

CONSIDERATIONS REGARDING AIR QUALITY IN TIMIȘOARA

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Abstract: Timisoara, as all major urban agglomerations are confronted with chronic pollution phenomena, which are accentuated in the warm season. Air quality is determined by emissions to air from stationary sources and mobile sources (road traffic), mainly in large cities, as well as long-distance transport of air pollutants. The Law on Air Quality aims to protect human health and the environment as a whole by regulating measures to maintain ambient air quality where it meets the ambient air quality objectives established by this law and its improvement in other cases.

Keywords: air quality, particulate matter, monitoring network

1. INTRODUCTION

Ensuring air quality assessment and monitoring of quality indicators is according with Law no. 104 / 2011 on ambient air quality. This provides for the air quality assessment to be carried out by measurements at fixed locations or by the mathematical modelling of emitted pollutants dispersion into the atmosphere.

For the assessment of local air quality are used measurements in fixed locations and mathematical modelling. The measurements in the fixed location are made using measurement stations that are part of the National Air Quality Monitoring Network under the management of the central public authority for environmental protection.

The sampling points are located in such a way as to take into account the criteria established by the European directives on air quality. At the level of Timisoara, urban background stations are located so that the pollution level is influenced by the integrated contributions of all sources in the wind direction.

When assessing the effects of industrial sources, at least one of the sampling points is located in the dominant direction of the wind from the source, in the nearest residential area.

2. MATERIALS AND METHODS

Concentrations of particulate matter with a diameter of less than 10 microns are evaluated based

on the daily limit value ($50 \mu\text{g} / \text{m}^3$), which should not be exceeded more than 35 times a year. The annual limit value for this indicator is $40 \mu\text{g} / \text{m}^3$ [1].

Particle concentration monitoring PM 2.5 is required to comply with the requirements of Directive 2008/50 / EC. The annual limit value for this indicator is $25 \mu\text{g} / \text{m}^3$ [2].

Concentration trends of particulate matter has been developed using the logarithmic function of the Microsoft Excel tool. Logarithmic trends are often used to obtain regression curves based on a series of data that carries a rate of change in elevated values.

3. RESULTS AND DISCUSSIONS

Because the present paper refers to the particulate matter concentration monitored in Timisoara, Figure 1 shows the location of the monitoring stations provided with an analyser for such particles.



Figure 1. The location of the monitoring stations in Timisoara

At national level, according to the Ministry of the Environment report [3] [4], the main emission sources for particulate matter are shown in Table 1. The situation is also relevant at the regional level in the western part of the country.

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Table 1. The main sources of particulate matter emissions

<i>National sector emissions</i>		Particulate Matter (between 2000-2015)	
		PM _{2.5}	PM ₁₀
Activity area	Specific activity	kt	kt
PublicPower	Public electricity and heat production	0,91	0,91
Road Transport	Road transport: Passenger cars	0,95	0,95
Road Transport	Road transport: Light duty vehicles	0,62	0,63
Road Transport	Road transport: Heavy duty vehicles and buses	1,35	1,35
Road Transport	Road transport: Mopeds & motorcycles	0,01	0,01
Offroad	Railways	0,15	0,16
Other Stationary Comb	Commercial/institutional: Stationary	0,73	0,64
Other Stationary Comb	Residential: Stationary	85,11	73,20
Other Stationary Comb	Agriculture/Forestry/Fishing: Stationary	0,06	0,06
Offroad	Agriculture/Forestry/Fishing: Off-road vehicles and other machinery	0,48	0,48
Industry	Cement production	1,03	1,96
Industry	Chemical industry: Other (please specify in the IIR)	0,06	0,08
Industry	Iron and steel production	0,41	0,52
Industry	Aluminium production	0,29	0,66
Industry	Stationary combustion in manufacturing industries and construction: Iron and steel	2,42	2,62
Industry	Stationary combustion in manufacturing industries and construction: Non-metallic minerals	3,04	3,13
Industry	Road paving with asphalt	0,84	4,29
Agri Livestock	Manure management - Dairy cattle	0,49	0,75
Agri Other	Inorganic N-fertilizers (includes also urea application)	0,50	6,99
Waste	Open burning of waste	0,57	0,62
National total for the entire territory (based on fuel sold)		100,00	100,00

It is obvious that at national level, the main role in the emission of particulate matter belongs to the residential heat sources, whose smoke combustion, is loaded with such particles [3].

Figure 2 shows the average daily value for the PM 10 fraction, recorded nationally in all monitoring stations on 10.01.2018. At the 3 stations that monitor the PM 10 parameter in Timisoara, the daily average value on 10.01.2018 did not record exceedences. This value is recorderd daily, and within one year, there must be no more than 35 overtakes to fit within the legal limits.

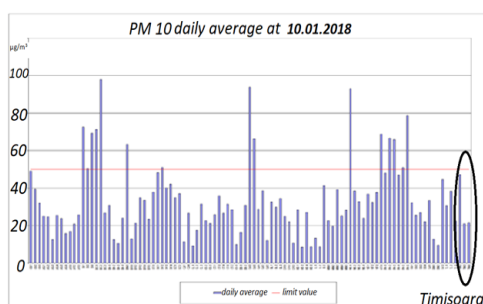


Figure 2. The average daily value for the PM 10 fraction

Regarding the contribution of stationary sources [5], [6] on the air quality in Timisoara, the situation is not dramatic, because such sources of combustion are quite small, but here, an important role in the emission of suspended particles has road traffic, especially heavy traffic. This is because the heavy-duty cars do not have a low degree of polluting emissions, the traffic is slow, the cars are still in traffic and hence the cumulative effect of the noxious production. Thus, systemic overflows, especially PM10, ie small dust particles, were recorded especially in highly circulated areas, such as Calea Aradului or Calea Şagului.

The situation of the values of the annual average concentrations recorded at the air quality monitoring stations in the Timis County for the PM 10 indicator is shown in Figure 3.

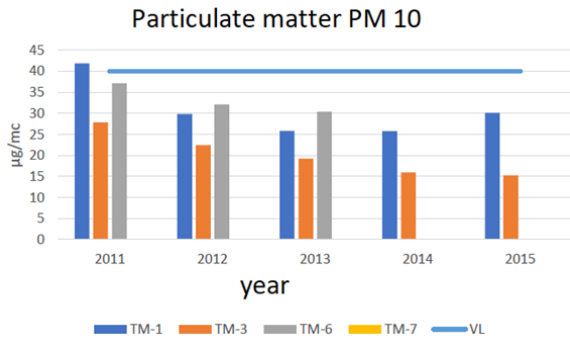


Figure 3. Evolution of PM10 concentrations in the period 2011-2015 in the Timis County [3]

Because for the particulate matter the correlation pollutant - type of source of pollution is a direct one [2], [7] I propose to identify the existence of a

scenario for maintaining the level of pollutants in the atmosphere, if the emission reductions associated with different categories of pollution emission sources are more expensive.

If we were to take into account the air pollution with particulate matter as an acceptable one, that does not endanger people's health, then we could say that a good measure would be to manage the levels of pollutant concentrations in current limits.

In this case, the current situation of the amounts of pollutants emitted locally will be presented. This scenario presupposes keeping the current situation without taking any measures to reduce emissions. The scenario does not imply the adoption of specific measures to maintain air quality: this will be influenced only by the ongoing / already planned actions / investments.

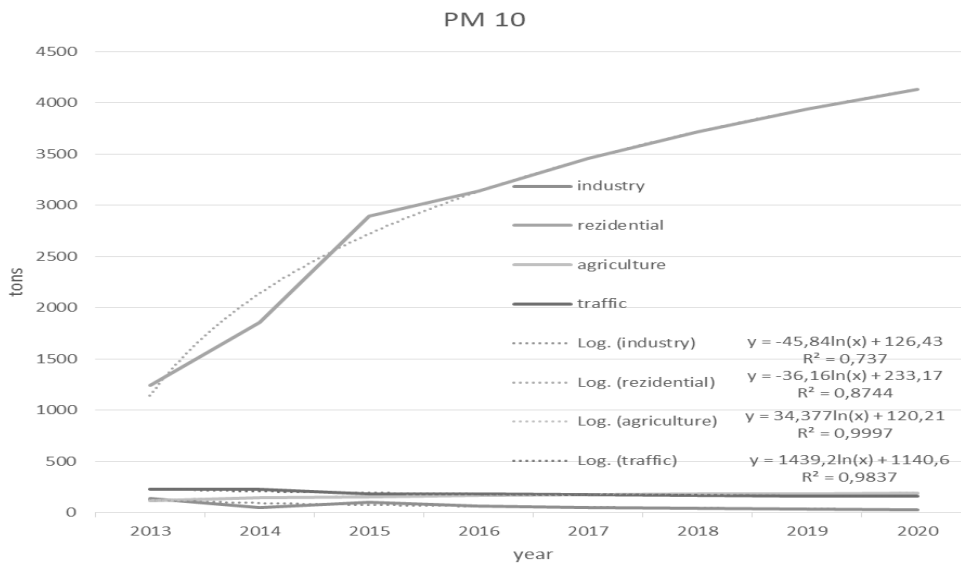


Figure 4. Total PM 10 trends in Timis County - data source [4]

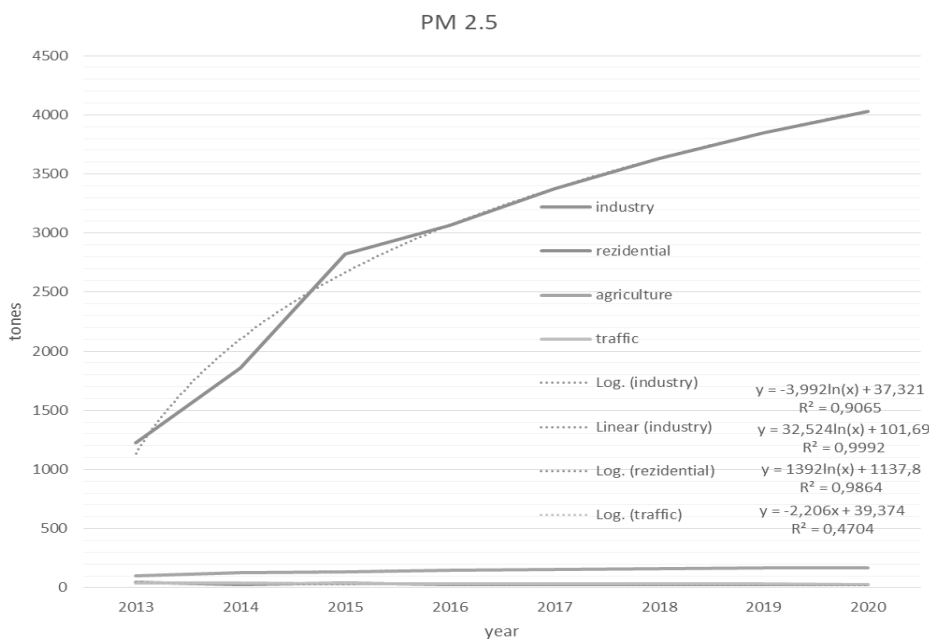


Figure 5. Total PM 2.5 trends in Timis County – data source [4]

With the assessment of annual emission trends, it can be noticed that the commercial / residential sector is growing in the estimation period. Commercial and residential combustion remains the sources responsible for emissions of large particulate matter (PM10 and PM2.5).

4. CONCLUSIONS

Road transport is an important source of pollution. The road traffic is one of the most important sources of CO, NO_x, PM2.5. The energy used in households from burning wood or coal is an important source of PM2.5 emissions.

In order to improve the air quality in the urban agglomeration Timisoara, several measures have to be taken:

- ✓ Washing the road gutters and controlling compliance with the site organization provisions;
- ✓ Restoration and tillage of green areas related to public roads and intersections;
- ✓ Verification of compliance with the conditions for the transfer to construction materials,

waste, land by organizing control filters at the entrances and exits of the city;

- ✓ Supervision of major road intersections in the city to detect vehicles that do not comply with statutory transport regulations (over-capacity, tarpaulin, etc.) and scatter materials, waste, ballast on the street.

REFERENCES

- [1] Council Directive 1999/30 / EC relating to limit values for sulfur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air.
- [2] Directive 2008/50 / EC of the European Parliament and of the Council of 21 May 2008 on ambient air quality and cleaner air for Europe.
- [3] <http://apmtm.anpm.ro>- Report on the Environment in Timis County, 2010-2015.
- [4] National Institute of Statistics - Tempo database.
- [5] Order of the Minister of Environment and Forests no. 3299 of 28.08.2012 on the approval of the methodology for the production and reporting of pollutant emissions into the atmosphere.
- [6] Law no. 104 of 15 June 2011 on ambient air quality.
- [7] Council Directive 96/62 / EC on ambient air quality assessment and management