

In large cities, pedestrian traffic is organized by building pedestrian crossings or pedestrian traffic is organized at intersections by introducing pedestrian traffic lights. An equally favourable measure to decrease environmental pollution would be constructing an above-ground or underground pedestrian crossing. There is a necessary area for constructing above-ground and underground pedestrian crossings (especially because we have artificially reduced their number) in the study areas, but too dense underground communication network does not allow us to build underground crossings and above-ground ones require large capital investments.

It is necessary to develop traffic light control software at busier intersections, but this approach requires installing additional equipment, in particular a time synchronization module for GPS signals.

The analysis of the research results showed that the level of air pollution in all areas corresponds to the level of "environmentally hazardous". The proposed options for reducing pollution by means of introducing traffic light control software or coordinated management contribute to reducing pollution from 22% to 60%.

The provided practical recommendations for improving the environmental load confirm the need to choose the most rational measures of TM. But the problem can be solved with an integrated approach: reducing the toxicity of emissions from each vehicle, rational planning of gas protection structures and landscaping and changing RN transport and planning characteristics along with TM improvement.

References

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THE PROBLEM OF AIR POLLUTION IN SERBIA

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The atmosphere is a mixture of gases, some with fairly constant concentrations, others that are variable in space and time. In addition, there are suspended particles (e.g. aerosol, smoke, ash, etc.) and hydrometeors (e.g. cloud droplets, raindrops, snow, ice crystals, etc.).

Dominant gasses in dry atmosphere are nitrogen (78.084 %), oxygen (20.946 %), argon (0.934 %), carbon dioxide (0.035 %) and trace gasses such as neon, methane, helium and hydrogen.

The most prominent air pollutants include: sulfur dioxide, nitrogen oxides, ozone, suspended particles, persistent organic pollutants and allergenic pollen.

Exposure to outdoor air pollution is associated with a broad spectrum of acute and chronic health effects ranging from irritant effects to death⁶. While the impacts on respiratory and cardiovascular disease are well documented, new science also shows air pollution as an emerging risk factor for children's health and even diabetes. Sensitive and vulnerable groups such as pregnant women, children, the elderly and those already suffering from respiratory and other serious illnesses or from low income groups are particularly affected.

Air quality in Serbia is a big concern: measurements show that citizens all over the country breathe in air that is considered harmful to health. For example, concentrations of PM_{2.5} and PM₁₀ are much higher than what the EU and the World Health Organization (WHO) have set to protect health.

Generally, during 2019, 73 percent of the population in urban or urban-industrial agglomerations was potentially exposed to the concentrations of pollutants above the reference level.

Protection from air pollution is regulated in Serbia by the Law on Environmental Protection (Official Gazette of the Republic of Serbia No. 135/04), Bylaw on Limit Values, Methods of Imission Measurements, Criteria for Posting Measuring Stations and Collecting Data (Official Gazette of the Republic of Serbia No 54/92), Bylaw on Emission Limit Values, Methods and Deadlines for Measurements and Data Collecting (Official Gazette of the Republic of Serbia No. 30/97) and Bylaw on Detailed Requirements for Expert Organisations Measuring Emissions and Imissions (Official Gazette of the Republic of Serbia No. 5/2002).

The Air Quality Control Programme in Serbia (Official Gazette of the Republic of Serbia No. 48/2004) is aimed to achieve several objectives:

- to determine levels of air pollution;
- to monitor trends in air pollution over several successive years;
- to assess air quality based on data comparison with guideline values;
- to determine measures to be taken to improve air quality;
- to identify critical and alarming situations with a purpose of warning the public and taking appropriate steps;

Air quality monitoring provides us with information about the current status of air quality, as well as with valuable information about the patterns and trends when it comes to air pollution. Based on air quality data, policies are formulated, air protection measures are selected and the effectiveness of the applied measures is assessed. Local monitoring stations are an important part of the air quality monitoring network, in addition to the national network managed by SEPA.

Local AQ (Air Quality) monitoring is established in 42 (54.5 %) of the 77 Local Self-Government Units (LSGs). AQ monitoring established in this way covers 85.8 % of the population covered by the questionnaire (or about 66.1% of the population of them Republic of Serbia).

The air quality control program for 2020, with the approval of the Ministry, was applied by 21 (27.3%) of the 77 LSGs that took part in the survey (covering 62.1% of the population). It is realistic to expect that there are more AQ monitoring activities and that the percentage of the population covered is slightly higher. This is because the procedure for obtaining Ministry approval for the program usually take some time, as well as because there is also a multi-year local AQ monitoring program.

In more than half of the LSGs, there are measuring points where AQ monitoring is performed or has been performed. In 70 % of cases, LSGs have more than 5 years of experience with AQ monitoring. The number of measuring points ranges from 1 to more than 15 (Belgrade). The most common number of measuring points is 1 to 5, in 71 % of local self-government units, and then 6 – 10 in about 22 % of local self-government units.

Local AQ monitoring programs mainly deal with the non-reference methods, common pollutants and partly specific pollutants. According to the existing regulations, the results of measurements by non-reference methods are acceptable only with the appropriate equivalence test with reference methods. These are most often SO₂, NO₂, soot and total suspended matter with heavy metal analysis (TDM with HM) and more recently PM₁₀ with or without heavy metal analysis - PM₁₀ HM. Measurements of PM₁₀, PM₁₀ HM are expensive, both due to the operational cost and due to the need to fulfil the required conditions for accreditation. In many local programs, such measurements are not carried out every day, therefore having a character of indicative measurements.

Depending on the air emissions impacting an area covered by the local AQ monitoring plan, the specific pollutants measured also include: NH₃, TNMHC, BaP, polycyclic aromatic hydrocarbons (PAH) in PM₁₀, BTX and PM₁₀ analysis on mercury content. The monitoring of allergenic pollen, which can be considered to be a unique natural pollutant, is also mentioned.

Implementation of the local AQ monitoring program, in accordance with the applicable regulations is conducted or has been conducted in 40 of the 77 LSGs and is assigned to interested legal entities through tender within the public procurement procedure. In most cases, the realisation of AQ monitoring is awarded to the local Public Health Institutes (PHI) (26 of 40 LSGs, or 65 % of LSGs that have local monitoring).

THE WORN TYRES PYROLYSIS' SOLID PRODUCTS OPPORTUNITY APPLICATION AS FUEL SUBSTITUTE ASSESSMENT

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One of the most common methods of utilization of rubber waste is pyrolysis. As a result, it always comes out three products: gas (about 12 %), liquid (35 – 52 %) and solid carbon product – char (about 36 %). The relation between the products of