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Air pollution measurements in Riga: results and experience

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Content

- Methodology of measurements:
 - » selection of residential areas
 - » selection of measurement points
 - » procedure of measuring
 - » instruments for measuring
- Results of PM 10 and PM 2.5
- Results of O₃ and CO
- Conclusions and recommendations

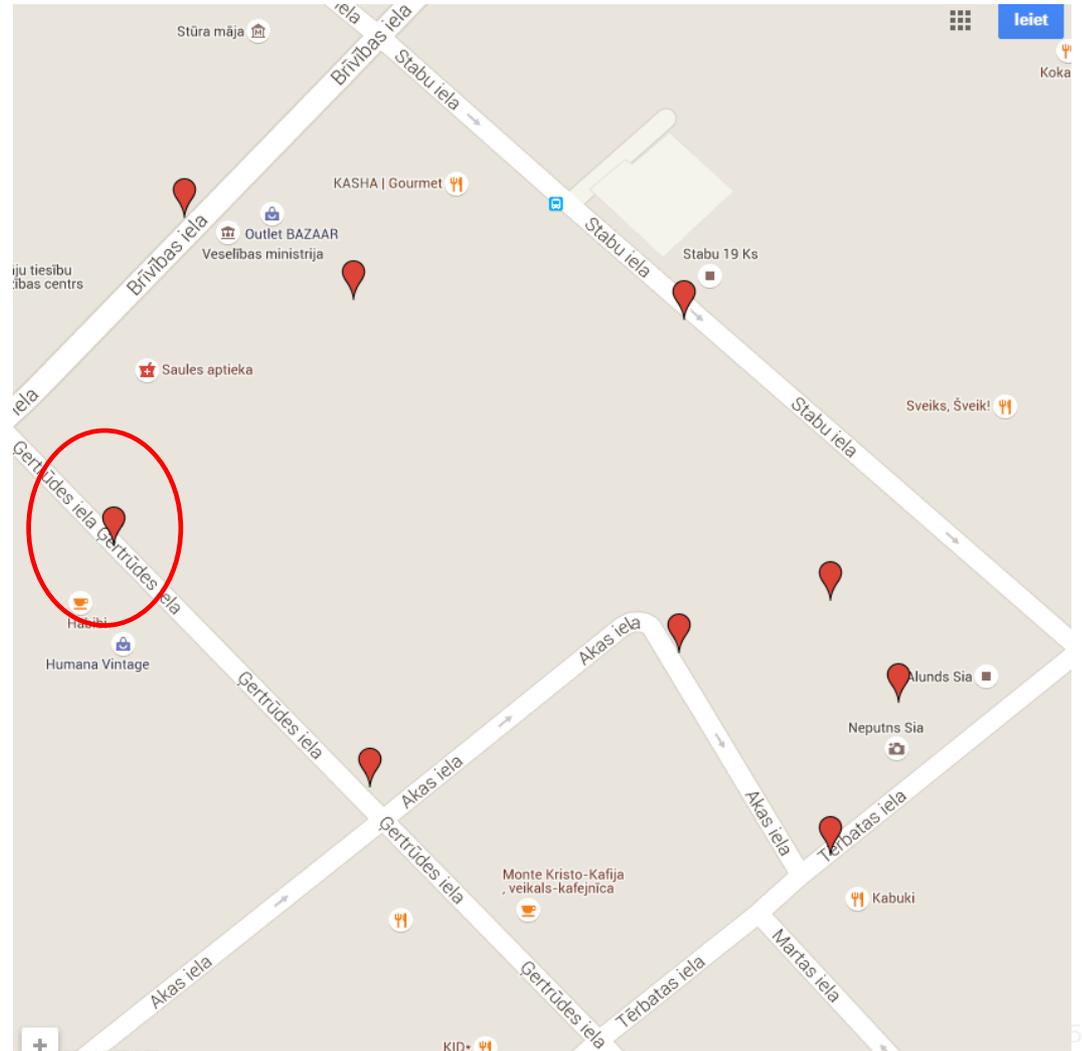
Rules about air quality, No 1290

	Type of acceptable value	Period of assessment	Acceptable value
1.	PM ₁₀ (R _d)	24 hours	50 µg/m ³ (not acceptable to exceed 35 days per year)
2.	PM ₁₀ (R _g)	Per year	40 µg/m ³
3.	PM _{2,5} (R _g)	Per year	20 µg/m ³

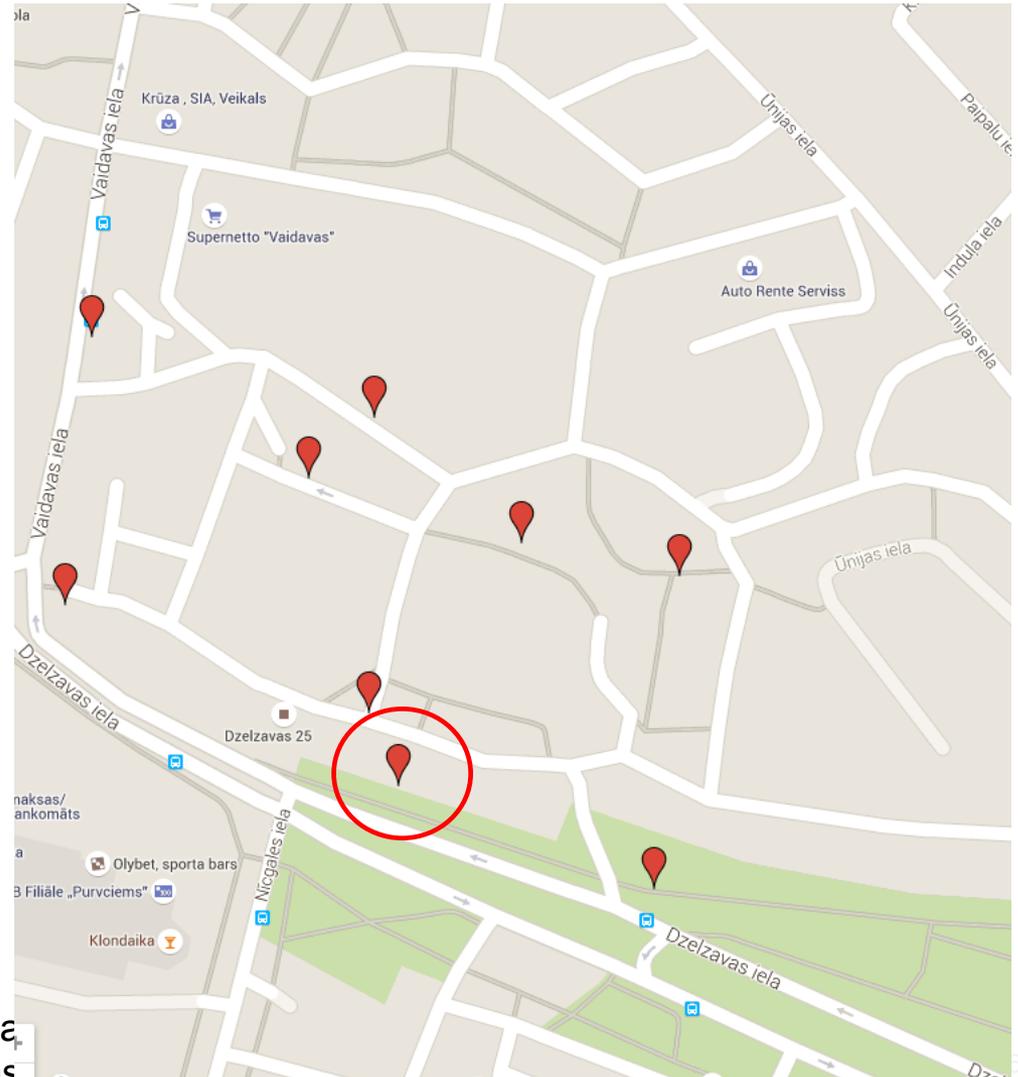
Methodology- selected residential areas in Riga



Methodology - PM10 and PM2.5 measurement's point in the centre of Riga



Methodology - PM10 and PM2.5 measurement's point in the residential area of Riga



Da
insitāt

Methodology

- Selected typical residential areas of Riga;
- Measurements were done in **August** and **October** (2015), and in **February** (2016)
- 1 point was selected in each residential area (near the street with heavy traffic);
- Every day measurements in one residential area were done;
- 3 measurements were done during the day :
 - 08:00-10:00;
 - 12:00-14:00;
 - 16:00-18:00.

PM 10 and PM 2.5 measurements were done by ELPI + (Electrical Low Pressure Impactor)

ELPI®+ enables measurement of real-time particle size distribution and concentration in the size range of **6 nm – 10 µm**.



Collected dusts' samples could be analysed for chemical composition and structure



Instrument for Ozone and CO measurements

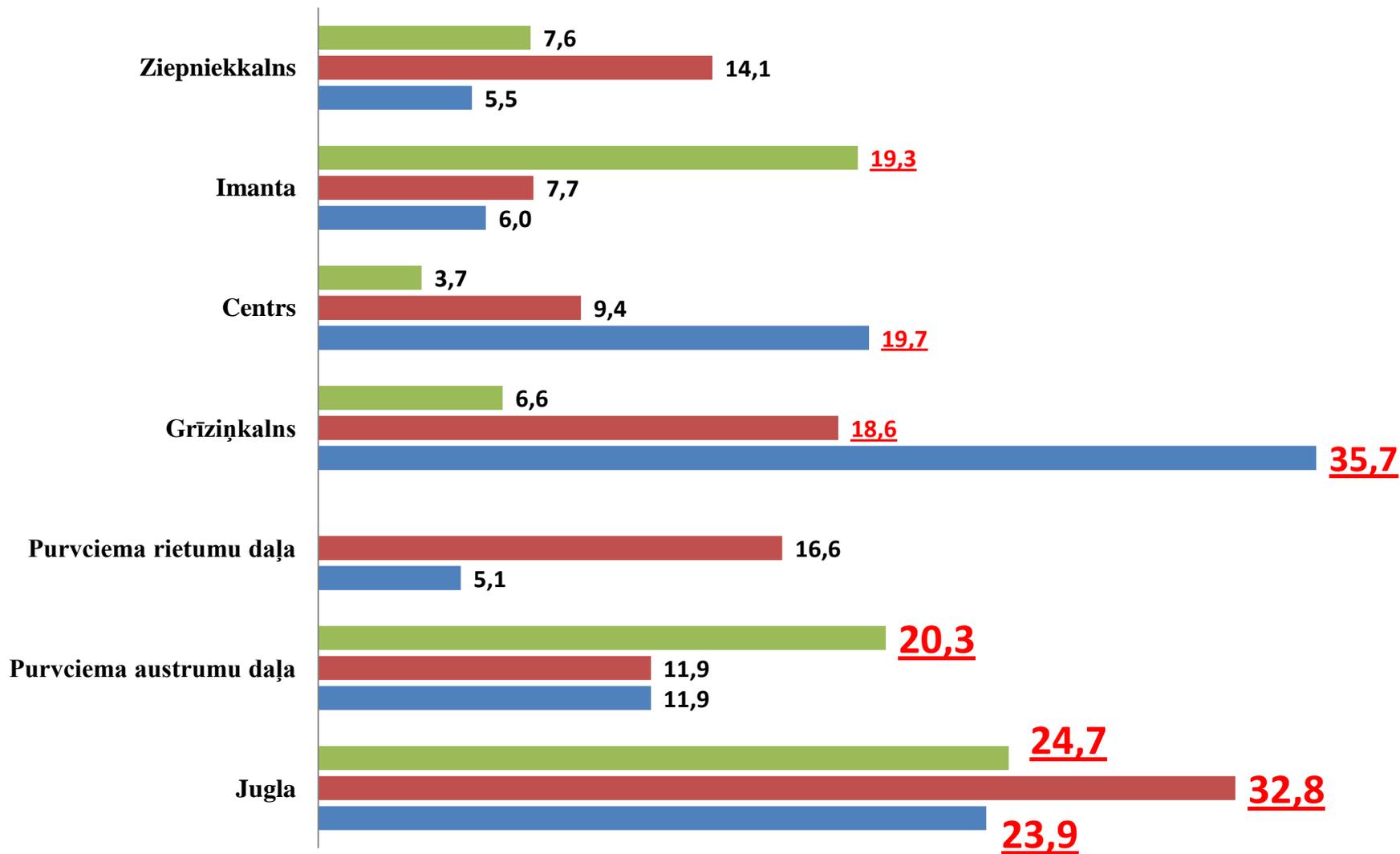
- Ozone
- CO
- CO₂
- PM
- Temperature
- Humidity



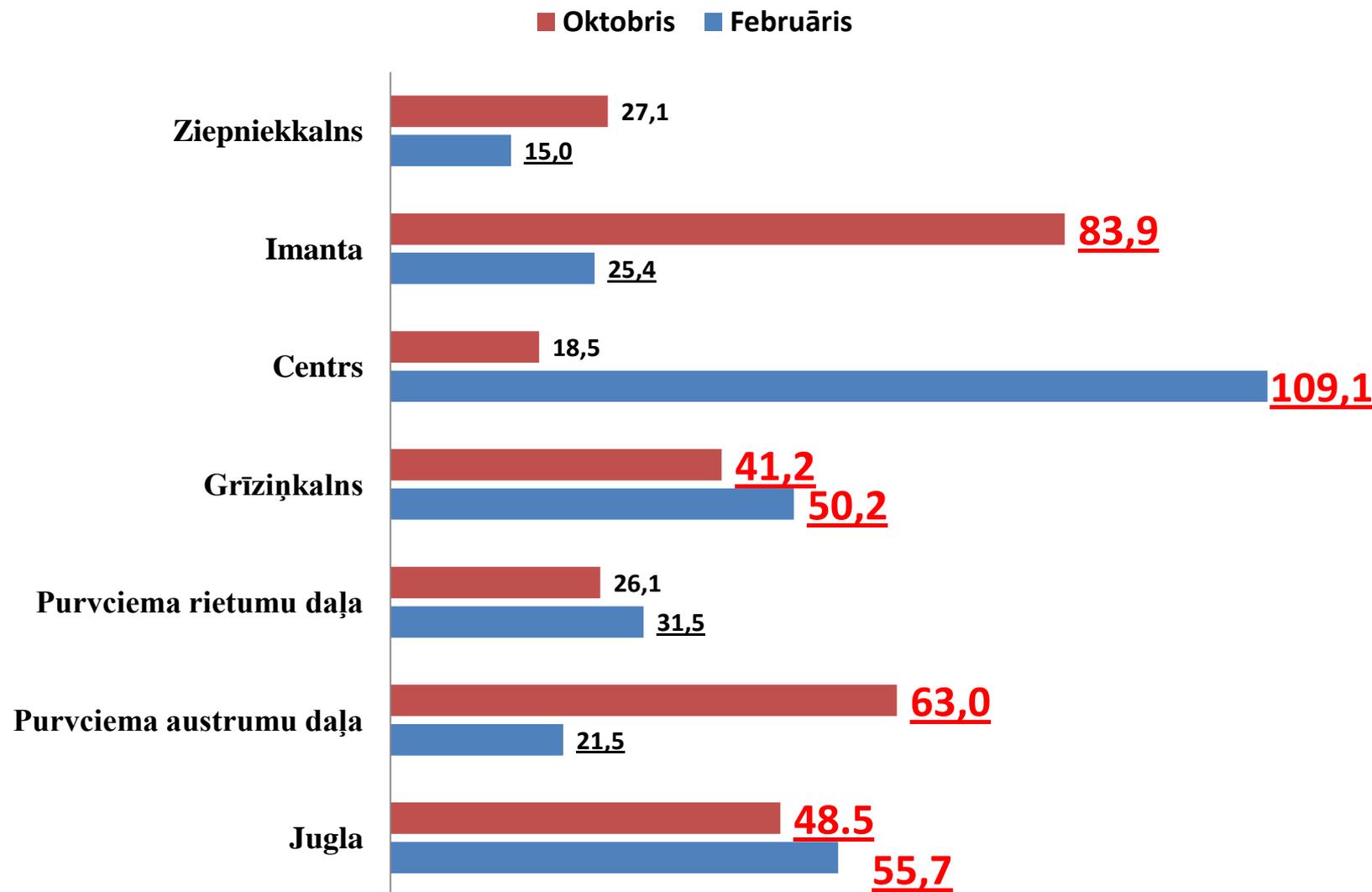
Results of PM in Riga

PM_{2.5} average per day (acceptable value - 20 µg/m³)

■ Augusts ■ Oktobris ■ Februāris



PM₁₀ average per day (acceptable value - 40 µg/m³)



PM 10 results from monitoring stations in Riga ($\mu\text{g}/\text{m}^3$)

■ In October (15.10.-27.10.15)

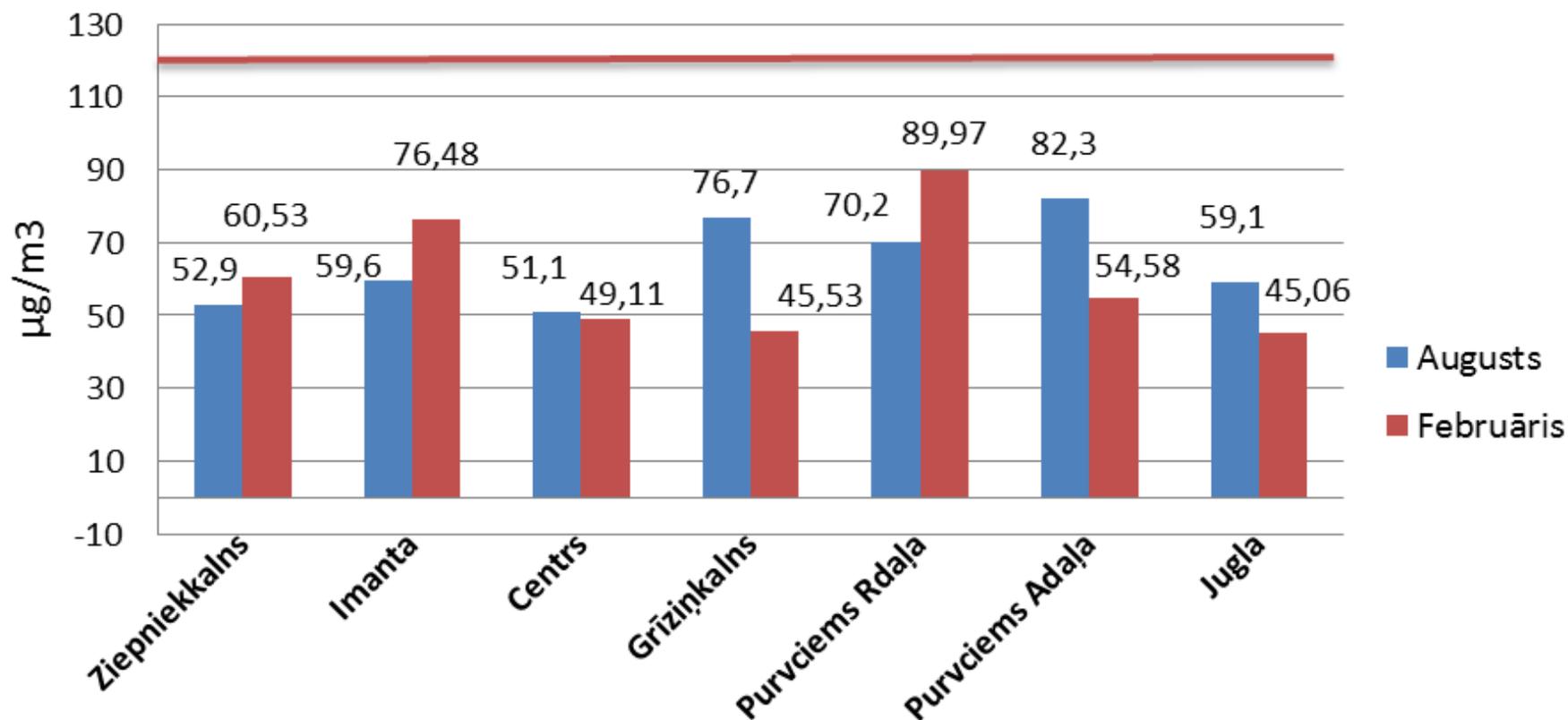
- Brīvības street: 20,5 – 41,8 $\mu\text{g}/\text{m}^3$
- Kronvalda bulv.: 6 – 38,6 $\mu\text{g}/\text{m}^3$

■ In February (24.02.-03.03.16.)

- Brīvības street: 37,5 – 101,3 $\mu\text{g}/\text{m}^3$
- Kronvalda bulv.: 10,1 – 39,9 $\mu\text{g}/\text{m}^3$

Results of O₃ and CO

Ozone (at the busiest street of residential area)



Results of Ozone from monitoring stations in Riga ($\mu\text{g}/\text{m}^3$)

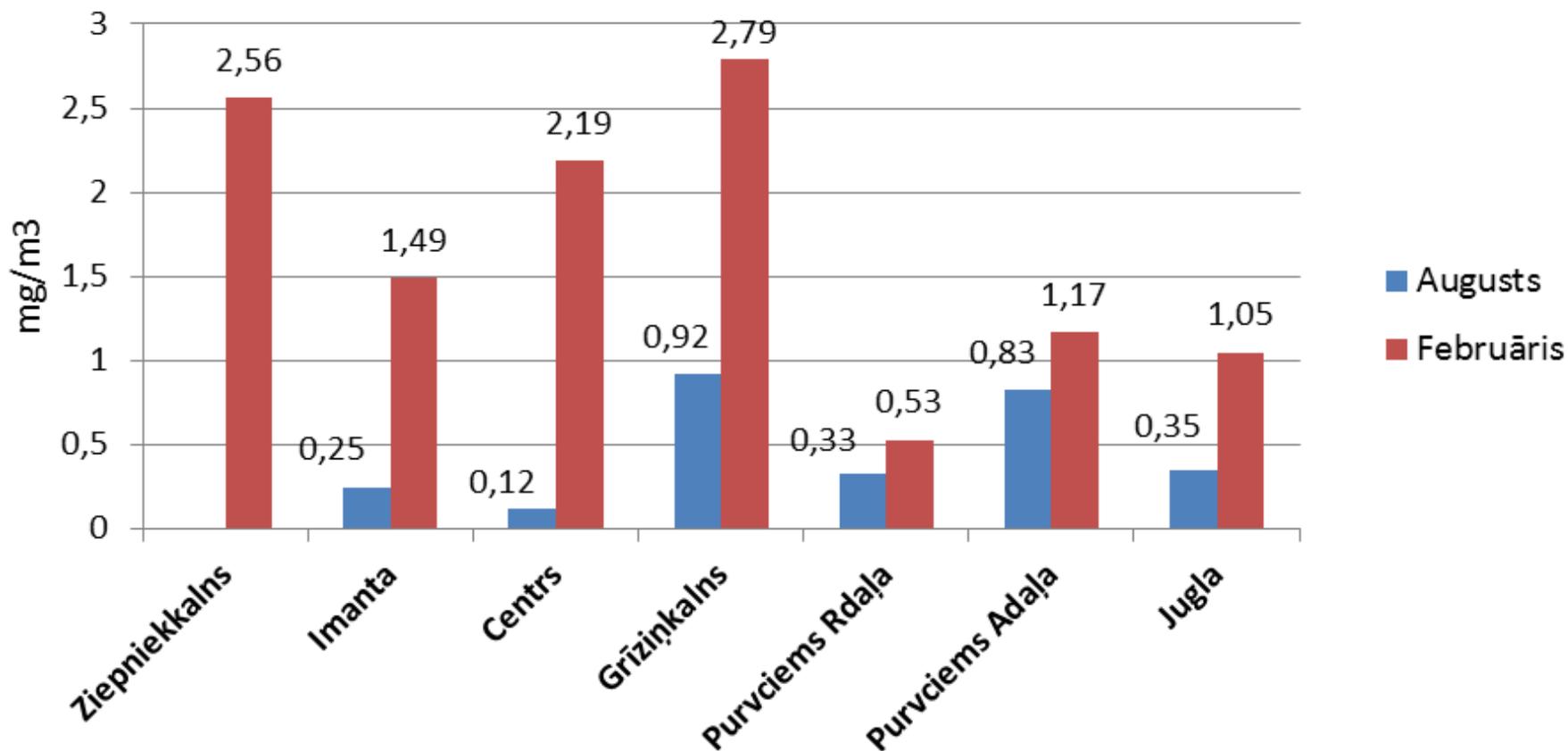
■ In August (10.08.-21.08.15):

- » Riga – Park (Riga's Centre): 0.35 – 78.4 $\mu\text{g}/\text{m}^3$
- » Riga – Kengarags (South part of Riga): 27.4 – 94.7 $\mu\text{g}/\text{m}^3$



<http://spoki.tvnet.lv/aktuali/Smogs-riga/105297>

CO (at the busiest street of residential area)



Conclutions - PM

- The highest results of **PM2.5** – *exceed acceptable values*:
 - » **Jugla** (East part of Riga; in October and in February);
 - » **Purvciems** (East part of Riga) and **Grīziņkalns** (East part of Riga, but close to Centre) in February.
- **PM2.5** results close to exceeding of acceptable values:
 - » **Grīziņkalns** in October;
 - » **Imanta** in August and **Centre** in February.
- The highest results of **PM 10** – *exceed acceptable values*:
 - » **Grīziņkalns un Jugla** (in October and in February);
 - » **Imanta** (West part of Riga) and **Purvciems** in October;
 - » **Centre** – in February.

Conclutions – O₃ and CO

- Total results of Ozone and CO did not exceed acceptable values.
- The results of Ozone and PM are comparable with Riga's monitoring station data.

Mobile air quality monitoring instruments (as ELPI+ and IQM60) is suitable for air pollution monitoring, but for short time.

ELPI+ could be suitable for air sample collections and analysing to describe particles chemical composition.

Recommendations

- Localisation of monitoring stations in the residential areas of Riga;
- Development of bicycles' roads and roads infrastructure;
- Promotion the use of public transport;
- Reducing of private transport on streets;
- Promotion the use of electro- and hybrid - cars and development of infrastructure for it (charging stations);
- Street watering during the dry period and sand collection after the winter season;
- Connection to the central heating system properties, which is used for individual heating system;
- Planting: the care, maintenance and restoration.

Thank you for your attention!

