

ACTION PLAN FOR FUA IN KRAKOW

DELIVERABLE D.T1.2.3

ACTION PLANS FOR NEW INNOVATIVE LOW-CARBON
MOBILITY SOLUTIONS & IMPROVED AIR QUALITY IN FUA

FINAL
05/2022





Project index number and acronym	CE1671 DYNAXIBILITY4CE
Lead partner	PP1 - Leipzig Transport Company (LVB)
Deliverable number and title	D.T.1.2.3 - ACTION PLANS FOR NEW INNOVATIVE LOW-CARBON MOBILITY SOLUTIONS & IMPROVED AIR QUALITY IN FUA
Responsible partner(s) (PP name and number)	PP9 - ZTP (Krakow FUA) PP4 - Redmint PP2 - RC
Project website	https://www.interreg-central.eu/Content.Node/Dynaxibility4CE.html
Delivery date	02/2022
Status	Final version
Dissemination level	Internal

Document history of revisions

Date	Name	Action	Status
28/01/2022	Daniel Franco, Rupprecht Consult	Structure and brief content description	Template
	Katarzyna Kyć	ZTP Krakow	Draft
	Katarzyna Nosal Hoy	ZTP Krakow	Final Version
	Gabriele Grea, Anja Seyfert, Redmint	Final check	Final Version



Development of action plans for new innovative mobility solutions & improved air quality in FUAs

- **Project overview**

The Dynaxibility4CE project (2020 - 2022) aims to prepare urban administrations and mobility operators more efficiently for current mobility trends that require dynamic and flexible planning in complex environments. New forms of mobility, such as Mobility as a Service (MaaS), changing ownership structures (sharing) and technologies (connected and automated driving) are increasingly blurring the classic boundaries between traditional mobility services and require new, integrated planning processes to ensure sustainable mobility in cities and urban regions. Therefore, the project develops strategies and tools for public transport authorities that strengthen planning capacities and thus the role of public transport as the backbone of an effective, low-emission mobility offer, thereby avoiding CO₂ emissions and thus contributing to improving air quality.

- **Relation to other project activities**

The Action Plan relates to the following project activities:

- **LOW EMISSION ZONE (L. E. Z.) in PARMA**

The project implies remote control of access of all vehicles in the area inside the ring road through the establishment of 41 doorways, they will be equipped with remote control cameras and electronic devices. Heavy and most pollutant vehicles will gradually be banned from the Low Emission Zone.

- **DELIVERABLE D.T.1.1.3 CONCEPT NOTE FOR CE SUMP 2.0 TOPIC GUIDE: UVAR**

This document lays out the upcoming efforts of the Dynaxibility4CE project to collect information, best practices, and research, which will contribute to expand the SUMP Topic Guide on Urban Vehicle Access Regulations (UVARs).

- **D.T.2.8. Guideline for air quality data collection / Management approaches for clean mobility.** These guidelines represent an attempt to put together major issues associated to mobility and air quality.



Executive Summary

According to the framework of the Dynaxibility4CE project, the Municipality of Kraków (ZTP) is planning to implement a professional Action Plan for mobility, which will comprehensively use the results of the forecasts made within the LIFE project as input conditions and will determine the final model of the residents' mobility in all available forms of movement: PT, walking, cycling, car and bike sharing, MaaS and finally private car. APfM is expected to indicate operational tasks and an implementation schedule of individual tasks to achieve the expected reduction of air pollution. The aim of the document is to describe the action planning process (UVAR) for new innovative low-carbon mobility solutions & improved air quality in FUAs.



1. Introduction

- **Goal of the document**

The goal of this document is to present the factors influencing the development of the Action Plan for UVAR in Kraków FUA as well as individual actions included in this plan and the schedule of their implementation.

The UVAR measures in Kraków need to be implemented in order to achieve the following goals:

- Improving air quality,
- Stimulating a shift in the modal split towards fewer car trips,
- Reducing parking problems,
- Stopping the phenomenon of continuous increase in motorization rate,
- Reducing noise pollution,
- Improving the road safety,
- Redistributing the road space.

- **Scope**

The scope of the document includes:

- Overview of the local planning process consisting of conducted activities, leading to development of the Action Plan for UVAR in Kraków FUA,
- Background presenting main transport & mobility problem and challenges as well as existing UVAR measures,
- Overview of the legal framework and planning/policy context influencing the process of development the Action Plan for UVAR in Kraków FUA,
- Key results and findings coming from conducted research and activities, leading to development of the Action Plan for UVAR in Kraków FUA,
- Individual planning measures included in the Action Plan for UVAR in Kraków FUA, together with the schedule of their implementation, as well as related infrastructure & tools, and issues concerning the capacity building and proper policy,
- Conclusions and recommendations for innovative low-carbon mobility planning in FUA,
- Dissemination and exploitation plans.

- **Local process overview**

The development of the UVAR Action Plan for Kraków FUA was preceded by a number of measures, which are summarized in Table 1.

The first of these was an analysis of different options for implementing UVAR in Kraków, taking into account the SUMP Topic Guide. Then, decision makers from the relevant municipal units were involved in order to select the most suitable UVAR type for the circumstances. The UVAR SUMP Topic Guide document was translated and the Polish version was forwarded to the Municipal Traffic Engineer Department, the Police, the Municipal Police, the Road Authority of Kraków and the Municipal Management Department. Representatives of these units were asked to provide comments



on the feasibility of implementing the various types of UVAR in Kraków and to make observations regarding their competencies.

The analysis of particular types of UVARs that can support various objectives of the city's policy and the results of consultations with representatives of municipal units have made it possible to formulate the conclusion that, in view of the priority of improving air quality in Kraków, the optimum solution will be the implementation of a Low Emission Zone (LEZ).

In order to identify the opinion of the residents on the implementation of the LEZ concept, workshops with the residents of Kraków in the form of focus groups were organized in December 2020. This workshop not only allowed to name the emotions of the residents about the implementation of the LEZ, but also provided very valuable conclusions that should be taken into account when formulating the scope of restrictions in the LEZ, designing an information campaign about the LEZ, forming a message about the objectives and benefits of the implementation of the LEZ, planning the scope of possible assistance measures for the units most affected by the LEZ, the period of implementation of the LEZ, the scope of investment and infrastructure measures accompanying/preceding the implementation of the LEZ.

The next stage of development of UVAR strategy for Kraków was a review and analysis of the currently binding planning documents addressing the issues of air protection and traffic calmed zones for the Kraków FUA, i.e. POP¹, PGN², Transport Policy³, Parking Policy⁴. This review was accompanied by the analysis of reports on emissions of harmful pollutants from transport in Kraków (especially the measurement of harmful pollutants emitted by the vehicles entering/ moving into 2nd ring road from 2019) and focus groups with residents.

The implementation of all the aforementioned measures and simultaneous cooperation with the NGOs made it possible to determine the initial scenarios for introducing LEZ in Kraków, together with the estimated effects of a potential implementation. These scenarios were described in D.T.1.2.1 - Scenario development for action plans for Krakow FUA.

The next step was to organise the UVAR workshop with the participation of the Dynaxibility partners and representative of the Kraków Transport Authority and other Krakow Municipality units involved in UVAR activities. The workshop was organised in July 2021 and its aim was to discuss future steps to introduce LEZ in Kraków as well as related challenges.

At the end of 2021, a lot of information about the need and the process of the LEZ implementation in Krakow has been distributed on different types of mass media to raise the stakeholders' awareness on this issue. This has been intensified at the beginning of 2022. Additionally, in December 2021 following activities have been realised: (1) production and online distribution of the video about the need of the LEZ implementation in Krakow, (2) distribution of the PL version of the UVAR SUMP Topic Guide among City Councillors, and (3) development of a tab regarding the LEZ in Krakow on the Kraków Transport Authority website.

¹ Air Quality Plan for Małopolska Province (POP) adopted by the Resolution No. XXV/373/20 of the Assembly of Małopolska Province of 28 September 2020.

² RESOLUTION NO. CXIV/3002/18 of the KRAKÓW CITY COUNCIL of 24 October 2018 on the adoption of an update of the "Low-Emission Economy Plan for the Municipality of Kraków". (PGN).

³ New Transport Policy for the City of Kraków for 2016 - 2025, adopted on 8 June 2016, by Resolution No. XLVII/848/16 by the Kraków City Council.

⁴ Parking Program for the City of Kraków adopted on 29 August 2012 by the Kraków City Council in Resolution No. LIII/723/12.



Simultaneously other activities helpful in Action Plan development were realised. A surveys regarding, inter alia, preferred forms of support for residents of future LEZ in Krakow were carried out. Representatives of the Kraków Transport Authority participated in the Clean Air Fund workshops on LEZ in December 2021, and in series of meetings organised by various municipality departments regarding the issue.

All previous measures as well as review of LEZ solutions existing abroad and constant cooperation with NGOs made it possible to prepare the Action Plan with the proposal of LEZ in Krakow that will be consulted with stakeholders.

All key results and most important findings from activities carried out are presented in Section 3 of this Action Plan.

Table 1. Measures that preceded the development of the UVAR Action Plan for Krakow.

Stage		Stakeholders involved	Date
1	Description and analysis of various options for UVAR implementation based on the available SUMP Topic Guide, with a view to possible implementation in Kraków.	Kraków Transport Authority	IX 2020
2	Translating the UVAR SUMP Topic Guide into Polish and forwarding it to the relevant municipal unit for comments, in the context of the possibility of implementing particular types of UVAR in Kraków.	Department of Municipal Traffic Engineer, Police, Municipal Police, Road Authority of Kraków, Public Utilities Department.	IX 2020
3	Organization of qualitative research with the participation of residents - focus groups on impressions regarding the LEZ in Kraków	Residents of Kraków	XII 2020
4	Analysis of available documents concerning air quality and limited traffic zones for the Kraków FUA, i.e. POP, PGN, Transport Policy, Parking Policy	Kraków Transport Authority	I 2021
5	Analysis of reports on emissions of harmful pollutants from transport in Kraków and focus groups with residents	Public Transport Authority, NGOs active in the field of air quality improvement	I 2021
6	Determining the most important goals of the Action Plan (taking into account the needs of residents and city units).	Kraków Transport Authority	I 2021
7	Defining main assumptions for scenario development	Public Transport Authority, NGOs active in the field of air quality improvement	I 2021
8	Development of initial scenarios and estimation of the effects of their potential implementation (D.T.1.2.1)	Kraków Transport Authority, NGOs active in the field of air quality improvement	II 2021
9	Organisation of UVAR workshop	Partners of the Dynaxibility project, Kraków Transport Authority, other Krakow Municipality units involved in UVAR activities	VII 2021
10	Surveys regarding, inter alia, preferred forms of support for residents of future LEZ in Krakow	Residents of the area inside the 2 nd ring road	XI 2021 - XII 2021



11	Information in different mass media about the need and the process of the LEZ implementation in Krakow	Residents of Kraków City & FUA and entrepreneurs	XI 2021 - III 2022
12	Production of video about the need of the LEZ implementation in Krakow	Residents of Kraków City & FUA and entrepreneurs	XII 2022
13	Distribution of the PL version of the UVAR SUMP Topic Guide among City Councilors	City Councilors	XII 2022
14	Development of a tab regarding the LEZ in Krakow on the Kraków Transport Authority website	Residents of Kraków City & FUA and entrepreneurs	XII 2021
15	Participation in the Clean Air Fund workshops on low emission zones	Kraków Transport Authority, NGOs, representatives of other PL cities	XII 2021
16	Participation in meetings organised by various municipality departments regarding the issues of UVAR and the LEZ in Krakow	Kraków Transport Authority, Krakow Mayors, other municipality units and departments	XII 2021-II 2022
17	Review of solutions existing abroad related to the LEZ operation	Kraków Transport Authority	XII 2021 - III 2022
18	Cooperation with NGOs in terms of solutions for LEZ implementation and public consultation process	Kraków Transport Authority, NGOs active in the field of air quality improvement	XII 2021 - III 2022

As already mentioned, the implementation of the Action Plan will be preceded by the public consultations. Some of the LEZ rules and elements will be further developed on their basis. The public consultation process is now preceded and accompanied by the information campaign (more information about the public consultation process is presented in Section 4 of this document). The LEZ implementation scope, developed during the consultations will be elaborated in a form of the project of the resolution, which will be presented to the Kraków City Council. The final decisions on the shape of the LEZ will be made by the Kraków City Council. A resolution incorporating the Council's amendments will be passed by the end of the year.

2. Planning and policy framework

- Background

Kraków, the place of project implementation, is the capital of the Małopolska Province and the very center of the Kraków agglomeration and the Kraków Metropolitan Area (KOM), which has a significant impact on traffic and the demand for public transport in the city.

FUA consists of the city of Kraków, as the metropolitan center, and 14 communes. These communes have intense functional connections with Kraków.

Kraków is located in the north-eastern part of the Małopolska Province. Kraków is the seat of the authorities of the Province and the main economic and educational center of the region. It covers an area of 326.8 km², with the population of 759 thousand residents.

Kraków is perceived primarily as one of the largest cultural and historical centers of the region and the country. For many years, the image of a modern academic and economic center has been created on



the basis of the historical capital of Poland, which has a significant impact on the number of visitors to the city and people using various forms of transport.

In terms of mobility Kraków faces a number of problems related to:

- continuous increase in the rate of motorization,
- progressive unfavorable changes in the division of transportation tasks (increasing share of car travels),
- poor air quality resulting from such factors as vehicle use,
- problems related to car parking,
- increasing traffic congestion in the city center area.

Kraków's road and street network consists mostly of radial ring road elements. In accordance with the historical development, rings or their elements linking the radial road system were created. Three ring roads can be distinguished in the whole road and street network, where ring roads I and II have the characteristics of complete circuits. Ring Road III has an incomplete layout and consists of only parts of the network.

On June 8, 2016, by Resolution No. XLVII / 848/16, the City Council of Kraków adopted a new Transport Policy for the city of Kraków for 2016-2025. The general goal of the new transport policy is: to create conditions for an efficient and safe movement of people and goods while limiting the adverse impact on the natural environment and living conditions of residents, and to improve transport accessibility within the city, as well as the metropolitan area, the province and the country in conditions of sustainable mobility in urban transport system.

The general goal is to be accomplished by achieving the following main objectives:

- providing users of the transport system with convenient mobility opportunities in internal and external connections
- developing and promoting ecological forms of travel
- improving natural environment, reducing transport nuisance for residents and increasing safety
- improving the efficiency of spatial management and transport
- improving the image of the city and building its prestige.

In many places the Transport Policy takes into account the concept of SUMP (Sustainable Urban Mobility Plan), widely promoted by the European Commission, which is a new planning concept that responds in a more sustainable and integrated way to challenges and problems related to transport in urban areas. The main purpose of this approach is to create a sustainable transport system in Kraków by:

- increasing the efficiency of passenger and cargo transport in the city,
- ensuring access to jobs and services for all residents,
- ensuring comfort and safety of urban transport,
- improving the attractiveness and quality of the urban environment,
- reducing environmental pollution, the greenhouse effect and the level of energy consumption by transporting passengers and cargo in the city.

The first restrictions on traffic in the city center were introduced as early as January 1979 when it was decided to restore the original function of the Main Square, degraded by car traffic. The biggest changes



in the city center, however, took place in 1988 when the introduction of pedestrian zones, limited traffic and limited parking was proposed. The beginnings of a system of one-way streets and cutting through traffic the inner city were also introduced.

In 1988, the City of Kraków was the first city in Poland, which introduced a no-car zone and a limited traffic zone. This policy has been continued until today. Downtown paid parking zone includes sectors qualified to subzones A, B, C: zone A completely closed to traffic, zone B, where only residents and suppliers can enter (during designated hours), zone C with parking fees for parking vehicles. The system of streets closed to car traffic in 2016 was the longest in the world (about 3.5km).

The city has two restricted traffic zones with a total area of over 1km² (access restrictions for most users), making the entire Old Town area inside the first ring road and Kazimierz more accessible for sustainable and ecological forms of transport. Due to the large number of cars entering the city center and the limited number of parking spaces in Kraków, a paid parking zone, 'Tempo 30' zones (26.5 km²), and residential zones were introduced. One-way traffic for cars has been introduced (two-way remains for cyclists and public transport) on a length of 1.4 km around the Old Town. Kraków is a pioneer of green mobility - the first Low Emission Zone in Poland was created and tested here.

Passage through the city center is significantly limited by the sectoral traffic organization (the so-called Houten model), which eliminates car travel between districts from the center, preferring other means of transport. It is no longer possible to cross the city center in a car on many routes, and soon it will not be possible at all, as it is the case, for example, in Ghent.

The entire functional Downtown has been covered by the largest Paid Parking Zone in Poland (20 thousand parking spaces), the efficiency of which has been increased, thanks to the increase in 2019 of the per hour rate of parking amounting to EUR 1.5.

In the center, where car traffic has been reduced and classic deliveries have designated hours, we offered unlimited service to entrepreneurs using cargo bikes (pilot implemented as part of the Low Carb project).

- **Legal framework overview and planning & policy context**

Legal framework as well as planning and policy context can be explained by the following documents and strategies:

- Transport Policy of the City of Kraków - indicates the objectives of transport policy for the city of Kraków and the means of achieving these objectives, including among others consideration of the possibility of restricting entry to the city for vehicles not complying with specific Euro emission standards, creation of limited or zero emission traffic zones in the environmental area, and extending the paid parking zone to areas with a significant deficit of parking spaces.
- Low-Emission Economy Program (PGN) - identifies main areas of environmental impact, including negative impact of transport on air quality; indicates actions necessary to be taken in order to minimize this impact, including introduction of limited traffic emission zone in the area of 2nd ring road (entrance to the zone for vehicles meeting EURO 4 emission standards), development of limited traffic zone, introduction of traffic restrictions on selected streets or exclusion from traffic of selected streets (for passenger vehicles and trucks), implementation of traffic calmed zones, speed limits for motor vehicles, exclusion from traffic of streets heavily used by pedestrians. At the same time, the PGN indicates the impossibility of implementation of measures to reduce emissions and improve air quality by the municipal government due to legal and organizational constraints, and stresses the need for, among other things: the creation of a legal framework allowing local government units to introduce zones of limited transport



emissions in areas of high motor vehicle traffic intensity (it should be noted that the PGN was updated in 2018, currently such a framework exists, but the provisions of the Act must be modified to give more competences to local governments).

- Adaptation Plan for the City of Kraków to Climate Change by 2030 - identifies the main areas (sectors) contributing to negative climate change; indicates in various sectors, including the transport sector, actions to be implemented for climate improvement. However, these are only actions encouraging to travel by public transport, cycling and walking; the plan does not foresee restrictive actions related to UVAR strategies.
- City Development Strategy - one of the most important development challenges presented in the document is improvement of the quality of natural environment, including first of all the air; adjustment to climate policy, especially in the scope of limiting emission of pollutants in line with the idea of a SMART CITY - SMART ENVIRONMENT. The document points to solutions based on restoring public space to residents by limiting access of cars to the city center, instead developing an efficient and environmentally friendly public transport system.
- Study of spatial development conditions and directions - in the directions and principles of transport system development, the study's provisions indicate actions aimed at ensuring the most beneficial, from the point of view of environmental quality and the adopted vision of the City's development, division of transportation tasks, i.e. with preference for public transportation and pedestrian and bicycle traffic, control of individual transportation through the introduction of restrictions on access to selected areas of the city, with particular attention to the city center.
- EIT Climate-KIC - Kraków is moving towards climate neutrality. It aims to become a zero-emission city by 2030 and to this end, as part of the Deep Demonstrations process proposed by EIT Climate-KIC, is building a completely new transformation strategy so that, among other things, active travel combined with public transport will account for 75% of transport.
- Air Protection Program for Małopolska Province - corrective actions also take into account an important aspect in the context of air pollution - transport. Actions include:
 - establishing a low emission zone in Kraków, based on Euro emission standards. It is recommended that the pilot version of the zone be established within the 2nd ring road and the target version include the area within the 4th ring road. Conditions of entry to the zone should be specified in the implementation plan prepared by the Kraków Municipality. Changes in regulations at the national level are required for implementation of this measure,
 - implementation of 'Tempo 30' zones in Kraków in designated areas inside the 3rd Ring Road,
 - launching by the City of Kraków of a transport emission monitoring system covering current information characterizing traffic in the city,
 - developing and adopting Sustainable Urban Mobility Plans (SUMP) in the cities with district rights, according to the EC guidelines,
 - conducting measures by the Province that will accelerate the introduction of national legislation, allowing the implementation of low emission zones based on the Euro emission standards.
- Act on Electromobility and Alternative Fuels - on December 24, 2021. the Act on Electromobility and Alternative Fuels of 11 January 2018 has been amended, according to which, in order to



reduce the negative impact of pollutant emissions from transport on human health and the environment, a Low Emission Zone may be established within the commune, covering roads managed by the commune. The entry of vehicles other than: electric, hydrogen-powered, natural gas-powered vehicles and excluded on the basis of a resolution of the commune council, in accordance with paragraph 4., shall be restricted to the LEZ. The change in the rules on establishing the LEZ introduced the possibility of introducing them in all municipalities (so far the LEZ could be only introduced in cities with a population over 100,000) and defining individual entitlements to enter by the municipalities. Therefore, the new provisions gave local governments greater flexibility in shaping LEZ. Other questions defined in the Act are related to the scope of exemptions from the entry ban, fees and vehicle markings. The LEZ is established by the municipal council by way of a resolution, which defines the boundaries of the LEZ area, the manner of organizing the restriction of entry to the low emission zone, and additional ways of publicizing the content of the resolution on the establishing of the low emission zone.

- **Related initiatives**

Climate Quarter project - The Krakow City is implementing the Climate Quarter, a groundbreaking urban project, in the area of Kazimierz and Grzegórzki. The project includes activities related to mobility, quality of public space, greenery and revitalization. The Climate Quarter is the beginning of changes in thinking, planning, and designing the public space of our city. This is reflected in the integration of the development of the area and infrastructural changes, transport as well as land use projects. The human dimension is also important - creating new relations and taking care of the existing ones, shaping changes in the surrounding space together, with the participation of its users, and with the support of the city. Among the many activities carried out in the project, some will concern restrictions in car traffic and parking such as new traffic organisation, together with closure of roads for cars, reduction of number of parking lots in favour of greenery and more space for pedestrians and cyclists. The city, by implementing the Climate Quarter, wants to counteract climate change and protect the environment and urban space. Individual activities are implemented with the involvement of residents and other local stakeholders, which allows building awareness of the need for changes and meeting the expectations of local communities. The project activities will also help to reduce CO2 emissions, which have a negative impact on health and quality of life.

3. Key results and findings

Following most important results and conclusions from conducted studies, participation process and workshops should be highlighted:

I. Conclusions from the consultations of the UVAR SUMP Topic Guide with the representatives of different city units and departments:

- The implementation of solutions such as: congestion charges, Zero- Emission Zone, Ultra -Low -Emission Zone requires changes at the statutory level.
- The Traffic Engineer of the City of Kraków emphasizes the role of public consultations in the implementation of such solutions - proposal to set up a consultative group that will include representatives of various local communities and people with special needs.
- The role of parking policy within the SUMP should be maximized due to the controversy in the implementation of restricted traffic zones and legal regulations at the national level.
- Planning of UVAR regulations should allow the entry of privileged transport (such as the police, ambulances, etc.) to all parts of the city (road parameters and road signs).



- When implementing UVAR, the characteristics of the entire region should be taken into account (location of cultural and social centres, congestion broken down into individual groups of vehicles and other road users, the existing infrastructure, road geometry and their interaction).
- UVAR should be used in the SUMP process for FUA
- Solutions from UVAR should be translated into the Polish and Kraków realities and the use of these solutions as a response to the vision and goals of sustainable urban mobility in the FUA area.
- We should lobby for the Low Emission Zone, which is indicated in the Air Protection Program for the Małopolska Province
- The implementation of truck tolls should be considered
- It is planned to introduce e-control (ANPR - Automatic number plate recognition) in the paid parking zone.

Moreover, the analysis of particular types of UVARs that can support various objectives of the city's policy and the results of consultations with representatives of municipal units have made it possible to formulate the conclusion that, **in view of the priority of improving air quality in Kraków, the optimum solution will be the implementation of a Low Emission Zone (LEZ).**

II. Conclusions from the workshops with the residents of Kraków in the form of focus groups, organized in December 2020:

- LEZ is a novelty, requiring talks with residents and careful communication;
- LEZ as perceived by residents will introduce disruption to daily life;
- The LEZ concept needs to be introduced in a gentle way;
- There is a need to present LEZ as part of the strategic vision for Kraków's development;
- Actions should be planned to help the groups that will be most affected by the introduction of the LEZ;
- It is worth considering a softening of the formula that will determine the elimination of vehicles from traffic in Kraków;
- There is a need to implement a number of investment and infrastructure measures prior to the introduction of LEZ.

III. According to the Act on Electromobility and Alternative Fuels, the entry of vehicles other than: electric, hydrogen-powered, natural gas-powered vehicles and excluded on the basis of a resolution of the commune council, in accordance with paragraph 4., shall be restricted to the LEZ. The LEZ is established by the municipal council by way of a resolution, which defines the boundaries of the LEZ area, the manner of organising the restriction of entry to the low emission zone, and additional ways of publicizing the content of the resolution on the establishing of the low emission zone.

IV. According to the provisions of the Air Protection Programme for the Malopolska Region (POP), Commune Council in Krakow is obliged to issue the resolution on the LEZ implementation in Krakow in one year from the change of national regulations, i.e. in the end of 2022. In the first phase, LEZ must be implemented in the area inside the 2nd ring road. In turn, LEZ in its final shape (inside ring road IV) must be implemented by the end of 2025 or after completion of construction of the Kraków ring road IV.



V. Measurement of harmful pollutants emitted by the vehicles entering/ moving into 2nd ring road from 2019 proved that the oldest cars with diesel engines, as well as private buses and minibuses play the greatest role in the emission of pollutants in Krakow. The results especially showed that passengers cars with diesel engines of Euro 1 - 3 Emission Standards emit almost 50% of all PM pollutants (Fig. 1). Also diesel cars are the main source of NOx in Krakow. There is no significant difference in exhaust emissions between petrol and LPG engines. LPG is a cheaper fuel, but it does not make the engine emit less pollutants.

Ile pojazdów spełniających poszczególne normy EURO porusza się po Krakowie i jaki jest ich udział w emisji zanieczyszczeń

Norma EURO (diesel)	Rok produkcji pojazdu*	Udział w ruchu	Udział w emisji NOx	Udział w emisji pyłów PM	Norma EURO (benzyna)	Rok produkcji pojazdu*	Udział w ruchu	Udział w emisji NOx	Udział w emisji pyłów PM
EURO 1 ON	1993-1996	<1%	1%	2%	EURO 1 Pb	1993-1996	1%	2%	2%
EURO 2 ON	1997-2000	2%	4%	10%	EURO 2 Pb	1997-2000	4%	7%	2%
EURO 3 ON	2001-2005	7%	14%	36%	EURO 3 Pb	2001-2005	11%	11%	4%
EURO 4 ON	2006 VIII 2009	12%	20%	30%	EURO 4 Pb	2006 VIII 2009	14%	7%	3%
EURO 5 ON	2011 VIII 2014	9%	19%	3%	EURO 5 Pb	2011 VIII 2014	11%	3%	3%
EURO 6 ON	2015 VIII 2018	9%	8%	1%	EURO 6 Pb	2015 VIII 2018	16%	3%	3%
EURO 6D ON	od IX 2018	1%	<1%	<1%	EURO 6D Pb	od IX 2018	3%	<1%	<1%

* daty orientacyjne

Fig. 1. The amount of NOx and PM emitted by the PB and ON passenger cars as well as they share in vehicle fleet in Krakow.

VI. The results of the survey carried out among residents living inside the 2nd ring road proved that, if the city introduced a no-entry zone for old cars in the city centre:

- 70% of residents would benefit from a surcharge on a two-year season ticket for public transportation,
- 62% of residents would benefit from a subsidy for the purchase of a e-bike up to PLN 3k or up to 60% of the value of the bicycle.

VII. Key lessons learned from other activities carried out so far:

- According to the results of the Krakow Barometer from 2020, 58 % of Krakow residents consider improving air quality as the second most important challenge for the city,
- In Kraków, cars are almost the only emitter of nitrogen oxides - 75 % of NOx in the air in Krakow comes from the exhaust gases of cars that drive on the streets,
- The results of the analyses confirmed that the UVAR solution most effective in terms of improving air quality in Kraków would be LEZ, but, at the same time, it should be borne in mind that in order to achieve the remaining city policy goals, other solutions, including the paid parking zone, should be continued,



- The changes introduced in the Act on Electromobility and Alternative Fuels in December 2021 make it possible to introduce the LEZ which rules will be socially acceptable, without focusing solely on electric cars,
- The LEZ requirements should be based on Euro Emission Standards and the type of fuel used by the engines,
- For residents and entrepreneurs, especially those living and operating in the future zone, support packages should be prepared in exchange for the scrapping of vehicles that do not comply with the LEZ rules,
- It is necessary to provide attractive and high-quality means of transport as alternative to car, and strengthen the operation of public transport, also in terms of commuting to the LEZ from FUA,
- Introducing exceptions to the ban on entry to the zone, e.g. for antique vehicles, should be considered.

4. Action Plan towards UVAR (LEZ) in Krakow

1. Planning Measures

Based on the results of the activities and research carried out so far, the Action Plan for the LEZ implementation in Krakow was developed. The Action Plan refers, among others, to definition of the proposal of the LEZ area, subjective scope and stakeholder support packages. The proposal will be consulted widely with residents and entrepreneurs. After the consultation, the LEZ project will be referred to the Commune Council of Krakow, which will adopt a resolution to establish the LEZ. All these issues and phases are described below.

I. Definition of the LEZ area and scope

It is planned that at the beginning, the LEZ will be introduced in the area covered by the 2nd ring road of Krakow (Fig. 2). The area is limited by Aleje Trzech Wieszczów and the following streets: Konopnickiej, Kamińskiego, Powstańców Śląskich, Powstańców Wielkopolskich, Turowicza, al. Powstania Warszawskiego and Wita Stwosza. At the time of putting the full express bypass of Krakow into service (4th ring road), in accordance with the Air Protection Plan for Malopolska Region, the LEZ should be enlarged to cover the entire area inside the 4th ring road.



Proponowany obszar objęty Strefą Czystego Transportu w Krakowie

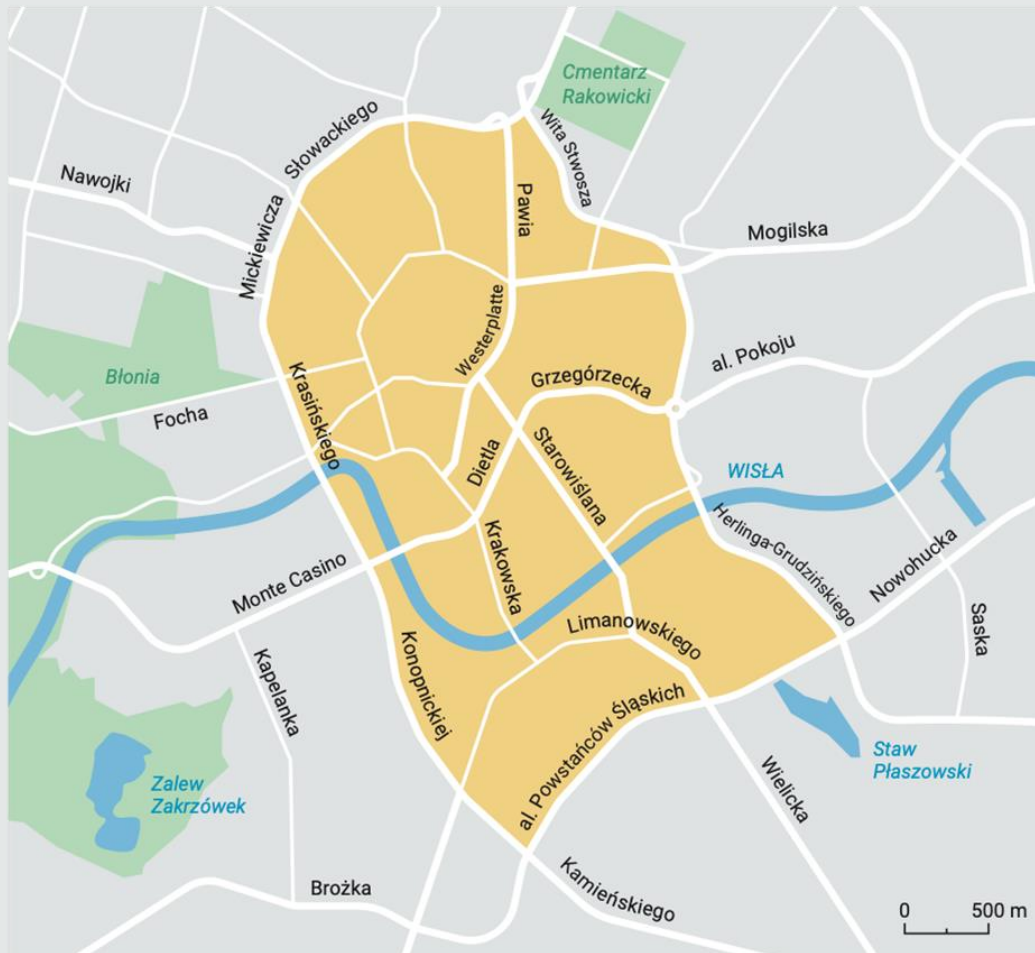


Fig.2. Proposed area initially covered by the zone.

Measurement of harmful pollutants emitted by the vehicles entering/ moving into 2nd ring road carried out in 2019 indicates two main factors on the basis of which the rules for entering the LEZ should be formulated (Fig.1):

- the amount of the pollutants emitted by a given group of vehicles (selected in terms of fuel and Euro Emission Standard) emits pollutants and
- the share of a given group of vehicles in a vehicle fleet in the city.

Based on this data, it was also possible to estimate the effects that would be achieved after the introduction of various requirements for cars in the LEZ.

The proposal that will be consulted with the stakeholders assumes the requirements for cars will be introduced in stages (Table 2 and 3). It is proposed that at the first stage (start in January 2023), only cars meeting the EURO 1 and EURO 2 Emission Standards, both ON and PB, will be banned from entry to the LEZ (Table 2).



With each new stage, more vehicles will be banned from entry to the LEZ (Table 3), but also the effectiveness of the solutions will be increased in terms of reduction of NOx and PM emissions. The dates of implementation of individual stages will be developed during public consultations.

Table 2. Vehicles that would enter the LEZ in the first stage.

Euro Standard	Date of production		STAGE1.; start: January 2023	Rules does not apply to:
	ON	PB		
EURO 1	1993-1996	1993-1996	NO	Vehicles of the residents of LEZ owning a K or N type vehicle parking subscription issued for zones A1, A2, A3, A4, A13, B11, B12, B20 and C19 until January 1, 2024
EURO 2	1997-2000	1997-2000	NO	
EURO 3	2001-2005	2001-2005	YES	Vehicles of the entrepreneurs operating in LEZ owning a M or I vehicle parking subscription issued for zones A1, A2, A3, A4, A13, B11, B12, B20 and C19 until January 1, 2024
EURO 4	2006-2010	2006-2010	YES	
EURO 5	2011-2013	2011-2014	YES	
EURO 6	2014-31.08.2018	2015-31.08.2018	YES	historic (antique) vehicles with a special registration issued by the Transport Department of the Krakow Municipality
EURO 6d	Od 1.09.2018	Od 1.09.2018	YES	vehicles registered in the system in regards to a visit to the Hospital or Specialist Outpatient Clinic

Table 3. Minimum requirements for vehicles that would enter the LEZ in the next stages and LEZ effectiveness.

Type of vehicle	STAGE 2. Minimum Requirements	STAGE 3. Minimum Requirements	STAGE 4. Minimum Requirements	STAGE 5. Minimum Requirements	STAGE 6. Minimum Requirements in 2030
PB	EURO 3	EURO 3	EURO 4	EURO 5	EURO 5
ON	EURO 4	EURO 5	EURO 6	EURO 6	EURO 6d
Share of cars covered by the requirements, compared with 2019	15%	24%	47%	61%	81%
Expected decrease in NOx emissions, compared with 2019	28%	48%	78%	85%	93%
Expected decrease in PM emissions, compared with 2019	52%	82%	89%	92%	93%

It is important to note that benefits from the LEZ implementation should also be considered in the category of reductions in CO2 emissions. It may be that some percentage of people will decide to forego car trips to the LEZ altogether and switch to another means of transportation, and these shifts in travel assignment will translate into reductions in CO2 emissions, reduced parking problems, etc.

It should also be emphasized that parallel to the introduction of individual LEZ stages, the implementation of other measures in the field of transportation and mobility, including other measures under UVAR, will



contribute to the achievement of synergy effects, e.g. regarding the emission of harmful pollutants or changes in travel behavior. The synergy effect, figuratively referred to as the "2+2=5 effect", means the effect occurring when different factors interact and many measures are implemented simultaneously. This effect is greater than the sum of effects resulting from the application of individual actions separately. Implementation of LEZ will be more effective if this and other measures are intertwined, complementary, integrated and coordinated. The role of measures that provide alternatives to car travel will be important in this case: the development of rail, bus, and tram connections and the improvement of service quality, including the provision of new rolling stock.

Synergy effect in terms of air quality improvement will also be expected as a result of actions planned for implementation in other impact areas, e.g. spatial planning, environmental protection and education.

II. Definition of support packages and other mobility options for different groups of stakeholders

a. Residents living in the LEZ area

The introduction of the LEZ will require an appropriate transition period so that the owners of the most emitting cars in the area covered by the zone will have time to adapt. It is planned that in the initial stages, the requirements will apply to the oldest cars. Depending on the scenario, for some residents it means the necessity to give up the old and poisonous car.

It is assumed that the resolution establishing the LEZ will provide for at least a one-year transition period for cars with "K" and "N" parking subscriptions for zones A1, A2, A3, A4, A13, B11, B12, B20 and C19.

Additionally, it is proposed to implement the following support mechanisms for the residents of the planned LEZ, who are permanently or temporarily registered in LEZ area and have passenger cars up to 3.5 tones registered before the date of official announcement of public consultations:

- one-time allowance in the amount of PLN 2,000,
- free of charge public transport network ticket for zones I + II + III for the period until December 31, 2024,
- surcharge for an electric bike or cargo bike in the amount of PLN 2,500,
- free subscription for long-term rental of an electric bike for a period of 24 months,

if the proof of scrapping or sale of the above-mentioned car, that does not meet the introduced standards, is provided.

b. Residents of other Krakow areas and residents of FUA

Residents of other Krakow areas and residents of FUA should comply with the LEZ requirements of or use:

- bus and tram service, which already provides 100% accessibility to the LEZ area, and in the near future will be enhanced - it is assumed that every resident of Krakow will be able to reach the LEZ area in less than 30 minutes,
- Fast Agglomeration Railway, which, at the end of 2022, after the completion of railway investments in downtown Krakow, will operate on most routes; almost all major travel destinations from the metropolitan area will be served,
- newly created cycle routes connecting LEZ with most districts,
- P + R system - in the coming months, it is planned to create 1000 additional parking lots, to provide an equivalent of those currently available in the LEZ area.



c. Entrepreneurs

The implementation of the zone will primarily apply to those entrepreneurs who run their business on the basis of regular deliveries. Therefore, it is proposed to introduce a transitional period until January 1, 2024 for entrepreneurs registered inside the LEZ area before the date of adopting the LEZ resolution. In the transition period, cars for which a parking subscription type "M" and "I" have been issued for zones A1, A2, A3, A4, A13, B11, B12, B20 and C19, which will not meet the established emission standards, would be allowed to enter.

The support mechanism will be offered to:

- entrepreneurs running a business in the planned LEZ area, for which a delivery vehicle over 3.5 tons has been registered before the official announcement of public consultations,
- entrepreneurs running a taxi business registered in the Krakow commune before the official start of public consultations,

The following forms of support will be available:

- one-time allowance in the amount of PLN 2,000
- surcharge for a cargo bike in the amount of PLN 2,500
- surcharge for the purchase of a vehicle with a gasoline or hybrid engine meeting at least the EURO 5 standard in the amount of PLN 10,000. zloty,

on condition of deregistering a taxi vehicle under a Krakow license/providing the proof of scrapping the vehicle that does not meet the accepted standards, registered before the official announcement of public consultations.

In addition, it is planned to start negotiations with the relevant ministry or the National Environmental Protection Fund for subsidies for the purchase of an electric or hybrid bus for carriers providing public transport services on the route reported to the appropriate transport authority, if at least one stop of the route is located in the area of the planned LEZ. For carriers that do not meet the introduced standards, the city will propose new end points outside the LEZ.

d. Visitors

The LEZ is also intended to protect the inhabitants of Krakow from the heavily polluting visitors' cars. This means that visitors too will have to adapt to the new rules.

Visitors will be able to park a car, that does not meet LEZ standards, on one of the existing P + R parking lots and reach the zone by train, tram or bus.

In order to improve the offer in this respect, the bus network in the Krakow agglomeration area will be strengthened - the assumption is that the journey from the metropolitan area to the borders of Krakow should not take more than 30 minutes.

In order to facilitate travel, the tariff integration between the Fast Agglomeration Railway and the bus & tram service in Krakow is also negotiated.

III. Information campaign & public consultations of the LEZ proposal

A lot of information highlighting the problem of air pollution due to transport as well as the need to introduce the LEZ in Krakow has been already spread (Table 1). More information, accompanying the public consultation process, will be given to raise awareness about the proposed LEZ scope and possibilities to be involved in consultations.



The public consultations will start on March 17th and will be finished on May 13th . Proposed LEZ scope will need to be discussed with the city residents and other stakeholders in order to develop a solution that is socially acceptable, but also one that will contribute most to the implementation of the assumed objectives, including improvement of air quality in the city. The following issues will be the subject of the public consultations:

- Requirements that cars will have to meet in order to enter the LEZ,
- The date on which these requirements will become effective, and the pace at which they will be raised,
- Complete schedule until 2030 (thanks to this, everyone will know from the very beginning and well in advance what requirements will be imposed on cars in the coming years),
- Transitional rules for LEZ residents and entrepreneurs using a car to work on its territory.

Different forms of engagement will be used to involve various groups of stakeholders. Table 4 presents the schedule & the overview of the public consultations process, together with accompanying information campaign.

Table 4. The schedule & the overview of the public consultations process and accompanying information campaign.

Date	Information activity/ form of consultation	Target group
10.03	Announcement of public consultations	All groups of stakeholders
14.03	Briefing about public consultations	All groups of stakeholders
14.03	Leaflets distributed at main intersections and among residents of the planned LEZ; video about the idea and reasons for introducing LEZ at Krakow.pl and relevant social media	All groups of stakeholders
15.03	Live stream with Krakow Mayor and experts	All groups of stakeholders
17.03 - 25.03	Information in local media and on social networks about the possibility of submitting comments through a special form and participate in workshops (recruitment for workshops)	All groups of stakeholders
17.03 - 25.03	Submission of comments to LEZ scope via a special form (available online and at selected city units)	All groups of stakeholders
28.04 - 01.04	Repeated announcement in the media about the workshops	All groups of stakeholders
31.03	Introductory meeting (first workshop) for residents	Residents
5.04 - 13.04	A series of four workshops for residents	Residents



19.04	Information in media about meeting summarizing the workshops for residents	All groups of stakeholders
21.04	Meeting summarizing the workshops for residents	Residents
26.04 - 28.04	A series of three meetings with entrepreneurs	Entrepreneurs
9.05 - 13.05	Expert telephone service	All groups of stakeholders
13.05	Completion of the consultation process	
13.06	Report with conclusions from the consultation process	

IV. Preparation and adoption of the resolution on LEZ in Krakow

After the consultation, the project of the resolution on LEZ, which takes the stakeholders' comments into account, will be referred to the Krakow City Council. The Krakow City Council will work on it and will adopt a resolution to establish the LEZ. The LEZ will be introduced according to stages developed during public consultations and approved by the City Council. The expected timeline of resolution preparation & adoption is summarised in Table 5.

Table 5. Expected timeline of consultations and resolution preparation & adoption.

Stage		Date
1	Public consultation process	III - V 2022
2	Report with conclusions from the consultation process	VI 2022
3	Preparation of the project of resolution on LEZ in Krakow	VI 2022
4	City council works on project of resolution on LEZ in Krakow	VII - IX 2022
5	Adoption of resolution on LEZ in Krakow	Not later than XII 2022
6	Implementation of 1st stage of LEZ in Krakow	I 2023

2. Infrastructure/Tools

The LEZ establishment will require implementation of a proper infrastructure and tools.

Every person planning to drive a car through the LEZ will be - in accordance with the requirements of the Act of the on Electromobility and Alternative Fuels - obliged to mark the vehicle with an appropriate sticker. Its formula will be determined by the Ministry of Climate in the coming weeks.

The sticker will be issued by the commune and the cost of the sticker cannot exceed PLN 5. It will be the only cost the owner of the car. As for now there is no plan to charge any fees on cars for entry - both for cars that meet the requirements of the LEZ, as well as for those that do not meet these requirements. To receive the sticker, the driver will need to specify the registration number of the vehicle for which it is to be issued, the type of fuel it supplies and the date of first registration.

The police and city guards will have the right to enter the LEZ. Penalties will be imposed both on drivers who enter the zone with a car that is not permitted to entry and with an unmarked car.

The Krakow Commune envisages equipping the streets with a video-detection system - currently the possibilities of installation are discussed with potential contractors. After starting such a system, the control of the LEZ will be strengthened and more effective.



It is also planned to launch a digital system. The driver will be able to register his vehicle using the online platform or the application (specifying the registration number, fuel type and date of first registration) by completing a simple form. After registering the vehicle, a sticker in accordance with the regulation will be sent to the address indicated or a confirmation of vehicle registration in the database will be generated, authorizing the receipt of the sticker at the selected point.

The entrance to the LEZ will be marked with the D-54 sign, and the exit with the D-55 sign (Fig. 3).



Fig. 3. Signs marking the LEZ entrance and exit.

According to the Act on Electromobility and Alternative Fuels, the LEZ is established by the city council by way of a resolution, which defines the boundaries of the LEZ area, the manner of organising the restriction of entry to the low emission zone, and additional ways of publicising the content of the resolution on the establishing of the low emission zone. After the public consultation, the Krakow City Council will work on the project of the LEZ resolution and will adopt the resolution, consisting all above mentioned elements. As shown in Table 5, the resolution will be adopted not later than in December 2022.

5. Conclusions and recommendations for innovative low-carbon mobility planning in FUA

- **Conclusions**

To develop low-carbon mobility at FUAs, cities needs to apply stick & carrot strategy - using measures, which, from the one hand - encourage the use of sustainable mobility modes, and, from the second hand - discourage the car travel. The measures that can discourage car use and therefore help minimising related problems are UVAR strategies. The case of Kraków shows that, if the main problem related to car use, is related to poor air quality, the best UVAR strategy to implement is the Low Emission Zone. The development of the Action Plan for LEZ implementation in Kraków was preceded by a series of activities, that helped to define the scope of the LEZ. Ones of the most important elements were studies, both measurements of pollutants from transport and surveys among residents, as well as close cooperation with NGOs operating in the field of air quality. Results of these studies, together with the review of laws and resolutions, made it possible to define assumptions for LEZ implementation proposal. According to this proposal the requirements for vehicles entering the LEZ were formulated taking into account the type of fuel and Euro emission standard. Special support packages and other mobility options are proposed to residents and entrepreneurs whose cars do not meet the requirements. The LEZ scope, support



mechanisms as well as implementation schedule will be consulted with the different groups of the stakeholders. The final project of the LEZ will be referred to the Kraków City Council, which will adopt the resolution of its implementation.

- **Recommendations**

When defining the public consultation process of the LEZ take into consideration following activities:

- organisation of the accompanying information campaign to raise awareness about consulted issues and possibilities to participate in consultations,
- application of different forms of public involvement to attract various groups of stakeholders and give them several ways to express their opinions,
- engagement of experts in field of mobility & transport and others related fields e.g. air quality and its impact on human health & life (including medicine doctors),
- engagement of NGOs who will serve as allies.

6. Dissemination and exploitation plans

The content of this Action Plan will be disseminated during the information campaign accompanying the public consultation process, especially through:

- Briefing about public consultations,
- Leaflets distributed at main intersections and among residents of the planned LEZ,
- Video about the idea and reasons for introducing LEZ at Krakow.pl and relevant social media,
- Live stream with Krakow Mayor and experts,
- Local mass media and social networks,
- The Kraków Municipality and the Kraków Transport Authority websites and related social media.

It will be also promoted at Polish and international UVAR and LEZ related conferences, workshops and meeting as well as in transport & mobility related journals and Internet platforms. It will help stimulating its exploitation through other Polish and foreign cities.

Annex (if applicable, images, maps, results, etc.)

- Leaflets distributed among residents of the 2nd ring road in Krakow and at selected intersection.
- EN version of the video about the need of the LEZ implementation in Krakow.

<https://youtu.be/yDWT08xdTGQ>