

Reducing of the noise and air pollution in Riga to improve the health of the population

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Introduction

Almost three quarters of Europeans live in cities. Therefore air quality in European cities is of significant importance to the health of urban residents. During the past twenty years considerable progress has been made in improving urban air quality, but issues remain: nitrogen dioxide, particulate matter and ozone remain above regulated levels, posing a threat to human health. Riga is the largest city in Latvia with high economic activity - industry, building, Sea port and dense traffic flow. Various air pollutants (nitrogen oxides, sulphur oxides, hydrocarbons, particulates, etc.) are emitted into the atmosphere from traffic and boiler stacks (including households), industrial and cargo transshipment activities. Polluted air negatively affects both human health and the environment. Good air quality in urban environment is an important issue for sustainable development of the city and prosperity of the population.

Among the air pollutants, particulate matter was found to be the most damaging. Particulate includes dust, dirt, soot, smoke and liquid droplets directly emitted into the atmosphere by sources such as factories, power plants, vehicles, construction activity, fires and windblown dust. They are also formed in the atmosphere by condensation of emitted gases from vehicle exhausts and stacks such as sulphur dioxide, nitrogen oxides and volatile organic compounds into tiny droplets. Particles get into the body through nose, lungs very deeply, especially the particles known as PM10 (with an aerodynamic diameter of 10 micrometers and less). These particles are of health concern – recent studies on the effects of chronic exposure to air pollution have identified PM10 as the pollutant most responsible for the life-shortening effect of dirty air.

Hearing is essential for the well-being and safety of community members in urban environment. Impaired hearing may come from the workplace, from the community, from urban environment (traffic noise). World health Organization (WHO) considers that exposure to sound levels less than 70 dB does not produce hearing damage, only creates a distortion of well-being and rise stress related illnesses, speech interference, sleep disruption and lost productivity. The largest impact of environmental noise is on annoyance and sleep disturbance, health effects of noise to which more than 30% of EU population may be exposed.

The external costs of noise and air pollution in the EU amounts to at least 0,5% of its GDP, but much higher values may be found depending from statistical approaches. In general both of them are considered amongst the most relevant environment & health problems, and at least 2 million Disability Adjusted Life Years are lost every year in the EU, mostly due to noise and air pollution from the road traffic.

Air

Air monitoring targets and thresholds are harmonized in Latvia with the European Union directives 1999/30/EC and 2008/50/EC on air quality. To assess the level of air pollution in Riga, most important air pollutants are monitored by the City Council (canyon-type streets with dense traffic flow and industrial region located close to populated place in city) and on national level (background pollution). Air quality assessments from 2003 to 2012 show that the central streets in Riga with dense traffic exceed the threshold of human health for particulate matter PM₁₀ and nitrogen dioxide NO₂.

To improve air quality and reduce air pollution in Riga, the Action Program of Air Quality Improvement (2004-2009) was implemented with different measures. For example, the Riga City Council Regulation based on NO₂ zoning map, which determines the need to prevent opening of new heating boiler stacks in areas where current air pollution exceeds the air quality standards, if central heating is available. Experience from the Riga's first Action Program to improve air quality showed that average number of vehicles crossing Vansu Bridge per day decreased by 8 % when new bridge (Dienvidu Bridge) was opened (data from 2009). To some extent this can be attributed to traffic entering city centre – Dienvidu Bridge has taken some of the traffic that only travel through the city, also traffic load from city centre is partly removed with developing Riga's ring roads structure according to Pierigas mobility plan (see figure 1 with average annual daily traffic on all 4 bridges in Riga).

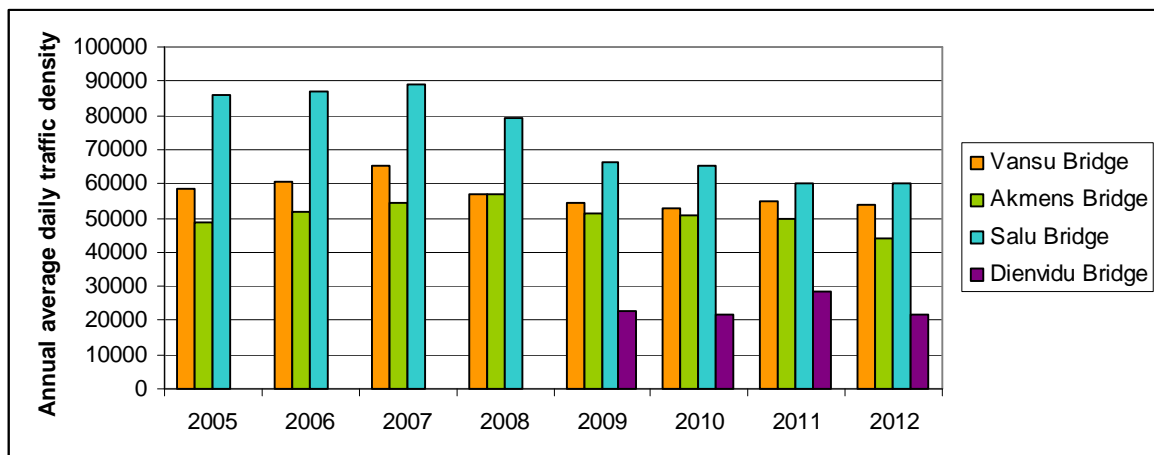


Figure 1. Number of annual average daily traffic on bridges across the River Daugava in Riga (Dienvidu Bridge is newest one and was opened on 2009)

It is expected that the implementation of another large traffic infrastructure projects in Riga (Austrumu trunk road to Sea Port, Brivibas Street substitute road, North crossing of River Daugava etc.) will reduce the amount of traffic in the Riga city centre. Nevertheless, due to non-compliance with air quality standards, Latvia has received the European Commission's formal notice of the infringement procedure on 2010 (Case No. 2008/2195), which indicates that the submitted air quality assessments of the 2007-2011 shows that the agglomeration of Riga has exceeded the threshold for human health for particulate matter PM₁₀ - the annual limit value (40 µg/m³) and the daily limit (50 µg/m³ of the calendar year may not exceed more than 35 times). The number of daily PM₁₀ exceedances at street level in Riga, 2007-2012 (Figure 2) is reducing with a promising trend to reach the threshold in 2015. This suggests that the first Action Program was not effective enough to ensure that air quality thresholds are met in Riga, but gave promising trends and guidance to identify further improvement options.

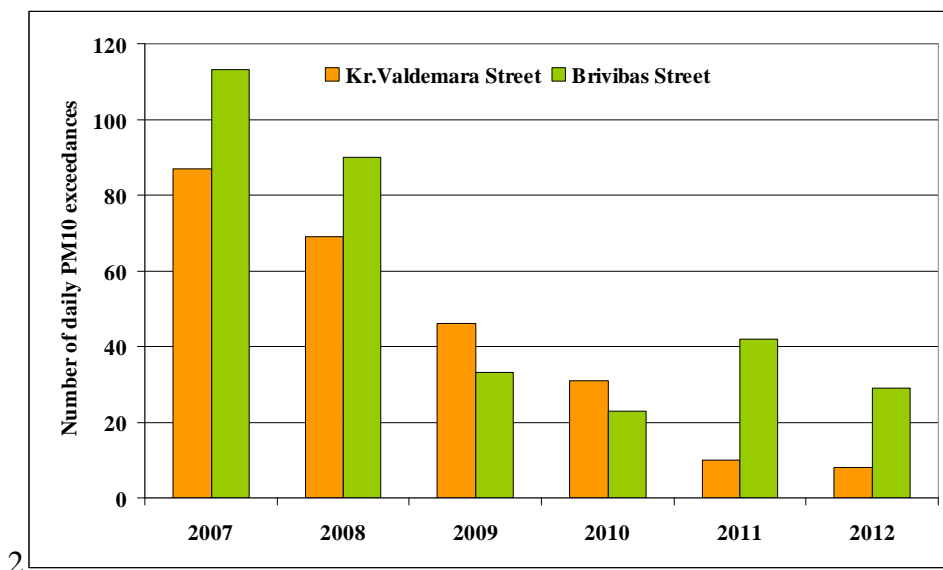


Figure 2. Number of daily PM10 exceedances at street level in Riga, 2007-2012

Riga's second Action Program to improve air quality has been developed and it was approved by the Riga City Council on June 6th, 2011. Reduction of traffic intensity in the city and improvement of existing cars are most significant (and most expensive) measures to reduce concentrations of the particles and nitrogen oxides, therefore improving the air quality by the relevant thresholds. Recent investigations about the origin of particles in the streets with dense traffic in central part of the city showed that more than 50% of all fine particulate matter comes from cars: diesel exhausts and re-suspension from wheels. To decrease the exhausts, it would be necessary to switch to zero or near-zero emission vehicles – electric and electric-hydrogen.

Noise

Noise is one of the physically disadvantaged factors that cause human discomfort, disorders and diseases. Especially transport noise significantly increases the noise level in the cities and on motorways located nearby.

In the Riga city the noise problem is acute along the major motorways, in the city centre with dense traffic and narrow streets with buildings very close to street, as well as close to Riga International Airport area. Noise identification and mapping is done in Riga – first strategic noise maps were developed in 2008. Accordingly to the strategic noise map of Riga the most affected areas in general are the Riga city centre and areas close to the arterial streets and railway lines. The total number of inhabitants living in the influencing zone, where noise level during the night time exceeds 40 dB(A) was 181 458 in 2008.

The Action Plan for Noise Reduction in Riga Agglomeration 2009-2019 has been developed in 2009, but it took 4 years to specify measures. It is planned to renew noise maps for Riga in 2014 accordingly the new traffic data and already implemented measures such as noise walls along Dienvidu Bridge exits, along Ulmaņa Gatve Overpass Bridge and in some places between apartment houses and railway.

One from the last success stories of the Riga city is renewing of the Ulmana Gatve Overpass in 2013 for almost 3 million Euro – the upper layer was taken off and replaced with new paving plates, waterproofing was done and new asphalt pavement coated; the sidewalks were widened to 2.5 meters due cyclists to be able to move easily, and the sound barriers were installed on sides of the bridge. Thereby the disturbance from the traffic noise is reduced at least for several hundred citizens living in residential houses in this area.

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