areas reached by the development, the inclusion in the VISUM model, and the targeted survey of population needs together provide an opportunity for transport service providers to accurately determine the travel needs generated by the development.

2. Who are the main stakeholders that need to be involved in planning and implementation in order to replicate the pilot solution?

   Answer: In order to achieve successful implementation, the active involvement of the transport organizer (in this case, Paks Transportation l.l.c.) and the ordering organizations (Paks City Municipality and its specialized committees), as well as the relevant transport service providers (in the case of Paks, this is also Paks Transportation l.l.c.), operators and operators is necessary. In addition, infrastructure managers, authorities and licensing bodies, as well as institutions providing financing and tender sources, play an important role. In order to achieve social acceptance and practical operability, it is also justified to involve passengers, local communities, civil society organizations, economic actors and public institutions, especially during the consultation and feedback processes. Continuous coordination and information sharing between the various stakeholders is a fundamental condition for the sustainable and effective application of the solution.

3. Where do you see the main issues or what are the prerequisites for successful replication of the pilot solution?

   Answer: If we want to continue using the model in Paks, the main challenges can be identified primarily in resource constraints, financing uncertainties, and the complexity of institutional and organizational cooperation, but the same risks exist in other settlements as well.

   Furthermore, the lack of data, the uncertainty of model and planning assumptions, the latency in public transport planning itself, the fact that we cannot necessarily take into account all needs, since we do not see them, can also cause problems. Insufficient consideration of local specificities can also cause problems. Meanwhile, the VISUM model provides an excellent planning basis with appropriate and continuous data entry and data maintenance, but only if the above is taken into account. Lack of public acceptance and limited operational capacities can also hinder the introduction.

   The prerequisite for successful repetition is a properly prepared professional and financial background, well-founded decision-support analyses, and a realistic schedule. In addition, an up-to-date database, continuous monitoring and feedback, as well as cooperation and transparent communication between the relevant actors are essential. If these conditions are met, the experiences of the experimental solution can be effectively put into practice, and sustainable results can be achieved in the long term.

   Overall, it can be said that the model can provide the greatest professional assistance if its use is continuous, with subsequent data entry in each case in order to ensure that they are accurate up to date.

4. What are the criteria to decide whether to continue or close the pilot action (why did you decide to continue or close the PA activities?

   Answer: The decision to continue or terminate the pilot action should be made primarily on the basis of objective, measurable performance indicators. Such criteria may include, among others,

the development of passenger traffic data, the level of service (timetable punctuality, availability, utilisation), the balance of operating costs and revenues, and the assessment of social and environmental impacts.

Another important aspect is the feedback from stakeholders – especially passengers and operators – and the extent to which the intervention fits into the strategic transport development goals. If the pilot demonstrably improves the efficiency and sustainability of the service, and operation can be ensured in the long term, continuation is justified. On the other hand, in the case of a permanently unfavourable cost-benefit ratio, low utilisation or significant operational difficulties, modification or termination may be a professionally sound decision.

The City of Paks, as the customer of the timetable, decided in conjunction with Paks Transportation l.l.c. to continue operating the new route introduced in the pilot. Primarily not due to the development of passenger numbers on the services launched on the new line, but because it generated a strong increase in population demand from other parts of the city located on the border of the service route, and in order to prevent an increase in demand related to the expected increase in population related to the PAKS II investment.

C.4.3.3. Financial implications

1. What are the main costs for implementation of the pilot solution?

   Answer: The main cost elements include planning and preparation tasks (analyses, modelling, expert work), possible infrastructure interventions, and vehicle and equipment purchases. Developments of IT and traffic management systems, communication and information activities, and the costs of licensing and administrative processes may also constitute a significant item.

   Personnel expenses, energy and maintenance costs, and expenses arising from possible additional operating needs arise during operation. Overall, both investment and operating costs occur during the pilot period, which together determine the financial sustainability of the project.

   In the case of Paks, there was a minimal increase in working hours and related personnel costs during the pilot, however, the necessary vehicle fleet was available, only their utilization increased. Additional significant costs would be incurred by purchasing a license for the VISUM model for a longer period, and the time required for professional processing, inputting and extracting data also generates costs. In the case of a settlement of this size, it is not necessarily advisable to solve this with permanent workforce; based on experience, it is more expedient to have these tasks carried out by external experts once or twice a year.

2. What are the main funds for implementation of the pilot action?

   Answer: The financial sources of implementation are typically multi-faceted. These may include local government or state budget contributions, transport organizers and service providers' own resources, and domestic or European Union grant funding. Occasionally, other targeted development or innovation funds may also be involved.

   The stability of the financing structure is crucial for the successful implementation and evaluation of the experiment, which is why it is justified to secure funds in advance and to carry out multi-year financial planning.

3. Do you see any other possibilities to finance upkeeping of the pilot action?

   Answer: In order to ensure long-term maintenance, it is advisable to examine alternative financing options beyond traditional budget sources. These could include, for example, involving additional tender sources, establishing partnerships, involving service providers or market players, or in certain cases, using constructions based on public-private cooperation.

In addition, it is worth considering the reinvestment of savings from improving operational efficiency and strengthening the revenue side (e.g. tariff system optimization, integrated services). However, the basic condition for sustainable financing is realistic cost estimates and regular financial monitoring.

4. How can expansion of the pilot activity in the same area or in other areas impact the costs (e.g. optimisation of personnel, vehicle fleet…)?

   Answer: The expansion of the pilot activity may affect the development of costs in several ways. In the case of a larger-scale application, certain fixed costs may decrease in specific terms, since the planning, management and IT systems, as well as the administrative capacities, can be shared between several areas. However, this is not feasible in the case of Paks due to the size of the settlement and the size of the service area. More efficient utilization of the vehicle fleet and personnel, coordination of schedules and standardization of operational processes may result in economies of scale, however, it should also be noted that in the case of Paks Transportation l.l.c., both the vehicle fleet and the number of traveling personnel are adjusted to the current schedule, so any increase in service requires the purchase of new equipment and an increase in the number of drivers, while the number of potential passengers of scheduled local transport is constant, or even decreasing, similar to developed civilizations. Only during the construction and planned operation of the two new power plant units planned for Paks, the population is expected to increase, but the extent of this increase does not justify the costs of renting the VISUM model. As we have written before, involving external experts in the processes is the most appropriate solution in a settlement of this size.

   Therefore, it can be stated that additional costs may arise in the initial phase of the expansion, especially due to infrastructure developments, vehicle and equipment purchases, training, and organizational and coordination tasks related to new areas. In addition, different local conditions – such as traffic conditions, travel habits or network structure – may reduce the savings from uniform solutions. Accordingly, cost-effectiveness can primarily be ensured with thorough preparation, gradual introduction and continuous performance evaluation.

5. What funds do you see for replication of the pilot solution to other areas in the country or other regions?

   Answer: The financing of the extension can be implemented by a combination of several sources. Local government and state budget sources, as well as the own development frameworks of transport organizers and service providers, can play a primary role. In addition, the involvement of domestic and European Union support programs, especially transport development, climate protection and innovation applications, is justified.

   The application of the model represents an excellent opportunity for the joint management of several public transport services. In the case of Paks, it can provide an excellent basis for cooperation at the district level, if all relevant service providers continuously upload measurement data, and settlement-level population data is also entered.

   Therefore, partnership structures, regional cooperation, and in some cases the involvement of market players or financing models based on public-private cooperation can represent additional opportunities. In the interest of long-term sustainability, it is advisable to reinvest the savings resulting from improving operational efficiency and also to increase the revenue potential. However, the conditions for successful extension are realistic cost estimates, a stable financing background and scheduled implementation.

C.4.3.4. Recommendations for improvement and up-scaling

1. Do you see in your county other locations, municipalities, regions where similar solution could be applied?

   Answer: Based on the experiences in Paks, the pilot solution can be successfully applied primarily in settlements and regions where the utilization of traditional, high-capacity public transport services is low, but there is a real mobility demand for more flexible, cost-effective solutions. The introduction may be particularly justified in larger cities, their peripheral areas, agglomeration

zones, but also in less densely populated rural areas, where the current service level does not always match travel needs.

However, the VISUM model is specifically suitable for modelling transport needs affecting large masses, so its application in large cities is particularly beneficial for transport service providers. Moreover, in their case, the rental cost is negligible compared to other costs, while the benefit is significant in the planning of the service.

Therefore, before designating specific locations, a detailed examination of the traffic, demographic and operational characteristics of the given region, as well as pilot testing, is necessary.

The adaptability of the method is therefore given, but it requires location-specific planning and gradual introduction. It is important to highlight that there are no larger settlements in Tolna County, and in fact, the seat of the County is one of the smallest in the country. Nevertheless, the model could be used effectively in Szekszárd and Dombóvár to organize public transport for real travel needs, and to organize transport for the development of roads. But in the case of the county, shared use – including intercity transport services – seems to be a truly profitable venture.

2. How do you see long-term optimisation of the PA (e.g. leverage of bigger vehicle fleet, more users, re-distribution of drivers, engagement of licensed drivers, capacity of vehicles, stability of financing, reinventing of passenger services with other options, development of SW support…)?

   Answer: The key to long-term optimization is the efficient capacity utilization of the assets and employees that are part of the system and its data-driven operation. To this end, a more flexible allocation of the vehicle fleet and personnel, a continuous review of the timetable and route planning processes, and a demand-oriented service organization are justified. One of the bases for this is the traffic management system of Paks Transportation l.l.c. in Paks, which we recommend supplementing with the VISUM model. In the case of the latter, until a common model is applied with other transport service providers or with the traffic counting data prepared by the operators of public roads, the program can be effectively applied by involving external experts as needed. Improving the utilization indicators and expanding the user base can significantly contribute to reducing specific costs.

   However, we must recognize that in the case of Paks, the current fleet of assets and driver pool represent a limitation in the feasibility of potential development ideas, which only allow for significant infrastructure development and the involvement of additional labour.

   Therefore, we can say that the development of digital and IT support, real-time data collection and traffic management, will play an important role. However, it is also necessary to stabilize the financing background and regularly evaluate the service model so that the system can adapt to changing travel needs. Optimization should therefore be understood as a continuous development process that requires technological, organizational and financial measures.

3. What is needed in terms of formal procedures for easier expansion of the solution (speeding the process) and upkeeping it (e.g. who finances, decides on additional schedule departures or line layout modification – what are limitations)?

   Answer: In order to ensure effective expansion, it is justified to establish clear institutional and decision-making frameworks for developments and to coordinate them with financing responsibilities, customer and operator roles, and the approval procedure for timetable and network modifications. This also means that in order to use the model together, not only Paks Transportation l.l.c. should cooperate with transport service providers, but also all affected settlements should reach an agreement in order to ensure coordinated operation. It is advisable to apply simplified, accelerated licensing and consultation processes for smaller-scale service modifications, as this is the only way to put the flexibility provided by the model into practice.

   Sustainable operation also requires the conclusion of multi-year financing agreements, the institutionalization of data sharing and monitoring, and the development of more flexible public procurement and contractual frameworks. At the same time, legal, regulatory and budgetary constraints that may slow down the introduction must be taken into account. In order to address these, it is advisable to involve relevant actors and coordinate processes in advance in the early planning phase.

4. How do you see possibilities given by the national (regional) legislation to introduce pilot actions into existing operations of the PT (e.g. 6 months change of the granted PSO on PT) – what are the needed actions to make pilot actions easier to implement and measure their success?

   Answer: The current legal environment basically provides an opportunity to introduce experimental measures, however, in many cases, applicability encounters administrative and procedural limitations. Public service contracts, licensing obligations and financing rules typically fix the operating framework for a longer period, which can reduce the possibility of quick and flexible interventions. This is especially true in the case of intercity public transport operating with national coverage. In the case of enterprises providing scheduled local transport, the flexibility of the customer side can be motivated to make faster decisions by providing the relevant local government – as the customer – with appropriate information and by the possibility of rationalizing the extent of the financing obligation arising from public service contracts. If the customer is also the owner, this process can be significantly accelerated, as is the case in Paks. Moreover, the express goal of the owner of Paksi Transportation l.l.c. is to give priority to public transport, so a modification procedure can be carried out in as little as one month, from the raising of the issue to its planning and implementation. Of course, if the necessary developments also require investment, the process will slow down in the case of a publicly owned enterprise, due to the time required to conduct the necessary public procurement.

   However, overall, it can be said that in order to ensure more efficient implementation, it would be justified to provide simplified, periodic (pilot-type) modification options for schedules, routes and service parameters, as well as to apply accelerated licensing procedures related to pilot projects. In addition, it is necessary to develop a unified monitoring and evaluation framework that makes the effectiveness of the measures measurable along objective indicators and provides a basis for further decisions.

5. Do we need a standardized methodology for identifying resident's (passengers') needs that would differently address big agglomerations and smaller settlements, regular services and DRT… – how do you identify the needs today?

   Answer: In our opinion, it is justified to develop a uniform, yet flexible methodology for exploring travel needs, which takes into account the different settlement structure and traffic characteristics. In metropolitan and agglomeration areas, an approach based primarily on large-scale data collection, traffic counting and modelling may be appropriate. In Paks, demand identification is typically done using a combination of several sources, for example, passenger traffic data, ticket sales statistics, population feedback, questionnaires and local experiences. At the same time, the standardization and regular application of these methods could contribute to more well-founded planning and more comparable decision support.

   These input data formed the basis of the planning process during the pilot action. All transport service providers are advised to collect as much data as possible and to update it continuously, as this will greatly assist the subsequent planning process.

6. What is the drive (incentive) for selection of alternative fuel vehicles in the operator's vehicle fleet?

   Answer: The use of vehicles powered by alternative fuels is encouraged by several factors. On the one hand, environmental protection – this is particularly emphasized in Paks – and climate protection objectives, as well as increasingly strict EU emission standards, necessitate the introduction of more sustainable technologies. On the other hand, in the long term, lower operating and energy consumption costs, as well as possible support and tender sources, can improve the return on investments.

   Another important motivation is the increase in operational reliability, the reduction of noise pollution and the improvement of the social perception of the service as the technology develops and spreads. At the same time, high initial investment costs and infrastructure development needs can pose a challenge, therefore the technology change can primarily be implemented effectively with appropriate financial incentives and a predictable regulatory environment. What is the driving force (incentive) for selecting alternative fuel vehicles in the operator's vehicle fleet?

Under the current circumstances, however, the planning methodology applied in the Paks pilot project also brings significant efficiency gains, and in the short and medium term, the company does not plan to purchase alternative fuel vehicles in addition to the existing electric fleet.

7. Do you provide support for transport operations on the basis of a commercial or custom-designed SW. Would you be ready to use an openly adaptable EU solution (e.g. for DRT service) to assure standardisation and easier cross-border integration of services?

   Answer: In Paks, the support of transport operations is currently typically based on a combination of commercial and partly custom-developed IT systems, which ensure timetable planning, traffic management, revenue accounting, traffic and sales data collection and reporting. The advantage of these systems is their adaptability and adaptability to local needs, but they can also pose integration and interoperability challenges in the longer term, especially in the case of cooperation with other service providers or regions (e.g. tariff community). However, the introduction can only be successful if compatibility with existing systems, data security, and appropriate professional and operational support are ensured. Accordingly, a gradual, pilot-type transition is recommended, which will allow for the evaluation of experiences and the consideration of local specificities.

APPENDIX D: OSIJEK pilot action

Thematic field: Public Transport (PT) Network Optimization - involves adjusting the routes and schedules of the existing PT system.

Pilot action in Osijek (Croatia): introduction of a new bus line between Višnjevac and Đakovština, connecting densely populated area with a big industrial zone; currently, no PT line available

D.1. Site-visit

Name of the PP: Urban passenger transport Ltd. Osijek

Date: 09.10.2025

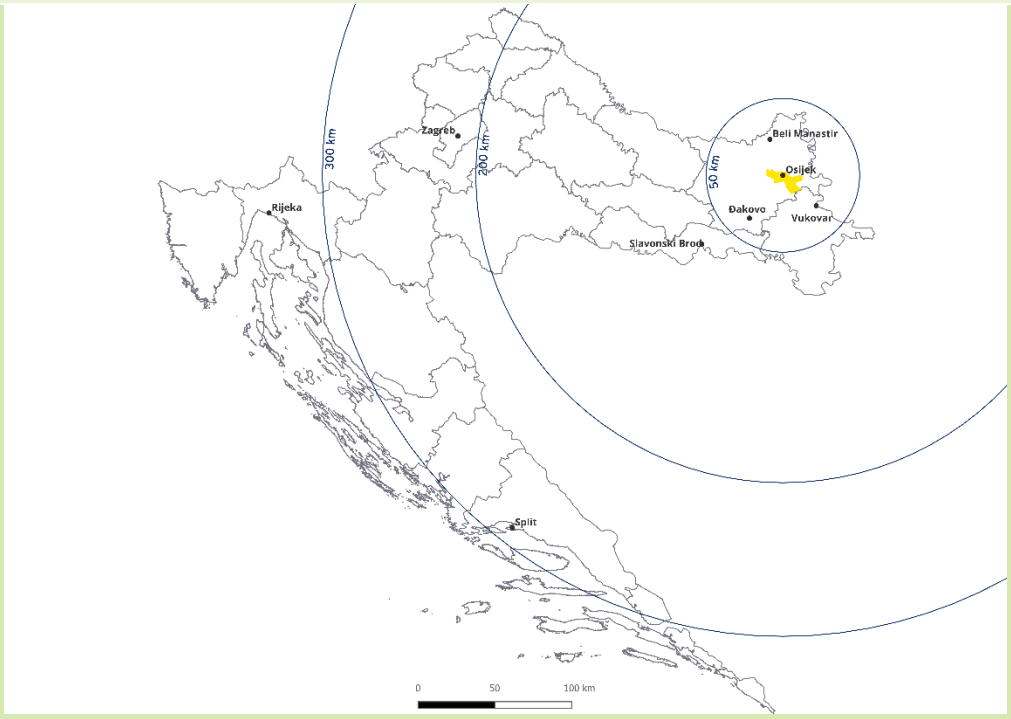
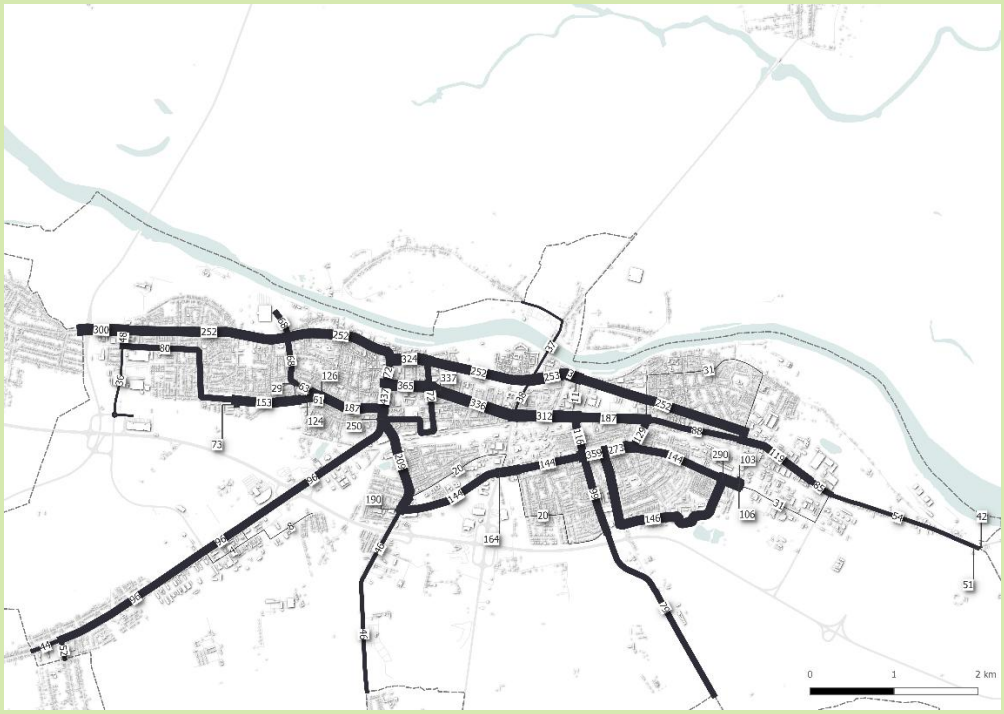
Venue: GPP Osijek Headquarters

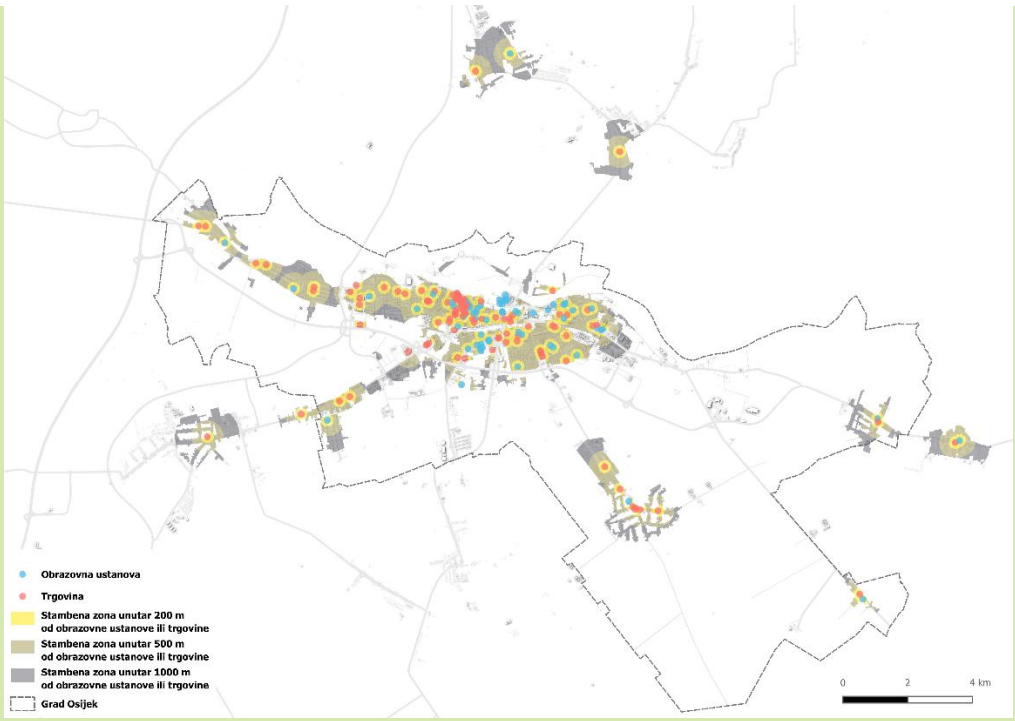
D.1.1. Number and types of participants

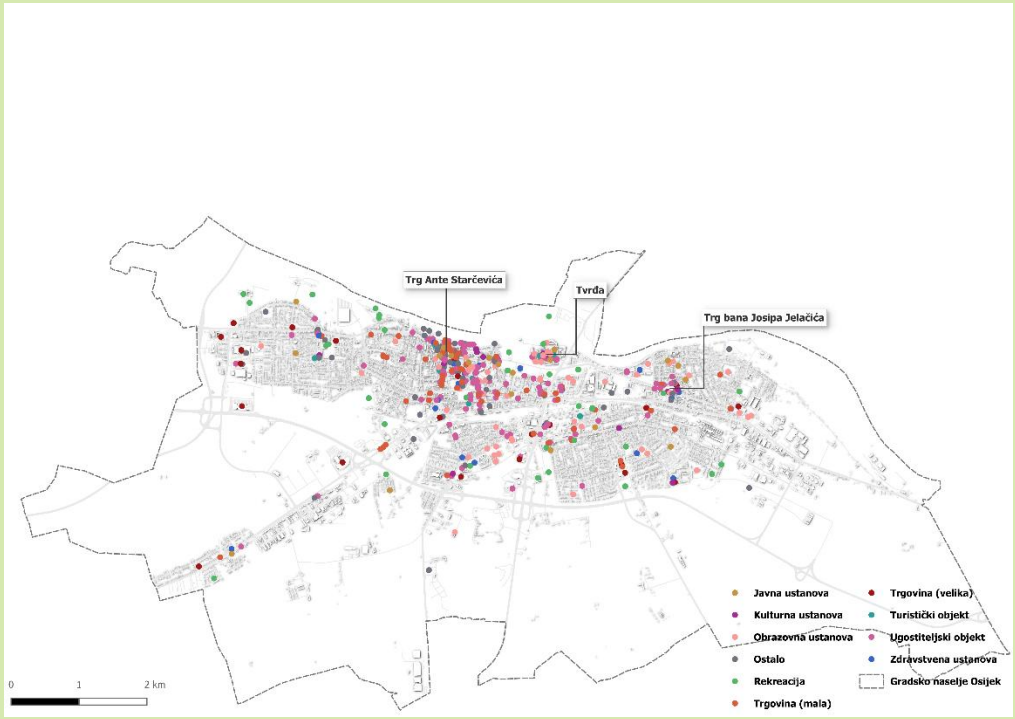
There was total of 6 participants on the site visit. More information is available upon request.

D.1.2. Situation & challenges of PT in Osijek PA area

The PA area

Item	Description
Location	City of Osijek
Map (general + detailed)	 





Area characteristics

Osijek is characterized by predominantly lowland terrain and is located on the very right bank of the Drava River. The population in Osijek has exhibited a decline, with recorded figures of 129,792 in 1991, 114,616 in 2001, 108,048 in 2011, and 96,313 in 2021.

Osijek is divided into several key urban areas, each with distinct characteristics:

Gornji Grad (Upper Town): The historic core, featuring Baroque architecture, the

Parish Church of St. Peter and Paul, and Tvrđa, an 18th-century fortified complex with museums, galleries, and vibrant nightlife. It's a cultural and tourist hub.

Donji Grad (Lower Town): A residential and commercial area with modern amenities, schools, and shopping centres. It's more suburban, with green spaces like King Tomislav Park.

Novi Grad (New Town): A newer residential zone with apartment blocks, sports facilities, and the large Portanova shopping mall. It's popular among families and younger residents.

Retfala: A quieter, primarily residential area west of the city centre, known for its mix of older homes and newer developments, with parks and local markets.

Jug II: A densely populated residential area in the south, featuring high-rise apartment buildings and proximity to industrial zones, with good public transport links.

Tvrđa: Often considered part of Gornji Grad but distinct for its historical significance as a fortified old town. It's a UNESCO candidate, with cobblestone streets, the Museum of Slavonia, and lively bars.

Sjenjak: A central residential neighbourhood with a mix of mid-20th-century housing and green areas, close to the Drava River and city amenities.

Industrijska Četvrt (Industrial Quarter): Located near the city's eastern edge, this area hosts industrial facilities, warehouses, and some worker housing, less focused on residential life.

These areas reflect Osijek's blend of historical, residential, and modern urban zones, cantered around the Drava River.

Today, the city of Osijek has approximately 30 km of tram tracks on which two lines operate. On the other hand, buses operate on 8 lines with various sub-variants. There are plans for the construction of a new depot, following the initiation of a project to modernize 9.5 km of tram tracks.

Although it is not located directly on any of the TEN-T corridors, Osijek is situated very close to the important Danube port - the Port of Vukovar. The Port of Vukovar is positioned on the Rhine-Danube corridor as well as on the Western Balkans - Eastern Mediterranean route.

PT services

Public transport operational indicators	
Short history of the public transport in Osijek	First form of public transport in Osijek started in 1884 when a horse-drawn tramway began to operate. Other milestones include: • 1926: electric tram began to operate • 2008: introduced new electronic toll collection system 'Butra' • 2009: tram line put into operation on the route from Mačkamama to Bikara • 2014: tram line on Line 1 was extended to the centre of Višnjevac • 2016: start of Project of tram infrastructure modernization • 2019: procurement of 12 new low-floor buses • 2022: procurement of 13 new low-floor buses • 2023: signed contract for procurement of 10 new low-floor trams • 2024: planned to introduce new line connecting Osijek and Bilje and Darda
Main modes of public transport in Osijek	Main modes of public transport in the City of Osijek are tram and buses. There are eight bus lines and two tram lines that connect city and its outskirts.
What is the numbers of vehicles by fuel type?	All 35 buses are diesel buses and: • 10 buses meet the Euro 4 standards • 12 buses meet the Euro 5 standards • 13 buses meet the Euro 6 standards.

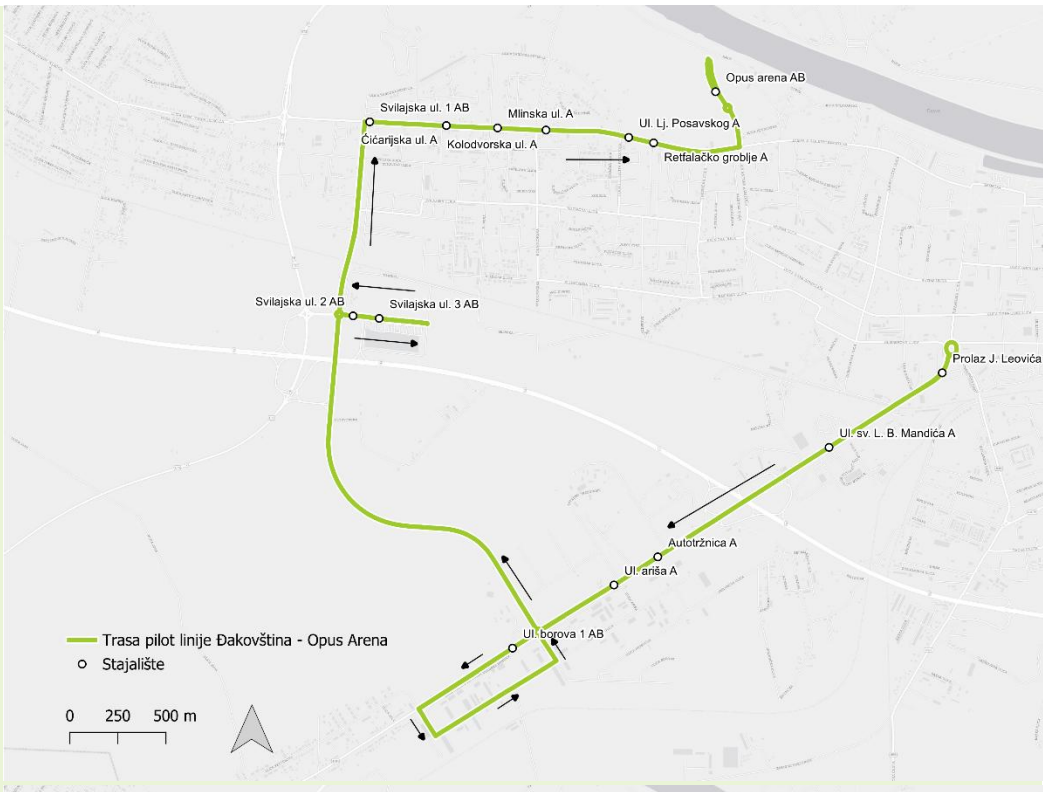
PT challenges

Item	Description
Key public transport issue(s) addressed and main causes	1. **Complicated Network Structure** ○ **Description:** The public transport network is complex, with many lines featuring multiple route or schedule variations throughout the day, making it challenging for passengers to navigate. 2. **Inadequate Information System** ○ **Description:** The information system lacks real-time schedules and transfer details, leaving passengers without easy access to accurate, up-to-date transit information. 3. **Low Population-to-Bus/Tram Kilometres Ratio** ○ **Description:** The study area has the lowest ratio of population to daily bus and tram kilometres, indicating underutilized or inefficiently allocated public transport resources. 4. **Low Public Transport Capacity Utilization** ○ **Description:** The daily static public transport capacity utilization is only 2,5, suggesting that buses and trams are significantly underused, with low passenger numbers relative to available capacity. 5. **Low Average Public Transport Trips per Inhabitant**

	○ **Description**: The average number of public transport trips per inhabitant is only 0,18, indicating very low usage of the system by the population, possibly due to inconvenience or lack of accessibility. 6. **High Operational Cost per Bus/Tram Kilometre** ○ **Description**: The operational cost, excluding amortization, is 2,56 EUR per bus/tram kilometre, with an average cost of 1,36 EUR per passenger, indicating high expenses relative to the low passenger utilization.
Future outlook	The "Local plan for the City of Osijek" aims to overhaul the public transport system by introducing a simplified, user-friendly network. Key expectations include: • **Simplified Network**: The plan will streamline the complex network of bus lines, thereby reducing route variations and making the system easier to navigate for passengers. • **Improved Transfers**: The new network will facilitate easier transfers between lines, enhancing connectivity and convenience. • **Increased Efficiency**: The redesigned network is expected to optimize resource allocation, improving the population-to-bus/tram kilometres ratio and overall system efficiency. • **Adaptation Period**: Current users may need time to adjust to the new system, as changes to routes and schedules could initially cause confusion.

D.1.3. Operated PA solution

Item	Description
Pilot Solution	Pilot solution will be introduction of new bus line between Opus Arena and Đakovština. Currently, there is no such line, and this pilot line will connect densely populated area (Retfala) with big industrial zone Jablan.



Opus Arena	Đakovština
5:30	6:00
6:30	7:00
7:30	8:00
8:30	9:00
9:30	10:00

	10:30	11:00
	11:30	12:00
	12:30	13:00
	13:30	14:00
	14:30	15:00
	15:30	16:00
	16:30	17:00
	17:30	18:00
	18:30	
Pilot Action goals	Goal of the pilot action is to enhance public transport network and improve and provide public transport connectivity between densely populated area and industrial zone. Currently, connections between these two parts of the city are complicated and include transfers to and from different lines. Pilot action will also help determine correlation between modelled and real benefits.	
Expected outcomes/effects of Pilot Action.	This pilot solution was chosen as it provides smooth connection for densely populated area and industrial zone. It is expected that pilot line will be attractive to passengers with its 1-hour frequency. It also connects shopping malls on the route so it will be interesting to analyse how many trips will be made for non-obligatory trips. It will also give answer on how users will react to introduction of new line before applying big changes to the whole network. It will also help identify correlation between modelled data and real demand.	

D.1.4. Site visit implementation

To ensure a comprehensive and effective presentation of the pilot solution during the site visit, several preparatory activities were carried out:

1. **Analysis of Publicly Available Information**: We conducted a detailed review of all publicly accessible sources related to the pilot action. This included:
    - Official project web pages and announcements
    - Social media posts and discussions
    - Online articles and press releases
    - Comments and feedback from residents on social media platforms

    This analysis provided valuable insights into public perception, user experience, and any operational challenges reported by the community.
2. **Planning and Coordination:** A structured schedule was developed to optimize the site visit. This included:
    - Arranging meetings with key stakeholders involved in the pilot
    - Coordinating the timing of the visit to align with peak operational hours
    - Planning a ride on the pilot bus line to experience the service firsthand and assess its performance in real conditions

These preparatory steps ensured that the visit would allow for a full demonstration of the pilot solution's functionality and user experience.

Visit to the site

The site visit was organized to provide a comprehensive understanding of the pilot solution's implementation and operational performance. The activities included:

1. **Presentation of the Local Plan:** The visit began with an in-depth presentation of the Local Plan for the City of Osijek. This session outlined the strategic objectives, expected impacts, and integration of the pilot line within the broader urban mobility framework.
2. **Discussion on the Pilot Line:** A detailed discussion followed, focusing on the pilot bus line's design, objectives, and operational experience to date. Key topics included route selection, service frequency, and user feedback.
3. **Collection of Feedback from Drivers and Operational Assessment:** Direct feedback was gathered from bus drivers to understand their perspective on the pilot's functionality and challenges. Additionally, operational factors were reviewed, including:
    - Verification of turnover times
    - Assessment of whether the line was planned and scheduled effectively
4. **On-Site Ride on the Pilot Bus Line:** The visit concluded with a ride on the pilot bus line, allowing participants to experience the service firsthand and observe real-time operational conditions.

Figure 25: Pilot line in operation (left) and passenger information on stop (right)

D.1.5. Insights of PA implementation & feedback (visitors/users)

During the site visit and subsequent discussions, several key observations were made regarding the implementation and performance of the pilot bus line:

1. **Ridership Levels:** Current ridership is relatively low. This indicates that the service has not yet reached its full potential in terms of user uptake.
2. **Missing Key Stops:** Feedback from stakeholders and users highlighted the absence of at least two critical stops:
    - Near the new shopping mall
    - Near Gospodarski centar Osijek

These omissions significantly reduce the attractiveness and utility of the line for potential passengers.

3. **Passenger Confusion:** Some passengers boarded the bus by mistake, assuming the line served a different route due to the sign "Đakovština." This suggests a need for clearer route information and signage.
4. **Demand and Route Alignment:** Although the line was requested by the Retfala district, current demand appears insufficient. One contributing factor is that part of the route passes through areas with no residential population (open fields), reducing its potential user base.
5. **Impact of Infrastructure Modernization:** The ongoing tram network modernization project has created additional challenges:
    - Tram services are partially suspended, requiring passengers to transfer to buses.
    - Diversions and temporary arrangements have increased the complexity of travel, possibly overwhelming passengers with too much information.
    - The prolonged duration of these works may be discouraging regular use of public transport, including the pilot line.
6. **Operational Feedback:** Drivers confirmed that operational aspects such as turnover times were generally respected, but they also emphasized the importance of adding the missing stops and improving passenger information to enhance usability.

D.2. Pilot action performance - KPIs

D.2.1. Plan of performance monitoring and evaluation

D.2.1.1. Identification of key performance indicators (KPIs)

Table 55: Pilot action KPIs

KPI	Brief description	Unit	Target
KPI_1	Weekly ridership on the observed line	passenger/week	750 passengers/week
KPI_2	Amount of CO_2 per passenger [t]	Tonne/week	Unknown, will be defined in comparison
KPI_3	Number of km travelled per week	km/week	>2.900 km/week
KPI_4	Daily ridership on the observed line per each bus station	passenger /station/day	>0
KPI_5	Average vehicle occupancy per day	% of daily capacity	> 30 %
KPI_6	Operational cost per passenger	EUR/passenger	<1,36 EUR/passenger

D.2.1.2. Identification of data sources & tool for KPIs

Table 56: Identification of data sources & tools for KPIs data

KPI	Data list	Methodology	Data source	Data tool
KPI_1	- Number of passengers registered	Weekly trend: [Number of registered passengers]	PTO (GPP)	Excel
KPI_2	- Length of run - Type of vehicle on each run - Number of validations per each run	Weekly trend: [number of kms by BUS]*0,00025 tonnes/km/[number of passengers]	PTO (GPP)	Excel
KPI_3	Number of km travelled on line	Weekly trend: [km travelled x number of departures]	PTO (GPP)	Excel
KPI_4	Number of passengers registered per station	Daily trend: [Number of registered passengers per station per day]	PTO (GPP)	Excel
KPI_5	Number of passengers per day	Daily trend: [Number of passengers per day/ Daily passenger capacity]	PTO (GPP)	Excel
KPI_6	Weekly operational cost (fuel, drivers, cleaning, etc) Number of passengers	Weekly trend: [operational costs]/[number of passengers])	PTO (GPP)	Excel

D.2.2. Analysis of Key Performance Indicators

D.2.2.1. KPI_1: Weekly ridership on the observed line

Table 57: Weekly monitoring of the KPI_1 values

KPI_1: Weekly ridership on the observed line			
Baseline KPI value [number of passengers]: 6,500,000			
Target KPI value [number of passengers]: 150			
Week	Monitoring KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]
W1	127	-23	-15
W2	97	-53	-35
W3	86	-64	-43
W4	72	-78	-52
W5	195	45	30
W6	372	222	148
W7	377	227	151
W8	334	184	123
W9	323	173	115
W10	360	210	140
W11	322	172	115
W12	179	29	19
W13	300	150	100
Average	241	91.85	61.23
Standard deviation	118		75.66

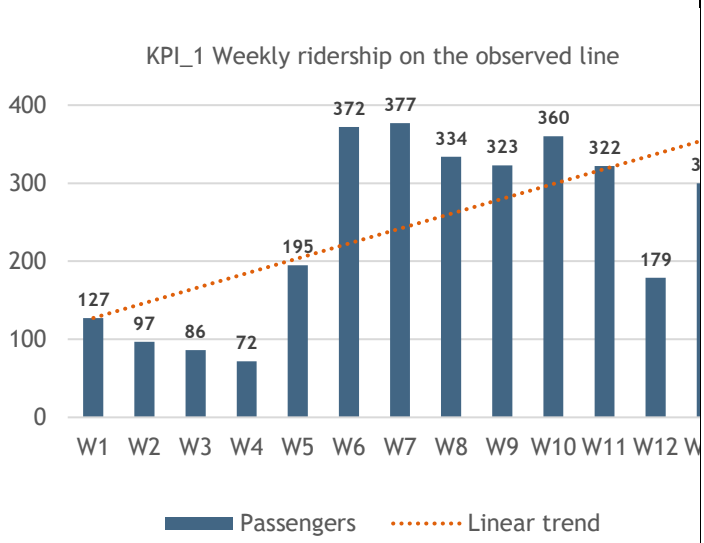


Table 58: Evaluation of the KPI_1 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	The graph shows that the weekly KPI values increased gradually from the initial lower values (< 100 in week 2-4) to the more than 300 passengers in weeks 6 - 11. The linear trend line has a positive slope, indicating a long-term increasing trend in the use of the weekly ridership.
2.	Does the trend of KPI develop in a positive, negative or	☒ Positive trend ☐ Negative trend	The average KPI value (241) significantly exceeds the target value (150), and the trend is clearly

No.	Evaluation question	KPI Results	Explanation
	neutral direction in relation to the set target?	☐ Neutral trend	moving upward beyond the target. In recent weeks, the values have remained well above the target, indicating a strong positive performance and successful overachievement of the goal.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☐ Improvement of previous state ☒ Insignificant change ☐ Worsening of previous state	When observing the pilot line in relation to the baseline, the results indicate that the pilot activity had only a minimal impact on the overall system. All KPIs show limited value compared to the baseline, which can be attributed to the relatively small share of the pilot line within the entire network. Consequently, the influence of the pilot implementation on the baseline values was not significant, suggesting that the system-level performance remained largely unchanged.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☐ Good selection ☒ Unsuitable selection	The target value of 150 is not selected appropriately, as the variability of the KPI around the target is very high (STD ≈ 79%), indicating significant fluctuations in performance. This large variability shows that the target is unrealistic and does not reflect the actual capability of the system.
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The average value (241) is significantly higher than the target value (118), indicating that the pilot activity did not reduce the number of passengers. On the contrary, passenger numbers were substantially above the target level, and therefore the KPI indicates a very positive outcome of the pilot activity.

D.2.2.2. KPI_2: Amount of CO_2 per passenger

Table 59: Weekly monitoring of the KPI_2 values

KPI_2: Amount of CO_2 per passenger				
Baseline KPI value [unit]: N/A				
Target KPI value [unit]: N/A				
Week	Monitoring KPI values [tonne]	Deviation from target value [unit]	Relative deviation from target value [%]	
W1	0.010	/	/	
W2	0.013	/	/	
W3	0.014	/	/	
W4	0.017	/	/	
W5	0.006	/	/	
W6	0.003	/	/	
W7	0.003	/	/	
W8	0.004	/	/	
W9	0.004	/	/	
W10	0.003	/	/	
W11	0.004	/	/	
W12	0.007	/	/	
W13	0.004	/	/	
Average	0.007	/	/	
Standard deviation	0.005			

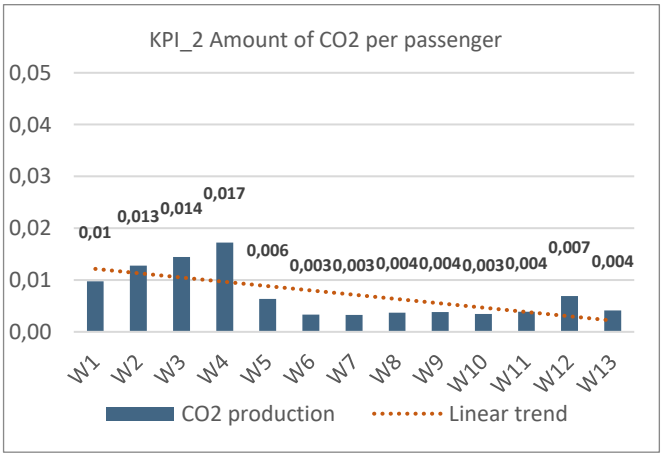


Table 60: Evaluation of the KPI_2 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☐ Increasing trend ☒ Decreasing trend ☒ Stable trend	The graph shows that the CO_2 emissions per passenger increased during the first four weeks, reaching a peak value of approximately 0.017 tons per passenger. From week 5 onward, the values started to decline over the following two weeks, dropping to around 0.003 tons of CO_2 per passenger. After this decrease, the trend stabilized and remained relatively constant until the end of the observed period. The linear trend line indicates an overall decreasing trend in CO_2 emissions per passenger over time.
2.	Does the trend of KPI develop in a positive, negative or	☐ Positive trend	Although a specific quantitative target was not formally defined,

No.	Evaluation question	KPI Results	Explanation
	neutral direction in relation to the set target?	☐ Negative trend ☐ Neutral trend	the development of the KPI can be considered positive. The observed trend aligns with the expected behaviour, as CO_2 emissions per passenger decrease over time as the weeks progress. This indicates an improvement in efficiency and suggests that the system performance evolved in the desired direction, despite the lack of an explicit target value.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☐ Improvement of previous state ☒ Insignificant change ☐ Worsening of previous state	This limited impact can be explained by the relatively small share of the pilot line within the overall transport system. In terms of total vehicle kilometres travelled, fuel consumption, and the number of passengers using the pilot line compared to the entire network, the pilot activity represents only a minor portion of system-wide operations. As a result, its influence on the baseline indicators remains marginal and does not lead to a measurable system-level change.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☒ Good selection ☐ Unsuitable selection	A specific target value for this KPI was not defined in advance. Nevertheless, based on the observed results, the average value of the KPI is 0.007, with a standard deviation of 0.005. This corresponds to a relative variability of less than 40%, which allows the result to be assessed as "Good" according to the defined criteria. Despite the absence of a predefined target, the KPI shows a reasonably stable behaviour over the observed period, supporting the validity of the monitored performance.
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value?	☒ Successful ☐ Unsuccessful	As neither a baseline nor a specific target value was defined for this KPI, the success of the pilot action

No.	Evaluation question	KPI Results	Explanation
	Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.		cannot be assessed through direct quantitative comparison. However, considering the limited scope of the pilot line and its relatively small contribution to the overall transport system, the pilot action did not have a significant impact at the system level. Its influence on the overall system performance remains marginal. Consequently, the pilot action cannot be classified as clearly successful or unsuccessful, as its effect is largely neutral due to its limited scale.

D.2.2.3. KPI_3: Number of km travelled per week

Table 61: Weekly monitoring of the KPI_3 values

KPI_3: Number of km travelled per week			
Baseline KPI value [unit]: N/A			
Target KPI value [unit]: N/A			
Week	Monitoring KPI values [km]	Deviation from target value [km]	Relative deviation from target value [%]
W1	1,429.00	/	/
W2	1,429.00	/	/
W3	1,429.00	/	/
W4	1,429.00	/	/
W5	1,429.00	/	/
W6	1,429.00	/	/
W7	1,429.00	/	/
W8	1,429.00	/	/
W9	1,429.00	/	/
W10	1,429.00	/	/
W11	1,429.00	/	/
W12	1,143.20	/	/
W13	1,429.00	/	/
Average	1,407.02	/	/
Standard deviation	79.27		/

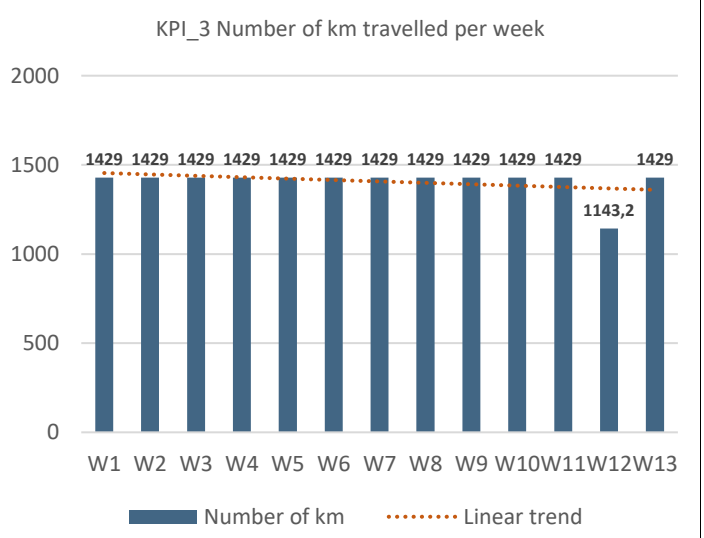


Table 62: Evaluation of the KPI_3 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action	☐ Increasing trend ☐ Decreasing trend	The data show a highly stable pattern, with identical KPI values recorded from week 1 to week 11 and again in week 13. A temporary

No.	Evaluation question	KPI Results	Explanation
	based on the weekly trend of KPI?	☒ Stable trend	deviation is observed in week 12; however, this appears as an isolated fluctuation rather than a sustained change. Based on this consistency, long-term expectations suggest that the KPI will remain stable over time, with no significant increasing or decreasing trend attributable to the pilot action.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☐ Positive trend ☐ Negative trend ☒ Neutral trend	Although a specific target value was not defined for this KPI, the observed trend can be assessed as neutral. A stable trend was expected, as the line operates every working day on the same route with a fixed number of departures and only minimal adjustments in exceptional circumstances. The weekly KPI values largely confirm this expectation, showing no systematic increase or decrease over time. This indicates that the KPI developed in line with operational assumptions rather than in a positive or negative direction relative to a target.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☐ Improvement of previous state ☒ Insignificant change ☐ Worsening of previous state	The impact of the pilot activity (PA) on the baseline state is likely insignificant, because although we don't have a baseline for this KPI, the total vehicle-kilometres travelled per day across the entire system is much larger than that of the pilot lines. Relative to the size of the network, this pilot line does not have a significant effect on the whole system.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%),	☒ Very good selection ☐ Good selection ☐ Unsuitable selection	Although the target value was not set prior to the analysis, the observed KPI data show an average of 1407.02 with a standard deviation of 79.27. The relative standard deviation is approximately

No.	Evaluation question	KPI Results	Explanation
	- Unsuitable (STD>40%)?		5.63%. Since this RSD is well below 20%, the variability of the KPI is low. This indicates that if a target value were to be set based on these observations, it would be very reliable and appropriate, falling into the "Very good" category according to the predefined criteria. This indicator does not directly reflect the assessment of the set target but rather represents the ratio of the mean to the standard deviation.
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	There is no predefined baseline or target value for this KPI. However, a stable trend was expected because the pilot line operates weekly on the same route with a consistent number of departures. Given that the pilot line represents only a small portion of the overall system, its impact on the total network is minimal. Therefore, even though we cannot directly classify the action as successful or unsuccessful relative to a target, the KPI behaviour is consistent with expectations and does not indicate any significant deviation.

D.2.2.4. KPI_4: Daily ridership on the observed line per each bus station

Table 63: Weekly monitoring of the KPI_4 values

KPI_4: Daily ridership on the observed line per each bus station				
Baseline KPI value [unit]: N/A				
Target KPI value [unit]: > 0				
Station	Monitoring KPI values [Avg. number]	Deviation from target value [Avg. number]	Relative deviation from target value [%]	
PROLAZ J. LEOVIĆA	4	4	300	
UL. SV. L. B. MANDIĆA ZAPAD	1	1	0	

AUTOTRŽNICA ZAPAD	1	1	0
ULICA ARIŠA ZAPAD	4	4	300
UL. BOROVA 1 ZAPAD	1	1	0
ĆIĆARIJSKA ULICA JUG	6	6	500
KOLODVORSKA UL. JUG	5	5	400
MLINSKA UL. JUG	4	4	300
UL. LJ. POSAVSKOG JUG	9	9	800
RETFALAČKO GROBLJE JUG	1	1	0
OPUS ARENA	4	4	300
RETFALAČKO GROBLJE SJEVER	1	1	0
UL. Š. PETEFIJA SJEVER	2	2	100
KOLODVORSKA UL. SJEVER	1	1	0
MLINSKA UL. SJEVER	1	1	0
PAMPAS SJEVER	1	1	0
SVILAJSKA UL. 1/ RETFALA SVILAJSKA UL.	3	3	200
SVILAJSKA UL. 2/JUG	3	3	200
SVILAJSKA UL. 3/SJEVER	1	1	0
UL. BOROVA ISTOK	0	0	-100
UL. ARIŠA ISTOK	0	0	-100
AUTOTRŽNICA ISTOK	1	1	0
UL. SV. L. B. MANDIĆA ISTOK	1	1	0
Average	2	2,4	139,13
Standard deviation	2,2		213

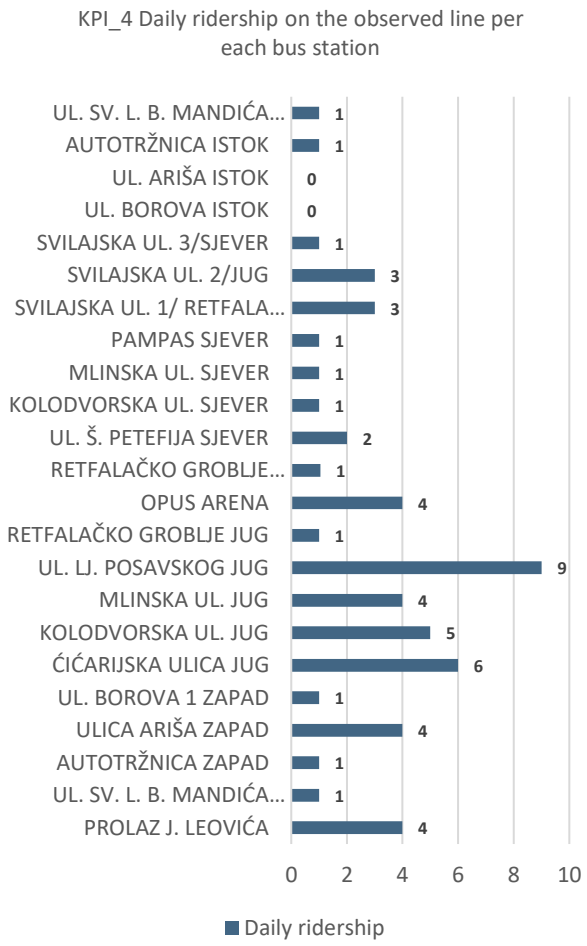


Table 64: Evaluation of the KPI_4 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	The current data represents the average number of passengers per stop, rather than weekly trends. While these numbers reflect typical usage at each stop, observing the overall line trend (KPI 1) suggests a positive growth trajectory. This means that, although the table shows averages, we can anticipate a gradual increase in passenger numbers per stop over time.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☒ Positive trend ☐ Negative trend ☐ Neutral trend	Given that the set target is > 0, and the current average number of passengers per stop is 2, the trend of the KPI is developing in a positive direction in relation to the target. Most stops are performing slightly above the expected benchmark, indicating growth and a favourable trend for the line. However, it is important to note that stops UL. BOROVA ISTOK and UL. ARIŠA ISTOK did not record any passengers, which could indicate underutilization at these specific stops.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☐ Improvement of previous state ☒ Insignificant change ☐ Worsening of previous state	Although a baseline has not been established, the average number of passengers per stop is very low compared to the overall system. This means that, despite minor differences at individual stops, the impact on the overall system would be minimal, and the change can be considered insignificant.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%),	☐ Very good selection ☐ Good selection ☒ Unsuitable selection	The target value of 1 is not selected appropriately, as the variability of the KPI around the target is very high (STD≈220%), indicating highly inconsistent performance. This large fluctuation shows that the target is unrealistic and does not

No.	Evaluation question	KPI Results	Explanation
	- Unsuitable (STD>40%)?		reflect the actual capability of the system.
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The pilot action can be considered successful in relation to the set target value. Although a baseline is not available, the average KPI per stop is 2, which is above the target (>0). While the overall number of passengers per stop is relatively low compared to the entire network—meaning the impact on the system is minimal—the KPI has moved in the desired positive direction, indicating that the pilot action is achieving its intended effect.

D.2.2.5. KPI_5: Average vehicle occupancy per day

Table 65: Weekly monitoring of the KPI_5 value

KPI_5: Average vehicle occupancy per day
Baseline KPI value [unit]: N/A
Target KPI value [unit]: 30 %

Week	Monitoring KPI values [%]	Deviation from target value [%]	Relative deviation from target value [%]
W1	3.2%	-26.8	-89.33
W2	2.5%	-27.5	-91.67
W3	2.2%	-27.8	-92.67
W4	1.8%	-28.2	-94.0
W5	5.0%	-25.0	-83.33
W6	9.5%	-20.5	-68.33
W7	9.6%	-20.4	-68.0
W8	8.5%	-21.5	-71.67
W9	8.3%	-21.7	-72.33
W10	9.2%	-20.8	-69.33
W11	8.2%	-21.8	-72.67
W12	4.6%	-25.4	-84.67
W13	7.7%	-22.3	-74.33
Average	6.2%	-23.8	−77.90
Standard deviation	3%		9.85

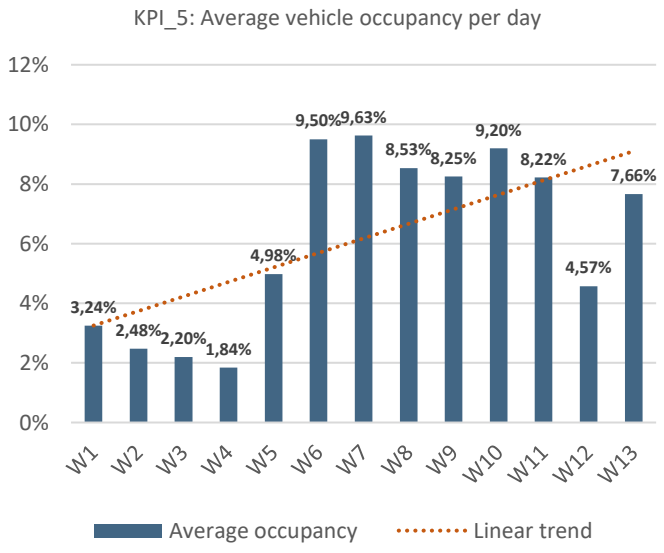


Table 66: Evaluation of the KPI_5 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	Based on the weekly KPI data, there is a clear upward trend from around 2–3% in the early weeks to over 8–9% in later weeks. This indicates that the pilot action is having a positive effect, and it can be expected that passenger usage will continue to grow steadily, suggesting a favourable long-term impact on the KPI.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☐ Positive trend ☒ Negative trend ☐ Neutral trend	The KPI data for weeks W1 to W13 shows values ranging from 1.84% to 9.63%, with a target of 30%. The KPI started very low in the first four weeks, then increased significantly around W5 to W7, followed by minor fluctuations in the following weeks. Despite this short-term improvement, the KPI remains consistently far below the target throughout the period. Therefore, while there is a slight positive trend mid-period, the overall performance relative to the 30% target is negative, indicating that the KPI is underperforming and additional actions are needed to approach the set goal.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☐ Improvement of previous state ☒ Insignificant change ☐ Worsening of previous state	Since we do not have the baseline value, we cannot definitively classify the impact as improved, insignificant, or worse according to the defined thresholds. However, it is important to note that this KPI represents only a small portion of the overall system, covering a limited number of passengers and departures, so its impact on the total system performance is likely minimal.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☒ Very good selection ☐ Good selection ☐ Unsuitable selection	The target value is very good in terms of stability because the standard deviation (STD = 3%) is only 10% of the target (30%), which is well below 20%. This indicates that the KPI values are consistent and not widely dispersed. However, despite this low variability, the average KPI (6.18%) is far below the target, showing that the target is unrealistically high relative to current system performance. Therefore, while the

No.	Evaluation question	KPI Results	Explanation
			target is stable (very good STD), it is unsuitable in terms of actual achievability.
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The pilot action can be considered successful in relation to the set target value. Although a baseline is not available, the average KPI per stop is 2, which is above the target (> 0). While the overall number of passengers per stop is relatively low compared to the entire network—meaning the impact on the system is minimal—the KPI has moved in the desired positive direction, indicating that the pilot action is achieving its intended effect.

D.2.2.6. KPI_6: Operational cost per passenger

Table 67: Weekly monitoring of the KPI_6 value

KPI_6: Operational cost per passenger			
Baseline KPI value [unit]: N/A			
Target KPI value [unit]: 1.36 EUR			
Week	Monitoring KPI values [EUR]	Deviation from target value [%]	Relative deviation from target value [%]
W1	22.26	-20.90	1538.24
W2	29.15	-27.79	2044.85
W3	32.88	-31.52	2317.65
W4	39.27	-37.91	2787.50
W5	14.50	-13.14	966.18
W6	7.60	-6.24	458.82
W7	7.50	-6.14	451.47
W8	8.46	-7.10	522.06
W9	8.75	-7.39	543.38
W10	7.85	-6.49	477.21
W11	8.78	-7.42	545.59
W12	15.79	-14.43	1060.29
W13	9.42	-8.06	592.65
Average	16.32	−14.96	1100.45
Standard deviation	11	10.57	743.36

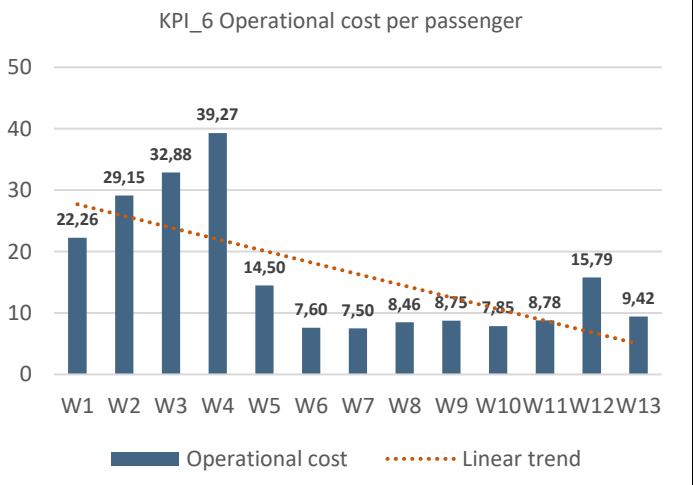


Table 68: Evaluation of the KPI_6 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☐ Increasing trend ☒ Decreasing trend ☐ Stable trend	Based on the weekly KPI data, there is a clear downward trend from higher values in the early weeks (around 22–39) to lower values in later weeks (around 7–10). This indicates that the pilot action is successfully reducing costs over time, and it can be expected that expenses will continue to stabilize at a lower level, suggesting a favourable long-term impact on the KPI.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☐ Positive trend ☒ Negative trend ☐ Neutral trend	Given that the target is 1,36 and the KPI values start high (22–39) and gradually decrease to around 7–10, the trend is moving in a positive direction because lower KPI values are better. However, the KPI is still far above the target, so while the trend is favourable, it is not yet close to achieving the set target.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☐ Improvement of previous state ☒ Insignificant change ☐ Worsening of previous state	Based on your description, even though the pilot action (PA) reduces costs compared to its own initial weeks, its impact on the overall system baseline is relatively small, since these costs represent only a minor portion of total operational expenses. However, the KPI values are still much higher than expected, meaning that while there is some positive effect, it is insignificant relative to the baseline. So according to your categories, the impact would fall under “Insignificant change”.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☐ Good selection ☒ Unsuitable selection	Since the standard deviation (STD) is 11, which is much larger than the target value of 1,36, this indicates that the target is far from the actual KPI variability. According to your criteria, with STD > 40%, the target value was unsuitable.
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value?	☐ Successful ☒ Unsuccessful	The pilot action can be considered successful in relation to the set target value.

No.	Evaluation question	KPI Results	Explanation
	Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.		Although a baseline is not available, the average KPI per stop is 2, which is above the target (>0). While the overall number of passengers per stop is relatively low compared to the entire network—meaning the impact on the system is minimal—the KPI has moved in the desired positive direction, indicating that the pilot action is achieving its intended effect. Since the average KPI is still far above the target value of 1,36, the pilot action has not moved the KPI close enough to the target and is therefore considered unsuccessful in relation to the set target. However, in the context of the entire system, this line represents a cost that is noticeable but not significant relative to total operational expenses.

D.2.3. Evaluation of PA performance

Table 69: Aggregative statistics of KPI monitoring evaluation

No	Evaluation question	KPI monitoring results							Total
		Metrics	KPI_1	KPI_2	KPI_3	KPI_4	KPI_5	KPI_6	
1.	Trend of long-term expectation of the PA	Increasing	•			•	•		
		Decreasing		•				•	
		Stable			•				
2.	Trend of KPI in relation to set target	Positive	•		•	•			
		Negative					•	•	
		Neutral		•					
3.	Evaluation of the impact regarding the baseline situation	Improvement	•		•	•			
		Insignificant change		•			•	•	
		Worsening							
4.	Definition of target value	Very good			•		•		
		Good		•					
		Not good	•			•		•	
5.	Successfulness of PA in relation to the baseline and target value	Successful	•	•	•	•	•		
		Unsuccessful						•	

D.2.3.1. Summary of evaluation

D.2.3.1.1. Assessment of overall achievement of the Pilot Action (PA) considering all KPIs

Baseline values are indicative and reflect best-available historical data rather than strictly comparable measurement periods. Some KPIs were retained for experimental or learning purposes and are therefore interpreted with limited weight in the overall success assessment.

When all KPIs are assessed collectively, the overall implementation of the Pilot Action can be considered successful. After the initial introductory period, a gradual increase in the number of passengers using the pilot line was recorded, indicating growing user acceptance and relevance of the service. Although some indicators did not show direct or significant improvement, the pilot nonetheless achieved its primary goal of testing the service concept and demonstrating the existence of demand. The presence of regular passengers itself is an important signal of the potential value of the line within the wider public transport system.

D.2.3.1.2. Representation of the selected KPIs

The KPIs applied in the pilot generally reflect the performance of the implemented solution, although some of them have limitations due to the short observation period and the nature of the pilot. The most representative KPI is passenger usage, as it directly demonstrates the relevance and acceptance of the new service.
Indicators related to environmental impact, such as CO_2 reduction, could not be reliably quantified because it remains unknown how many passengers shifted from private cars to public transport. For potential future pilots, the KPI structure could be enhanced by adding indicators that capture user experience and satisfaction, while indicators with limited measurability in short-term pilots could be simplified or deprioritised.

D.2.3.1.3. Availability and sustainability of data sources

Data availability during the pilot was sufficient for basic monitoring, but long-term sustainability would benefit from improved and more consistent data collection tools. Automated or digital collection methods—such as mobile applications, on-board passenger counters, public web portals, or API-based data integration—would increase accuracy and reduce manual reporting needs.
For data processing, tools such as Excel or Access can be sufficient for smaller pilots, while more complex or repeated monitoring processes would benefit from custom-designed applications or integrated data platforms. Establishing a clear, standardised data-collection protocol would further support long-term consistency and comparability of KPI results.

D.2.3.1.4. List of essential KPIs

In the event of a continuation or replication of the pilot solution, KPI monitoring should be conducted regularly and over a longer period to capture realistic trends and service impacts. Key KPIs, particularly those related to ridership and operational performance, should ideally be monitored on a monthly basis. Additional or supporting KPIs—such as user satisfaction, accessibility indicators, or environmental effects—may be monitored quarterly or semi-annually, depending on the stability of data sources and the intensity of operational changes. Extended monitoring would enable better adjustment of the service to users' needs and provide a more reliable evidence base for decision-making.

Most important KPIs which should be regularly monitored are KPI_1 (Weekly ridership), KPI_4 (Daily ridership) and KPI_5 (Average vehicle occupancy per day). These KPIs should be regularly monitored as they will most precisely help to determine demand and effectiveness of such lines. It is also important to

distinguish between periods with high and low demand (i.e. school summer break) so timetable can be adjusted to the real needs of users.

D.2.3.1.5. Proposed target values for monitoring of KPIs

Given the nature of the pilot and the available data, reference target values should be defined pragmatically and aligned with realistic expectations of demand and operational capacity. Target values may include:

- **Ridership growth:** a gradual increase in passenger numbers, for instance a positive monthly trend compared with the initial period.
- **Service utilisation rate:** achieving stable occupancy that indicates regular demand, with continuous improvement over time.
- **User satisfaction:** a consistently positive rating collected through occasional surveys or digital feedback tools.
- **Operational reliability:** maintaining high punctuality and regularity levels in line with standard public transport performance criteria.
- **Environmental indicators:** to be defined only when modal shift (from private cars to public transport) can be reliably measured.

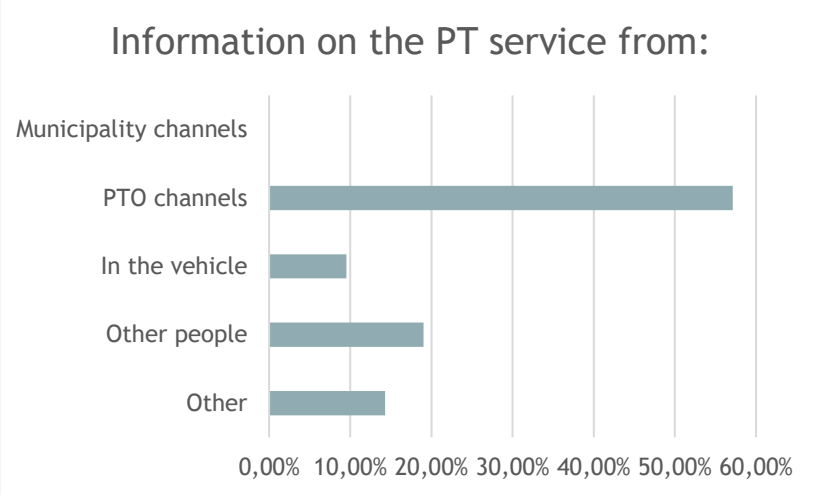
These target values should serve as a flexible framework that can be adjusted as more data becomes available and as the service develops.

D.3. Users-survey

D.3.1. General questions

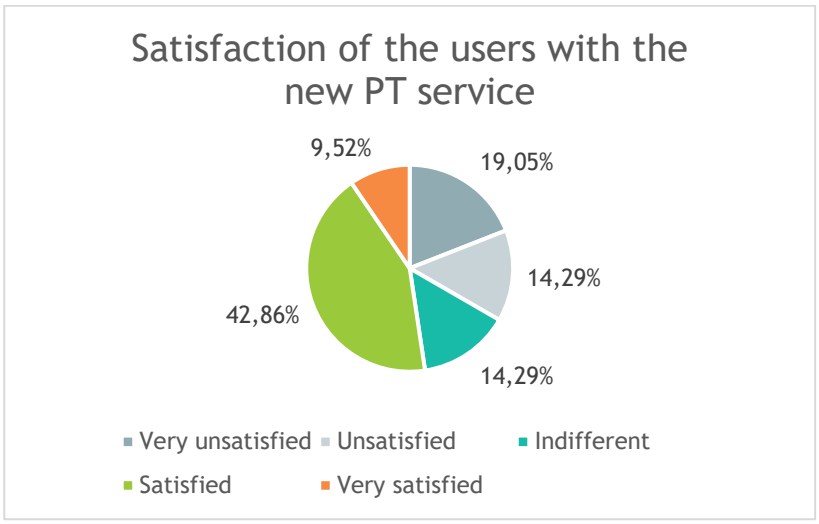
1. How were you informed about this service?

Category	Respondents	%
Other	3	14.29 %
Other people	4	19.05 %
In the vehicle	2	9.52 %
PTO channels	12	57.14 %
Municipality channels	0	0.00 %



2. How were you satisfied with the new service?

Category	Respondents	%
Very Unsatisfied	4	19.05 %
Unsatisfied	3	14.29 %
Indifferent	3	14.29 %
Satisfied	9	42.86 %
Very satisfied	2	9.52 %

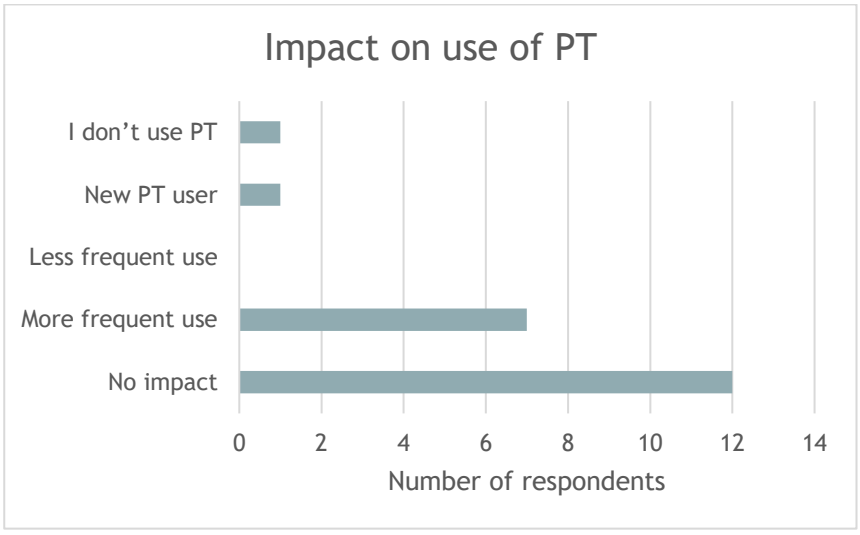


3. ***Does the new service in your opinion contribute to improvement of environmental performance of PT?***

Category	Respondents	%
Yes	13	61.90 %
No	8	38.10 %

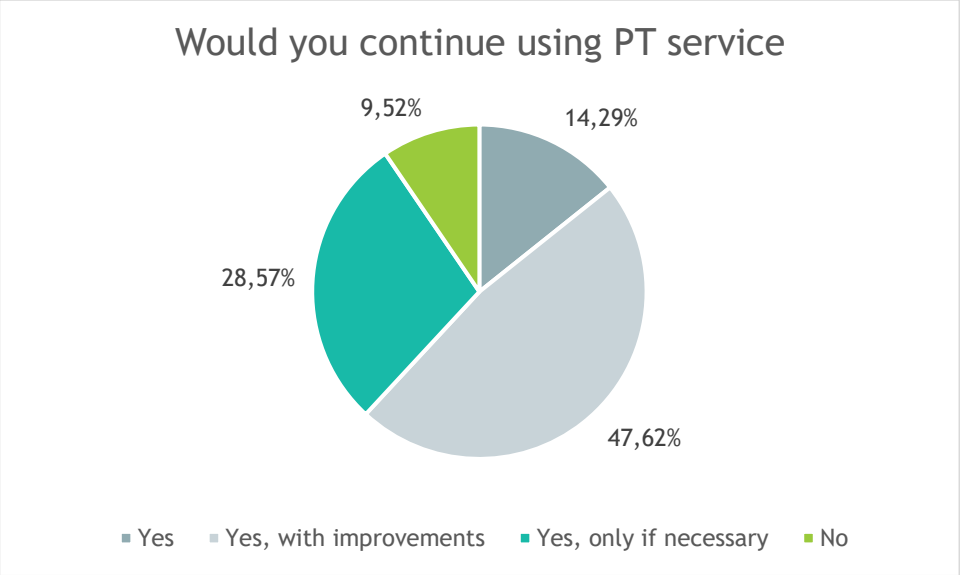
4. ***How did implementation of the new service impact your use of PT?***

Category	Respondents
No impact	12
More frequent use	7
Less frequent use	0
New PT user	1
I don't use PT	1



5. Would you continue using the new PT service?

Category	Respondents	%
Yes	3	14.29 %
Yes, with improvements	10	47.62 %
Yes, only if necessary	6	28.57 %
No	2	9.52 %



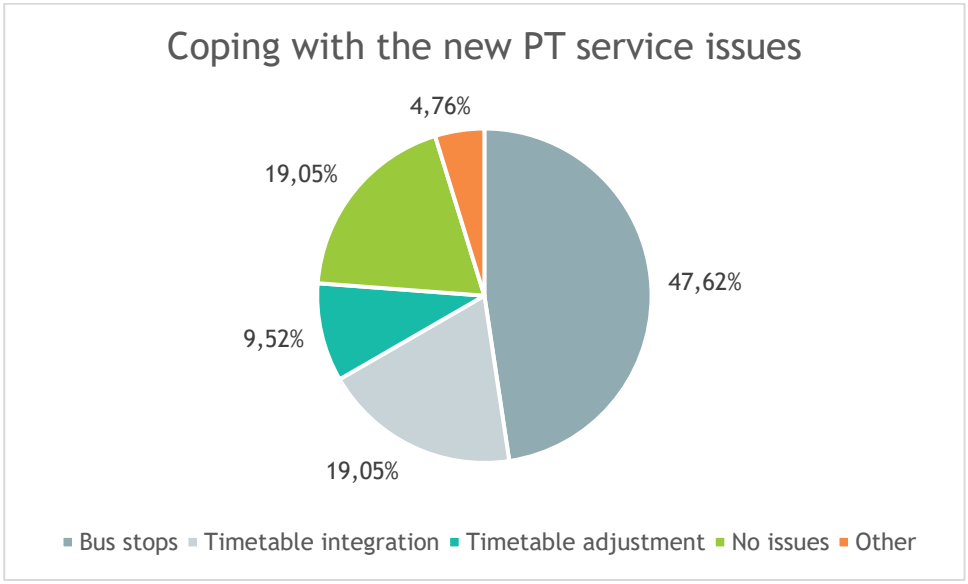
6. Would you recommend the new or changed PT service to the ones who don't use the PT?

Category	Respondents	%
Yes	12	57.14 %
No	9	42.86 %

D.3.2. Specific questions

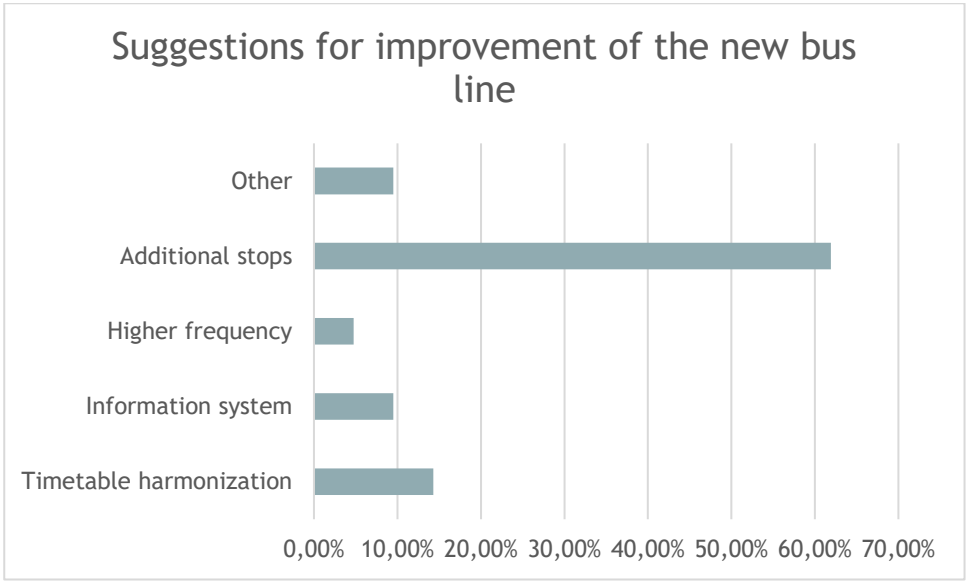
1. Coping with issues during the new PT service use

Category	Respondents	%
Bus stops	10	47.62%
Timetable integration	4	19.05%
Timetable adjustment	2	9.52%
No issues	4	19.05%
Other	1	4.76%
Bus stops	10	47.62%



2. Suggested improvements of the new service

Category	Respondents	%
Timetable harmonization	3	14.29%
Information system	2	9.52%
Higher frequency	1	4.76%
Additional stops	13	61.90%
Other	2	9.52%



3. Population specific attitude to the new service

Overall, the introduction of the pilot line can be considered successful in terms of promoting public transport within the City of Osijek. However, several challenges—most notably extensive infrastructure works affecting the entire public transport system—had a negative impact on both user satisfaction and demand for the new pilot line. While ridership did not reach the desired level, passenger feedback was generally positive. Users particularly valued the line's ability to connect a densely populated residential area with key points of interest, such as shopping areas, services, and workplaces. One of the main identified shortcomings was the lack of additional stops (e.g. at the Gospodarski centar and along Svilajska Street), which passengers clearly highlighted as opportunities for improvement. With the completion of infrastructure works and better timetable harmonization, the pilot line would likely achieve improved performance and higher overall user satisfaction.

D.4. Stakeholders' consultation

Name of the PP: **Ernst&Young Advisory Ltd, GPP Osijek**

Date of the meeting: **February 4th, 2026**

Venue of the meeting: **GPP Osijek, MS Teams**

D.4.1. Number and types of participants

There was total of 7 participants on the stakeholders' consultation. More information is available upon request.

D.4.2. A short summary of the PA presentation

ToC of PPT presentation:

- Purpose and objectives of the OPTI-UP project
- OPTI-UP approach to public transport optimization (D.1.2.1 & D.1.3.2)
    - Development of local plans on public transport optimization in small and medium-sized cities
- Local plan on public transport improvement for Osijek
    - Analysis of public transport data
    - Vision & goals
    - Transport measures – activities
    - List of KPIs
    - Transport model simulation scenarios for activities
    - Implementation of transport modelling in PTV VISUM
- Pilot activity
    - Goals and objectives
    - Implementation baselines- analysis of the current situation and resources
    - Bus pilot line users' needs survey
    - Concept of implementation
    - Implementation process
    - Site visit
    - Survey on satisfaction with DRT service introduction
    - KPI monitoring results
    - Summary of results, findings, and recommendations
- Discussion
    - Stakeholder insights and recommendations

D.4.3. Insights and feedback from stakeholders

D.4.3.1. Outcomes of LUTI & transport modelling scenarios

Discussion of the results of LUTI model – where applies – and transport modelling scenarios.

Please provide answers to the questions below.

1. How do you evaluate the validity and usefulness of the outcomes of transport scenario simulations?

   Answer: The validity and usefulness of transport scenario simulation outcomes are assessed by examining how accurately the model reflects observed conditions and how effectively it can support future decision-making. Although the modelled transport scenarios did not fully capture the realised demand, the process demonstrated the importance of conducting transport modelling. It also underscored the need for an accurate and well-calibrated transport model as a foundation for reliable analyses and informed strategic planning.

2. How do you assess use of transport modelling in planning of measures for improvement of public transport, including the presented method of the model implementation and finetuning in view of its potential for use at the local level?

   Answer: The use of transport modelling in planning measures for improving public transport is assessed primarily through its ability to support strategic decision-making and to provide a structured framework for evaluating alternative solutions. Tools such as transport models are particularly important because they enable the testing and comparison of different scenarios, allowing the most effective option to be identified.

   The presented approach to model implementation and fine-tuning demonstrates strong potential for application at the local level, as it provides a systematic method for analysing impacts, optimising proposed measures, and ensuring that decisions are based on transparent and evidence-driven assessments.

D.4.3.2. Operational implications of PA

1. What are the necessary planning steps in order to replicate the pilot solution (documentation, strategies, plans, funds, stakeholders, purchase of additional vehicles) and which steps take the most time?

   Answer: The planning steps required to replicate a pilot solution depend on the scale of the intervention, the administrative framework, and the extent of changes proposed. For smaller pilot projects such as this one, extensive documentation is generally not required. However, to ensure full compliance with relevant requirements, a comprehensive definition and detailed analysis of the mobility needs of the population are essential when planning the overall network.

   In this pilot, one of the main challenges concerned the establishment of temporary stops. Due to administrative procedures, these stops could not be implemented, and the pilot had to be conducted using the existing stop infrastructure. This illustrates how administrative constraints can significantly influence both the scope and timing of implementation.

   For cases involving more substantial changes, an assessment of the necessary legal steps is required, such as potential amendments to Public Service Obligation (PSO) contracts. Depending on the organisational structure of the operator and the contractual framework, such changes may become complex and time-consuming.

   Ultimately, each step of the process has the potential to become prolonged or complicated if not carefully planned. Thorough preparation, early identification of risks, and meticulous coordination between stakeholders are therefore crucial to ensuring smooth implementation and minimising project delays.

2. Who are the main stakeholders that need to be involved in planning and implementation in order to replicate the pilot solution?

   Answer: The successful planning and implementation of a pilot solution require the involvement of several key stakeholders. The public transport operator plays a central role, particularly in developing and validating the detailed operational concept to ensure that the pilot is feasible and can be delivered within existing operational constraints.

   Equally important is the participation of the infrastructure owner and investor, which in most cases is the city or local authority. Their involvement is essential for decisions related to infrastructure

adjustments, stop locations, and any required temporary or permanent physical interventions. In addition, other road authorities or infrastructure managers may need to be engaged, depending on the jurisdiction and ownership of the road network on which the pilot is implemented.

Close coordination among these stakeholders is crucial, as it ensures that operational, technical, and administrative requirements are aligned, enabling a smoother implementation process and increasing the likelihood of a successful replication of the pilot solution.

3. Where do you see the main issues or what are the prerequisites for successful replication of the pilot solution?

Answer: The successful replication of the pilot solution depends on several key prerequisites, as well as the mitigation of issues that may arise during planning and implementation. One of the main challenges relates to the provision of appropriate stop infrastructure. As seen in the pilot, the need for new or temporary stops can introduce delays due to administrative procedures or infrastructure limitations, which may limit the scope of the intervention if not resolved in advance.

Another essential prerequisite is the commitment and active engagement of the public transport operator, particularly in validating operational feasibility and ensuring that the concept can be integrated into existing services. Support from the local community and the city administration is equally important, as their cooperation is required for securing approvals, coordinating infrastructure adjustments, and facilitating smooth implementation.

Overall, successful replication relies on a combination of adequate infrastructure planning, strong institutional support, and coordinated involvement of all key stakeholders.

4. What are the criteria to decide whether to continue or close the pilot action (why did you decide to continue or close the PA activities?

Answer: The decision to continue or close a pilot action is typically based on an assessment of operational performance, user uptake, resource availability, and alignment with broader strategic plans. In this case, the pilot was discontinued. Although the results indicated a clear interest in the service, the line operated within a limited timeframe and was conceived as only one component of a wider public transport system reorganisation.

The pilot was therefore closed because the allocated resources were planned exclusively for the designated pilot period. A comprehensive system-wide reorganisation is scheduled to follow, during which a similar connection is expected to be reintroduced as part of the updated network. As a result, discontinuation of the pilot was not a reflection of its performance, but rather a consequence of the planned transition towards a more extensive restructuring of the public transport system.

D.4.3.3. Financial implications

1. What are the main costs for implementation of the pilot solution?

Answer: The main costs associated with the implementation of the pilot solution are primarily linked to vehicle operation. These include fuel expenses, driver labour costs, and vehicle depreciation. Together, these operational components represent the core financial requirements for running the pilot service.

2. What are the main funds for implementation of the pilot action?

Answer: The main source of funding for the implementation of the pilot action was the operator's regular budget. All operational activities were financed through standard internal financial allocations, without the need for additional external funding mechanisms.

3. Do you see any other possibilities to finance upkeeping of the pilot action?

Answer: Yes, additional financing options could be considered to support the continuation of the pilot action. In particular, interested public and private bodies could be involved in co-financing the service. Such institutional participation may provide supplementary funding and help ensure the financial sustainability of the pilot beyond the operator's regular budget.

4. How can expansion of the pilot activity in the same area or in other areas impact the costs (e.g. optimisation of personnel, vehicle fleet…)?

   Answer: The expansion of the pilot activity within the same area or in other locations has the potential to positively influence overall costs through improved operational efficiency. A broader or more integrated service network can contribute to better optimisation of driver working hours, reducing idle time and enabling more efficient scheduling.

   In addition, expanded operations may increase the utilisation rate of the vehicle fleet, ensuring that buses are deployed more effectively across services. Higher vehicle utilisation can, in turn, support more cost-efficient operations by distributing fixed and operational costs across a larger number of service hours or kilometres.

5. What funds do you see for replication of the pilot solution to other areas in the country or other regions?

   Answer: The replication of the pilot solution in other areas of the country or in different regions could be financed primarily through the operator's regular budget, as this represents the most direct and readily available funding source. However, depending on the scale, complexity, and specific needs of the replication, additional public funding streams may also be utilised. These can include contributions from national, regional, or local authorities, as well as targeted public programmes aimed at improving public transport services.

   Such diversified funding sources can help ensure financial viability and reduce the burden on the operator, particularly in cases where infrastructure adjustments or expanded operational requirements are anticipated.

D.4.3.4. Recommendations for improvement and up-scaling

1. Do you see in your county other locations, municipalities, regions where similar solution could be applied?

   Answer: Yes, similar solutions could be applied in many—if not most—parts of the county, depending on the specific mobility needs and the requirements for introducing new public transport lines or reorganising the existing network. The applicability largely depends on local demand patterns, connectivity gaps, and the strategic goals of municipalities or regions regarding the improvement of public transport services.

2. How do you see long-term optimisation of the PA (e.g. leverage of bigger vehicle fleet, more users, re-distribution of drivers, engagement of licensed drivers, capacity of vehicles, stability of financing, reinventing of passenger services with other options, development of SW support…)?

   Answer: Long-term optimisation of the pilot action is expected to increase the overall cost-effectiveness of the public transport system. Through improved fleet management, higher utilisation of vehicles, better distribution of drivers, and gradual growth in passenger numbers, a significantly greater operational effect can be achieved with the same—or only slightly higher—level of resources.

   Such optimisation would have a positive impact on service availability for passengers, which in turn is likely to stimulate additional demand. Furthermore, the stability of financing, potential enhancement of passenger services, and the development of supporting software solutions can reinforce the long-term sustainability and efficiency of the system.

3. What is needed in terms of formal procedures for easier expansion of the solution (speeding the process) and upkeeping it (e.g. who finances, decides on additional schedule departures or line layout modification – what are limitations)?

   Answer: To facilitate a smoother and faster expansion of the solution, several formal and procedural improvements are required. Most importantly, the responsibilities for each step of the process should be clearly defined in advance, ensuring that it is immediately known which institution or stakeholder must be contacted for specific approvals or decisions. Clear allocation of roles would significantly reduce uncertainty and administrative delays.

Requests related to the establishment, adjustment, or expansion of public transport services should also be given priority within the relevant administrative structures. This would help ensure that all necessary permits, documents, and formal decisions are issued without unnecessary delays, allowing implementation activities to proceed efficiently.

Such procedural clarity and prioritisation are key to both accelerating expansion and ensuring stable long-term operation of the service, including decisions on financing, timetable adjustments, and potential modifications to the line layout.

4. How do you see possibilities given by the national (regional) legislation to introduce pilot actions into existing operations of the PT (e.g. 6 months change of the granted PSO on PT) – what are the needed actions to make pilot actions easier to implement and measure their success?

   Answer: The possibilities provided by national or regional legislation for introducing pilot actions into existing public transport operations would be significantly enhanced by reducing the administrative burden associated with temporary service changes. Although operators are already required to submit regular performance reports as part of their Public Service Obligation (PSO) commitments, the introduction of pilot services often requires additional procedures, duplicating information that is already routinely provided.

   Easier implementation could be achieved by streamlining these administrative requirements, particularly for short-term pilots such as those allowed under the six-month modification provision of the PSO framework. Simplified procedures, reduced documentation, and the recognition of existing reporting obligations as sufficient for pilot evaluation would considerably accelerate implementation.

   Such adjustments would allow pilot actions to be introduced more flexibly, tested under real operational conditions, and assessed more efficiently, ultimately supporting evidence-based improvements to public transport services.

5. Do we need a standardized methodology for identifying resident's (passengers') needs that would differently address big agglomerations and smaller settlements, regular services and DRT… – how do you identify the needs today?

   Answer: A standardised methodology for identifying residents' and passengers' mobility needs can be beneficial, particularly when comparing different settlement types or service concepts. However, in practice, the most effective approach remains a detailed local assessment. Each area may have its own specific characteristics, constraints, and user expectations, making it essential to understand local conditions directly rather than relying solely on broad methodological distinctions between large agglomerations, smaller settlements, regular services, or DRT solutions.

   In current practice, needs are identified through a thorough analysis of the area and its users. Regardless of the size of the settlement, most residents share fundamental mobility requirements. Since public transport services should be shaped according to these needs, it is crucial to conduct a high-quality, context-specific assessment. This ensures that decisions on service design or system reorganisation are aligned with actual demand and lead to the most appropriate and effective outcomes.

6. What is the drive (incentive) for selection of alternative fuel vehicles in the operator's vehicle fleet?

   Answer: The main incentive for the selection of alternative-fuel vehicles in the operator's fleet is typically financial. These vehicles can provide substantial savings in fuel costs when compared with conventional diesel vehicles. In addition, electric vehicles are often supported through various subsidy schemes that help reduce initial investment expenses, making the transition more economically feasible.

   Operational advantages also represent a significant motivating factor. When high-quality vehicles are used, electric fleets generally require simpler and less costly maintenance, contributing to greater operational efficiency over the long term.

   Beyond financial and operational considerations, the adoption of alternative-fuel vehicles directly supports broader environmental and sustainability objectives. Their use helps reduce greenhouse

gas emissions, improves local air quality, and aligns public transport operations with strategic climate and sustainability goals at the local, national, and EU levels.

Together, these financial, operational, and environmental benefits form the key drivers behind the shift towards alternative-fuel vehicle fleets.

7. Do you provide support for transport operations on the basis of a commercial or custom-designed SW. Would you be ready to use an openly adaptable EU solution (e.g. for DRT service) to assure standardisation and easier cross-border integration of services?

   Answer: The question of whether support for transport operations is provided through commercial or custom-designed software can vary depending on the specific system and organisational setup. Regardless of the software type currently in use, it is generally considered beneficial to adopt any solution that contributes to improving the efficiency and quality of the service.

   From this perspective, the use of an openly adaptable EU-level solution—such as those developed for DRT services—could be viewed positively, as long as it supports operational needs, enhances standardisation, and facilitates easier integration across borders. Tools that streamline processes, improve user experience, and contribute to more coordinated and interoperable public transport systems can bring significant advantages to operators and passengers alike.

APPENDIX E: Appendix: PÉCS pilot action

Thematic field: Alternative Fuel Technologies - focuses on testing the impact of electric propulsion vehicles on energy efficiency and public transport (PT) ridership by enhancing comfort and cleanliness, both contributing to greater sustainability.

Pilot action in Pécs (Hungary): new electric bus lines and stops to expand the PT network in the underserved area, offering a sustainable mobility alternative for employees; goals: providing reliable and direct connections, reduce car dependency, lower emissions, and support better access to jobs.

E.1. Site-visit

Name of the PP:	South Transdanubian Regional Innovation Agency
Date:	12.11.2025, from 10:00 a.m. to 13:00 p.m.
Venue:	Pécs, Tüke Busz Plc. (PTO) headquarters, the route of pilot action bus line No 90, the Tüskésrét road depo of Tüke Busz Plc.

E.1.1. Number and types of participants

There was total of 13 participants on the site visit. More information is available upon request.

E.1.2. Situation & challenges of PT in Pécs PA area

The PA area

Tüke Busz Plc., the public transport provider for the city of Pécs, has placed increasing emphasis in recent years on making its operations more environmentally friendly and economical. It is of paramount importance to us to reduce our ecological footprint by modernizing our vehicle fleet, reducing fuel consumption, and introducing alternative fuel vehicles. In addition, we are constantly looking for solutions that will reduce operating costs to a more sustainable level in the long term, so that public transport is not only more environmentally friendly but also more financially stable.

Our development plans include optimizing the daily mileage of electric buses, as making the best possible use of the capacity of new vehicles is key to economical and sustainable operation. The operation of electric buses is particularly effective when their range and charging cycles are optimally coordinated with the city's transport needs.

Table 70: Traffic data for Tüke Busz Zrt. – Size of garage runs

Full network		**Year 2024**	**Year 2025 first half**
Total distance travelled	thousand km	6,702.2	3,408.1
Garage run [5]	thousand km	461.1	242.4
Ratio	%	6.9	7.1
Mercedes eCitaro fleet		**Year 2024**	**Year 2025 first half**

[5] Garage run: the movement of an empty bus without passengers, which is part of the task. Examples include movement from the depot to the start of service, movement within the depot for repair purposes, movement for the purpose of recharging batteries, etc.

Total distance travelled	Km	497,912	271,947
Garage run	Km	28,368	21,213
Ratio	%	5.7	7.8

An equally important goal is to reduce the number of kilometres travelled by garage runs, as these do not directly serve passenger transport, yet involve significant fuel and cost expenditures**. Optimizing garage trips not only results in financial savings but also contributes to reducing urban traffic congestion and harmful emissions.** In 2024, garage trips accounted for 6.9% of total kilometres travelled (see Table 1). This figure rose in the first half of 2025, with 7.1% of all kilometres travelled by buses being garage trips. Nearly 8% of the kilometres travelled by electric buses were garage trips, some of which were necessitated by the need to recharge.

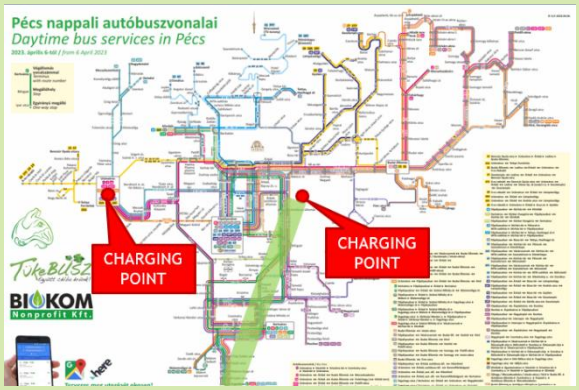
In addition to all this, one of Tüke Busz's goals is to expand public transport coverage and connect new areas to the network that have been less accessible until now. This fits in closely with the aspirations of the city and the OPTI-UP project: optimizing public transport not only ensures more efficient operation but also provides better access, which in the long term increases the attractiveness of the service and strengthens Pécs' sustainable urban development goals.

Taking the above into consideration, the new 90 bus route can be launched, which will run between Tüskésréti út and Fagyöngy utca. The new route would transport passengers along Tüskésréti út – Siklósi út – Táncsics Mihály utca – Aidinger János út – Nagy Imre út – Illyés Gyula utca – Fagyöngy utca, thereby connecting another part of the city to public transport.

Figure 26:Route of the Pilot Line

PT services

Item	Description
Location	Pécs

Map (general + detailed)	 
Area characteristics	Type of area: 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. Population and its key economic and social trends: 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. Key urban areas: 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.

	Key public transport infrastructures: 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. Relation to key TEN-T network: 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. Why is your pilot area considered peripheric? • While Pécs functions as a regional centre, certain parts of the city—such as the Légszeszgyár 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.

PT challenges

Item	Description
Key public transport issue(s) addressed and main causes	Public transport service is currently non-existent in the Légszeszgyár 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.
Future outlook	These improvements aim to make public transport a more attractive option for people working in the area, encouraging a shift away from private car use. If the new services are well received and ridership increases, there is potential to further expand the frequency and coverage of the bus routes. Future adjustments

	could include aligning service schedules with shift times at nearby workplaces, improving both accessibility and convenience for employees. This shift could lead to significant environmental benefits as well, by reducing traffic congestion, lowering CO_2 emissions, and contributing to a more sustainable urban mobility system.

E.1.3. Operated PA solution

Item	Description
Pilot Solution	The pilot introduces new bus lines and stops to serve this underserved zone, offering a sustainable mobility alternative for employees. By providing reliable and direct connections, the action is expected to reduce car dependency, lower emissions, and support better access to jobs.
Pilot Action goals	• 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

E.1.4. Site visit implementation

Preparatory activities

The preparatory activities were as follows:

- STRIA announced the Pécs pilot action site visit on 29 October 2025 in České Budějovice during the morning session dedicated to Work Package 2 Implementation and Monitoring, under the topic of Pilot actions – status of implementation and discussion with PPs,
- following that, based on one-to-one phone calls and email exchanges with project partners that are located near to Pécs, namely TUW, GGP and Paksbusz responded positively on attending,
- STRIA held the Pécs OPTI-UP site visit on 12 November 2025 in cooperation with the Tüke Busz Plc., with 13 participants (12 signing the List of Participants).

Visit to the site

The visit followed the schedule as that is below:

- presentation of the Pécs public transport (in the morning, premises: headquarter office of Tüke Busz (Pécs, Nyugati Ipari út 8, 7634) - 10-11 hours in the morning,
- light lunch at Tüke Busz, following the presentation (11:00-11:30),
- travel by car to the end station of line No 90, taking a ride with the 12:01 scheduled bus to the other end station of the line by bus (11:30-12:30 hours, noon),
- site visit at the depot of the electric buses (12:30-13:00 hours, afternoon),
- end of the site visit and farewell (13:00 hours).

The presentations of the site visit could be found here: https://drive.google.com/drive/folders/1V4c2FdcVl5Z1nDTCdWKBoStg63XdJDii?usp=sharing . Showcased presentations were focused on the public bus line network of Pécs and the concept behind and the delivery

of the Pécs OPTI-UP Pilot Action, i.e. the new, pilot bus Line No 90. Presenters were the managers of Tüke Busz Plc.

During the questions and answers session the following issues were tackled:

- at Pécs, considering the landscape endowments, e-buses consume 1,1-1,2 kW per kilometre,
- the e-Citaro Mercedes buses are more popular among the bus drivers, at the same time the BYD buses are more difficult to maintain owing to availability of the spare parts of these buses from the Netherlands,
- the GGP colleagues added that in Croatian one centralised tender has been published for the procurement of the e-buses country-wide,
- Tüke Busz introduced the charging solutions used for the Mercedes (Siemens, two headed) and BYD buses (Floading) and added that at Fagyöngy street bus terminal there are ongoings talks with the E.ON (distribution system operator) to deploy a local charging stations for the e-buses. Both AC and DC charging stations are available, up to 180 kW capacity. In Osijek maximum 300 kW charging capacity will be available soon,
- the TUW colleague added to the debate that the GTFS based urban planning they apply in Wien is capable to create AI based scenarios that could further support the Pécs public bus transport development,
- further topics were also discussed, such as the presence of foreign bus drives in Hungary and Croatia, the differences of salaries and staffing issues between the countries, and the impact of the COVID-19 on the use of public transport in the two cities.

On the “Fagyöngy street” end station of the bus line No 90 Tüke Busz Plc. presented the bus driver rest area (a properly equipped container in service of bus drivers – toilet, kitchen, restroom included). Following that the participants of the study visit got on the bus at Fagyöngy street and got off the bus at Tüskésréti road, where the depot and service station of the Tüke Busz Plc. is located.

When staying at the depot, the maintenance staff of Tüke Busz Plc. presented the e-charging process of the Mercedes and BYD buses used in the fleet of Tüke Busz Plc. The tools used for maintenance of different faults were also introduced, and the colleagues went into details as regards the operating experiences of the two different types of buses in service of the County Rank City of Pécs.

E.1.5. Insights of PA implementation & feedback (visitors/users)

Attendees of the study visit were especially curious about the experiences of the passengers and their satisfaction rates with the new service. Tüke Busz shared with them that the pilot bus line No 90 this far reported modest, but rising number of passengers, and new passengers were also registered in the new bus stops of the service. Based on feedback of the users, the timetable of the bus line should be better aligned with the daily routines of the passengers, and it should be more often used in the morning and afternoon peak hours.

E.1.6. Additional photos

Figure 27: Pécs site visit

There is a very colourful and vivid short video of the Pécs pilot action site visit at the Facebook website of STRIA. The link is: https://www.facebook.com/reel/4751371015089651.

E.2. Pilot action performance - KPIs

E.2.1. Plan of performance monitoring and evaluation

E.2.1.1. Identification of key performance indicators (KPIs)

Table 71: Pilot action KPIs

KPI	Brief description	Unit	Target
KPI_1	Number of passengers per day	passenger/day	75 passengers/ day
KPI_2	Number of passengers per one ride	passenger / one ride (per day)	15 passengers / ride
KPI_3	Number of km travelled	km / day	56 km / day
KPI_4	Number of passengers at the new bus stops per day	passenger / bus stop (per day)	35 passenger / day
KPI_5	Cost of energy consumption per km travelled per passenger on pilot line	EUR/km (per week)	0.24 (with 5 workdays)

E.2.1.2. Identification of data sources & tool for KPIs

Table 72: Identification of data sources & tools for KPIs data

KPI	Data list	Methodology	Data source	Data tool
KPI_1	- Number of passengers	Daily trend	passenger counting equipment (PTO)	Excel
KPI_2	- Number of passengers	Daily trend	passenger counting equipment (PTO)	Excel
KPI_3	Number of km travelled	Daily trend	statistic database (PTO)	Excel
KPI_4	Number of passengers	Daily trend	passenger counting equipment (PTO)	Excel
KPI_5	Number of km travelled Average consumption of electricity [kWh/km] price of electricity [EURO/kWh] number of passengers	Weekly trend	statistic database (PTO)	Excel

E.2.2. Analysis of Key Performance Indicators

E.2.2.1. KPI_1: Number of passengers per day

Table 73: Weekly monitoring of the KPI_1 values

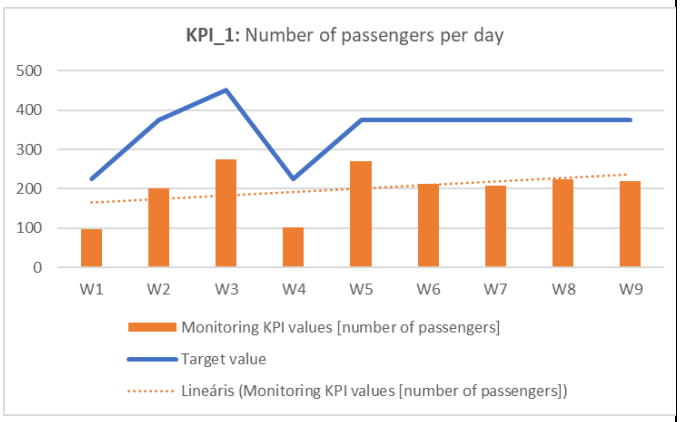
KPI_1: Number of passengers per day				
Baseline KPI value [number of passengers]:				
Target KPI value [number of passengers]: 75				
Week	Monitoring KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]	
W1	98	-127	-56	
W2	202	-173	-46	
W3	274	-101	-27	
W4	101	-124	-55	
W5	271	-104	-28	
W6	213	-162	-43	
W7	208	-167	-44	
W8	224	-151	-40	
W9	220	-155	-41	
W10				
Average	201.2	-140	-42	
Standard deviation	63.17		10.23	

Table 74: Evaluation of the KPI_1 monitoring results

No.	Evaluation question	KPI Results	Explanation
	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	KPI values show an upward trend, with passenger traffic increasing compared to the first few weeks.
	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☐ Positive trend ☒ Negative trend ☐ Neutral trend	KPI values are not reaching the set target, although passenger traffic has increased, but not to a sufficient extent.
	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☐ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	This Pilot Action is a new service; it cannot be compared with the baseline situation.

No.	Evaluation question	KPI Results	Explanation
	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☒ Very good selection ☐ Good selection ☐ Unsuitable selection	The standard deviation of the KPI is 63.17, representing a 10% relative deviation. The target value is considered very well chosen according to the criteria.
	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The average KPI value has moved in direction of the target compared to the first week, although it cannot reach it.

E.2.2.2. KPI_2: Number of passengers per one ride

Table 75: Weekly monitoring of the KPI_2 values

KPI_2: Number of passengers per one ride
Baseline KPI value [number of passengers]:
Target KPI value [number of passengers]: 15 passengers / ride

Week	Monitoring KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]
W1	4.08	-10.92	-72.78
W2	5.05	-9.95	-66.33
W3	5.71	-9.29	-61.94
W4	4.21	-10.79	-71.94
W5	6.78	-8.23	-54.83
W6	5.33	-9.68	-64.50
W7	5.20	-9.80	-65.33
W8	5.60	-9.40	-62.67
W9	5.50	-9.50	-63.33
W10			
Average	5.27	-9.73	-64.85
Standard deviation	0.81		5.38

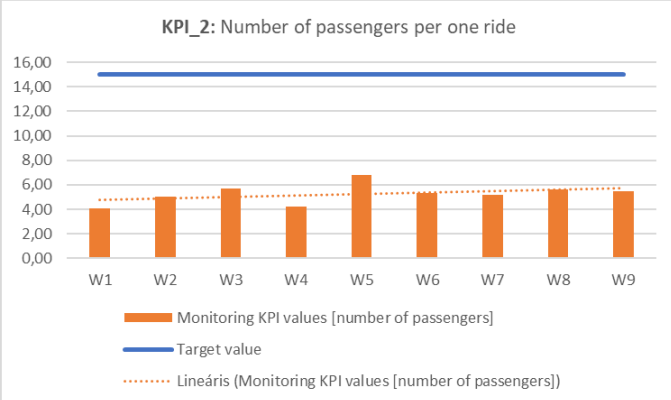


Table 76: Evaluation of the KPI_2 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	KPI values show an upward trend, with passenger traffic increasing compared to the first few weeks.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☐ Positive trend ☒ Negative trend ☐ Neutral trend	KPI values are not reaching the set target, although passenger traffic has increased, but not to a sufficient extent.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☐ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	This Pilot Action is a new service; it cannot be compared with the baseline situation.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☒ Very good selection ☐ Good selection ☐ Unsuitable selection	The standard deviation of the KPI is 0.81, representing a 5% relative deviation. The target value is considered very well chosen according to the criteria.
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The average KPI value has moved in direction of the target compared to the first week, although it cannot reach it.

E.2.2.3. KPI_3: Number of km travelled

Table 77: Weekly monitoring of the KPI_3 values

KPI_3: Number of km travelled				
Baseline KPI value [km]:				
Target KPI value [km]: average 275 (with 5 workdays)				
Week	Monitoring KPI values [km]	Deviation from target value [km/day]	Relative deviation from target value [%]	
W1	168	0	0	
W2	280	0	0	
W3	336	0	0	
W4	168	0	0	
W5	280	0	0	
W6	280	0	0	
W7	280	0	0	
W8	280	0	0	
W9	280	0	0	
W10				
Average	261	0	0	
Standard deviation	56		0	

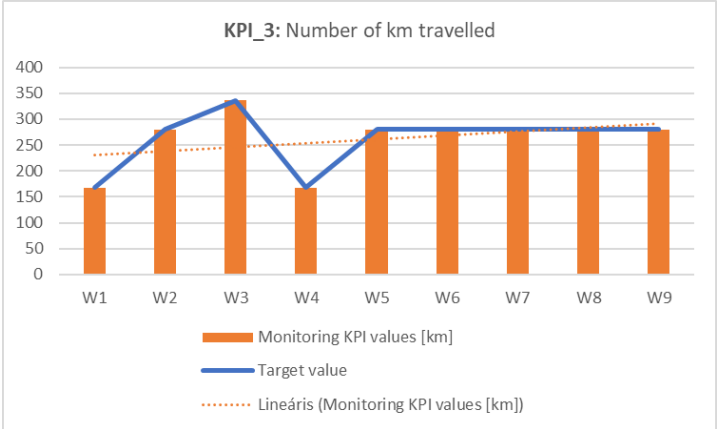


Table 78: Evaluation of the KPI_3 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	It is increasing trend according to the chart, but it depends on the number of workdays on a week.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☐ Positive trend ☐ Negative trend ☒ Neutral trend	There was no change.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☐ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	This Pilot Action is a new service; it cannot be compared with the baseline situation.
4.	Was the target value selected correctly? - Very good (STD <20%),	☒ Very good selection ☐ Good selection	The standard deviation of the KPI is 56, representing a 0% relative deviation (because every ride was

No.	Evaluation question	KPI Results	Explanation
	- Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Unsuitable selection	completed). The target value is considered very well chosen according to the criteria.
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The KPI value is equal to the target value.

E.2.2.4. KPI_4: Number of passengers at the new bus stops per day Number of km travelled

Table 79: Weekly monitoring of the KPI_4 values

KPI_4: Number of passengers at the new bus stops per day			
Baseline KPI value [number of passengers]:			
Target KPI value [number of passengers]: average 175 (with 5 workdays)			
Week	Monitoring KPI values [number of passengers]	Deviation from target value [number of passengers]	Relative deviation from target value [%]
W1	6	-99	-94
W2	25	-150	-86
W3	16	-194	-92
W4	5	-100	-95
W5	35	-140	-80
W6	18	-157	-90
W7	36	-139	-79
W8	19	-156	-89
W9	20	-155	-89
W10			
Average	20	-143	-88
Standard deviation	10.89		5.68

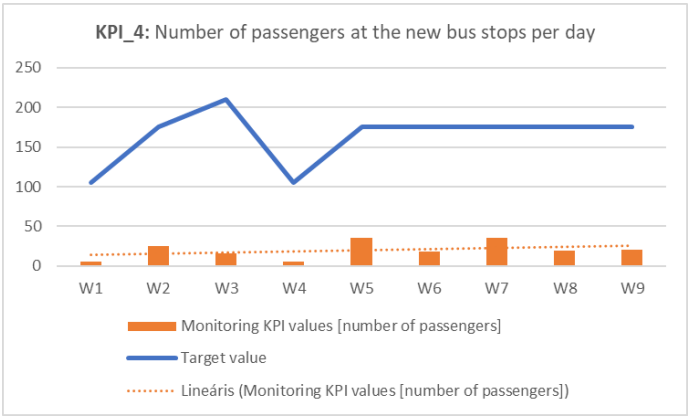


Table 80: Evaluation of the KPI_4 monitoring results

No.	Evaluation question	KPI Results	Explanation
	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	KPI values show an upward trend, with passenger traffic increasing compared to the first few weeks.
	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☐ Positive trend ☒ Negative trend ☐ Neutral trend	KPI values are not reaching the set target, although passenger traffic has increased, but not to a sufficient extent.
	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☐ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	This Pilot Action is a new service; it cannot be compared with the baseline situation.
	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☒ Very good selection ☐ Good selection ☐ Unsuitable selection	The standard deviation of the KPI is 10.89, representing a 6% relative deviation. The target value is considered very well chosen according to the criteria.
	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The average KPI value has moved in direction of the target compared to the first week, although it cannot reach it.

E.2.2.5. KPI_5: Cost of energy consumption per km travelled per passenger on pilot line

Table 81: Weekly monitoring of the KPI_5 values

KPI_5: Cost of energy consumption per km travelled per passenger on pilot line				
Baseline KPI value [EUR/km]:				
Target KPI value [EUR/km]: 0.24 (with 5 workdays)				
Week	Monitoring KPI values [EUR/km]	Deviation from target value [EUR/km]	Relative deviation from target value [%]	
W1	0.20	0.12	143.65	
W2	0.28	0.14	98.20	
W3	0.28	0.12	68.81	
W4	0.19	0.05	33.99	
W5	0.20	0.06	40.74	
W6	0.24	0.10	73.97	
W7	0.27	0.13	93.88	
W8	0.24	0.10	67.87	
W9	0.24	0.10	72.32	
W10	0.20	0.12	143.65	
Average				
Standard deviation	0.04		32.64	

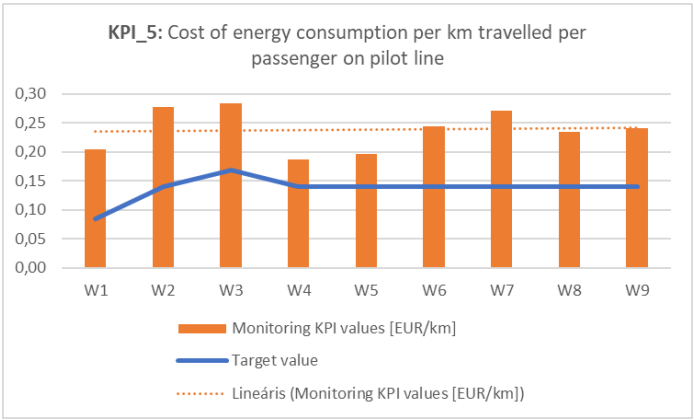


Table 82: Evaluation of the KPI_5 monitoring results

No.	Evaluation question	KPI Results	Explanation
	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	A minimal upward trend, although in this case a downward trend would have been more favourable.
	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☐ Positive trend ☒ Negative trend ☐ Neutral trend	This KPI value was higher than the set target. The reason was that fewer passenger used the Pilot Line than it was expected.
	What is an impact of PA to the baseline state? Improved: (average (KPI - baseline value) >10% Insignificant change 10%>(average (KPI) - baseline value) >-10% Worse: (average (KPI - baseline value) <-10%	☐ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	This Pilot Action is a new service; it cannot be compared with the baseline situation.
	Was the target value selected correctly? Very good (STD <20%), Good (20% ≤ STD <40%),	☐ Very good selection ☒ Good selection	The standard deviation of the KPI is 0.04, representing a 33% relative deviation. The target value is

No.	Evaluation question	KPI Results	Explanation
	Unsuitable (STD>40%)?	☐ Unsuitable selection	considered well-chosen according to the criteria.
	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target: Successful: if average (KPI) has moved in direction of the target Unsuccessful: if average (KPI) is close or even over the target.	☐ Successful ☒ Unsuccessful	The average KPI value is over the target and moves away from it. It means the cost of consumption per km per passenger has an increasing trend.

E.2.3. Evaluation of PA performance

Table 83 : Aggregative statistics of KPI monitoring evaluation

No	Evaluation question	KPI monitoring results						Total
		Metrics	KPI_1	KPI_2	KPI_3	KPI_4	KPI_5	
1.	Trend of long-term expectation of the PA	Increasing	•	•	•	•	•	5
		Decreasing						0
		Stable						0
2.	Trend of KPI in relation to set target	Positive						0
		Negative	•	•		•	•	4
		Neutral			•			1
3.	Evaluation of the impact regarding the baseline situation	Improvement						
		Insignificant change						
		Worsening						
4.	Definition of target value	Very good	•	•	•	•		4
		Good					•	1
		Not good						0
5.	Successfulness of PA in relation to the baseline and target value	Successful	•	•	•	•		4
		Unsuccessful					•	1

E.2.3.1. Summary of evaluation

E.2.3.1.1. Assessment of overall achievement of the Pilot Action (PA) considering all KPIs

Baseline values are indicative and reflect best-available historical data rather than strictly comparable measurement periods. Some KPIs were retained for experimental or learning purposes and are therefore interpreted with limited weight in the overall success assessment.

The pilot action shows an overall positive long-term outlook, as the trend of long-term expectations is increasing for all five monitored KPIs. None of the indicators show a stable or decreasing expectation, indicating a generally optimistic assessment of the pilot action's future performance.

E.2.3.1.2. Representation of the selected KPIs

When examining the KPIs in relation to their set targets, the results are more mixed. Four out of the five KPIs display a negative trend compared to their target values, while one KPI shows a neutral trend. No KPI demonstrates a positive trend in relation to the predefined targets. This suggests that although expectations regarding the pilot action remain high, the actual performance has not yet fully aligned with the established targets.

E.2.3.1.3. Availability and sustainability of data sources

Regarding the definition of target values, the majority of KPIs are assessed positively. Four KPIs have very well-defined target values, while one KPI is evaluated as having a good target definition. None of the indicators fall into the “not good” category, indicating that the target-setting process was generally appropriate and clear.

E.2.3.1.4. List of essential KPIs

In terms of overall successfulness, four KPIs are considered successful when compared to both the baseline situation and the target values. One KPI, however, is evaluated as unsuccessful, highlighting that further improvements are needed in certain areas to ensure consistent achievement across all indicators.

In case the PA solution is considered for long-term implementation, the list of essential KPIs: KPI_1 and KPI_5. These indicators are particularly important, as they allow the assessment of the service’s effectiveness both in terms of passenger demand and environmental impact. KPI_1 reflects ridership and usage levels, while KPI_5 provides insight into sustainability and emission-related performance. Continuous monitoring and regular review of these KPIs are strongly recommended to ensure the long-term success and optimization of the pilot service.

E.2.3.1.5. Proposed target values for monitoring of KPIs

In terms of overall successfulness, four KPIs are considered successful when compared to both the baseline situation and the target values. One KPI, however, is evaluated as unsuccessful, highlighting that further improvements are needed in certain areas to ensure consistent achievement across all indicators.

E.3. Users-survey

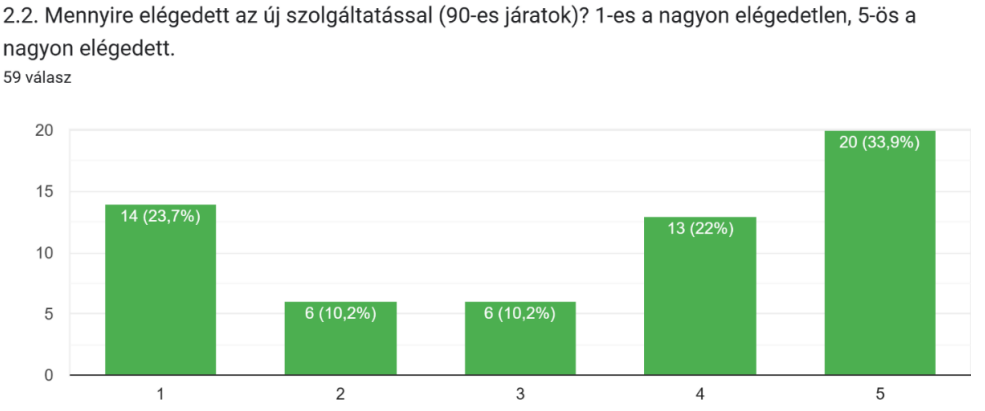
E.3.1. General questions

1. How were you informed about this service?

Category	Respondents	%
Online channels of the Municipality, City	5	8.5%
Online channels of public transport operator	45	76.3%
Leaflet/billboard in the PT vehicle	2	3.4%
From acquaintances, friends, or other users	4	6.8%
Other	3	5%

2. How were you satisfied with the new service?

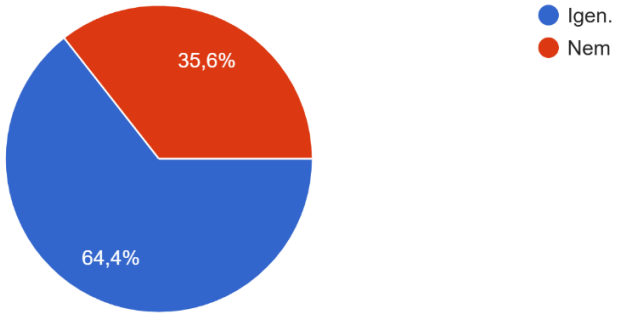
Category	Respondents	%
Very unsatisfied	14	23.7%
Unsatisfied	6	10.2%
Indifferent	6	10.2%
Satisfied	13	22%
Very satisfied	20	33.9%



3. ***Does the new service in your opinion contribute to improvement of environmental performance of PT?***

Category	Respondents	%
Yes	38	64.4%
No	21	35.6%

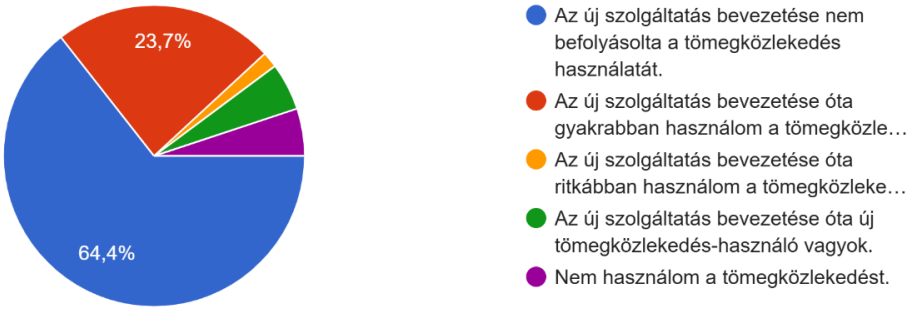
2.3. Úgy véli, hogy ez az új szolgáltatás (90-es járatok) hozzájárul a környezetbarátabb tömegközlekedéshez?
59 válasz



4. ***How did implementation of the new service impact your use of PT?***

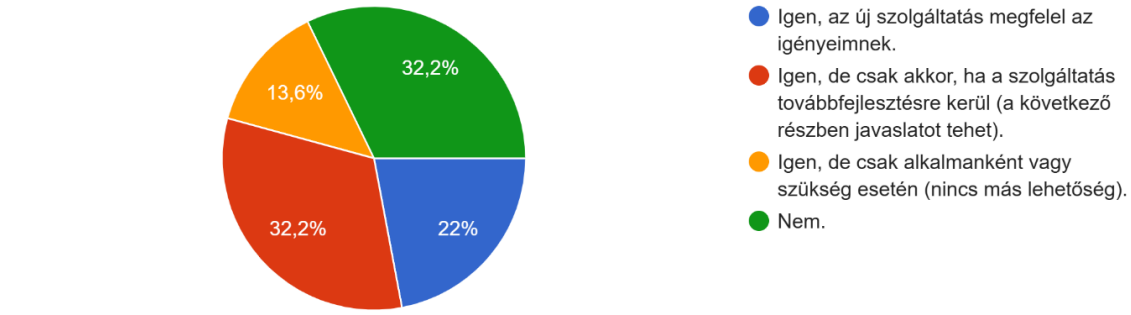
Category	Respondents	%
No impact	38	64.4%
More frequent use	14	23.7%
Less frequent use	1	1.7%
New PT user	3	5.1%
I don't use PT	3	5.1%

2.4. Hogyan befolyásolta az új szolgáltatás bevezetése az Ön közösségi közlekedés használati szokásait?
59 válasz



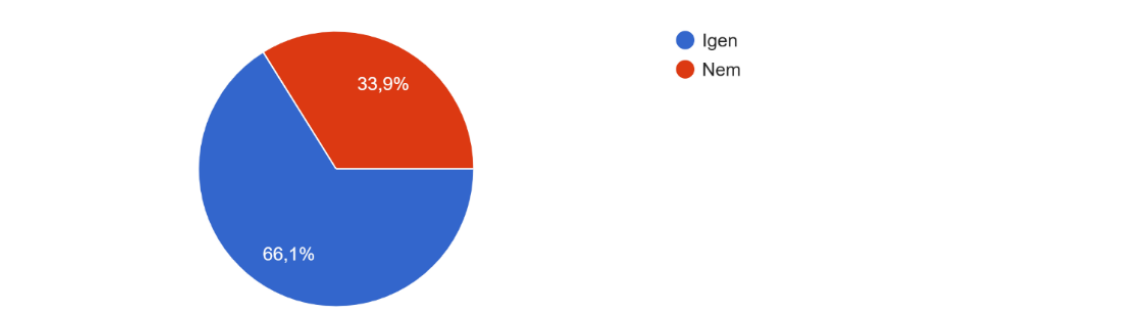
5. Would you continue using the new PT service?

Category	Respondents	%
Yes	13	22%
Yes, with improvements	19	32.2%
Yes, only if necessary	8	13.6%
No	19	32.2%



6. Would you recommend the new or changed PT service to the ones who don't use the PT?

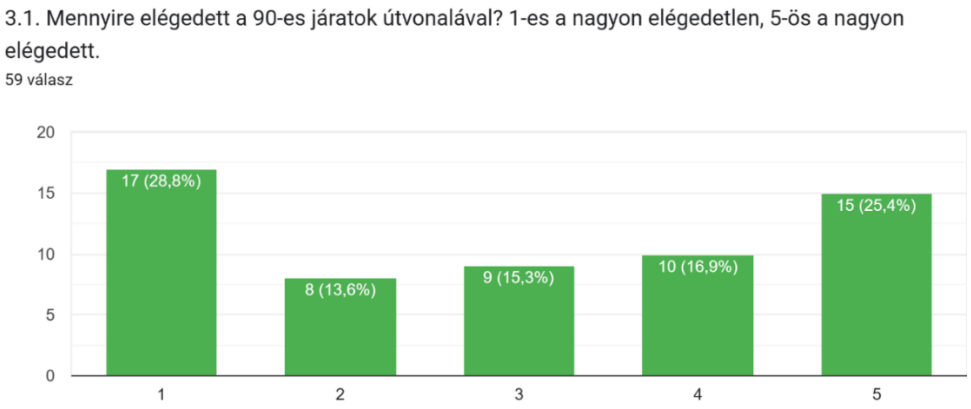
Category	Respondents	%
Yes	39	66.1%
No	20	33.9%



E.3.2. Specific questions

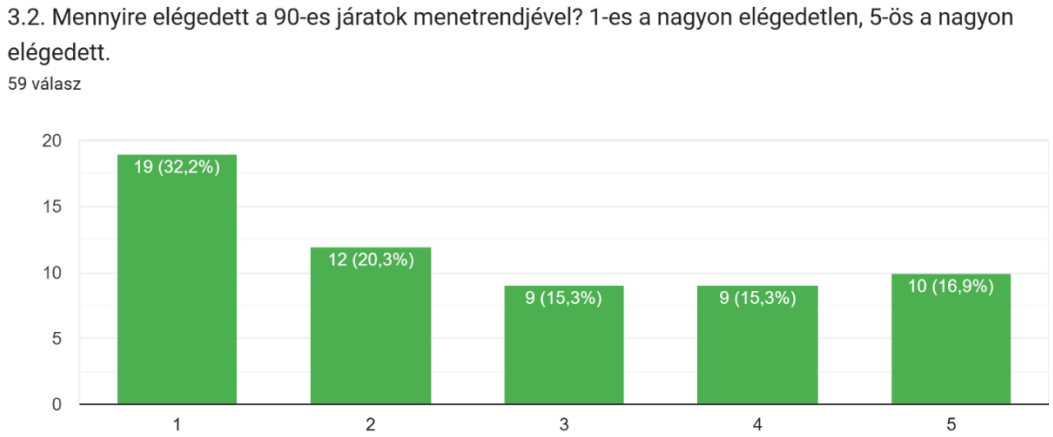
1. How are you satisfied with the route of line 90?

Category	Respondents	%
Very unsatisfied	17	28.8%
Unsatisfied	8	13.6%
Indifferent	9	15.3%
Satisfied	10	16.9%
Very satisfied	15	25.4%



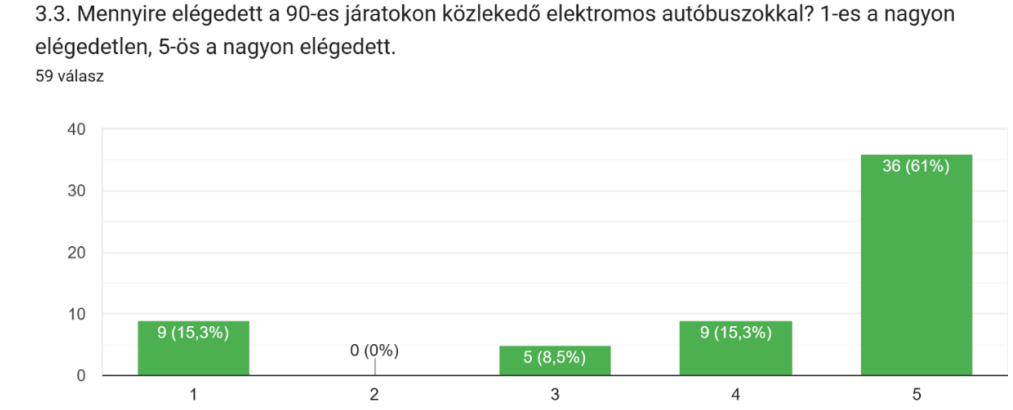
2. How are you satisfied with the schedule of line 90?

Category	Respondents	%
Very unsatisfied	19	32.2%
Unsatisfied	12	20.3%
Indifferent	9	15.3%
Satisfied	9	15.3%
Very satisfied	10	16.9%



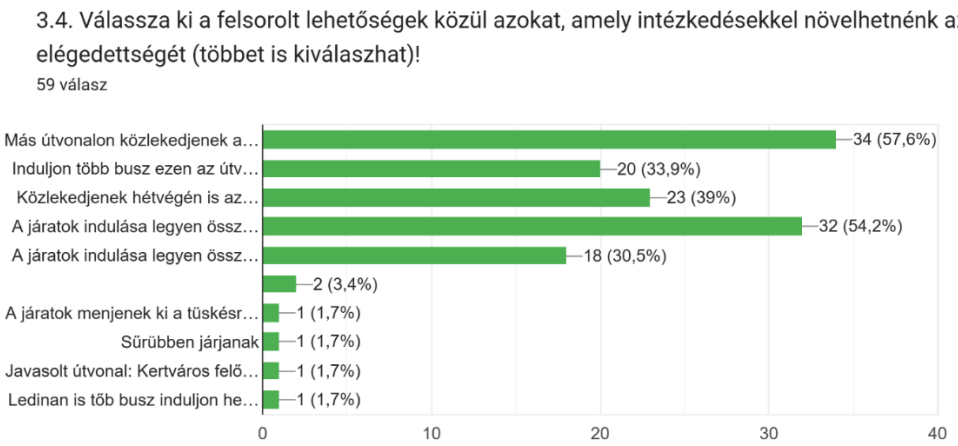
3. How are you satisfied with the electric buses what served the line 90?

Category	Respondents	%
Very unsatisfied	1	15.3%
Unsatisfied	0	0%
Indifferent	5	8.5%
Satisfied	9	15.3%
Very satisfied	36	61%



4. Select from the options listed below the measures that would increase your satisfaction (you can select more than one)!

Category	Respondents	%
Buses should take a different route between the two terminals.	34	57.6%
More buses should run on this route.	20	33.9%
Buses should also run on weekends.	23	39%
Bus departures should be coordinated with other buses.	32	54.2%
Bus departures should be coordinated with the working hours of workplaces in the Légszeszgyár utca area.	18	30.5%
Other	6	10.2%



5. Population specific attitude to the new service

Based on the questionnaire results, most respondents—mainly employees and students—expressed neutral or satisfied opinions about the new service, and they believe its introduction has a positive environmental impact. Although the pilot action did not change their usual travel habits, many emphasized that the new service should be maintained in the long term.

More than three-quarters of the respondents had already been using public transport prior to the pilot period, but among those who previously relied on other transport modes, a small number reported that they started using public transport specifically after the launch of the new route. This suggests that while the service primarily builds on the existing public transport user base, it has also attracted some new passengers.

The vast majority of respondents do not live with a disability, and those who do reported that the newly introduced route had no significant impact on their daily mobility. Therefore, feedback from respondents with disabilities did not differ markedly from the overall evaluation and acceptance of the new service.

E.4. Stakeholders' consultation

E.4.1. The stakeholders' meeting 10/12/2025

Name of the PP: **STRIA**

Date of the meeting: **10/12/2025**

Venue of the meeting: **Microsoft Teams**

E.4.1.1. Number and types of participants

There was total of 7 participants on the stakeholders' consultation. More information is available upon request.

E.4.1.2. A short summary of the PA presentation

ToC of PPT presentation:

- Purpose and objectives of the OPTI-UP project
- Presentation of Pilot activity:
  - Goals and objectives
  - Introduced the summary of the Pilot Action – the bus line No 90
  - Introduced the key results based on data collection and monitoring
  - Introduced the predefined KPI parameters as measured during the Pilot Action
- Discussion
  - Stakeholder insights and recommendations

E.4.1.3. Insights and feedback from stakeholders

E.4.1.3.1. Operational implications of PA

1. What are the necessary planning steps in order to replicate the pilot solution (documentation, strategies, plans, funds, stakeholders, purchase of additional vehicles) and which steps take the most time?

   Answer: Tüke Busz informed us at the follow-up to the stakeholder meeting that the Municipality of Pécs decided that the exploitation of non-serviced public transport areas is to be continued after the closure of the pilot action. Until June 2026 the Pilot Action can be replicated.

2. Who are the main stakeholders that need to be involved in planning and implementation in order to replicate the pilot solution?

   Answer: The decision maker is the Municipality of Pécs, the operator is Tüke Busz Plc.

3. Where do you see the main issues or what are the prerequisites for successful replication of the pilot solution?

   Answer: There was no feedback received. The audience accepted the information shared.

4. What are the criteria to decide whether to continue or close the pilot action (why did you decide to continue or close the PA activities?

   Answer: Because the Municipality wanted to keep the new connection to the non-serviced public transport area as Tüke Busz informed us at the follow-up.

E.4.1.3.2. Financial implications

1. What are the main costs for implementation of the pilot solution?

   Answer: The main costs were vehicle mileage and drivers' wages.

2. What are the main funds for implementation of the pilot action?

   Answer: The costs of the pilot action were covered by the OPTI-UP project funds.

3. Do you see any other possibilities to finance upkeeping of the pilot action?

   Answer: There was no feedback received. The audience accepted the information shared.

4. How can expansion of the pilot activity in the same area or in other areas impact the costs (e.g. optimisation of personnel, vehicle fleet…)?

   Answer: There was no feedback received. The audience accepted the information shared.

5. What funds do you see for replication of the pilot solution to other areas in the country or other regions?

   Answer: There was no feedback received. The audience accepted the information shared.

E.4.1.3.3. Recommendations for improvement and up-scaling

1. Do you see in your county other locations, municipalities, regions where similar solution could be applied?

   Answer: The Pilot Action solution can be applied in cities (Miskolc, Paks) where electric buses operate and where there are areas that currently lack public transport connections.

2. How do you see long-term optimisation of the PA (e.g. leverage of bigger vehicle fleet, more users, re-distribution of drivers, engagement of licensed drivers, capacity of vehicles, stability of financing, reinventing of passenger services with other options, development of SW support…)?

   Answer: The Pilot Action service will continue to be available, but increasing the number of bus services would mean a better, more accessible service.

3. What is needed in terms of formal procedures for easier expansion of the solution (speeding the process) and upkeeping it (e.g. who finances, decides on additional schedule departures or line layout modification – what are limitations)?

   Answer: There was no feedback received. The audience accepted the information shared.

4. How do you see possibilities given by the national (regional) legislation to introduce pilot actions into existing operations of the PT (e.g. 6 months change of the granted PSO on PT) – what are the needed actions to make pilot actions easier to implement and measure their success?

   Answer: There was no feedback received. The audience accepted the information shared.

5. Do we need a standardized methodology for identifying resident's (passengers') needs that would differently address big agglomerations and smaller settlements, regular services and DRT… – how do you identify the needs today?

   Answer: There was no feedback received. The audience accepted the information shared.

6. What is the drive (incentive) for selection of alternative fuel vehicles in the operator's vehicle fleet?

   Answer: Environmentally friendly and lower operating costs.

7. Do you provide support for transport operations on the basis of a commercial or custom-designed SW. Would you be ready to use an openly adaptable EU solution (e.g. for DRT service) to assure standardisation and easier cross-border integration of services?

   Answer: There was no feedback received. The audience accepted the information shared.

E.4.2. The stakeholders' meeting 11/12/2025

Name of the PP: **STRIA**

Date of the meeting: **11/12/2025**

Venue of the meeting: **52 Siklósi street, Pécs**

Figure 28: The stakeholders' meeting 11/12/2025

E.4.2.1. Number and types of participants

There was total of 4 participants on the stakeholders' meeting. More information is available upon request.

E.4.2.2. A short summary of the PA presentation

ToC of PPT presentation:

- Purpose and objectives of the OPTI-UP project
- Presentation of Pilot activity:
  - Goals and objectives
  - Introduced the summary of the Pilot Action – the bus line No 90
  - Introduced the key results based on data collection and monitoring
  - Introduced the predefined KPI parameters as measured during the Pilot Action
- Discussion
  - Stakeholder insights and recommendations

E.4.2.3. Insights and feedback from stakeholders

E.4.2.3.1. Operational implications of PA

1. What are the necessary planning steps in order to replicate the pilot solution (documentation, strategies, plans, funds, stakeholders, purchase of additional vehicles) and which steps take the most time?

   Answer: Municipality of Pécs decided that the exploitation of non-serviced public transport areas is to be continued after the closure of the pilot action. Until June 2026 the Pilot Action can be replicate.

2. Who are the main stakeholders that need to be involved in planning and implementation in order to replicate the pilot solution?

   Answer: The decision maker is the Municipality of Pécs, the operator is Tüke Busz Plc.

3. Where do you see the main issues or what are the prerequisites for successful replication of the pilot solution?

   Answer: BIOKOM Nonprofit Ltd. advised tailoring the timetable to daily peak hours and making effective promotion of the further pilot or further new bus lines to increase passenger numbers.

4. What are the criteria to decide whether to continue or close the pilot action (why did you decide to continue or close the PA activities?

   Answer: Because the Municipality wanted to keep the new connection to the non-serviced public transport area.

E.4.2.3.2. Financial implications

1. What are the main costs for implementation of the pilot solution?

   Answer: not relevant

2. What are the main funds for implementation of the pilot action?

   Answer: not relevant

3. Do you see any other possibilities to finance upkeeping of the pilot action?

   Answer: not relevant

4. How can expansion of the pilot activity in the same area or in other areas impact the costs (e.g. optimisation of personnel, vehicle fleet…)?

   Answer: not relevant

5. What funds do you see for replication of the pilot solution to other areas in the country or other regions?

   Answer: not relevant

E.4.2.3.3. Recommendations for improvement and up-scaling

1. Do you see in your county other locations, municipalities, regions where similar solution could be applied?

   Answer: There was no feedback received. The audience accepted the information shared.

2. How do you see long-term optimisation of the PA (e.g. leverage of bigger vehicle fleet, more users, re-distribution of drivers, engagement of licensed drivers, capacity of vehicles, stability of financing, reinventing of passenger services with other options, development of SW support…)?

   Answer: There was no feedback received. The audience accepted the information shared.

3. What is needed in terms of formal procedures for easier expansion of the solution (speeding the process) and upkeeping it (e.g. who finances, decides on additional schedule departures or line layout modification – what are limitations)?

   Answer: There was no feedback received. The audience accepted the information shared.

4. How do you see possibilities given by the national (regional) legislation to introduce pilot actions into existing operations of the PT (e.g. 6 months change of the granted PSO on PT) – what are the needed actions to make pilot actions easier to implement and measure their success?

   Answer: There was no feedback received. The audience accepted the information shared.

5. Do we need a standardized methodology for identifying resident's (passengers') needs that would differently address big agglomerations and smaller settlements, regular services and DRT… – how do you identify the needs today?

   Answer: There was no feedback received. The audience accepted the information shared.

6. What is the drive (incentive) for selection of alternative fuel vehicles in the operator's vehicle fleet?

   Answer: There was no feedback received. The audience accepted the information shared.

7. Do you provide support for transport operations on the basis of a commercial or custom-designed SW. Would you be ready to use an openly adaptable EU solution (e.g. for DRT service) to assure standardisation and easier cross-border integration of services?

   Answer: There was no feedback received. The audience accepted the information shared.

E.4.3. The stakeholders' meeting 30/1/2026

Name of the PP: **STRIA**

Date of the meeting: **30/1/2026**

Venue of the meeting: **GoToMeeting**

E.4.3.1. Number and types of participants

There was total of 15 participants on the stakeholders' meeting. More information is available upon request.

E.4.3.2. A short summary of the PA presentation

ToC of PPT presentation:

- About OPTI-UP project
  - Presenting the aims and goals
- Present the LinkedIn video of Pécs and Paks
- About Local Plan
  - Goals of WP1
  - Results of short-term scenarios
  - Result of long-term scenarios
  - Analysis of public transport data
  - Implementation of transport modelling in PTV VISUM

E.4.3.3. Insights and feedback from stakeholders

E.4.3.3.1. Outcomes of LUTI & transport modelling scenarios

1. How do you evaluate the validity and usefulness of the outcomes of transport scenario simulations?

   Answer: There was no feedback received. The audience accepted the information shared.

2. How do you assess use of transport modelling in planning of measures for improvement of public transport, including the presented method of the model implementation and finetuning in view of its potential for use at the local level?

   Answer: There was no feedback received. The audience accepted the information shared.

APPENDIX F: Appendix: ČESKÝ KRUMLOV pilot action

Thematic field: Alternative Fuel Technologies - focuses on testing the impact of electric propulsion vehicles on energy efficiency and public transport (PT) ridership by enhancing comfort and cleanliness, both contributing to greater sustainability.

Pilot action in Český Krumlov (Czech Republic): introduction of an electric minibus, connecting residential areas with the city centre and connecting with regional transport; modernizing public transport in cities with historic character and challenging terrain by employing environmentally friendly PT solution.

F.1. Site-visit

Name of the PP:	VŠTE
Date:	15.09.2025
Venue:	Český Krumlov Bus Station, Line 2

F.1.1. Number and types of participants

There was total of 4 participants on the site visit. More information is available upon request.

F.1.2. Situation & challenges of PT in Český Krumlov PA area

The PA area

Český Krumlov is a historic town with approximately 12,800 inhabitants, covering an area of about 22 km^2. 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.

PT services

Public transport in Český Krumlov is primarily based on bus services and is operated through two urban bus lines (Line 1 and Line 2), which serve the city centre and surrounding residential neighbourhoods. The network provides basic accessibility to key destinations such as the hospital, the bus and railway stations, and parking areas; however, service to peripheral and hilly parts of the city is limited, especially outside peak hours. Integration with regional bus and rail transport is only partial, and public transport operations are significantly influenced by seasonal tourist demand. The pilot action complements the existing system by introducing an electric minibus with the aim of improving accessibility, comfort, and the environmental performance of public transport in the pilot area.

PT challenges

Public transport in Český Krumlov faces several challenges related to the town's historic urban structure, hilly terrain, and strong seasonal tourist demand. The existing bus network is limited in flexibility and provides insufficient coverage in peripheral residential areas, particularly outside peak hours. Accessibility for seniors and people with reduced mobility is inadequate, and the current public transport fleet relies largely on conventional diesel vehicles, contributing to environmental pressure in the historic city centre. Public transport services are only partially integrated with regional bus and rail connections, and seasonal peaks cause congestion, reduced service reliability, and increased demand for parking.

F.1.3. Operated PA solution

The operated pilot action solution in Český Krumlov consists of the introduction of an electric bus as an innovative and sustainable public transport service. The pilot operation is carried out on an existing bus route, where the electric bus replaced a conventionally used bus within the pilot action, without changing the basic level of transport service in the area. The solution is designed to increase the availability and attractiveness of public transport, particularly in areas with limited access to existing services (G1). By using electric propulsion, the pilot action contributes to reducing CO_2 emissions and noise levels, thereby improving environmental conditions in the historic city centre (G2). The pilot supports a modal shift from individual car use to public transport by offering a more comfortable, accessible, and reliable service (G3). Operational data collected during the pilot operation will be evaluated in order to optimise the public transport network and assess the potential for scaling up the solution (G4). The service is designed with a strong focus on inclusivity, ensuring improved mobility for seniors and people with reduced mobility (G5).

F.1.4. Site visit implementation

Preparatory activities

Preparatory activities for the pilot action in Český Krumlov focused on organisational, technical, and coordination tasks to ensure smooth implementation and full operation of the pilot solution. The project team was established with representatives of VŠTE, including the Lead Project Manager, application developer, and communication manager, in cooperation with the City of Český Krumlov as the key local stakeholder.

During the preparatory phase, coordination meetings were held between the project partner and the Department of Transport and Road Management of the City of Český Krumlov in order to align the pilot action with local transport conditions and operational requirements. Technical preparation included cooperation with the transport operator, verification of the selected route, and preparation for the deployment of the electric bus within the existing public transport system. Communication activities were also carried out to support internal coordination and information flow related to the pilot implementation.

These preparatory steps ensured that the pilot action could be showcased as a fully operational solution during the site visit.

Visit to the site

The site visit in Český Krumlov was carried out to observe the real operation of the pilot electric bus and to assess its performance under local conditions. The visit included a guided overview of the pilot route, during which participants experienced the service through a personal journey on the line, allowing direct observation of vehicle operation, passenger boarding, comfort, and accessibility.

During the site visit, the availability and quality of passenger information at stops along the route were checked, including timetables and information related to the pilot service. Operational aspects were discussed on site with representatives of the City of Český Krumlov and the Department of Transport and Road Management. In addition, feedback was collected from the operating staff regarding daily operation, technical performance of the electric bus, and any challenges encountered during service delivery.

The site visit concluded with a summary discussion focusing on initial observations, operational experience, and potential areas for further optimisation of the pilot solution.

Figure 29: electric bus at the Český Krumlov bus station

Figure 30: link to the pilot action questionnaire available at the bus stop

Figure 31: members of the VŠTE team participating in the site visit

Figure 32: link to the pilot action survey in the electric bus

Figure 33: OPTI-UP project marking on the electric bus

F.1.5. Insights of PA implementation & feedback (visitors/users)

During the implementation of the pilot action in Český Krumlov, the operation of the electric bus within the regular public transport system was observed. The pilot operation was stable and ran without major operational issues, and the electric bus proved to be suitable for the local conditions, particularly in hilly terrain.

Feedback from passengers was predominantly positive. Users especially appreciated the quiet operation of the vehicle and the smoothness of the ride. Some passengers noted the need for clearer information about the pilot service.

Operational staff assessed the pilot operation positively, particularly in terms of vehicle handling, driving comfort, and environmental benefits.

Overall, the pilot action confirmed the technical and operational feasibility of deploying electric buses in the conditions of a small city and provided a useful basis for further decision-making regarding their use in public transport.

F.2. Pilot action performance - KPIs

F.2.1. Plan of performance monitoring and evaluation

F.2.1.1. Identification of key performance indicators (KPIs)

Table 84: Pilot action KPIs

KPI	Brief description	Unit	Target
KPI_1	Average number of passengers per electric vehicle per day: It measures the number of passengers per day.	Passengers /day	135
KPI_2	Average range per electric vehicle per charge	Km/charge	140

KPI	Brief description	Unit	Target
KPI_3	Operational cost savings (fuel and maintenance) per vehicle/month	EURO, CZK/vehicle, EURO, CZK/month	Reduction in fuel and maintenance costs 5 %
KPI_4	CO_2 emissions per km travelled per user	Grams/km/user	Reduction in CO_2 emissions 5 %
KPI_5	Share of kms travelled with zero emission vehicles in total kms travelled	%	Increase in the number of zero-emission kilometres 5 %

F.2.1.2. Identification of data sources & tool for KPIs

Table 85: Identification of data sources & tools for KPIs data

KPI	Data list	Methodology	Data source	Data tool
KPI_1	- Daily Number of Passengers	Total Number of Passengers per Day / Statistical Survey	Carrier, Onboard Passenger Counters	Onboard Counters, Daily Reports
KPI_2	- Number of Kilometres Driven per Charge, Number of Charges	Total Kilometres Driven Between Charges / Number of Charges	Records from the Vehicle Onboard System	Telematics, GPS System, Operational Logbook
KPI_3	Monthly Fuel and Maintenance Costs for Electric and Conventional Vehicles	Difference Between Average Monthly Costs of Electric and Conventional Vehicles	Carrier's Accounting, Technical Records of Vehicles	Cost Tables, Accounting Software
KPI_4	Amount of CO_2 Emissions, Number of Kilometres Driven, Number of Users	Total CO_2 Emissions / (Total Kilometres * Number of Users)	Calculations Based on Consumption and Emission Factors	Excel, Calculations According to Methodology
KPI_5	Number of Kilometres Driven by Zero-Emission Vehicles, Total Number of Kilometres	(Number of Kilometres Driven by Zero-Emission Vehicles / Total Number of Kilometres) * 100	Records of Vehicles and Routes	Fleet Management Software, Excel

F.2.2. Analysis of Key Performance Indicators

F.2.2.1. KPI_1: Average number of passengers per electric vehicle per day

Table 86: Weekly monitoring of the KPI_1 values

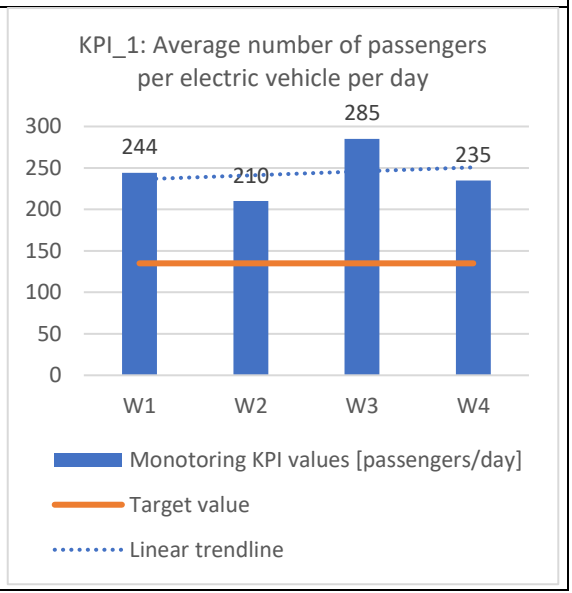
KPI_1: Average number of passengers per electric vehicle per day				
Baseline KPI value [number of passengers]: 200				
Target KPI value [number of passengers]: 135				
Week	Monitoring KPI values [passengers/day]	Deviation from target value [passengers/day]	Relative deviation from target value [%]	
W1	244	109	81	
W2	210	75	56	
W3	285	150	111	
W4	235	100	74	
Standard deviation	31.18		23.1	

Table 87: Evaluation of the KPI_1 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	The average monitored KPI value is approximately 244 passengers per day, which is higher than the baseline value of 200 passengers per day. However, considering the short monitoring period and observed variability, the difference does not clearly indicate a substantial structural change compared to the baseline state. Therefore, the impact of the pilot action on the baseline level is assessed as insignificant.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☒ Positive trend ☐ Negative trend ☐ Neutral trend	All monitored weekly KPI values significantly exceed the target value of 135 passengers per day. Although some week-to-week fluctuations are present, the

No.	Evaluation question	KPI Results	Explanation
			overall development remains well above the target and shows an upward tendency. This indicates a positive development of the KPI in relation to the set target.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	The average monitored KPI value is approximately 244 passengers per day, which is higher than the baseline value of 200 passengers per day. However, considering the short monitoring period and observed variability, the difference does not clearly indicate a substantial structural change compared to the baseline state. Therefore, the impact of the pilot action on the baseline level is assessed as insignificant.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☐ Very good selection ☒ Good selection ☐ Unsuitable selection	The standard deviation of the KPI values is 31.18 passengers, corresponding to a relative standard deviation of approximately 23.1%. According to the defined criteria, this level of variability indicates a good target value selection. The target is realistic and achievable, while still allowing meaningful evaluation of performance changes.
5.	Has the pilot action proved successful or unsuccessful in relation to the baseline and set target values? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The monitored KPI values consistently exceed both the baseline value and the target value throughout the observed period. In addition, the overall trend indicates stable or increasing performance over time. This confirms that the pilot action has been successful in achieving and surpassing the intended KPI objectives.

F.2.2.2. KPI_2: Average range per electric vehicle per charge

Table 88: Weekly monitoring of the KPI_2 values

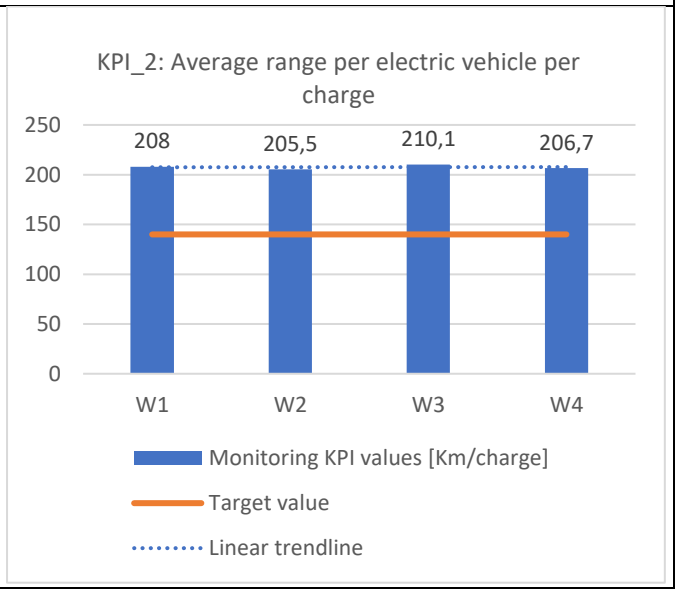
KPI_2: Average range per electric vehicle per charge				
Baseline KPI value [Km/charge]: Data are not available				
Target KPI value [Km/charge]: 140				
Week	Monitoring KPI values [Km/charge]	Deviation from target value [Km/charge]	Relative deviation from target value [%]	
W1	208.00	68	49	
W2	205.50	65.50	47	
W3	210.10	70.10	50	
W4	206.70	66.70	48	
Standard deviation	1.97		1.41	

Table 89: Evaluation of the KPI_2 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☐ Increasing trend ☐ Decreasing trend ☒ Stable trend	The monitored KPI values show only minor fluctuations over the observed four-week period. Due to the short monitoring horizon, no reliable long-term trend can be identified. Therefore, long-term expectations of the pilot action cannot be robustly assessed at this stage.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☒ Positive trend ☐ Negative trend ☐ Neutral trend	The monitored KPI values consistently exceed the target value of 140 km per charge and show a slight upward tendency over the observed period. This indicates an improvement in the average range per electric vehicle per charge in relation to the set target.
3.	What is an impact of PA to the baseline state?	☒ Improvement of previous state	The baseline state for this KPI is not available, as the electric bus was

No.	Evaluation question	KPI Results	Explanation
	- Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☐ Insignificant change ☐ Worsening of previous state	not operated prior to the pilot action. The introduction of electric bus operation represents a clear improvement compared to the previous state, as the KPI value was effectively zero before implementation.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☒ Very good selection ☐ Good selection ☐ Unsuitable selection	The standard deviation of the monitored KPI values is 1.97 km, corresponding to a relative standard deviation of approximately 1.41%. This indicates very low variability of the KPI values. According to the defined criteria, the target value is considered very well selected.
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	Despite the absence of a baseline value, all monitored KPI values consistently exceed the set target throughout the monitoring period. This indicates that the pilot action has successfully achieved the defined KPI objective.

F.2.2.3. KPI_3: Operational cost savings (fuel and maintenance) per vehicle/month

Table 90: Weekly monitoring of the KPI_3 values

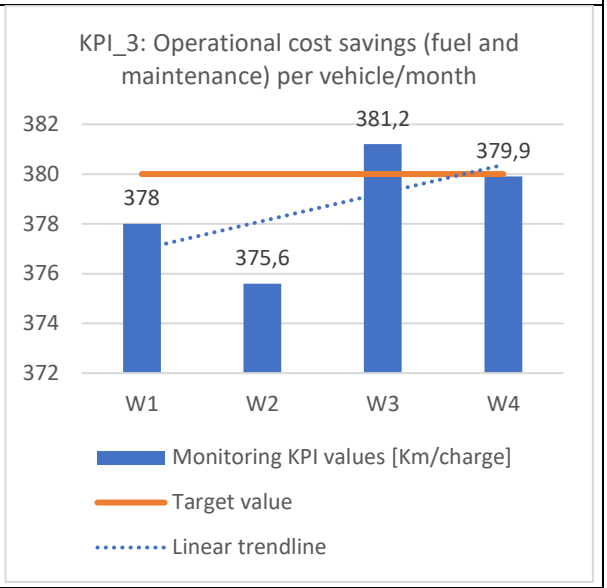
KPI_3: Operational cost savings (fuel and maintenance) per vehicle/month				
Baseline KPI value [EURO/vehicle]: 400				
Target KPI value [EURO/vehicle]: 5 % reduction				
Week	Monitoring KPI values [EURO/vehicle]	Deviation from target value [EURO/vehicle]	Relative deviation from target value [%]	
W1	378.00	-22	-6	
W2	375.60	-24.4	-6	
W3	381.20	-18.8	-5	
W4	379.90	-20.1	-5	
Standard deviation	2.43		0.61	

Table 91: Evaluation of the KPI_3 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☒ Increasing trend ☐ Decreasing trend ☐ Stable trend	The monitored KPI values show an increasing trend over the observed period, indicating rising operational costs per vehicle. As higher KPI values correspond to higher costs, this trend represents a deterioration in performance rather than an improvement. From a cost-efficiency perspective, the observed trend does not indicate positive long-term expectations.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☐ Positive trend ☐ Negative trend ☒ Neutral trend	The monitored KPI values remain close to the target level corresponding to a 5% cost reduction. While some weekly improvements are observed, the overall development does not indicate a clear directional trend. The KPI development in relation to

No.	Evaluation question	KPI Results	Explanation
			the target is therefore assessed as neutral.
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	Compared to the baseline value of 400 EUR per vehicle per month, all monitored KPI values indicate lower operational costs. This demonstrates an improvement compared to the baseline state, suggesting that the pilot action contributes to reduced fuel and maintenance costs.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☒ Very good selection ☐ Good selection ☐ Unsuitable selection	The standard deviation of the KPI values is 2.43 EUR, corresponding to a relative standard deviation of approximately 0.6%. This indicates very low variability of the monitored values. According to the defined criteria, the target value is considered very well selected.
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The monitored KPI values consistently remain below the baseline level and are close to the target corresponding to a 5% reduction. This confirms that the pilot action has been successful in reducing operational costs per vehicle.

F.2.2.4. KPI_4: CO_2 emissions per km travelled per user

Table 92: Weekly monitoring of the KPI_4 values

KPI_4: CO_2 emissions per km travelled per km			
Baseline KPI value [Grams/km]: 0			
Target KPI value [Grams/km]: Reduction 5 %			
Week	Monitoring KPI values [Grams/km]	Deviation from target value [Grams/km]	Relative deviation from target value [%]
W1	799.96	799.96	-
W2	792.40	792.40	-
W3	807.80	807.80	-
W4	798.60	798.60	-
Standard deviation	6.33		-

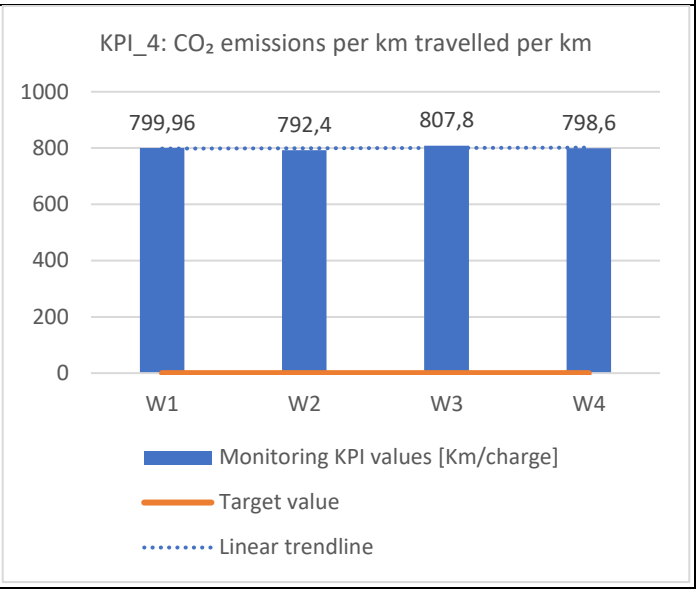


Table 93: Evaluation of the KPI_4 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☐ Increasing trend ☐ Decreasing trend ☒ Stable trend	The monitored KPI values remain relatively stable over the observed period, with only minor week-to-week fluctuations. Due to the limited length of the monitoring period, no reliable long-term trend can be identified. Long-term expectations regarding emission reduction therefore cannot be conclusively assessed at this stage.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☒ Positive trend ☐ Negative trend ☐ Neutral trend	The introduction of electric bus operation resulted in a reduction of CO_2 emissions compared to the previous state. This development represents positive progress toward the target of reducing emissions.
3.	What is an impact of PA to the baseline state?	☒ Improvement of previous state	The baseline value for this KPI was zero, as no electric bus operation was present prior to the pilot

No.	Evaluation question	KPI Results	Explanation
	- Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☐ Insignificant change ☐ Worsening of previous state	action. The deployment of electric buses has resulted in measurable CO_2 emission reductions, representing a clear improvement compared to the baseline state.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☒ Very good selection ☐ Good selection ☐ Unsuitable selection	The correctness of the target value selection cannot be fully assessed, as the baseline value was zero prior to the pilot action. Due to the lack of historical reference data, it is not possible to fully evaluate whether the target of a 5% reduction was optimally defined.
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The implementation of electric bus operation has resulted in a clear reduction of CO_2 emissions compared to the baseline state with no electric operation. Based on the available data, the pilot action can therefore be considered successful in terms of reducing emissions.

F.2.2.5. KPI_5: Share of kms travelled with zero emission vehicles in total kms travelled

Table 94: Weekly monitoring of the KPI_ values

KPI_5: Share of kms travelled with zero emission vehicles in total kms travelled			
Baseline KPI value [%]: 0			
Target KPI value [%]: Increase 5%			
Week	Monitoring KPI values [%]	Deviation from target value [%]	Relative deviation from target value [%]
W1	35.10	35.10	-
W2	34.80	34.80	-
W3	35.40	35.40	-
W4	35.00	35.00	-
Standard deviation	0.25		-

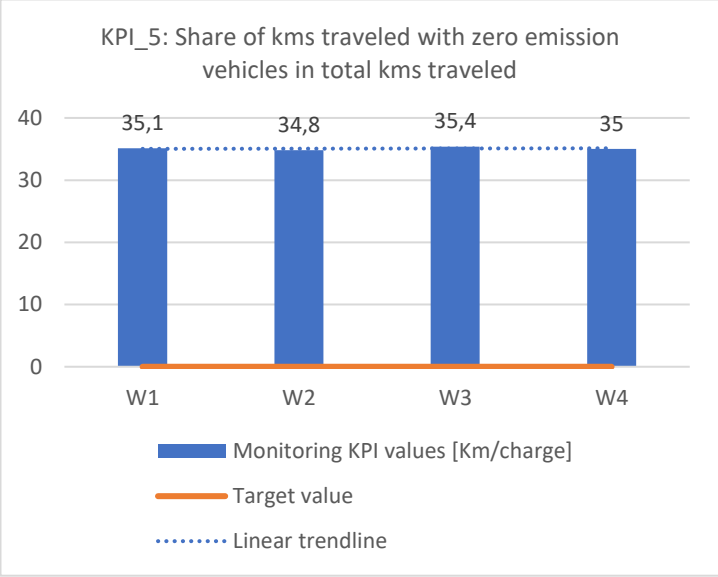


Table 95: Evaluation of the KPI_5 monitoring results

No.	Evaluation question	KPI Results	Explanation
1.	What are long-term expectations of the pilot action based on the weekly trend of KPI?	☐ Increasing trend ☐ Decreasing trend ☒ Stable trend	The monitored KPI values remain relatively stable over the observed period, with only minor week-to-week fluctuations. Due to the short monitoring period, no reliable long-term trend can be identified. Long-term expectations of the pilot action therefore cannot be conclusively assessed at this stage.
2.	Does the trend of KPI develop in a positive, negative or neutral direction in relation to the set target?	☒ Positive trend ☐ Negative trend ☐ Neutral trend	The KPI development shows a positive direction in relation to the set target, as zero-emission vehicle operation was not present prior to the pilot action. The observed share of kilometres travelled with zero-emission vehicles therefore represents a clear improvement and confirms positive progress toward the objective of increasing zero-emission mobility.

No.	Evaluation question	KPI Results	Explanation
3.	What is an impact of PA to the baseline state? - Improved: (average (KPI - baseline value) >10% - Insignificant change 10%>(average (KPI) - baseline value) >-10% - Worse: (average (KPI - baseline value) <-10%	☒ Improvement of previous state ☐ Insignificant change ☐ Worsening of previous state	The baseline value for this KPI was 0%, as zero-emission vehicles were not operated prior to the pilot action. The introduction of zero-emission vehicle operation represents a clear improvement compared to the baseline state, resulting in a significant share of kilometres travelled with zero emissions.
4.	Was the target value selected correctly? - Very good (STD <20%), - Good (20% ≤ STD <40%), - Unsuitable (STD>40%)?	☒ Very good selection ☐ Good selection ☐ Unsuitable selection	The correctness of the target value selection cannot be fully assessed, as the baseline value for this KPI was zero prior to the pilot action. Due to the absence of historical reference data, it is not possible to fully evaluate whether the target level was set optimally.
5.	Has the pilot action proved successful or unsuccessful in relation to the set target value? Compare the calculated average value of KPI to the baseline and set target: - Successful: if average (KPI) has moved in direction of the target - Unsuccessful: if average (KPI) is close or even over the target.	☒ Successful ☐ Unsuccessful	The KPI values demonstrate a clear improvement compared to the baseline value of 0% and indicate progress toward the defined target of increasing the share of zero-emission kilometres. Based on the available data, the pilot action can be considered successful.

F.2.3. Evaluation of PA performance

F.2.3.1. Summary of evaluation

Table 96: Aggregative statistics of KPI monitoring evaluation

No	Evaluation question	KPI monitoring results						Total
		Metrics	KPI_1	KPI_2	KPI_3	KPI_4	KPI_5	
1.	Trend of long-term expectation of the PA	Increasing	•		•			2
		Decreasing						0
		Stable		•		•	•	3
2.	Trend of KPI in relation to set target	Positive	•	•		•	•	4
		Negative						0
		Neutral			•			1
3.	Evaluation of the impact regarding the baseline situation	Improvement	•	•	•	•	•	5
		Insignificant change						0
		Worsening						
4.	Definition of target value	Very good		•	•	•	•	4
		Good	•					1
		Not good						0
5.	Successfulness of PA in relation to the baseline and target value	Successful	•	•	•	•	•	5
		Unsuccessful						0

F.2.3.1.1. Assessment of overall achievement of the Pilot Action (PA) considering all KPIs

Baseline values are indicative and reflect best-available historical data rather than strictly comparable measurement periods. Some KPIs were retained for experimental or learning purposes and are therefore interpreted with limited weight in the overall success assessment.

The Pilot Action demonstrated overall positive results when assessed by considering all monitored KPIs in an integrated manner. The introduction of electric bus operation contributed to improvements across operational, economic and environmental dimensions. While some KPIs showed a stable development due to the relatively short monitoring period, clear improvements compared to the previous state were achieved, particularly in environmental indicators. Overall, the Pilot Action can therefore be considered successful in meeting its main objectives.

F.2.3.1.2. Representation of the selected KPIs

The selected KPIs appropriately reflect the performance of the Pilot Action, as they cover key aspects of service operation, cost efficiency and environmental impact. Among them, the share of kilometres travelled with zero-emission vehicles is the most representative indicator, as it directly reflects the core objective of the implemented solution. CO_2 emission reduction indicators further strengthen the assessment of environmental benefits. None of the selected KPIs are considered redundant; however, for future monitoring, the inclusion of an additional indicator focused on energy efficiency (e.g. kWh per kilometre) could further improve performance evaluation.

F.2.3.1.3. Availability and sustainability of data sources

The availability and quality of data sources were generally sufficient for short-term monitoring purposes. KPI data were obtained from operational records and onboard vehicle monitoring systems, ensuring an adequate level of accuracy and consistency. For long-term sustainable data collection, the use of automated digital sources such as vehicle telematics systems is recommended. Data processing should rely on standardized digital tools, with spreadsheet-based solutions suitable for short-term analysis and dedicated databases or web-based applications recommended for long-term monitoring. Manual data collection methods should be minimized to reduce the risk of errors and improve data reliability.

F.2.3.1.4. List of essential KPIs

In the case of continuation or replication of the Pilot Solution, a monthly monitoring frequency is recommended for the most representative KPIs, particularly those related to environmental impact and operational efficiency. It is essential to regularly monitor, in particular, KPI_2 (average range per electric vehicle per charge), KPI_3 (operational cost savings) and KPI_4 (CO_2 emissions per km travelled per user).

These KPIs provide essential information for assessing the performance of the electric bus, its economic efficiency, and its contribution to emission reduction. Their continuous monitoring enables the timely identification of potential issues and supports the optimisation of operations as well as strategic decision-making for the future.

Additional KPIs may be monitored on a quarterly basis to reduce administrative burden while still enabling meaningful evaluation of longer-term trends.

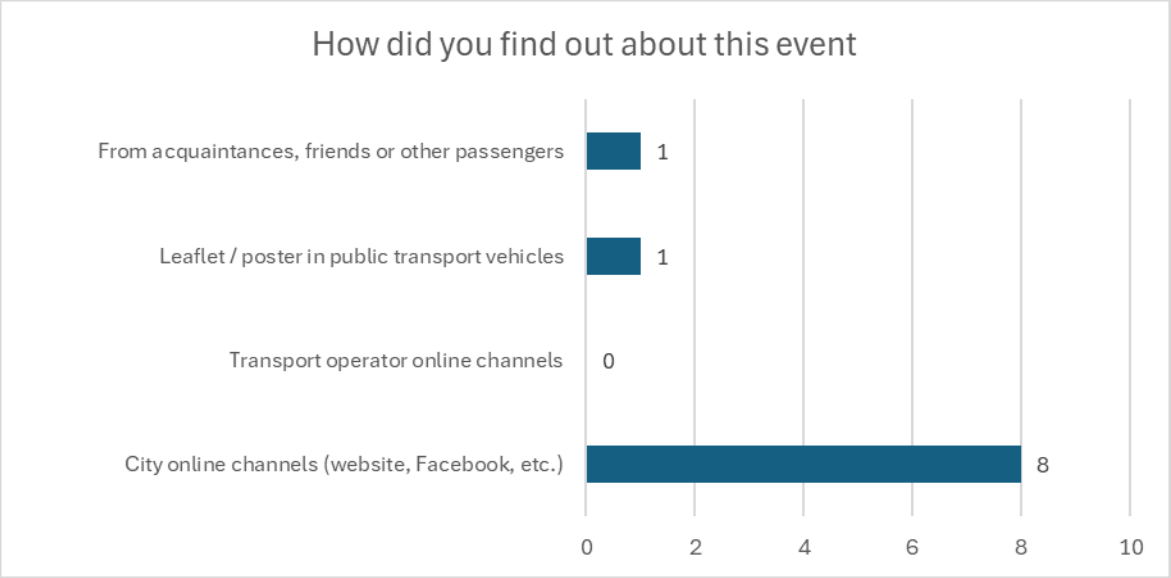
F.2.3.1.5. Proposed target values for monitoring of KPIs

For long-term monitoring, reference target values should aim to maintain or moderately improve current performance levels for passenger demand and vehicle range, achieve and sustain operational cost reductions of at least five percent compared to conventional operation, ensure continuous reduction of CO_2 emissions relative to conventional bus services, and progressively increase the share of kilometres travelled with zero-emission vehicles toward full zero-emission operation on selected routes.

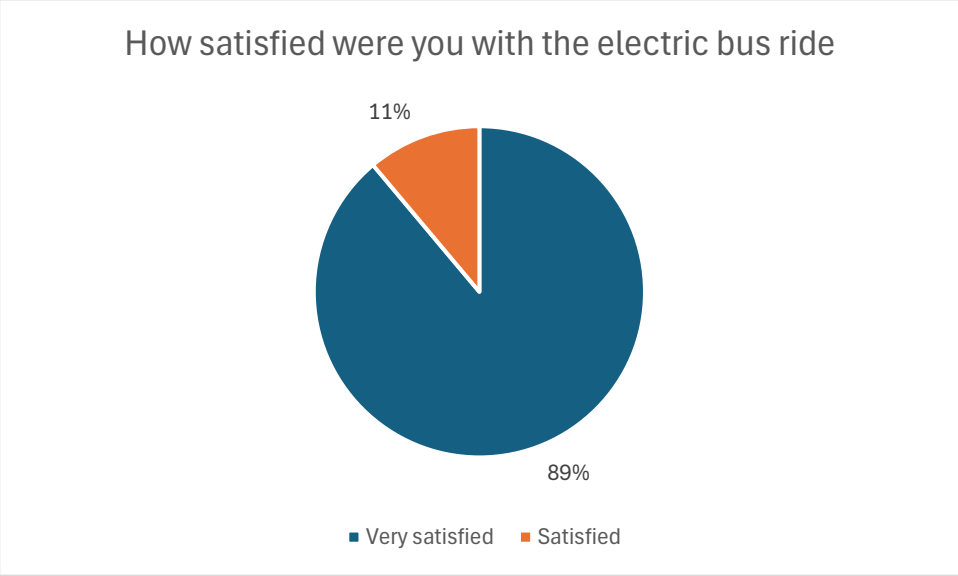
F.3. Users-survey

F.3.1. General questions

1. How did you find out about this event?



2. How satisfied were you with the electric bus ride?



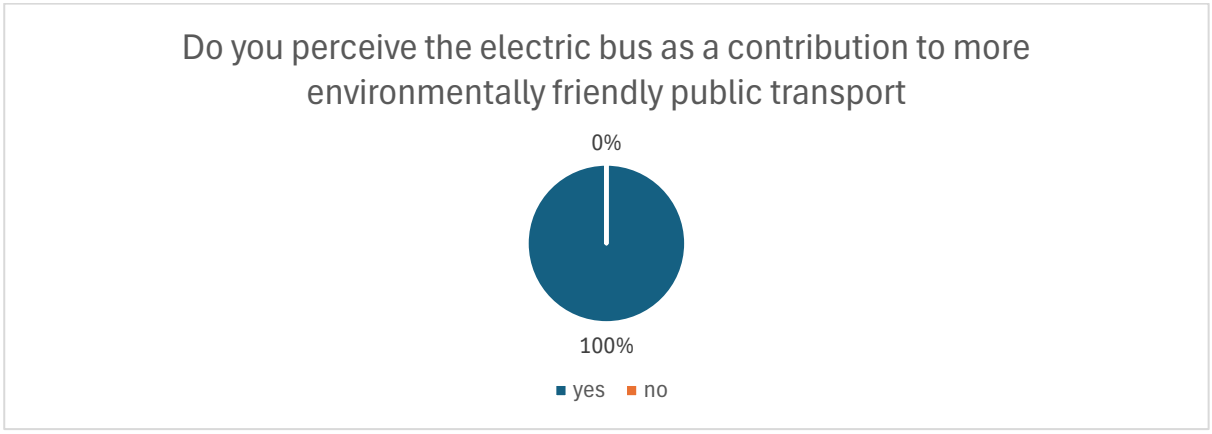
Additional comments?

The ride itself and the driver's performance were excellent, but the space between the seats is very uncomfortable for a person 185 cm tall (insufficient legroom, with knees pressed against the seat in front). Honestly, the old buses were better.

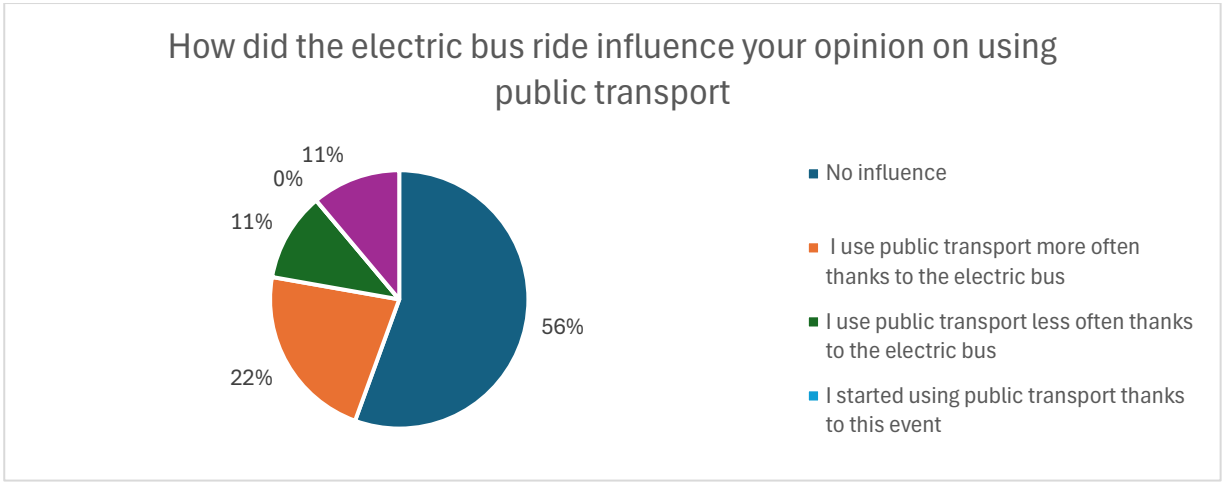
Very satisfied. Nice lighting, and the possibility to exit through multiple doors, both the rear ones and those in the middle. A smooth, calm ride with very quiet operation.

A beautiful vehicle. If it were, for example, in red and the passenger information panel worked properly, it would be absolutely fantastic.

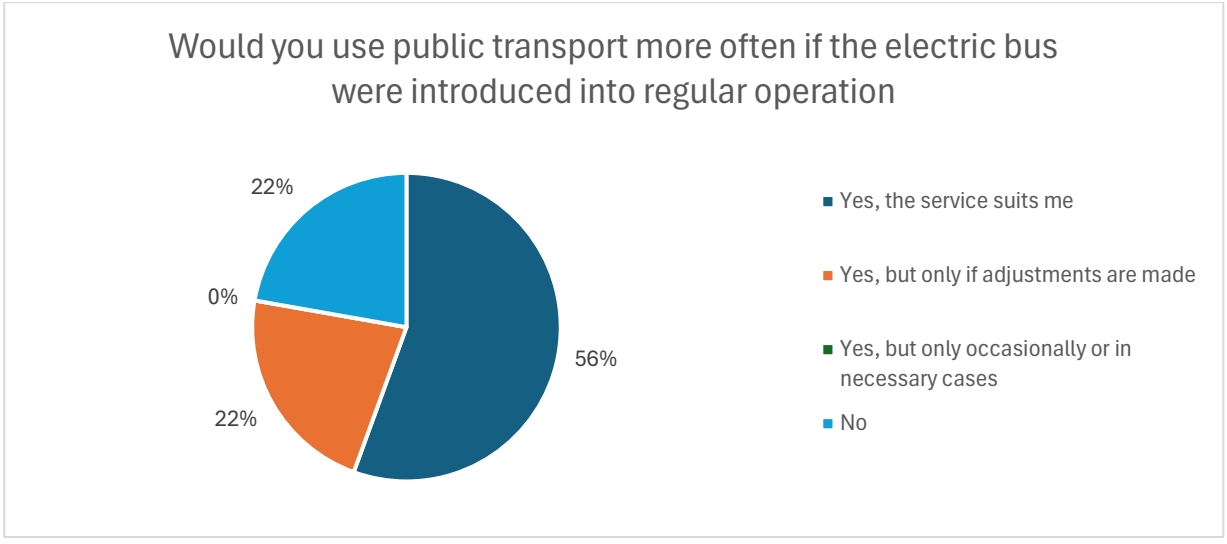
3. ***Do you perceive the electric bus as a contribution to more environmentally friendly public transport?***



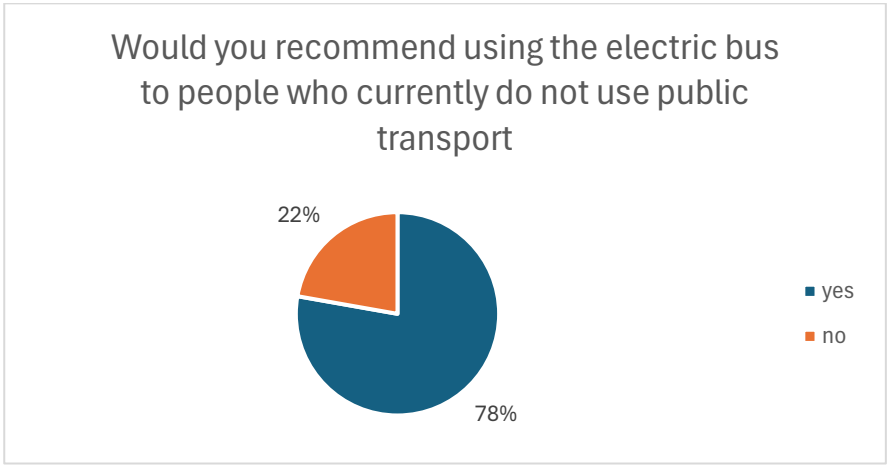
4. ***How did the electric bus ride influence your opinion on using public transport?***



5. ***Would you use public transport more often if the electric bus were introduced into regular operation?***

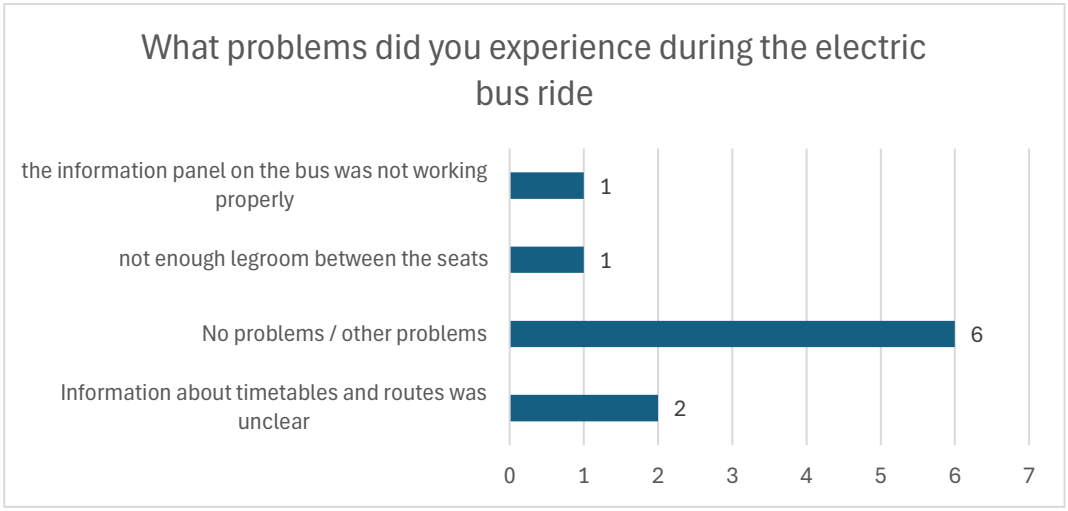


6. Would you recommend using the electric bus to people who currently do not use public transport?

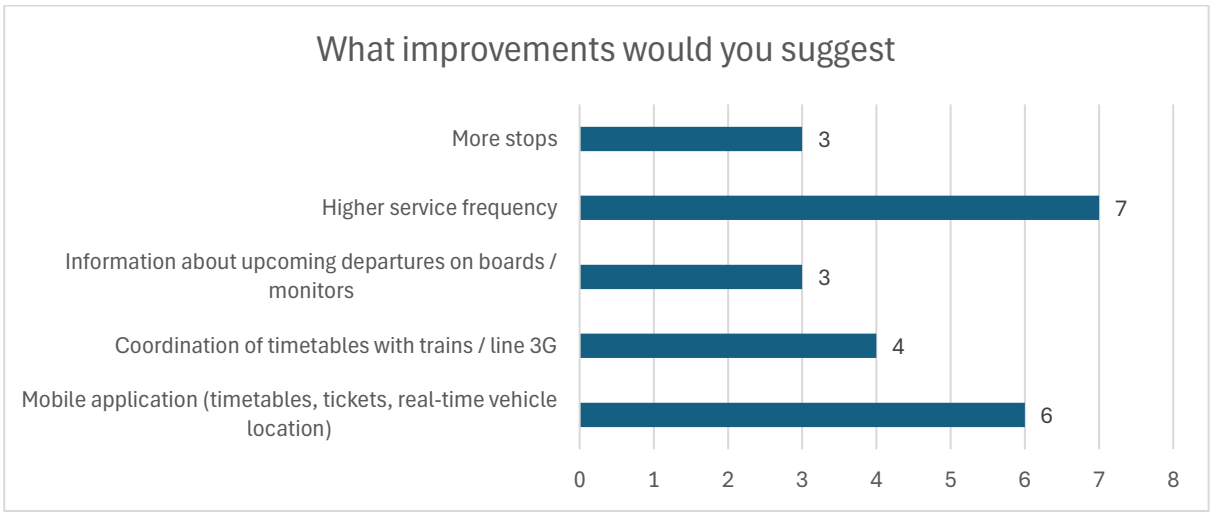


F.3.2. Specific questions

1. What problems did you experience during the electric bus ride?



2. What improvements would you suggest?



3. Population specific attitude to the new service

I would test it once more, and above all I would also try an additional bus – an 18-metre one on Line 1, which is always crowded. That would definitely make sense. Also, the outward-facing information panels could be in a different colour, and on Line 2 it should state that it goes to Vyšný instead of the bus station, as it is written now. For both lines, "Kemp Spolí" should be displayed across the entire outward-facing information panel.

If possible, I would purchase more buses of this type. If you decided to buy them, it would also be good to implement stop announcements inside the bus and, as a trial, introduce tickets with ticket machines at all stops, similar to České Budějovice. This could allow the buses to run earlier and might also help increase service frequency.

F.4. Stakeholders' consultation

Name of the PP:	Institute of Technology and Business in České Budějovice (VŠTE)
Date of the meeting:	28 January 2026
Venue of the meeting:	Okružní 517/10, 370 01 České Budějovice, Czech Republic

Figure 34: Stakeholders meeting at VŠTE

F.4.1. Number and types of participants

There was total of 5 participants on the stakeholders' meeting. More information is available upon request.

F.4.2. A short summary of the PA presentation

The meeting started with a presentation of the OPTI-UP project, followed by a discussion with stakeholders focusing on the experience gained from the pilot action and possibilities for its further development and potential expansion in Český Krumlov.

The presentation introduced the main objectives and current results of the OPTI-UP project and explained the project's approach to public transport optimisation in small and medium-sized cities through local-level planning activities. Particular attention was given to the development of the Local Public Transport Plan for Český Krumlov, which includes an analysis of the current transport situation, evaluation of available transport data, results of public transport user surveys, SWOT analysis, and the proposal of measures aimed at improving accessibility and quality of public transport services.

The presentation also covered the proposed mobility vision and strategic goals of the city, the list of key performance indicators (KPIs), and results of transport model simulations prepared using the PTV VISUM modelling tool, which evaluated different scenarios for further development of public transport services.

A significant part of the presentation focused on the pilot action involving the introduction of an electric bus into the city public transport system. The goals of the pilot operation, the baseline situation in the pilot area, the implementation process, testing phase, and monitoring of operational and environmental impacts were presented. The presentation also included results of passenger satisfaction surveys and initial operational findings that will support further optimisation of transport services.

The presentation concluded with an open discussion, during which stakeholders shared their feedback and recommendations concerning future development of public transport services and possibilities for continuation or expansion of the pilot solution in the city.

ToC of PPT presentation:

- Purpose and objectives of the OPTI-UP project
- OPTI-UP approach to public transport optimisation
- Comprehensive Strategy for optimisation of public transport networks
- Development of Local Public Transport Plan for Český Krumlov
- Analysis of public transport data
- Public transport users' opinion survey results
- SWOT analysis of public transport in Český Krumlov
- Vision and strategic mobility goals
- Proposed transport measures and activities
- List of Key Performance Indicators (KPIs)
- Transport model simulation scenarios
- Implementation of transport modelling using PTV VISUM
- Pilot activity in Český Krumlov – introduction of an electric bus
- Goals and objectives of the pilot action
- Implementation process and operational testing
- User satisfaction survey results
- KPI monitoring results
- Summary of results and recommendations
- Discussion and stakeholder feedback

Figure 35: Main slides of the presentation presented during the stakeholder meeting

F.4.3. Insights and feedback from stakeholders

F.4.3.1. Outcomes of PTV VISUM transport modelling scenarios

1. How do you evaluate the validity and usefulness of the outcomes of transport scenario simulations?

   Answer: Stakeholders considered the transport modelling results useful for illustrating potential impacts of proposed public transport measures in Český Krumlov. The simulations helped to better understand possible changes in passenger flows, service efficiency, and environmental benefits associated with different transport scenarios. Although modelling outcomes represent estimated developments, they provided valuable support for discussion and planning of future improvements in public transport services.

2. How do you assess use of transport modelling in planning of measures for improvement of public transport, including the presented method of the model implementation and finetuning in view of its potential for use at the local level?

   Answer: The use of PTV VISUM transport modelling was assessed positively as a helpful planning tool for evaluating different operational scenarios before their real implementation. Stakeholders appreciated that modelling allows optimisation of routes and service organisation while reducing risks connected with introducing changes in public transport operations. At the same time, it was highlighted that modelling results should be continuously refined using updated operational data and combined with practical experience and passenger feedback when planning future measures.

F.4.3.2. Operational implications of PA

1. What are the necessary planning steps in order to replicate the pilot solution (documentation, strategies, plans, funds, stakeholders, purchase of additional vehicles) and which steps take the most time?

   Answer: Stakeholders agreed that replication of the pilot solution requires preparation of operational documentation, updating local transport plans, securing financial resources, coordination with transport operators and regional authorities, and procurement of additional electric vehicles together with charging infrastructure. The most time-consuming steps are securing funding, procurement procedures for vehicles, and preparation of necessary infrastructure adjustments.

2. Who are the main stakeholders that need to be involved in planning and implementation in order to replicate the pilot solution?

   Answer: Key stakeholders include the City of Český Krumlov, the public transport operator, the South Bohemian Region and regional transport coordinator, infrastructure managers, and relevant municipal departments responsible for transport planning and environment. Cooperation with local communities and public transport users is also important for successful implementation.

3. Where do you see the main issues or what are the prerequisites for successful replication of the pilot solution?

   Answer:

   The main prerequisites include availability of financial resources, readiness of infrastructure for electric bus operation, and sufficient operational capacity of transport operators. Possible issues include higher investment costs, technical requirements for charging infrastructure, and the need to adapt services to local transport demand.

4. What are the criteria to decide whether to continue or close the pilot action (why did you decide to continue or close the PA activities?

   Answer:

The decision to continue the pilot action is mainly based on passenger demand, operational reliability, environmental benefits, and overall user satisfaction. In the case of Český Krumlov, positive operational experience and environmental benefits support continuation and further development of the solution.

F.4.3.3. Financial implications

1. What are the main costs for implementation of the pilot solution?

   Answer: The main costs are related to the acquisition of the electric bus, installation or adjustment of charging infrastructure, and preparation of operational conditions for the pilot service. Additional costs include driver and technical staff training, adaptation of passenger information systems, and activities related to monitoring and evaluation of pilot operation.

2. What are the main funds for implementation of the pilot action?

   Answer: The implementation of the pilot action is financed through the OPTI-UP project and the budget resources of the City of Český Krumlov. The public transport operator also contributes through its operational resources used to ensure technical and operational provision of the service.

3. Do you see any other possibilities to finance upkeeping of the pilot action?

   Answer: Future financing possibilities may include national programmes supporting environmentally friendly transport solutions or regional support schemes for public transport services. In the long term, operational optimisation and increased passenger demand may also help improve financial sustainability of the service.

4. How can expansion of the pilot activity in the same area or in other areas impact the costs (e.g. optimisation of personnel, vehicle fleet…)?

   Answer: Expansion of services may reduce unit operational costs through more efficient use of vehicles, staff, and infrastructure. Larger operational coverage allows better vehicle circulation planning and staff scheduling. However, expansion may also require additional investments in vehicles or infrastructure, which can temporarily increase total costs.

5. What funds do you see for replication of the pilot solution to other areas in the country or other regions?

   Answer: Replication of the pilot solution in other cities or regions could be supported by national funding schemes for sustainable mobility, regional public transport budgets, and future programmes focused on decarbonisation and modernisation of public transport services in small and medium-sized cities.

F.4.3.4. Recommendations for improvement and up-scaling

1. Do you see in your county other locations, municipalities, regions where similar solution could be applied?

   Answer: Similar solutions could be applied in other small and medium-sized towns with historic centres, seasonal tourism, or dispersed residential areas where sustainable and flexible public transport solutions are needed. Towns facing traffic congestion in sensitive urban areas or aiming to reduce emissions from transport could particularly benefit from introducing electric buses and optimised public transport services.

2. How do you see long-term optimisation of the PA (e.g. leverage of bigger vehicle fleet, more users, re-distribution of drivers, engagement of licensed drivers, capacity of vehicles, stability of financing, reinventing of passenger services with other options, development of SW support…)?

   Answer: Long-term optimisation can be achieved through gradual expansion of the electric vehicle fleet, improvement of service frequency based on demand, better allocation of vehicles and drivers, and further development of digital tools supporting service planning and passenger information. Stable financing and continuous monitoring of passenger demand will be necessary to maintain service quality while optimising operational efficiency.

3. What is needed in terms of formal procedures for easier expansion of the solution (speeding the process) and upkeeping it (e.g. who finances, decides on additional schedule departures or line layout modification – what are limitations)?

   Answer: Simplifying administrative procedures related to service changes, vehicle procurement, and infrastructure development would help accelerate expansion of the solution. Clear responsibilities between municipalities, regional authorities, and operators regarding financing and operational decisions are also necessary. Limitations are mainly connected to budget availability and regulatory requirements for public transport operation.

4. How do you see possibilities given by the national (regional) legislation to introduce pilot actions into existing operations of the PT (e.g. 6 months change of the granted PSO on PT) – what are the needed actions to make pilot actions easier to implement and measure their success?

   Answer: Current legislation generally allows temporary operational adjustments for pilot testing; however, clearer procedures for introducing pilot services and evaluating their results would simplify implementation. Establishing simplified approval processes and flexible operational arrangements could support faster testing of innovative transport solutions.

5. Do we need a standardized methodology for identifying resident's (passengers') needs that would differently address big agglomerations and smaller settlements, regular services and DRT… – how do you identify the needs today?

   Answer: Current legislation generally allows temporary operational adjustments for pilot testing; however, clearer procedures for introducing pilot services and evaluating their results would simplify implementation. Establishing simplified approval processes and flexible operational arrangements could support faster testing of innovative transport solutions.

6. What is the drive (incentive) for selection of alternative fuel vehicles in the operator's vehicle fleet?

   Answer: The main incentives include reduction of emissions and noise in urban areas, compliance with environmental targets, improvement of passenger comfort, and long-term operational efficiency. Positive public perception and support for sustainable mobility also contribute to decisions to introduce alternative fuel vehicles.

7. Do you provide support for transport operations on the basis of a commercial or custom-designed SW. Would you be ready to use an openly adaptable EU solution (e.g. for DRT service) to assure standardisation and easier cross-border integration of services?

   Answer: Transport operations are currently supported mainly by commercial software solutions used by operators and municipalities. Stakeholders expressed openness to future adoption of adaptable EU-level solutions, provided that they are compatible with existing systems and bring operational or financial benefits.