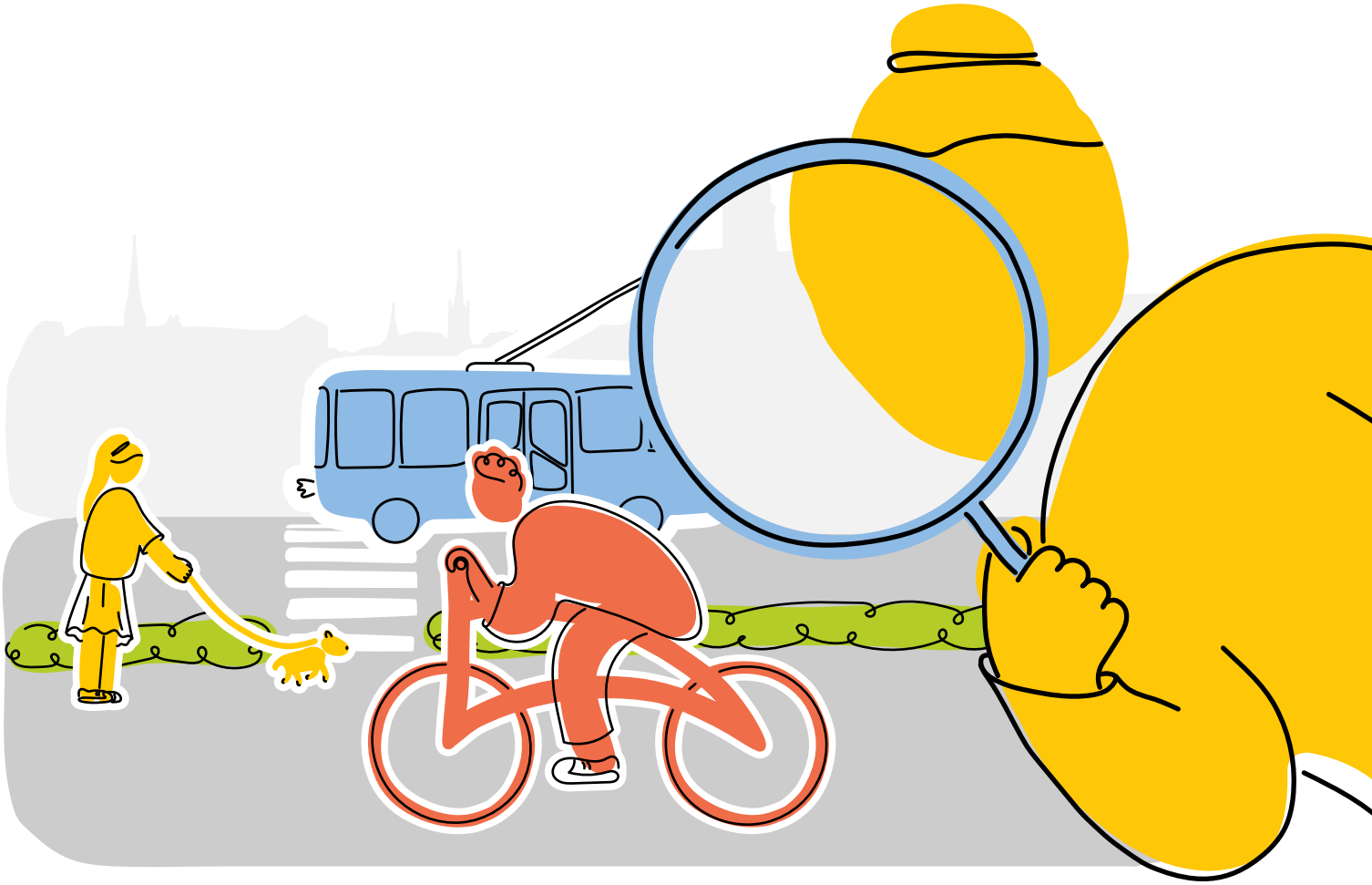
RĪGA

# Breathe, Riga!

Summary report on air quality
and population mobility habits



2026

# Introduction and Methodology

**Take a look at the summary report on air quality and population mobility habits in Riga!**

This is a summary report of the initiative "Breathe, Riga!" (please, see the full report in Latvian here). It reflects data of a study conducted from September 2025 to February 2026 during which levels of particulate matter ($PM_{2,5}$ and $PM_{10}$) were measured along the most commonly used routes used by residents in the centre of Riga. The study was conducted with the aim of obtaining and analyzing spatially widely available data on particulate matter pollution, as well as to examine the mobility habits of the residents of Riga, particularly young people and parents, and their potential of behavioural change.

The approach used in the study is an innovative solution that promotes **public participation** and enables **data-based decision-making**; it also actively involves the residents in research and environmental monitoring processes while complementing the data obtained from other studies. The **involvement of students** is particularly significant - by participating in hands-on data collection, they engage in citizen science while also gaining insights into topics such as mobility and air quality.

## Approach and study framework

**Social practice theory** was used to analyze population mobility and the interaction of competencies and meanings.

Additionally, the **concept of value-action gap** was applied to explain the differences between attitudes and actions.

A combined approach allows for integration of both **quantitative and qualitative data**, enabling a systematic analysis of mobility.

## Data collection (quantitative + experimental data)

Using a citizen science approach, **117 students (aged 15 to 19)** were involved in data collection.

Measurement period: **from September 2025 to February 2026.**

**> 696,000** measurement records obtained

Devices used: ***AtmoTube Pro / Pro2***

**Measured indicators:**

**$PM_{2,5}$ and $PM_{10}$**

**temperature**

**relative humidity**

## Qualitative data

**2 focus groups, 19 parents in total**
(13 women, 6 men)

Age:
**25 to 55**

Total recording time:
**7 h 17 min**

Data transcribed and triangulated with other data sources

## Survey data

### High school student panel survey

**Two surveys**
(before and after wearing sensors)
were conducted to **analyse changes in habits**
(117 respondents)

### Public survey

Total:
**1208 respondents**

Riga:
**889**

Riga suburbs:
**319**

Age:
**18–75 years**

Period:
**12 – 23 February 2026**

Sampling method:
**quota sampling**
(representative by gender, age, education, place of residence)

## Data processing and analysis

1. Data **anonymization and filtering**
2. **Analysis of temperature measurements** (excluding indoor data)
3. **Statistical analysis of particulate matter, mapping** carried out using QGIS Desktop 3.44.4.
4. Statistical analysis:
   - **chi-square ($x^2$) test**
   - **statistical significance: $p < 0.05$**
   - **strength of association assessed** using Cramer's V coefficient, with **effect size interpreted** accordingly

**By combining sensor measurements with residents' experiences and data on their habits, it becomes possible to understand not only where pollution occurs, but also why people end up in these specific mobility situations.**

# Air quality in the centre of Riga

The experimental part of the study

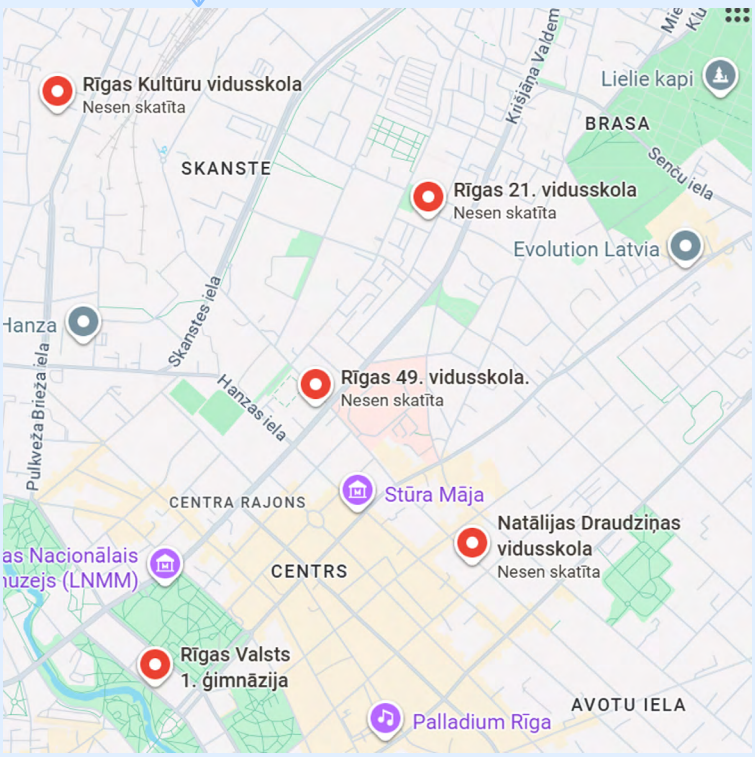
## What was done:

Air quality was analysed, using
**~696 000 sensor measurements**

Data was collected by
**117 students from 5 Riga schools**

Measurements were taken at different times of day and along different routes

School locations




Source: *Google Maps*

**Overall, air quality is satisfactory; however, temporary peaks in pollution levels were observed in the measurements.**

Rush hours:
**7:30–9:00**
**16:00–18:00**

During the rush hours, the concentrations of $PM_{2.5}$ and $PM_{10}$ particles are 9-10 % higher than during the rest of the day.

Main sources of pollution:
**transport emissions and combustion processes.**

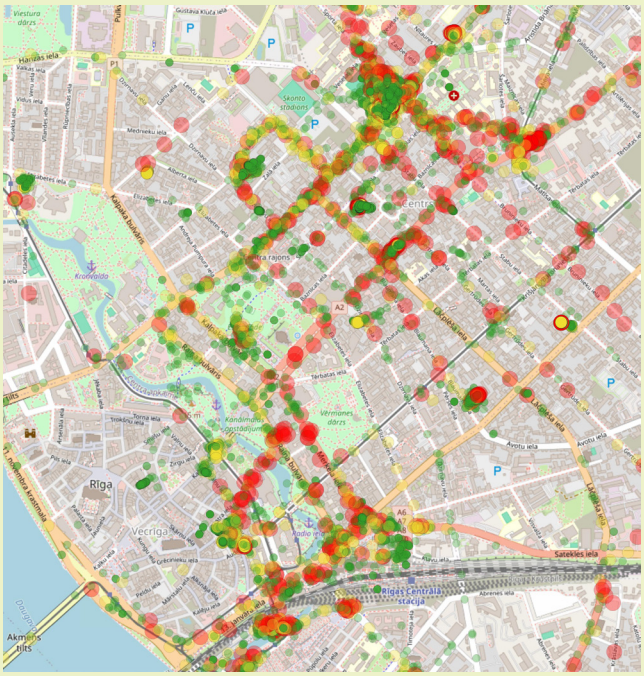
Results indicate a moderate impact of transport on the pollution, also supplemented by other sources in the city, such as heating and secondary aerosols.

## Road transport affects air quality

The highest concentrations of $PM_{2.5}$ pollution were observed in areas with heavy traffic, particularly at major intersections, such as the intersections of K. Barona and Gertrudes Streets, K. Valdemara and Stabu streets, Merkela and Marijas streets, A. Caka and Bruninieku streets.

$PM_{2.5}$ and $PM_{10}$ levels are closely related (r = 0.996), meaning that when $PM_{10}$ levels increase, $PM_{2.5}$ levels also tend to rise; on average, $PM_{2.5}$ particles account for approximately 82 % of $PM_{10}$ particles. This proportion is characteristic of urban pollution, where transport emissions, combustion processes and secondary aerosols are the dominant sources.

**Measurements obtained from portable sensor devices indicate that air pollution in Riga is not uniform. Concentrations peak at certain times of the day and in specific locations, with the highest $PM_{2.5}$ levels observed at intersections with heavy traffic. Other factors, such as heating and weather conditions, also influence the measurements.**




The figure below shows outdoor measurements of $PM_{2.5}$ particulate matter, collected from 06.01.2026. till 27.01.2026. by the students of Riga Secondary School No.49.

Concentrations are indicated as follows: 0–15 ug/m³ in green; 15–25 ug/m³ in yellow; 25–50 ug/m³ in red.

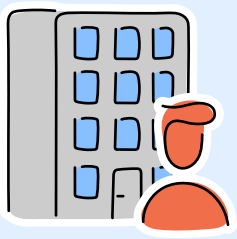
# Resident of Riga City

# Resident of the Riga Suburbs

Mobility habits are shaped not only by individual choices, but also by place of residence, distances, available transport alternatives and daily responsibilities. The mobility profiles of the resident of Riga City and that of the Riga suburbs presented below illustrate the most frequent trends, based on data from the public survey (n=1208). These profiles do not represent every individual resident of Riga (n=889) or the Riga suburbs (n=319).

**Mobility profile**

## Socio-demographic profile



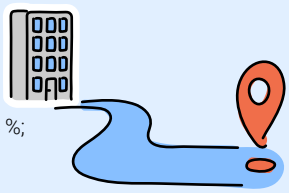
Lives in an apartment
(often, in a Soviet-era or renovated multi-apartment building)

Less frequently owns a car
(59 % of the respondents report owning a car)

A middle-aged working person, seniors and young people
(63 % of the respondents report no children in their household)

Has greater access to public transport

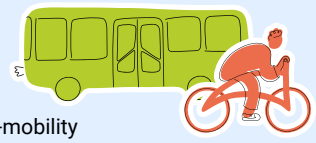
## Mobility requirements



Shorter distances
(up to 30 min – 35 %; 31-90 min – 54 %; longer trips – 11 %)

Active mobility habits:
52 % travel on foot or by bicycle on a daily basis

## Mode split



Predominantly:
public transport + on foot + micro-mobility

Higher levels of satisfaction with public transport

Car use is discretionary
(on weekends or for specific purposes)

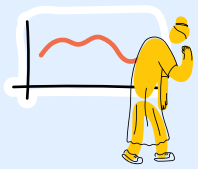
## Behavioural profile and motivations

Prioritises health, convenience and cost

Less dependent on cars

More positive attitude toward restrictions
(e.g., parking policies)

## Barriers to sustainable mobility



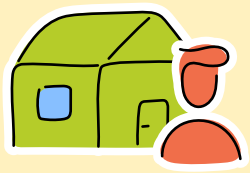
Lack of quality public transport
(overcrowding, irregular schedules)

Lack of safe cycling infrastructure

Transfer time

**Mobility profile**

## Socio-demographic profile



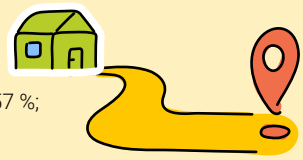
Lives in a private house or terraced house

Frequently owns a car
(73 % of the respondents report owning a car)

A middle-aged working person, often with a family
(56 % of the respondents report no children in their household)

Typically works in Riga

## Mobility requirements



Longer distances
(up to 30 min – 23 %; 31-90 min – 57 %; longer trips – 20 %)

Passive mobility habits:
25 % travel on foot or by bicycle

## Mode split

Predominantly
private car

Limited use of public transport
(irregular schedules, inconvenient transfers)

Lower levels of satisfaction with public transport

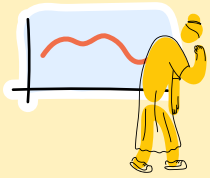
## Behavioural profile and motivations

High structural dependency on the car

Prioritises time, convenience and flexibility

Less inclined to give up car use

## Barriers to sustainable mobility



Insufficient availability / frequency of public transport

Poor connectivity

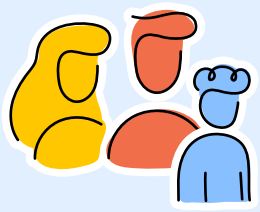
Lack of infrastructure
(cycling infrastructure, safe transfer hubs)

# Young person

**Mobility profile**

Participants of the experimental part of the study (n=117)

## Socio-demographic profile



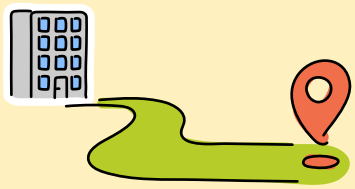
Age:
~ 15 to 19

Lives with parents
(Riga or the Riga suburbs)

No access to a private car
as a primary user
(depends on parents for car use)

High digital literacy
(planning tools, mobile applications)

## Mobility requirements



Regular, structured routes:
school – home –
extracurricular activities

Travel time:
more than 30 min – 46 % of the students
(mostly by public transport or car)

21–30 min – 19 % of the students
(mostly by public transport)

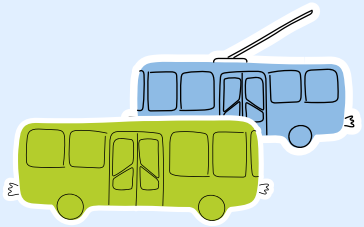
11-20 min - 23 % of the students
(mostly by public transport)

up to 10 min – 12 % of the students
(mostly on foot)

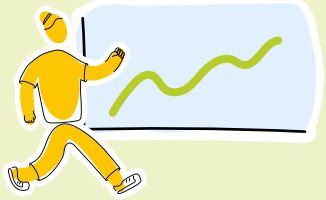
## **Mode split** (typical structure)

~ 70 % use public transport several times per week
~ 33 % go to school on foot several times per week
~ 32 % report going to school by car several times per week

The majority of the students believe that in the future they will mainly travel by car (~ 50 %) or public transport (~ 30 %).



## Behaviour and motivation

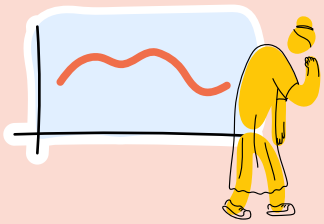


Low level of autonomy → limited freedom of choice

Practical motivation:

- public transport users prioritise speed
- when using car, passengers prioritise speed and convenience
- pedestrians prioritise health and well-being

## Barriers to sustainable mobility



Lack of quality public transport
(overcrowding, irregular schedules)

Lack of safe cycling infrastructure

Transfer time

| Factor | Public transport users | Car users (driven by parents) | Active mobility (on foot/by bicycle) |
|---|---|---|---|
| Speed | ↑↑ **very high** | ↑↑ **very high** | ↑ medium - high |
| Convenience | ↑ high | ↑↑ **very high** | ↔ medium |
| Health and well-being | ↔ medium | ↓ lower | ↑↑ **very high** |

## Main barriers

- lack of safe infrastructure (e.g., bike lanes, bicycle parking facilities)
- perceived insufficient safety
- social norms

# Main findings of the study

## 1. Mobility system is structurally dependent on private cars, despite the widespread use of public transport

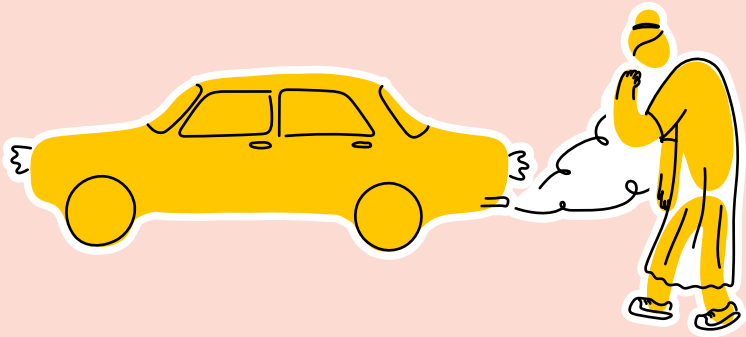
The mobility system in the Riga Metropolitan area is functionally dependent on private cars, as residents most frequently rely on them for daily logistics. In many cases, public transport cannot compete with the private car in terms of travel time and flexibility.

### Facts and figures

- Car is almost never used by 50.3 % of the respondents in Riga and by 43.9 % in the Riga suburbs.
- Public transport is almost never used by 43.9 % of the respondents in Riga and by 64.9 % in the Riga suburbs.
- Car is considered the fastest and the most flexible option, whereas public transport is often considered slower and requires transfers.

## 2. Air quality is significantly affected by transport and worsens during rush hours

Although outdoor air quality in the centre of Riga is relatively good, peak pollution levels clearly coincide with periods of high traffic intensity. This indicates that transport has a predominant role in the air pollution of the city.

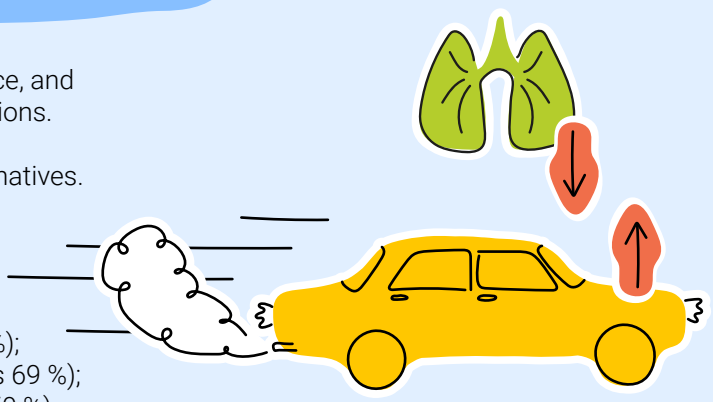


### Facts and figures

- Rush hours: 7:30–9:00 and 16:00–18:00.
- Concentration levels of $PM_{2.5}$ and $PM_{10}$ increase by an average of 9-10 % during the rush hours.
- On weekdays, concentration levels are higher compared to the weekends.

## 3. Speed and convenience, rather than health, are the predominant values in mobility

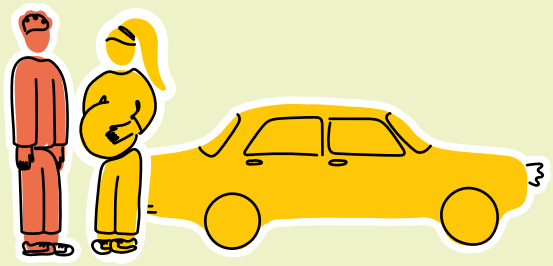
Residents' mobility choices are shaped by time, convenience, and flexibility rather than by environmental or health considerations. Value-based arguments alone have no significant effect on mobility habits; they must be combined with practical alternatives.



### Facts and figures

- Key factors:
  speed (overall - 77 %; in Riga - 77 %, in the suburbs - 79 %);
  convenience (overall - 64 %; in Riga - 63 %, in the suburbs 69 %);
  flexibility (overall - 45 %; in Riga - 43 %, in the suburbs - 50 %).
- Only 3 % of the respondents mention that environmental concerns are key to making their choices.

## 4. Use of private cars is related to daily routines, especially for families and in the Riga suburbs

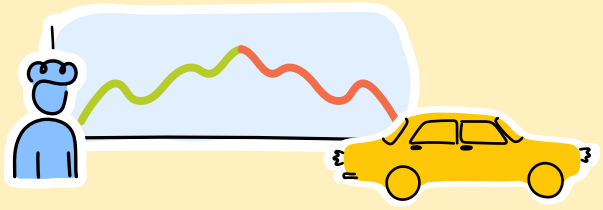


The use of private cars is not solely an individual choice; it is closely related to place of residence, family structure and infrastructure. In the Riga suburbs, as well as for families, the car is often the only practical solution to ensure the flexibility required for daily mobility needs.

### Facts and figures

- 61 % of car users believe that it is impossible to reduce car use in children-related logistics.
- Limited access to public transport in the Riga suburbs.
- Car use ensures the combination of several activities in a single trip.

## 5. Mobility among young people is currently sustainable, but future choices are car-oriented

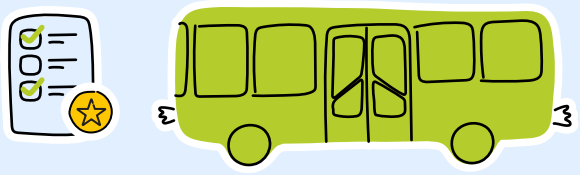


Currently, young people mainly use public transport; however, they plan to switch to car use in the long term. This indicates the importance of mobility-related identity and social norms.

### Facts and figures

- ~ 75 % of young people regularly use public transport.
- ~ 55 % plan to travel by car in the future.
- Gender differences: girls use public transport more often, whereas the risk of car-orientated mobility choices among boys is higher.

## 6. The quality of alternatives is the main prerequisite for changing mobility

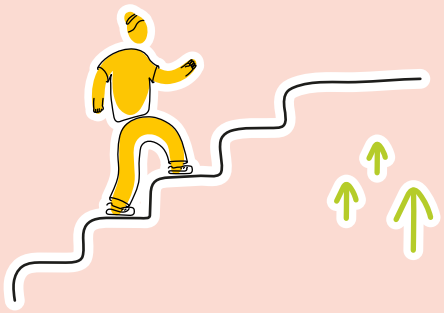


Mobility habits can only change if alternatives can compete with cars. Travel time, reliability and connectivity are crucial factors.

### Facts and figures

- 42–46 % of residents would choose public transport if it were faster and more frequent.
- Critical factors: travel time, regular schedules, direct connections.
- Negative factors: overcrowding, safety concerns, hygiene.

## 7. Policies should be based on improvements, not restrictions alone



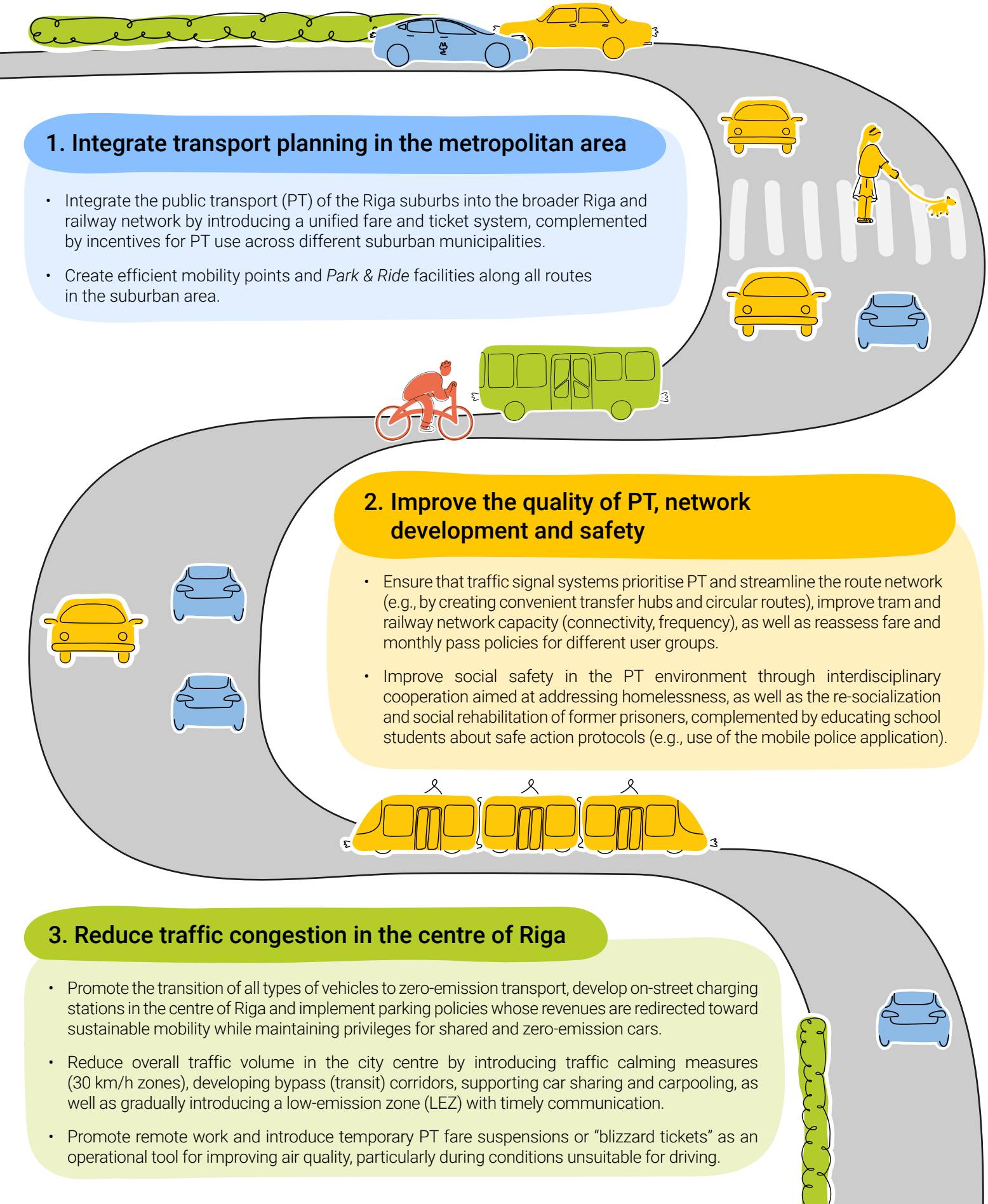
Mobility is not solely the result of individual choices but a social practice, shaped by infrastructure, accessibility and the organization of daily life. Therefore, policies should make sustainable choices the simplest and most logical everyday solution. Restrictions should be implemented in parallel with the development of functional alternatives, otherwise behavioural change will remain limited and gradual.

### Facts and figures

- Higher motivation: improved public transport (42–46 %).
- Fee-based mechanisms → gradual, not radical behavioural change.

# Recommendations and fields of action: how to make Riga faster, safer and cleaner

The recommendations are based on an analysis of the contents of Riga State City's transport and air quality planning documents, as well as air quality data and suggestions received from residents. The need to address infrastructure, social and value-based changes in an integrated manner is emphasized.



## 1. Integrate transport planning in the metropolitan area

- Integrate the public transport (PT) of the Riga suburbs into the broader Riga and railway network by introducing a unified fare and ticket system, complemented by incentives for PT use across different suburban municipalities.
- Create efficient mobility points and *Park & Ride* facilities along all routes in the suburban area.

## 2. Improve the quality of PT, network development and safety

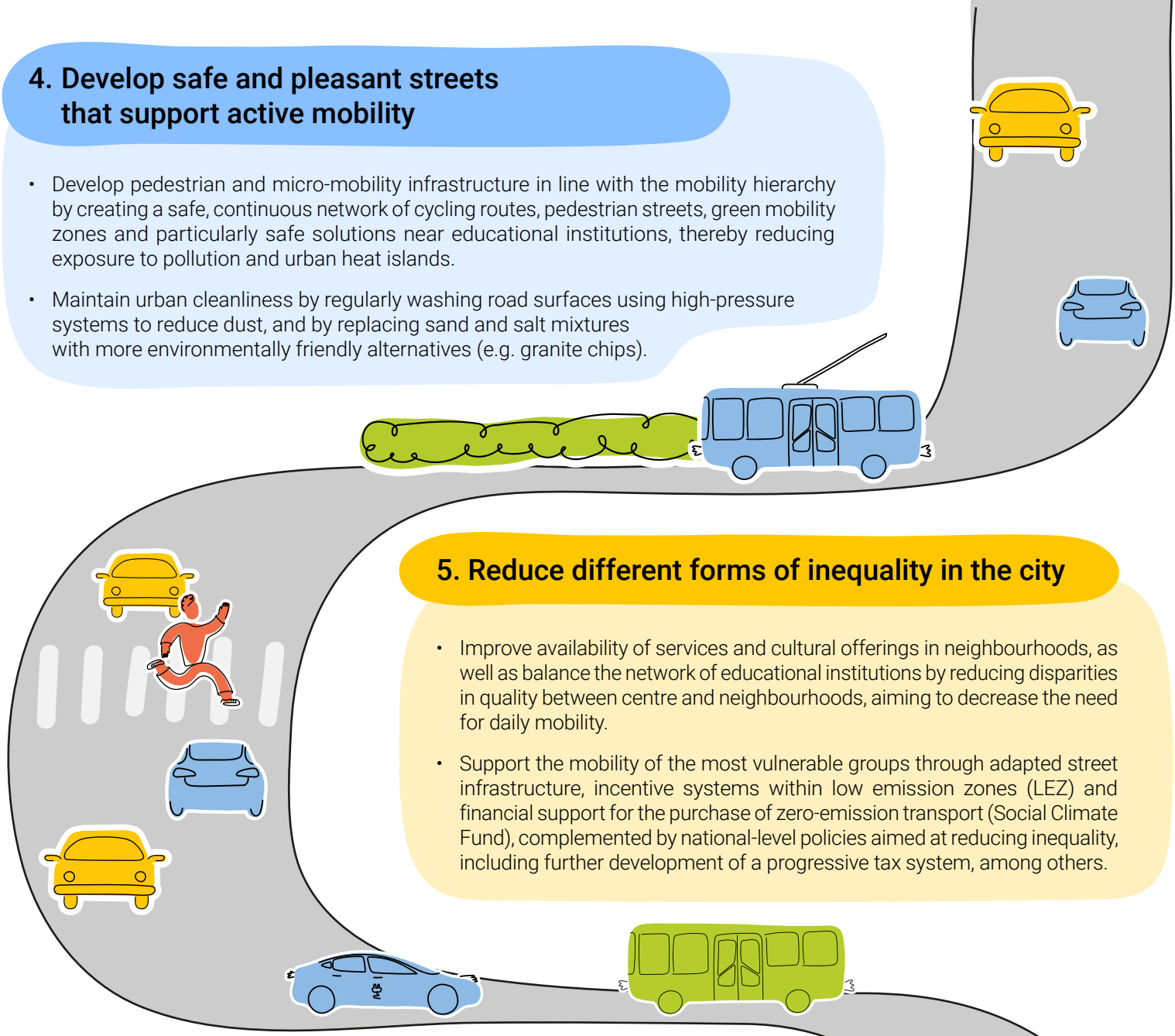
- Ensure that traffic signal systems prioritise PT and streamline the route network (e.g., by creating convenient transfer hubs and circular routes), improve tram and railway network capacity (connectivity, frequency), as well as reassess fare and monthly pass policies for different user groups.
- Improve social safety in the PT environment through interdisciplinary cooperation aimed at addressing homelessness, as well as the re-socialization and social rehabilitation of former prisoners, complemented by educating school students about safe action protocols (e.g., use of the mobile police application).

## 3. Reduce traffic congestion in the centre of Riga

- Promote the transition of all types of vehicles to zero-emission transport, develop on-street charging stations in the centre of Riga and implement parking policies whose revenues are redirected toward sustainable mobility while maintaining privileges for shared and zero-emission cars.
- Reduce overall traffic volume in the city centre by introducing traffic calming measures (30 km/h zones), developing bypass (transit) corridors, supporting car sharing and carpooling, as well as gradually introducing a low-emission zone (LEZ) with timely communication.
- Promote remote work and introduce temporary PT fare suspensions or "blizzard tickets" as an operational tool for improving air quality, particularly during conditions unsuitable for driving.

## 4. Develop safe and pleasant streets that support active mobility

- Develop pedestrian and micro-mobility infrastructure in line with the mobility hierarchy by creating a safe, continuous network of cycling routes, pedestrian streets, green mobility zones and particularly safe solutions near educational institutions, thereby reducing exposure to pollution and urban heat islands.
- Maintain urban cleanliness by regularly washing road surfaces using high-pressure systems to reduce dust, and by replacing sand and salt mixtures with more environmentally friendly alternatives (e.g. granite chips).

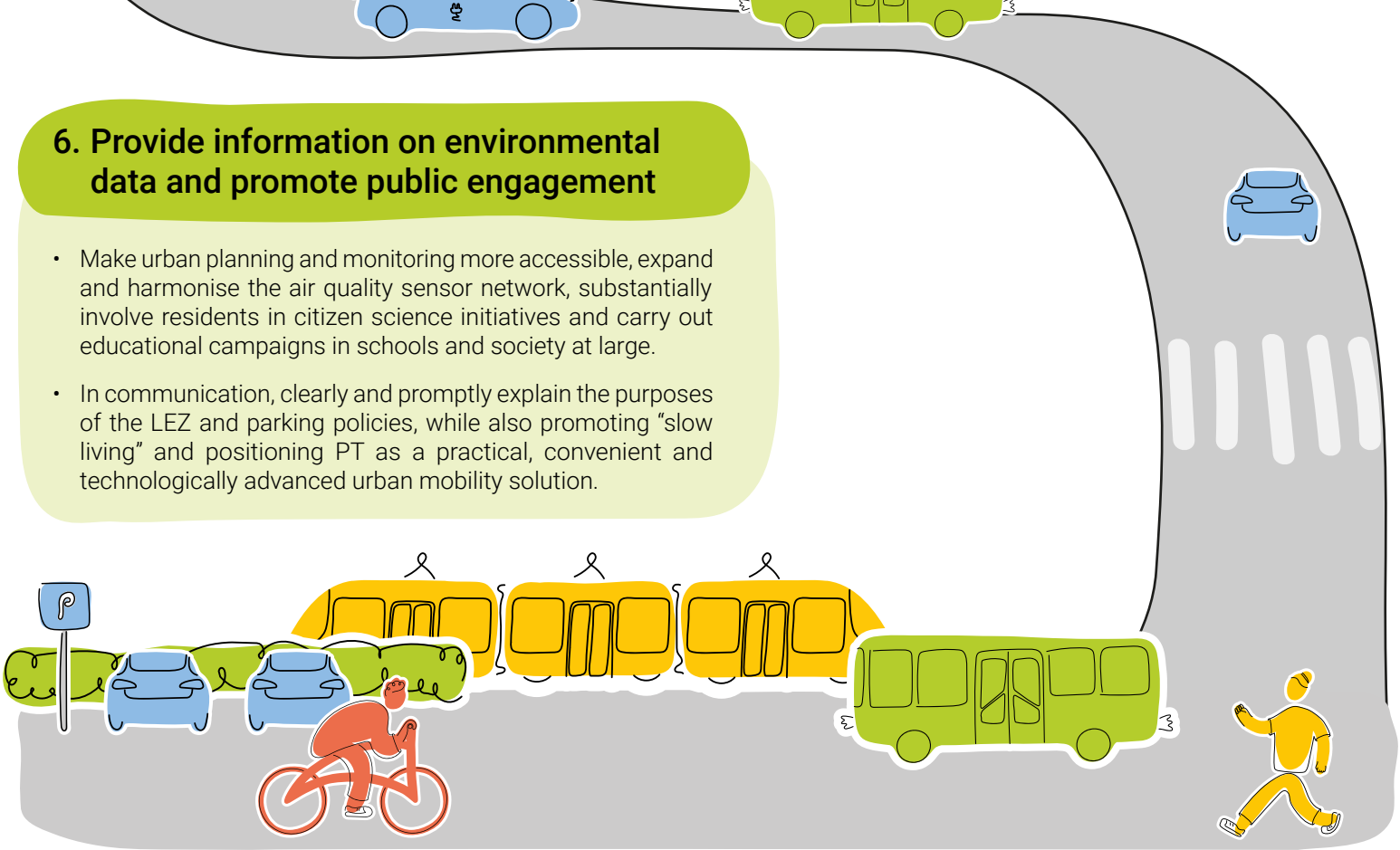


## 5. Reduce different forms of inequality in the city

- Improve availability of services and cultural offerings in neighbourhoods, as well as balance the network of educational institutions by reducing disparities in quality between centre and neighbourhoods, aiming to decrease the need for daily mobility.
- Support the mobility of the most vulnerable groups through adapted street infrastructure, incentive systems within low emission zones (LEZ) and financial support for the purchase of zero-emission transport (Social Climate Fund), complemented by national-level policies aimed at reducing inequality, including further development of a progressive tax system, among others.

## 6. Provide information on environmental data and promote public engagement

- Make urban planning and monitoring more accessible, expand and harmonise the air quality sensor network, substantially involve residents in citizen science initiatives and carry out educational campaigns in schools and society at large.
- In communication, clearly and promptly explain the purposes of the LEZ and parking policies, while also promoting “slow living” and positioning PT as a practical, convenient and technologically advanced urban mobility solution.



# Breathe, Riga!

## Summary report of air quality and population mobility habits

This report was developed by the Riga State City Municipal Agency “Riga Energy Agency” in cooperation with the association “Green Liberty” and the Faculty of Science and Technology of the University of Latvia as part of the NetZeroCities Pilot Cities Program – Cohort 2 project “A Doughnut Economics Approach to Sustainable Decarbonization and Citizen Engagement (SEED)”. It was funded by the European Union’s research and innovation funding programme Horizon 2020.

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More details about “Breathe, Riga!” along with the full report (in Latvian) are available here:

https://rea.riga.lv/elpo-riga

**Want to know more? Contact:**

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