The Urban Lab of Europe!

JOURNAL

PROJECT

INNOAIR - Innovative demand responsive green public transportation for cleaner air in urban environment

Sofia, Bulgaria

TOPIC

Air quality

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BY GEREON MEYER

INNOAIR Journal 2: Putting the green mobility options on the road

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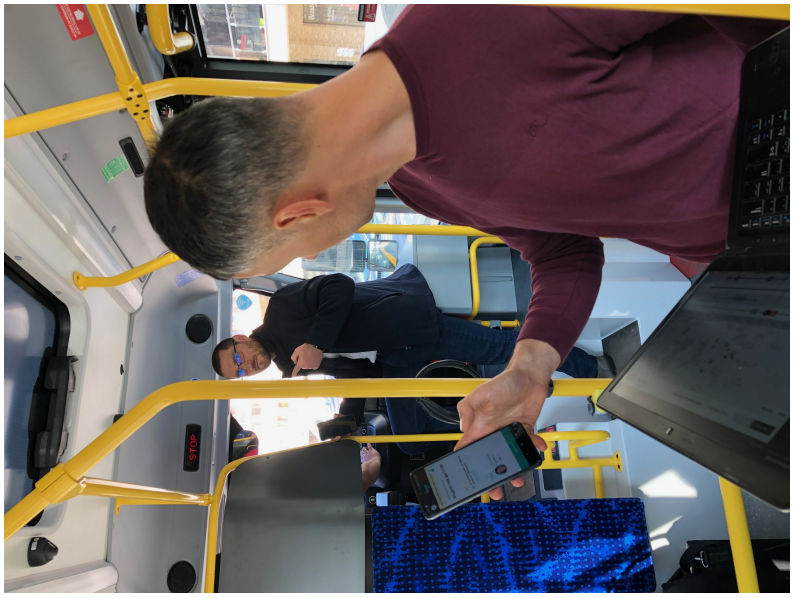

This journal summarizes the progress of activities of the project INNOAIR implemented by the city of Sofia, Bulgaria, with the support of the Urban Innovative Actions (UIA), an initiative under the European Regional Development Fund (ERDF) in the period from January to December 2022. Initially, a short project update is given, reporting on the steps that the project has taken towards the implementation of a green and on-demand public transport service, the creation of green corridors and the establishment of low emission zones. Thereafter, the challenges that the consortium of INNOAIR had to overcome are described, and the experiences that have been made and could be shared with other cities are summarized.

1. Project Update

The Municipality of Sofia, Bulgaria, is tackling emissions from road transport through the project“Innovative demand responsive green public transportation for cleaner air in urban environment“ (INNOAIR), which is funded by the Urban Innovative Actions' (UIA) Call 5 and focuses on air quality.

The INNOAIR project had taken a number of successful first actions in implementing highly-interlinked innovative services for the improvement of air quality in Sofia and had gathered an understanding of citizens’ expectations from the shared e-bus service which is one of the four innovative solutions to improve air quality and reduce emissions that the INNOAIR project has been focusing on during the last year.

The primary project focus in 2022 was clearly put on preparing the on-demand operations of a fleet of five electric mini buses to connect suburban residential areas with the urban metro system using a sophisticated software platform. That platform uses artificial intelligence (AI), machine learning, and big-data analytics to optimize routes and respond to usage requests. For the other three innovative solutions of by INNOAIR, i.e. green corridors, congestion charges, and low emission zones, infrastructures and regulations were adapted to reducing car usage and actions to motivate more travel by soft modes such as walking and cycling were taken.

In September 2022, the new electric minibuses for the on-demand green public transport service were

delivered to the Municipality of Sofia. The features of the busses, the charging infrastructure and the systems for the transportation platform and app for managing their booking and mission in two neighborhoods in the Southern periphery of the city, Buxton and Manastirski livadi, has been described in the INNOAIR podcast #4 “Electric minibuses offering on-demand and zero-emission public transport options to citizens in Sofia”, recently (https://uia-initiative.eu/en/news/electric-minibuses-offering-ondemand-and-zeroemission-public-transport-options-citizens-sofia). Before the end of 2022, extensive tests of the on-demand service have started. The goal of this pilot phase was twofold: one, to train drivers and dispatch officers, and equally important, to involve the communities in the deployment areas to evaluate the application and potential of the service, test routes, and identify any potential gaps.

In parallel to these pilots, the Municipality of Sofia and Sofia Development Association organized a design competition for the buses in partnership with New Bulgarian University. The students of the Bachelor’s programme "Web Design and Graphic Advertising“ were tasked to create a design that shows that the minibuses are part of the public transport system, but also that their use is via an application and without a fixed route. The simple and modern designs proposed consist of e.g. winding or crisscrossing bus lines indicating that the routing in the warren of narrow residential streets is adapted to the demand. They also promote the BUSINN booking app as well as the a QR code for downloading it from Google Play and App stores.

Compared to on-demand public transport approaches in other cities, Sofia’s comprehensive approach to combine it with electric minibuses and complement it by other measures to reduce urban transport emissions and improve air quality, based on infrastructure, regulation and behavior change, has been unique in the EU so far.

In 2022, preference has been given to green corridors as a complementing measure to the on-demand electric bus service implemented by the project INNOAIR. These corridors prioritize zero-emission transportation methods, such as public transit, shared electric bikes and cars, and personal micro vehicles like e-bikes and e-scooters. They will connect major transport hubs and include the zones for on-demand green public transport, where the on-call electric minibuses are deployed. Efforts are also made to connect these corridors to existing green spaces like parks, bike lanes, and pedestrian areas. The web-based digital map of the selected green corridors will be publicly available, based on OpenStreetMaps, with free access and no registration. The map combines both dynamic and static information: on the one hand, current conditions and location of zero emission ground public transport vehicles, metro, electric buses, trams, trolleys and the new on-demand transport, as well as the location of shared electric vehicles, and on the other hand charging stations, stops location, bike routes as well as lines, routes and timetable of public transport vehicles. Users can choose between the modes to be displayed on the map and select the layers of the static data. The access is provided via https://livemap.sofiatraffic.bg. The green corridors are a unique way to extend the promotion of public, green, and soft mobility modes to the whole city of Sofia and beyond the neighborhoods where on green on-demand public transport is offered.

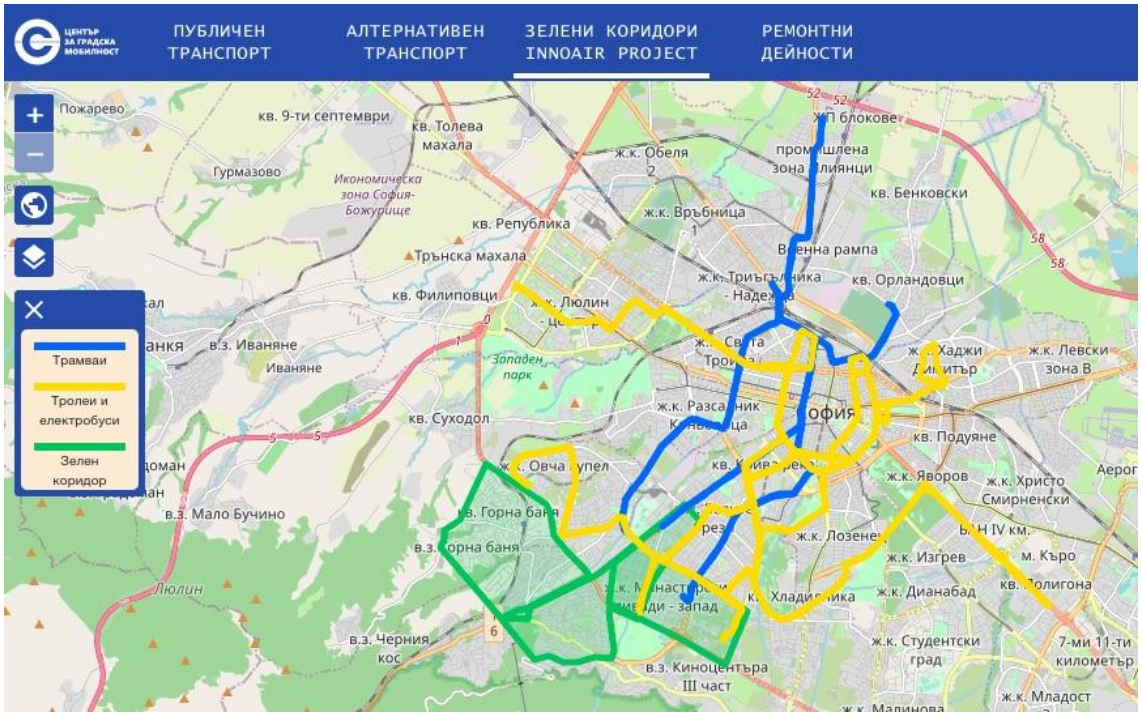

Figure 1:
Digital map indicating public, shared and active travel options in Sofia (yellow: blue: tram lines, trolley and electric bus lines, green: green corridors including areas with on-demand public transport)

Furthermore, in the course of 2022, the INNOAIR project has supported the Municipality's plans to introduce low-emission zones (LEZ) to tackle air pollution. Sofia is one of the most polluted cities in the EU and faces serious public health concerns due to one of the highest ultra-fine particulate concentration levels in the EU. This is partly caused by the widespread use of coal and firewood for heating in the city's homes, but also due to the slow progress in expanding public transportation and encouraging residents to switch from cars. Therefore, the comprehensive approach of the INNOAIR project complements green corridor and on-demand public transport offers by the introduction of LEZ as a regulatory measure.

The draft ordinance proposing two LEZ for transport had been open for consultation for one month in summer 2022. In September, the authorities in the Bulgarian capital voted the approval of a new policy establishing two LEZ in the city centre and surrounding neighborhoods, the small ring and the large ring zones. The zones will be introduced gradually until 2025, with violators being photographed and receiving appropriate sanctions. As of December 2023, cars from the first ecological group, i.e. EURO 1 and EURO 2 cars, will be banned from entering the small ring zone, and the ban will extend to the second and third ecological groups in 2025 and 2028, respectively, while the large ring zone will follow a few years later. This will eventually affect the vast majority of the more than 170.000 cars entering the small ring zone, and more than 300.000 for the large ring zone every day. Exceptions to the ban include cars of people living in the zones, cars of people with disabilities, cars with a special mode of operation, i.e. electric vehicles, and public transport. INNOAIR conducted a study and testing of the low emission zone model in terms of transport, which will contribute to improving air quality. It is supporting a number of measures that make public transport and soft modes more attractive, e.g. by providing access to the public transport system through the on-demand bus service, by creating the green corridors or by offering incentives for cycling through the SofiaCoin app. The London-based research centre Clean Air Fund supported the City of Sofia in drafting the policy, by estimating the costs of reduced labour productivity and absenteeism due to air pollution for the city’s economy, which they estimated up to 13.4% of local GDP. In view of other cities such as Krakow announcing comparable efforts on LEZ, Sofia is becoming a pioneer, not only in Bulgaria, but also in Central and Eastern Europe.

The INNOAIR project also promoted green urban transport through a diverse and abundant programme during the European Mobility Week in Sofia in September 2022. The campaign aimed to raise awareness about sustainable mobility, promote behavioral change in favor of active mobility, and foster synergies between people and places. Activities included events to protect the safety of the youngest residents, exhibiting public transport vehicles, offering open door days to learn about the modern metro control system, and installing cameras to count bicycles in Sofia. The car-free day in September was the culmination of the European Mobility Week, where the city center was closed for car traffic, and a bike ride was organized to support the idea of healthy and sustainable commuting in the city. The new electric minibuses that would provide the INNOAIR in-demand transport were also presented to the public. The European Mobility Week reflected the wish of the citizens of Sofia, as well as the desire of people across Europe, to reconnect with each other after months of isolation, restrictions, and bans due to the COVID 19 pandemic. In recognition of Sofia’s efforts, the European Mobility Week selected Sofia as one of the three finalists for the 2022 award, together with Zagreb, Croatia, and Braga, Portugal, and pointed out INNOAIR as instrumental for that decision.

2. Challenges

The development of the INNOAIR project activities has regularly been analysed regarding the seven implementation challenges of UIA projects, and some lessons learned have been identified. The following summarizes to what extend the challenges were relevant in terms of meaning, intensity, likelihood and temporality at the different stages of the project period covered by this journal.

2.1 Leadership

While the INNOAIR project is coordinated by the Municipality of Sofia, represented by the Mayor, the day-to-day leadership role is pursued by Ivan Nikolov, the city’s Director for Transport, with support by Sevdalina Voynova, Programme Director at the Sofia Development Association. Like in the previous period, the team continues not to face any relevant leadership issues. Quite differently, due to the success of INNOAIR to deliver on its exceptionally strong ambitions, particularly by Kristian Krastev, deputy mayor of Sofia who is in charge of transportation, has been backing the project activities with his strong support in 2022.

2.2 Public Procurement

Initially, the consortium of the INNOAIR project had been concerned that the purchase of the five electric minibuses to be deployed for the on-demand service concept of the INNOAIR project could be significantly delayed due to a late release of the call for tenders caused by sophisticated technical requirements. After the project coordinators had strengthened their efforts to push up the launch of the call for tenders and finally were able to release it before the end of 2021 (see INNOAIR Journal for 2021) the public procurement procedure could eventually be concluded on time and the vehicles were delivered by the Turkish manufacturer KARSAN in late summer 2022, i.e. a full year before the conclusion of the project. As a result, the electric minibuses could be presented to the public for the first time during the European Mobility Week in September 2022, and were able to enter an intensive testing and piloting phase right afterwards.

2.3 Participation

In parallel to the deployment of the electric mini buses for the testing and piloting of the green and public on-demand transport service in two neighborhoods of Sofia, the co-design process for the on-demand public transport solution, its stops and frequency was intensified with the participation of citizens in 2022: in December, Sofia municipality, Sofia Development Association, Sofia Urban Mobility Center, Modeshift Europe ltd., and the community association “United for Manastirski Livadi – West” organized an information day to introduce the new electric minibuses and the on-demand service in the Manastirski Livadi neighborhood. The event aimed to gather citizen engagement in developing potential on-demand bus routes and identifying points of interest for travel. The mobile application BUSINN was introduced, and citizens were encouraged to try it out and provide feedback on its features. The electric minibus was available for residents to test and provided features such as Wi-Fi, power outlets, low floors, and a ramp for wheelchairs and pushchairs. The residents proposed measures to increase the service's popularity, were interested in its tariff and the use of public transport monthly and yearly cards. Around 20 residents volunteered to be test users of the app and bus in the coming days and provide feedback on its features.

2.4 Cross-Department Working

Many of the challenges of implementing the INNOAIR project are related to the need of a close collaboration between the involved agencies, institutes and universities on the one hand, and of companies on the other hand. Oftentimes, the issues arise around the standards of handling of users’ mobility data. In the reporting period of 2022, this has become particularly relevant for setting up the BUSINN app for managing the green, on-demand public transport service in the selected neighborhoods of Sofia. The service has been developed by Modeshift, a fare and data collection company based in Europe and the U.S., commissioned by the Sofia Mobility Urban Mobility Center. A matter of discussion and joint agreement was the policy of sharing pictures of users to facilitate the pick-up of passengers for the on-demand bus service. Upon initiative by public authorities, it includes an opt-out rule for those citizens who are hesitant to provide their personal data. Another issue that was solved upon initiative of the city government was the accessibility of the service for digitally less experienced persons lacking access to smart phones.

2.5 Monitoring

The success of the INNOAIR project is determined by its effect on air quality as indicated by a reduction in the concentration of black carbon, a major component of particulate matter that is considered the most harmful form of air pollution in Sofia. After the National Institute for Meteorology had set up the Bulgarian Chemical Weather Forecast System such that background concentrations of key pollutants can be reported in the previous project period, in 2022 background concentrations of pollutants were determined and the “Guidebook on air pollution interdependences for different stakeholders” was published as a free tool for policy, research, education, industry and environmental bodies to understand the processes leading to undesired high levels of pollution in urban areas (https://www.innoair-sofia.eu/images/documents/D413-Guidebook_ENG-publ.pdf). The purpose was not just to show actual data but also to summarize in an understandable way what factors influence the levels of various pollutants in the atmosphere and how their adverse influence can be eliminated or limited so to improve air quality in cities in a short and long-term time horizon.

2.6 Communication

Creating broad awareness for sustainable and smart mobility in Sofia is one of the most important objectives of the communication activities of the INNOAIR project. The coordinators admit that this topic is causing debates and even opposition in the public that are occasionally also reflected in the media. Critics arose around the

question whether e.g. replacing old coal stoves with electric heaters, would be cheaper and more effective in their effects on air quality then a transformation in the transport sector. The INNOAIR project thus took a number of additional actions to get buy-in from citizens e.g. by disseminating evidence, promoting soft or public travel options and explaining benefits for air quality and public health at events around the European Mobility Week in September 2022, at university competitions and citizen challenges.

2.7 Scaling-up

The involvement of National Association of Municipalities in the Republic of Bulgaria in the consortium of the INNOAIR project is ensuring the proper scaling-up of the solutions tested and piloted in Sofia by other cities in the country. The Executive Director of the Urban Mobility Center in Sofia, Dimitar Dilchev, presented the INNOAIR project at the Annual Meeting of the Bulgarian Municipalities in October 2022, where he explained to transportation executives of other cities in Bulgaria that INNOAIR aims to improve traffic and reduce air pollution in the city through innovative solutions. He discussed the latest electric on-demand minibuses, which are currently in a trial period and expected to launch officially in a few months in the southern districts of Sofia. Dilchev also mentioned the electronic ticket payment system in the capital and emphasized the need for innovation and high-tech solutions in the sector to be backed by cities. The Urban Mobility Center aims to open the market for different distributors to get involved in the sale of electronic documents through IT solutions.

3. Conclusions

In the period from January to December 2022 period, the INNOAIR project funded by the Urban Innovative Action (UIA) in the Bulgarian capital of Sofia successfully implemented innovative services to improve air quality. These services included the deployment of green on-demand minibuses, the establishment of green corridors for public, active and shared transport modes, and the implementation of low emission zones. The project identified potential routes for the on-demand minibuses and developed an AI-and-big-data enabled software platform for their management, and it implemented wide activities for the engagement of citizens for the co-creation of the services. Overall, the implementation of these measures marks significant achievements in the INNOAIR project's efforts to improve air quality in the city of Sofia

Many of the typical challenges of implementing UIA projects have not significantly affected INNOAIR, or are no longer doing so. While neither leadership nor scaling-up has never been considered to be a particular issue for the project consortium, INNOAIR made up leeway in other challenge areas in 2022, most notably in public procurement after the successful purchase of the electric minibuses for the on-demand service. Progress has also been shown in participation, communication and cross-department working.

All in all, it can be stated that the project INNOAIR is successfully delivering on its extraordinary high ambition of implementing green and on-demand public transport services and promoting active and zero-emission alternative transit options in the Bulgarian capital of Sofia. At the same time, the project can be considered a role model for the projects of the Urban Innovative Actions and its follow-up activity, the European Urban Initiative, particularly in terms of leadership, citizen participation and greater impact.