European Network on New Sensing Technologies for Air Pollution Control and Environmental Sustainability - *EuNetAir*

COST Action TD1105

3rd International Workshop *EuNetAir* on

New Trends and Challenges for Air Quality Control

University of Latvia - Faculty of Geography and Earth Sciences

Riga, Latvia, 26 - 27 March 2015

Air pollution Modelling for Regulatory Purposes: Riga Case-Study

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COST is supported by the EU Framework Programme

ESF provides the COST Office through a European Commission contract

Background

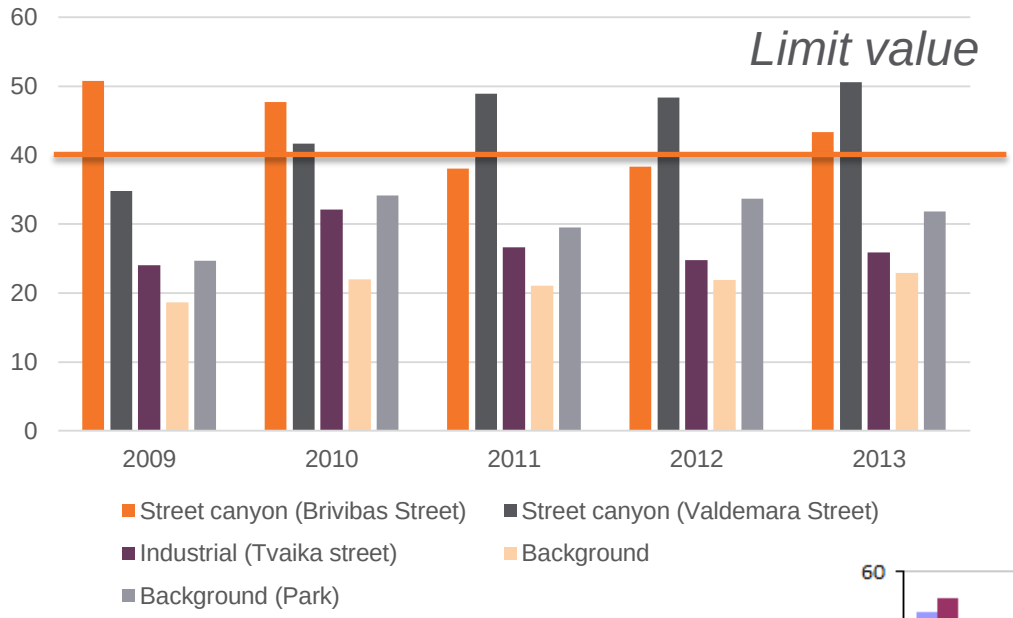
- Almost in all European countries air quality models are used for regulatory purposes - issuing emission permits, cases studies for environmental impact assessment, analysis of future development and planning.

- Directive 2008/50/EC (into force from 11 June 2008) regulate that air quality status should be maintained where it is good and improved if necessary.

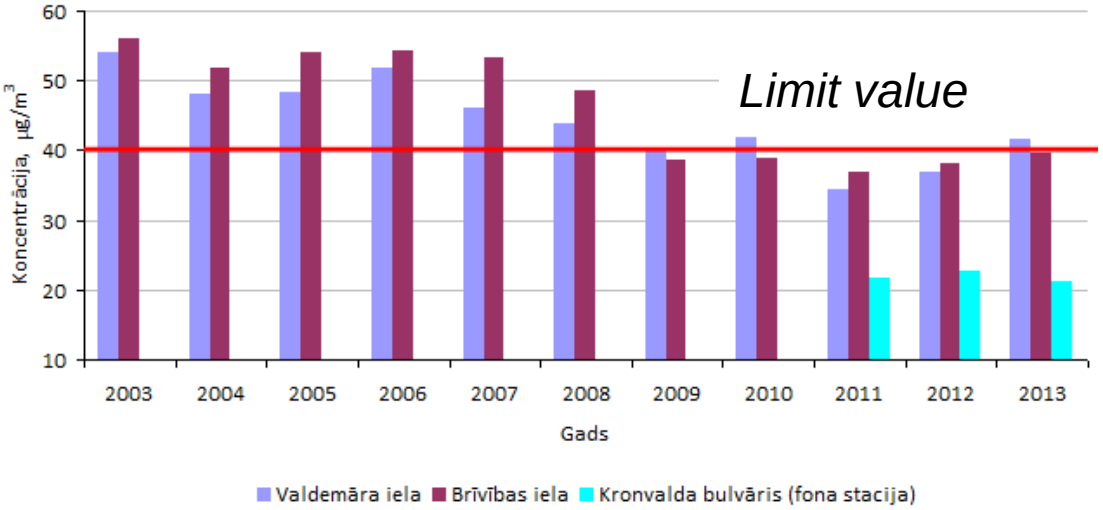
- According to more than 10 years' experience of monitoring, Riga municipality should work on the air quality improvement actions for nitrogen dioxide (NO_2) and particulate matter (PM_{10}) pollution level decreasing.

- One of the actions showing roadmap for air quality improvement consist of revision of emission data and sources data base, and further modelling in order to identify hot spots for further actions.

Monitoring Results



NO_2 annual concentrations, ug/m^3



PM_{10} annual concentrations, ug/m^3

Methods

- In this study
  - Meteorological pre-processors for data quality control and preparation are used (data matrix 2013; 5 year data statistics);
  - Annual emission permits and reports for 2013;
  - Video-counting traffic data for daily profiles;
  - Traffic statistics from Road Traffic Safety Directorate and further calculations according EURO car classes depending on fuel, engine, driving speed, ….
  - Gaussian plume dispersion model (commercial names – EnviMan, AERMOD) is used.

- While NO_2 zoning was developed already 4^{th} time (2004, 2007, 2010, 2014), PM_{10} zoning maps were created for the first time.

Differentiation of pollution zones

- yearly average concentration exceeds allowed limit value of 40 mg/m^3

No any new sources!

Actions for “responsible” sources!

- yearly average concentration is between 30 to 40 µg/m^3;

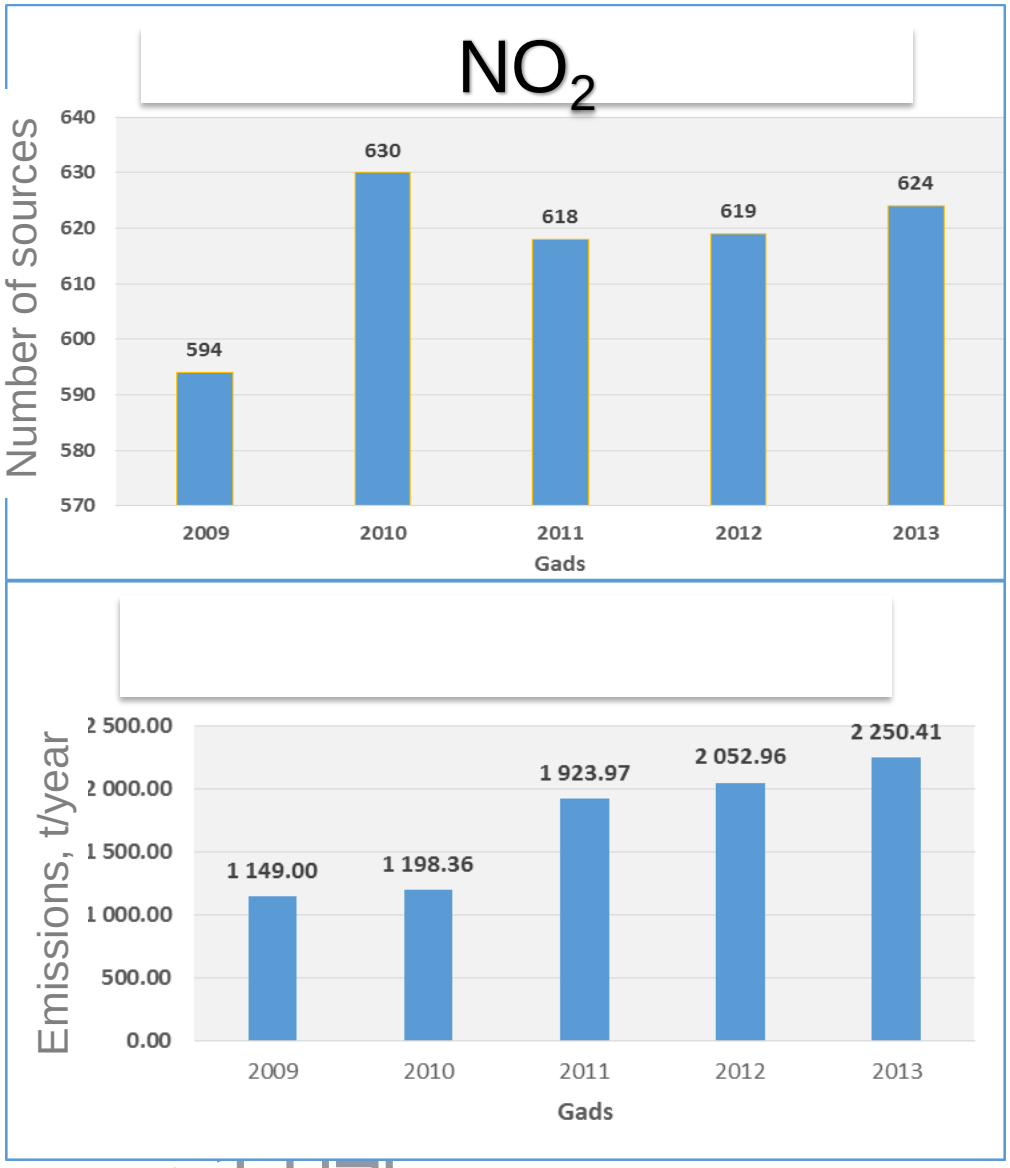
Detailed analysis before new sources!

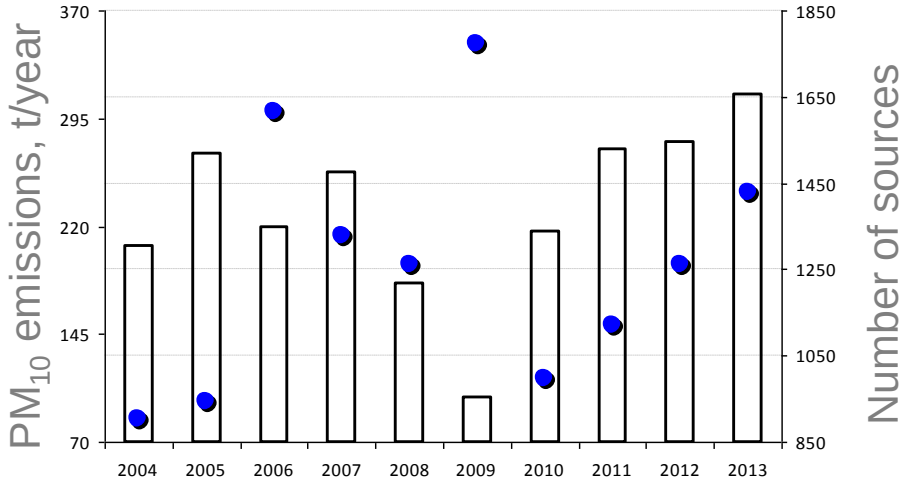
Analysis of “responsible” sources!

- yearly average concentration is below 30 µg/m^3.

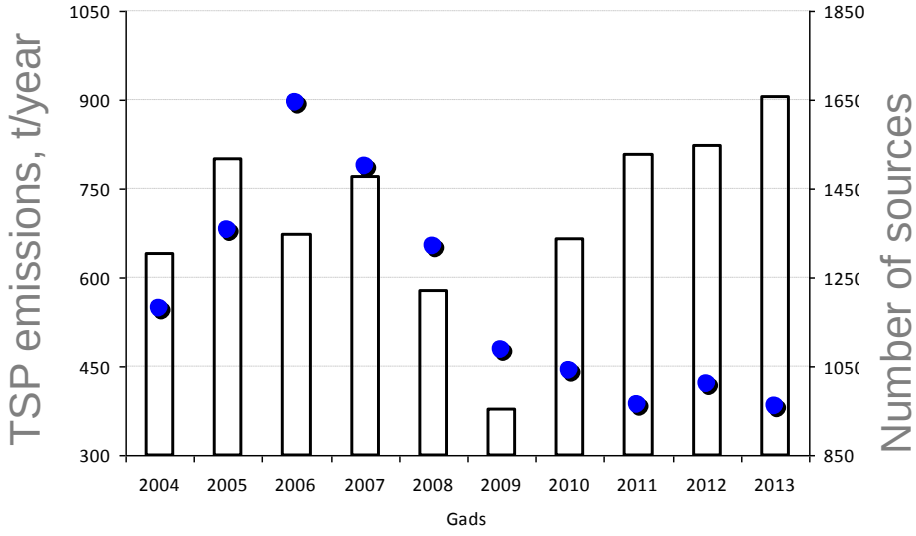
Air quality monitoring to ensure good quality in future.

Emissions and source analysis



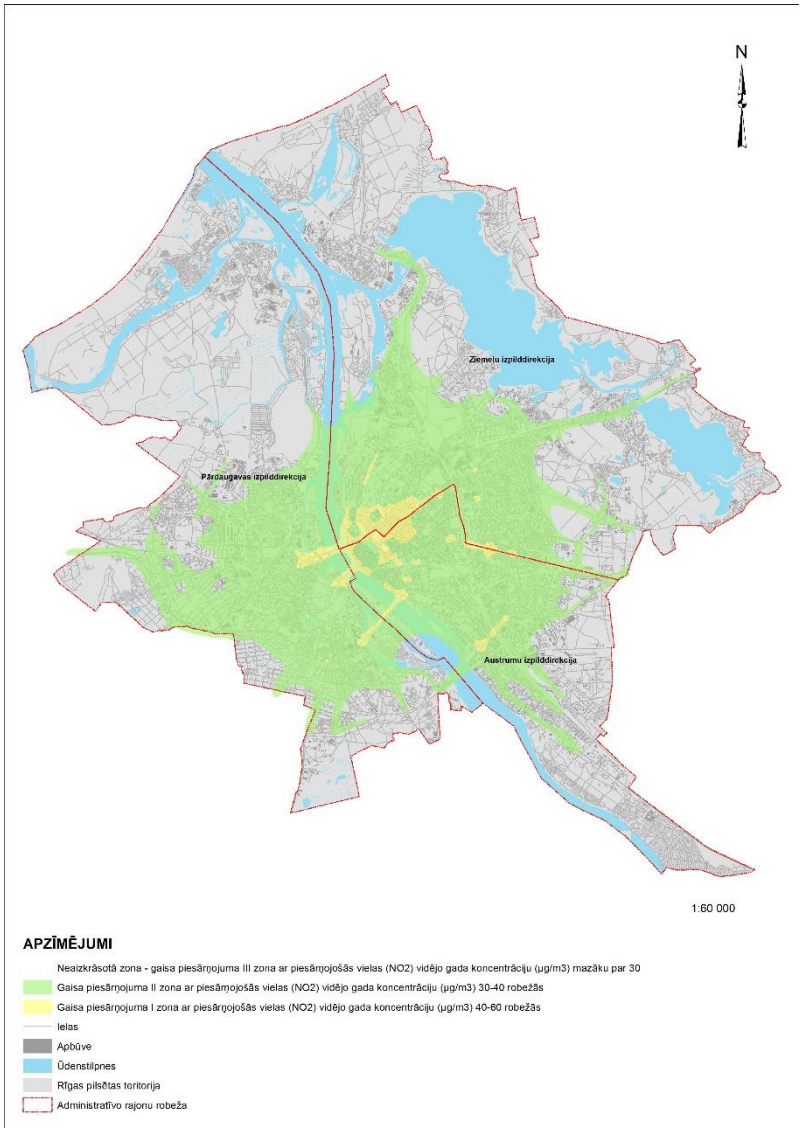


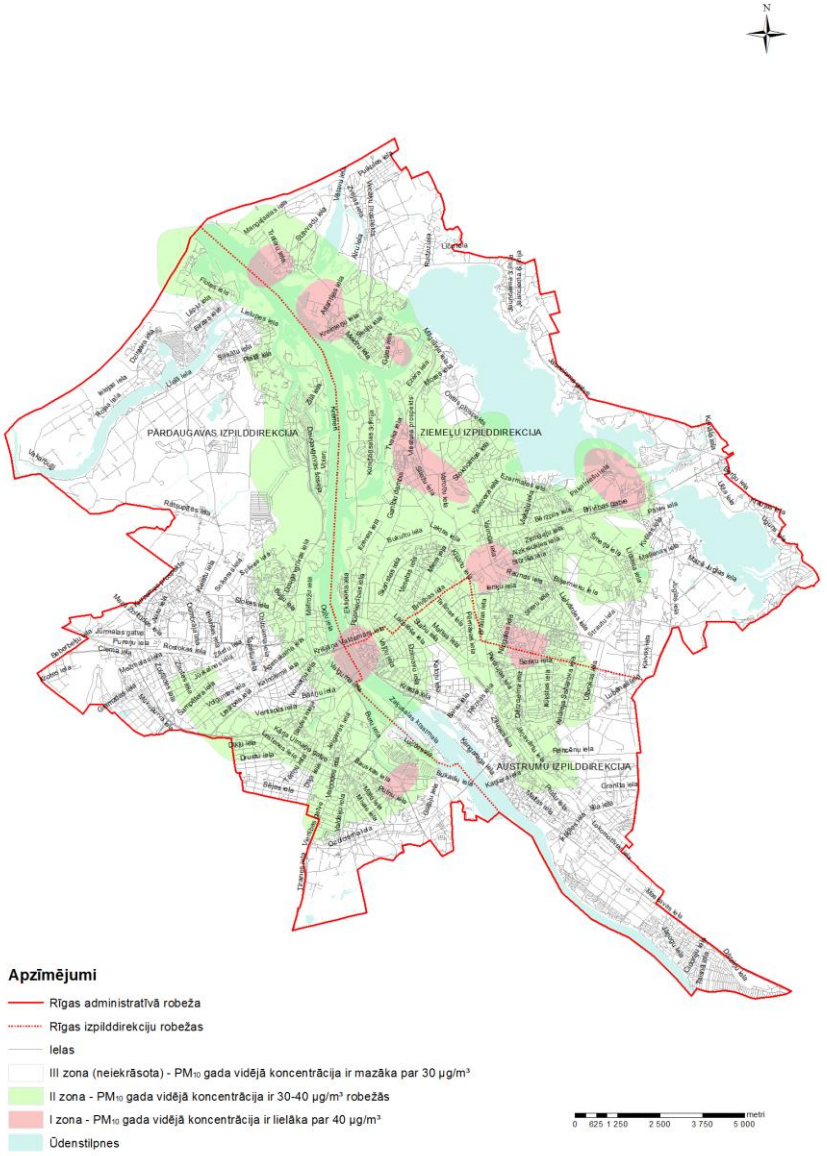
□ - number of sources; PM_{10} emission



□ - number of sources; TSP emission

Results


N
Ziemeļu izpilddirekcija
Pārdaugavas izpilddirekcija
Austrumu izpilddirekcija
1:60 000
APZĪMĒJUMI
Neaizkrāsotā zona - gaisa piesārņojuma III zona ar piesārņojošās vielas (NO2) vidējo gada koncentrāciju (µg/m3) mazāku par 30
Gaisa piesārņojuma II zona ar piesārņojošās vielas (NO2) vidējo gada koncentrāciju (µg/m3) 30-40 robežās
Gaisa piesārņojuma I zona ar piesārņojošās vielas (NO2) vidējo gada koncentrāciju (µg/m3) 40-60 robežās
Ielas
Apbūve
Ūdenstilpnes
Rīgas pilsētas teritorija
Administratīvo rajonu robeža


PĀRDAUGAVAS IZPILDDIREKCIJA
ZIEMEĻU IZPILDDIREKCIJA
AUSTRUMU IZPILDDIREKCIJA
Apzīmējumi
Rīgas administratīvā robeža
Rīgas izpilddirekciju robežas
Ielas
III zona (neiekrāsota) - PM10 gada vidējā koncentrācija ir mazāka par 30 µg/m³
II zona - PM10 gada vidējā koncentrācija ir 30-40 µg/m³ robežās
I zona - PM10 gada vidējā koncentrācija ir lielāka par 40 µg/m³
Ūdenstilpnes
metri
0 625 1 250 2 500 3 750 5 000

Source - apportionment

No	Sector	Number of sources	Total amount of emissions, t/year	Maximum concentration, μg/m^3
1	Stationary point sources	454	241.0	**17.5**
2	Stationary area sources	115	2.3	**26.4**
3	Traffic	381	31.8	**48.7**
4	Households	245000	5.2	**21.3**
5	**Background pollution**	**-**	**-**	

CONCLUSIONS

- NO_2 pollution in city centre closely correlate with traffic flow and future actions for improvement are necessary

- According to traffic source analysis:
  - 30-40 % of PM_{10} coming from re-suspension processes,
  - 1-2 % from abrasion processes and
  - left as exhaust aerosols.

- Modelling results showed highest concentrations in relation to traffic impact and in Riga Sea Port territory where activities are conducted to coal handling and processing.