

# Deliverable D3.2: Summary document of Krakow city demonstration measurement campaign

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Krakow remote  
emission  
sensing  
measurement  
campaign  
successfully  
completed



December 17, 2021



News



see also CARES website: <https://cares-project.eu/cares-remote-emission-sensing-campaign-krakow-completed/>



# Summary

- This summary document provides an overview of the Krakow Low Emission Zone context, a description of the preparatory work completed as well as the data collection. Results of the measurements will only become available at a later stage and are not part of this document. Results will be documented in D3.4 (Summary report on partner cities' measurement campaigns).

# Participating organizations

- **OPUS RSE:** open-path system at 10 locations (measuring NO, NO<sub>2</sub>, HC, CO, PM relative to CO<sub>2</sub>).
- **Technical University of Graz (TUG) and Technical University of Prague (CTU) :** Point sampling (measuring NO, NO<sub>2</sub>, black carbon, PN relative to CO<sub>2</sub>) at three locations.

# Attainment of the objectives and explanation of deviations (1/3)

## Description of work related to deliverable as given in DoW

- The primary objective of the demonstration measurements in Krakow was to demonstrate the role that remote sensing can play in steering new policies such as Low Emission Zone (LEZ).
- Against this main objective, the consortium would use commercially available cross-road remote emission sensing instrument of the OPUS-type, as well as the point sampling system further developed in WP1, covering at least 3-5 measurement spots within the city of Krakow, delivering data for about 100,000 individual vehicles.
- The secondary objective was the comparison with the previous measurement 2019 Krakow spring/summer campaign using data collected in the winter
- The third goal was to compare point sampling with commercial technologies in real urban situations

# Attainment of the objectives and explanation of deviations (2/3)

## Time deviation from original DoW

- Measurements in Krakow were originally planned for winter 2020/21, and to be the second among the three CARES city demonstration measurement campaign. However, as measurements got pushed back due to implications from the COVID pandemic, measurements in Krakow took place in November and December 2021, after the Milan campaign.

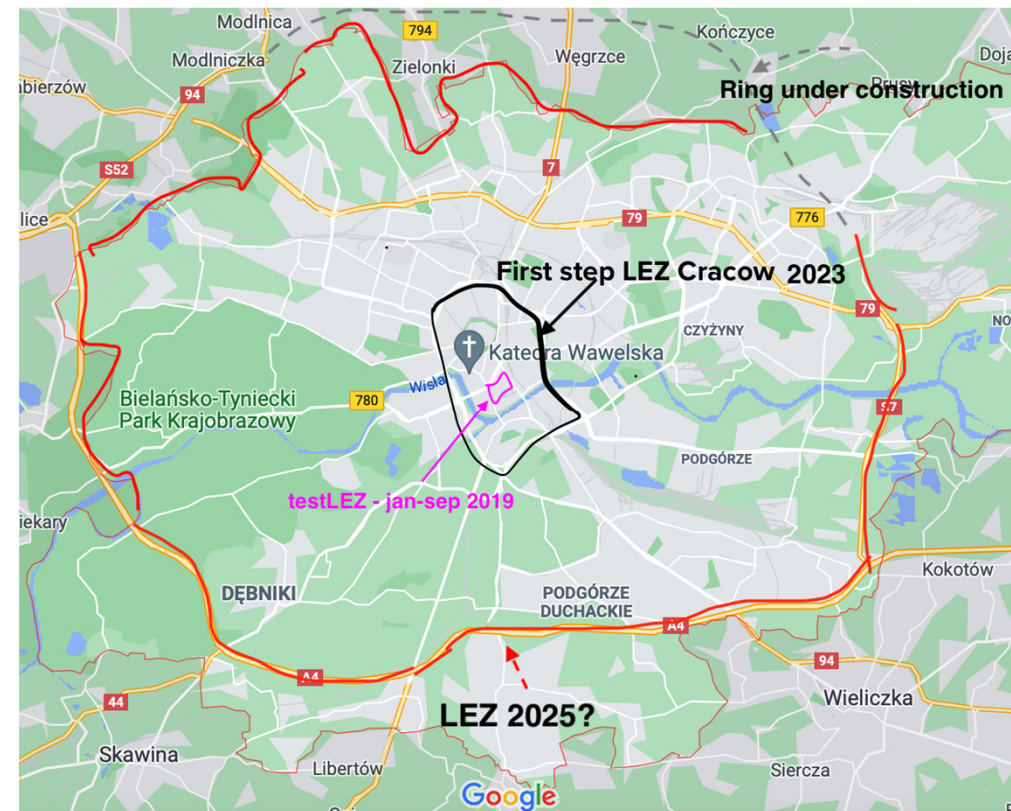
# Attainment of the objectives and explanation of deviations (3/3)

## Content deviation from original DoW

- None.
  - The target of measuring 100,000 vehicles was largely exceeded, with 104,864 valid measurements for the OPUS commercial remote sensing technology alone
  - In addition, point sampling technology recorded 33,418 passes with valid license plate recognition of 22,665 individual vehicles

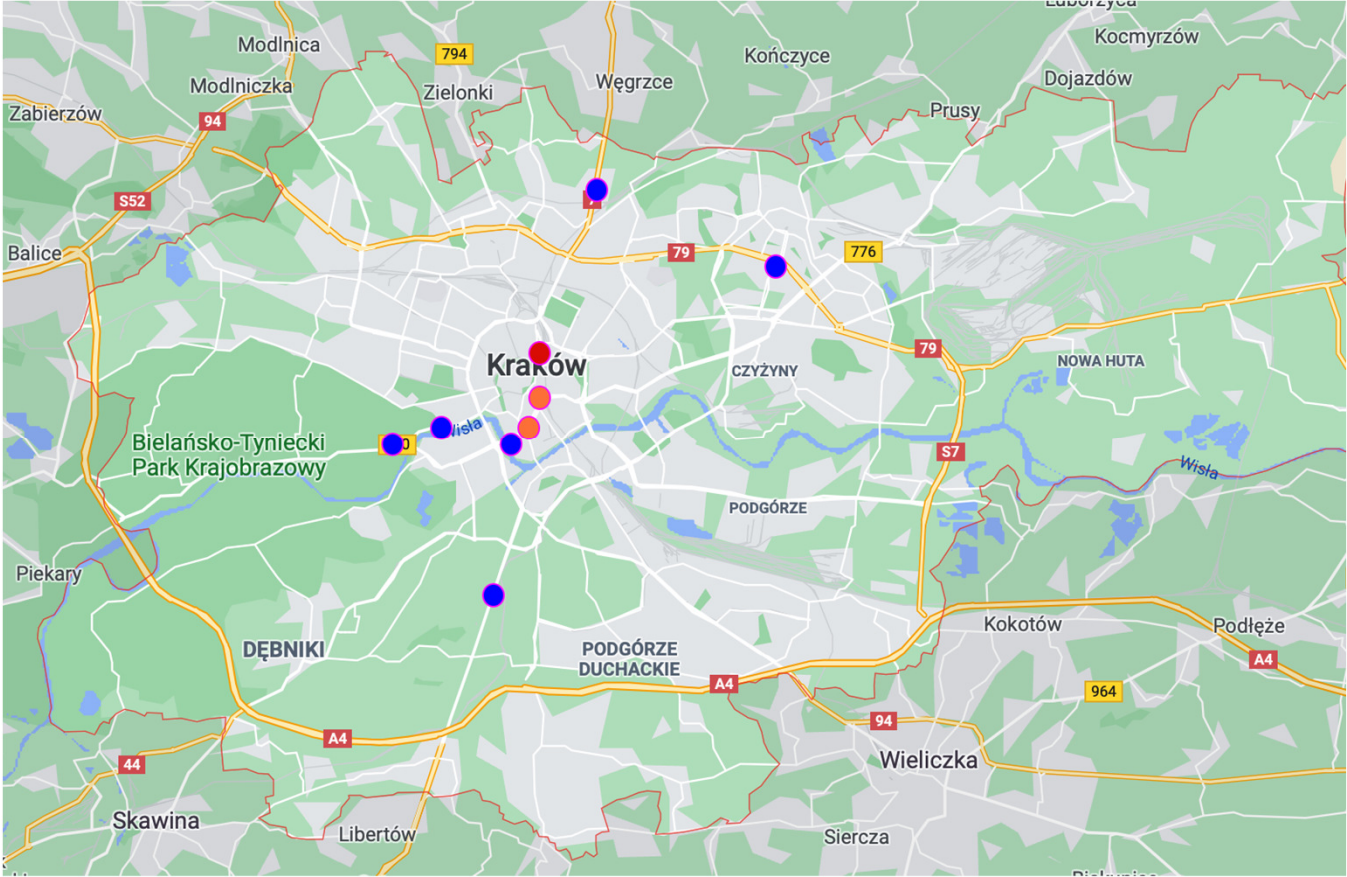
# Low Emission Zone (LEZ) in Krakow

- A pilot LEZ in Krakow (from January to September 2019) led to the introduction of national provisions on LEZs in 2021
- These new national provisions will allow cities in Poland to implement LEZ, and distinguish by fuel type and euro standard
- Remote-sensing data is seen as a key tool to inform policymakers in charge of designing the upcoming LEZ
- CARES data collected in December 2021 will be compared with May 2019 data collected by the city (the first remote sensing campaign)



CARES

# CARES testing location



- Commercial - OPUS
- Point sampling
- Colocation



# Lessons learnt

- The importance of visiting candidate spots which help to discard some of the initial 20 locations
- The need for backup locations:
  - One of the preselected site had to be discarded due to an unexpected change in traffic organization (necessary road repair)
  - Locations for point sampling had only been visited virtually prior to the campaign and turned out to be suboptimal. Additional spots were selected early in the campaign
- Electricity was made accessible relatively easily by the city and did not require extensive preparation compared to the Milan campaign
- The use of batteries during day hours was essential. Street lamps could provide power during night hours only.
- Harsh weather may halt the testing:
  - Snow-covered license plates
  - Wet roads with dirt which covered plates
  - Worsened translucency of the OPUS unit



# Status of datasets

- Over 100,000 measurements collected by OPUS
- Point sampling data in post-processing
- Licenses plates were processed and delivered by the central registration authority in July 2022 (CEPIK)
- First consolidated dataset delivered from OPUS

## Next steps

- On-going: Post-processing of emissions measurement data, including quality control
- Upcoming: Detailed analysis of anonymized data to distill conclusions about emission levels, RES instrument performance and comparability, etc.



# CARES

CITY AIR REMOTE EMISSION SENSING



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## CONSORTIUM PARTNERS

