PGI00208 – T.R.A.M. PROJECT

"Towards new Regional Action plans for sustainable urban Mobility"

4th STUDY VISIT

November 23-24th 2017, Miskolc (HUNGARY)

SUMMARY REPORT

28/02/2018/

TABLE OF CONTENTS

INTRODUCTION

Miskolc is highly determined to keep on the track to become a liveable and sustainable city for its citizens, visitors and established businesses. The best solution is not to react to the challenges of the modern times but to prepare the changes in a proactive way: setting targets, collecting information, raising resources and implementing developments.

That was the intention behind the reason for joining to the initiative of the Covenant of Mayors, the Johannesburg Declaration and international projects like TRAM is.

There is no shame to show our aims, our achievements and to learn from others who have already reached forward in some aspects. Gathering experience can also give us hints to set up new goals, adopt new practices and avoid mistakes, wasting times and energy.
The 4th Study visit in the TRAM project was organized by Miskolc to present our formerly identified good practices within the thematic area of Intelligent Transport Systems for urban areas and low emission and green transport – in practice – to our four project partners (Marche Region (Italy), Public Works Agency of Andalusia Regional Government (Spain), Region Blekinge (Sweden), North-West Regional Development Agency (Romania) with the participation of their local/regional stakeholders and ITRE experts.

During the study visits in the project the participants have the chance not only to get information and facts about the previously selected good practices, but to examine them in the context of circumstances, asking questions and getting impressions by seeing the “whole pictures”. In our common experience, seeing an ongoing process/service always indicates such a wild branch of questions in the participants that the scheduled time usually becomes tight to talk over all issue.

The project partner Municipality of Miskolc on County Rankheld the fourth study visit in Miskolc on November the 23-24th 2017, after the first one was held in Karlskrona (Blekinge Region) in March 2017 and the second one held in Cluj-Napoca (Romania North West Region) in June 2017 and third one to held in Seville (Public Works Agency of the Andalusia Regional Government). The selected GP were GP n.30 “Real-time passenger information system for public transportation”, n.32 “Procurement and introduction of CNG-fuelled public bus fleet”, GP n. 33 “CNG fuel station open for public” and GP n.29 “Smart intersections intelligent traffic lights”.

These projects are part of the City Mobility Development Concept and Sustainable Urban Mobility Plan (SUMP) and formerly completed developments, with tangible results and experiences even concerning the ongoing operation period.

Every GP presentation started with a “ppt” presentment by the local stakeholders which are responsible for the concrete developments even for running the results. After the interactive lectures, the participants had the chance to ask about details or still open issues and even had to see directly – in the job – how the subjects of the developments work.

AGENDA OF THE STUDY VISIT DAYs

Location Reception Hall, Municipality of Miskolc City Hall, 8 Városház Square
"In service" presentation: at the tram stop next to the City Hall and on the tram on the way to the next venue

Date November 23rd, 2017 a.m.

08:45 – 09:00 Registration

09:00 – 09:15 Welcome speech by Péter Pfliegler, Vice Mayor of Municipality of Miskolc

09:15 – 10:15 Presentation of GP No. 30 Real-time passenger information system for public transportation (stop displays, touch screen info boards, route planning, smartphone app)
A new, modern traffic management system has been introduced in Miskolc, which incorporates timetable planning, editing, work schedule preparation and control, furthermore, a new dispatcher system that ensures the above mentioned provision of passenger information at the stops, on board, through cell phones and online. The passengers can easily plan their travel on an online surface or mobile devices and can become informed about the real-time arrival of the vehicles. The travel planner surface with a map can be found on the website of MVK Zrt. (Miskolc City Transportation Company, www.mvkzrt.hu/valosidoben). On cell phones, an SMS service is available (MVK SMS: +36303444329), and on Android-based phones an application (free download) is able to illustrate the real-time position of the vehicles on a map, apart from the timetable data (transIT timetable: MVK Plc.).

10:15 – 10:30 Q & A

10:30 – 10:50 Coffee break & distribution of the Miskolc Pass cards for project participants

10:50 – 11:00 Visit to the tram stop and demonstration of the timetable displays and information desks

11:00 – 11:30 Travelling to MVK Plc.'s Headquarters by tram – demonstrating on board displays of passenger information system

Location Main Hall, Headquarters of MVK Plc. /Miskolc Public Transport Company/, 1 Szondi Street
"In service" presentation: Dispatcher Centre, CNG filling station, workshop in the yard of the company

Date November 23rd, 2017 p.m.

11:30 –11:35 Welcome speech by János Juhász, Director of Operation and Services

11.35-12.00 Presentation of GP No. 32 Procurement and introduction of CNG-fuelled public bus fleet.

Urban public transportation services in Miskolc are provided by Miskolc Városi Közlekedési Zrt. (MVK Plc: Miskolc City Transportation Company Plc.), which is indirectly owned by the Municipality of Miskolc (as a property of Miskolc Holding Municipal Asset Management Plc). The obsolete vehicles of the municipal public transportation service provider company were replaced by new, environmental friendly, gas-powered buses. Due to the introduction of 75 CNG-fuelled buses, the majority of buses running in Miskolc are mainly low-floored, comfortable and air-conditioned ones that comply with EURO 6 environmental requirements. After being awarded in the tender published by the Ministry of National Development, MVK Plc. purchased and put in operation 40 pcs of solo (shorter) and 35 articulated (longer) buses in March, 2016. Solo buses have 30 seats each + 75 standing places as calculated; longer buses can transport a maximum amount of 42 sitting and 118 standing passengers.

12:00 – 12:10 Q & A

12:10 – 13:00 Visit of the technical site: Dispatcher Center, CNG buses, Repair Hall CNG fuel station, Skoda trams, Carbarn.

13:00 – 14:00 Light buffet lunch

14:00 – 14:30 Presentation of GP No. 33 CNG fuel station open for public

The CNG filling station, constructed for the CNG buses is open all day long also for private individuals and companies in addition to the buses of MVK Zrt. The automated payment system enables payment by credit card and issues an invoice as well.
The goal was to become an environmentally friendly service provider on the market at an acceptable price and at a profit if possible.

14:30 – 14:45 Q & A

Location	Assembly Hall, 3rd floor Municipality of Miskolc City Hall, 8 Városház Square
Date	November 24th, 2017 a.m.

09:15 – 09:30 Registration

09.30 - 10:30 Presentation of GP No. 29 Smart intersections, intelligent traffic lights

Intelligent traffic lights give priority to delayed public transportation vehicles. The tram line in Miskolc is positioned in east-west direction across the city. The length of the tram line is 11.2 km (following its recent extension by 1.4 km).

10:30 – 11:00 Conclusions of the Study Visit, discussions with the members of the SG of Miskolc

11:00 – 11:30 Closing of the SV, farewell speech by hosting partner & LP

11:30 – 12:30 Light working lunch

OVERVIEW OF THE VISITED GOOD PRACTICE CASES

1. Integrated real time passenger information system (GP Nº 30)

A new, modern traffic management system has been introduced in Miskolc which incorporates timetable planning, editing, work schedule preparation and control, furthermore, a new dispatcher system that ensures the above mentioned provision of passenger information at the stops, on board, through cell phones and online.

The passengers can easily plan their travel on an online surface or mobile devices and can become informed on the real-time arrival of the vehicles. The travel planner surface with a map can be found on the website of MVK Zrt. (www.mvkzrt.hu/valosidoben). On cell phones, an SMS service is available (MVK SMS: +36303444329), and on Android-based phones, an application (free download) is able to illustrate the real-time position of the vehicles on a map, apart from the timetable data (transIT timetable: MVK Zrt.).

The passenger information desks help those who want to travel at the key nodes of Miskolc. The information equipment can be found in the new, priority-status tram stops. It is also able to display the transport maps and timetable information of MVK. When designing the information desks, the designers had also focus on create vandal-proof devices.

In more than 100 locations, on placed-out LED displays - in addition to the current time - the number of the arriving and departing lines, their direction and the time remaining until leaving is displayed, as well. On board, we provide written information too about traffic changes and potential disturbances. The installed equipment operates at all times, adapting to the transport of the lines. We would like to ease the transport of the passengers with reduced mobility, by providing audio information and by pushing a button.

Lessons learned

Digital devices are constantly entering the lives of people. Experiences and passenger feedbacks show that more LED displays are needed in other areas of the city. More surveys and forums are needed to place similar displays throughout the city. We also have to further develop the Android app adapted to user needs.
By communicating real-time data, traffic is more convenient and faster. Experience has shown that inhabitants prefer to use high-tech tools to paper-based charts.

Replicability potential. Feedback from the participants

The participants think that the replicability potential is high, despite the obvious differences between the cities. The main points of the practice that identified as fully replicable were:

- “The practice is potentially able to be transferred to our context, because it might provide a way to address problems about communication with passengers. It must be highlighted that the presentation pointed out several benefits and implications which go further beyond the

provision of information to passengers. In fact, the system provides information to the company to optimize the timetable, scheduling, and information about traffic and running conditions."

- "The traffic management system including the preferred system for the tram and the bus fleet operation system, are parts of the same integrated system, which guarantees its functionality and its efficacy."
- "To make things easy for all age users seems to be a good option. The information system is very visual, really user friendly, and gives a lot of information in a very intuitive way."
- "It is a better way for passengers to get information that makes travel more efficient. The good benefits for planning traffic was an unexpected outcome."
- "Dissemination of the results achieved should be stronger."

Impact of the GP n.30 in the considered dimensions

Social dimension (max. 4)	3.67
Environmental dimension (max. 4)	3.33
Economic dimension (max. 4)	2.67

Overall Evaluation of GP n.30

Statement	**Overall Evaluation (1 to 5)**
The study visit was well organized	5.00
The organized activities reached the expectations	4.33
The analysed outcomes/results are potentially able to be transferred to other organizations	4.33
The aims set out for this study visit were reached	4.33

2. Procurement and introduction of CNG-fuelled public bus fleet (GP Nº 32)

The obsolete vehicles of Miskolc Városi Közlekedési Zrt. (MVK) were replaced by new, environmental friendly, gas-powered buses. As a result of commission of the CNG-operated, i.e. compressed gas-fuelled buses, nowadays in Miskolc mainly low-floored, comfortable and air-conditioned buses are used which comply also with the EURO 6 environmental requirements. By the tender announced by the Ministry of National Development, MVK Plc. implemented the purchase of 75 pcs of CNG buses and on 4th March 2016, 40 pcs of solo and 35 articulated CNG buses were put into service. On the solo bus, there are 30 sitting and 75 standing places available, and the articulated bus is able to transport 42 sitting and 118 standing passengers.

The project was implemented between 2014-2016. The main goals were:

- to decrease the concentration of carbon dioxide and airborne dust (PM10),
- to reduce CO_2 emission reduction (%): 10.86%, particulate emission (%): 99.39% and noise load,
- to renew the fleet, and to increase passenger satisfaction.

Passengers can travel by new low-floor, zero-emission buses. MVK Plc. provides free on-board Wi-Fi service on CNG buses. Starting and arriving with new vehicles has become more conceivable due to the excellent technical background. By purchasing new buses, we have achieved a higher level of passenger satisfaction. The buses of Miskolc, equipped with CNG technology easily meet even the most strickt EURO 6 environmental standards and their pollutant emission is almost zero. The first time the environmental impact of gas-fuelled and Diesel vehicles, i.e. their emissions were measured in Hungary under real environment conditions in Miskolc at the end of March 2016. During the measurements, comparative analysis were carried out with a focus on Neoplan (Diesel, Euro IV engine) buses and the new MAN (CNG-powered, Euro VI engine) buses on three local buses, with artificial ballasting corresponding to the estimated weight of 90 passengers. According to the final result, 98-98.5% less nitrogen oxide ($NO+NO_2$) gets into the air from the gas-fuelled buses compared to the Diesel-fuelled buses. Due to the new bus fleet, the total amount of NO_2-emission has been decreased by 30 tons/year at city scale. Buses can be operated more economically than old diesel vehicles. The fuel costs of solo CNG buses are 36% and CNG articulated vehicles 47% less than the diesel bus.

Maintenance costs are 83% lower for CNG buses and 86% for CNG articulated buses than in the case of old vehicles. The cost of operating activities (direct costs related to vehicles + Bus operating overheads + administrative costs) is 10% lower for CNG buses and 18% for CNG articulated buses.

Return on investment is long-term.

Lessons learned

Experience has shown that these vehicles can be operated more economically and can significantly contribute to the protection of local citizens from an environmental burdens resulting from air pollution derived from traffic. Fuel costs of compressed natural gas are considerably lower than in case of diesel vehicles. Based on the experience, it seems justified to expand the fleet further and to acquire more low emission vehicles.

Replicability potential. Feedback from the participants

- "Partners might have some concerned about transferability to our context, because the action required an important investment, and this can hardly have occurred in a period of budget-cut."
- "The investment promoted overall awareness and attention towards the public transport system."
- "The positive impacts of this project are very important for the society in terms of the environment, noise reduction and savings in maintenance costs and energy."
- "It must be considered that CNG as fuel is not a final settlement, as it is not renewable. Also, Europe needs to import gas, and that creates an energy dependency that can be a problem at certain times."

The impact of the GP in the different dimensions shows that it is very positive from an environmental point of view, more than social and economic.

Impact of the GP No.32

Social dimension (max. 4)	2.5
Environmental dimension (max. 4)	3.25
Economic dimension (max. 4)	2.75

Overall Evaluation of GP No. 32

Statement	Overall Evaluation (1 to 5)
The study visit was well organized	5.00
The organized activities reached the expectations	4.33
The analysed outcomes/results are potentially able to be transferred to other organizations	4.00
The aims set out for this study visit were reached	4.00

3. CNG fuel station open for public (GP No 33.)

CNG is made by compressing natural gas (which is mainly composed of methane), to less than 1 percent of the volume it occupies at standard atmospheric pressure. It is stored and distributed in hard containers at a pressure of 20–25 MPa (2,900–3,600 psi). MVK Plc. has developed 3 compressors and 6-positions filling station in the framework of the project tailored to this intervention. The investment was financed from green investment fund amounting to 398.6 M HUF related to the call for proposal No. ÚSZT-ZBR-CNG-2014, as the infrastructure background for the operation of CNG buses.

The fuel can also be used for external customers, so it is not only for refueling vehicles from MVK Zrt. Fuel can be used by foreign vehicles on the public area.

The compressed, 220 bar pressure gas reaches the server unit via an underground pipeline network. In the metering booths, high pressure gas is passed through a standard plug into the gas tank of vehicles.
Within the filling station, the public service and the service filling station partition are separated. There is a metering station at the public service station and there are 6 metering pits at the service station.
There are personnel serving in the public sector and the gas charging at the service station is done by drivers.

The CNG filling station, constructed for the CNG buses is open all day long also for private individuals and companies in addition to the buses of MVK Zrt. The automated payment system enables payment by credit card and issues an invoice, as well.

The goal was to become an environmentally friendly service provider on the market with an acceptable price and the expected profit.

Lessons learned

Vehicle manufacturing is increasingly gearing up for alternative energy, so the popularity of CNG and electric cars is growing, and the number of fueling stations in the public service station is increasing.

Replicability potential. Feedback from the participants

- Opening the gas station for private use brings additional income for the company. However, as the gas supplier is that state it is arguable if this scheme would also work with a private gas supplier.
- A good example of getting profit from a facility used mostly for public transport and in this regard, make this service more economically sustainable.
- The key success was to take advantage of the renewal of the bus fleet to give the users and potential ones the chance to contribute to the mobility change and use CNG instead of other fuels.
- Environmental impacts are limited because of the limited number of users of the service. The economic impact is negative if we consider the CNG filling station as a stand-alone practice:

in this case the limited number of users would not justify the investment and the running costs.

The impact of the GP in the different dimensions shows that it is very positive from an environmental point of view, more than social and economic.

Impact of the GP No.33

Social dimension (max. 4)	2.25
Environmental dimension (max. 4)	2.75
Economic dimension (max. 4)	2.00

Overall Evaluation of GP No. 33

Statement	**Overall Evaluation (1 to 5)**
The study visit was well organized	5.00
The organized activities reached the expectations	4.25
The analysed outcomes/results are potentially able to be transferred to other organizations	3.50
The aims set out for this study visit were reached	4.00

4. Smart intersections, intelligent traffic lights (GP Nº 29)

The tram line in Miskolc is positioned in east-west direction across the city. The length of the tram line is 11.2 km long (following its recent extension by 1.4 km). Going through many frequented junctions and traffic control lamps, the duration of an end-to-end trip is approx. 34 minutes the variation of which (prior to the project) highly depended on traffic circumstances. These intersections stopped the trams temporarily and slowed down the public transport.

In 2014 under the Green Arrow Electricity Project, 16 pcs tram preference traffic lights, so called smart phase-sequence modifications were built along the tram line, so-called smart phase-sequence modification. If the system detects a delay according to the tram timetable, it helps the tram by switching the lamp to red for the rest of the traffic, and let the tram to continue its way uninterrupted. The project has been implemented to popularize the public transport in Miskolc. The goal was to reduce the travel time in the city traveling by trams.

This project was planned and implemented parallel and closely joint to the other presented good practices!

The expected goals and achievements figures:

PROJECT INDICATORS	Target (Commission Decision)	Achieved
Travel time savings (passenger hour/ year)	1 277 135	1 277 135
Due to the number of inhabitants per enhancements better travel opportunities (passenger)	40 000	40 000

The implementation of the development was smooth and effective, no major complications emerged.

However, it was problematic to engage the national road operator company in the project and to convince them to agree on involving some key intersections in the project, in particular in the heart of the city. In fact, it was not only problematic but proved to be impossible. As a result, not all important intersections along the tramline became “smartified”.

The preference tram traffic system ensured the required timetables for trams. Using the benefits of this system, passengers can plan their tram journey safely from one transport hub to another transport hub. The built-in system is part of a complex development. This good practice could not have been realized in the project without a renewed and enlarged tram track, and without 31 new, modern, technically compatible low-floor Skoda trams.

Lessons learned

The designation of development areas have to be coordinated with the competent authorities and developers already in the planning period.

The authorization process was difficult. Good planning, compliance deadlines and accurate management is necessary to make procedures effective.

The tram preference built-in system works well on the tram line, fulfils its purpose. So it would be feasible on other public transport routes, especially at frequented junctions.

Replicability potential. Feedback from the participants

- "The presentation focused on too many technical details about implementation, lacking some important elements about the achieved benefits and the economic dimensions."
- "The local authority organized interesting promotional events which might have increased public interest towards the new system, promoting a clear brand identity."
- "The traffic preferred system allows the tram to go much faster, which makes the tram a very attractive option for most citizens, apart from other aspects of the services like the modern rolling stock manufactured by Skoda or the advanced real passenger information system."
- "The main problem seems to be the national road that crosses the city and has priority over any other means of transport. Some roads belong to the national authority, and this is an important handicap."
- "Nowadays traffic engineering and new technologies allow municipalities to give priority to the public transport in many different and safe ways over the rest of the traffic and pedestrians; nevertheless, the most important factor is to have a strong political will to do so and to implement the different projects in a coordinated way, according to a sustainable strategy or a mobility plan for the whole city."
- "The system works just for trams, busses don't benefit yet from the green light system.2

The evaluation of the practice by participants shows that, on average, its benefits from an environmental point of view are important and higher than social or even economic benefits.

Impact of the GP No. 29

Social dimension (max. 4)	3.5
Environmental dimension (max. 4)	3.75
Economic dimension (max. 4)	3.25

Overall Evaluation of GP No.29

Statement	Overall Evaluation (1 to 5)
The study visit was well organized	4,25
The organized activities reached the expectations	4,00
The analysed outcomes/results are potentially able to be transferred to other organizations	4,75
The aims set out for this study visit were reached	4,00

LIST OF PARTICIPANTS

Name / Surname	Organization	Country	City/Region
Luca Barbadoro	LP Marche Region	IT	Marche Region
Prof. Renato De Leone	University of Camerino	IT	Marche Region
Pier Luigi Agostinelli	ASSTRA	IT	Marche Region
Simone Franceschini	ISFORT - Tram Expert LP	IT	Rome
Raffaella Triponsi	Marche Region	IT	Marche Region
Giulia Vitali	Marche Region	IT	Marche Region
Luis Ramajo	Regional Goverment of Andalusia	ES	Andalusia
Isabel Fiestas	Public Works Agency	ES	Sevilla
Rafael Sanchez	Public Works Agency expert	ES	Sevilla
Gergely Török	NW Regional Agency	RO	Cluj Napoca
Stadler Reinhold	GEA S&C (CIVITTA Romania)	RO	Bucharest
Mathias Roos	Region Blekinge	SW	Sweden
Magnus Forsberg	Region Blekinge	SW	Sweden
Péter Pfliegler	Municipality of Miskolc	HU	Miskolc
Viktor Takacs	Miskolc Holding Plc.	HU	Miskolc
Bernadett Tóth Virágh	MVK Plc.	HU	Miskolc
János Juhász	MVK Plc.	HU	Miskolc
Virág Borosnyai	MVK Plc.	HU	Miskolc
Kornél Rétfalvi	MVK Plc.	HU	Miskolc
Péter Polgár	MVK Plc.	HU	Miskolc
Viktória Holdiné Varga	Municipality of Miskolc	HU	Miskolc
Nikolett Szalai	Közlekedés Ltd.	HU	Budapest
Ádám Márton	Municipality of Miskolc	HU	Miskolc
Krisztina J Horváth	Miskolc Holding Plc.	HU	Miskolc
István Szlaboda	Miskolc Holding Plc.	HU	Miskolc
Zsolt Singlár	MVK Plc.	HU	Miskolc
Zsuzsa Fieszl	Miskolc Holding Plc.	HU	Miskolc
Árpád Horánszky	Municipality of Miskolc	HU	Miskolc