

## **ESTIMATION OF EMISSIONS FROM SOURCES FROM THE BIHOR COUNTY**

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### **Abstract**

*The provisions of Order 1.206 / 2015 for the approval of the lists of territorial administrative units drawn up following the inclusion in management regimes of the areas and agglomerations listed in Annex no. 2 of the Law no. 104/2011 on Ambient Air Quality includes Bihor county in the air quality management regime II, which reveals a level of pollutants in the atmosphere below the admissible limit values, Identification of measures that will lead to the fitting of the air quality parameters in a regime Higher assessment is a duty of all decision-makers in the county.*

**Key words:**emissions, sources, liniar, surface, point, effect

### **INTRODUCTION**

The provisions of Order 1.206/2015 for the approval of the lists of territorial administrative units drawn up following the inclusion in management regimes of the areas and agglomerations listed in Annex no. 2 of the Law no. 104/2011 on Ambient Air Quality includes the Bihor county in the air quality management regime II, which reveals a level of pollutants in the atmosphere below the acceptable limit values and consequently the necessity to develop the Air Quality Maintenance Plan at county level for the indicators:

- particulate matter in PM10 suspension - in the A,  $28 \mu\text{g} / \text{m}^3 < c < 40 \text{ mg} / \text{m}^3$
- particulate matter PM2,5 suspension - in the A,  $c < 35 \mu\text{g} / \text{m}^3$  (2013) and  $c < 20 \mu\text{g} / \text{m}^3$  (2020)
- benzene, (C6H6) - in the assessment regime C,  $c < 2 \mu\text{g} / \text{m}^3$
- sulfur dioxide (SO2) - in the assessment regime C,  $c < 8 \mu\text{g} / \text{m}^3$
- carbon monoxide (CO) - in the B assessment regime,  $5 \mu\text{g} / \text{m}^3 < x < 7 \mu\text{g} / \text{m}^3$
- lead (Pb) - in the assessment regime C,  $c < 0,25 \mu\text{g} / \text{m}^3$
- arsenic (As) - in the assessment regime C,  $c < 2,4 \text{ ng} / \text{m}^3$
- cadmium (Cd) - in the assessment regime C,  $c < 2 \text{ ng} / \text{m}^3$
- nickel (Ni) - in the assessment regime C and  $c < 10 \text{ ng} / \text{m}^3$
- dioxide / oxides of nitrogen (NO, NOx) - in the assessment regime B,  $19,5 \mu\text{g} / \text{m}^3 < c < 24 \text{ mg} / \text{m}^3$

## MATERIAL AND METHOD

For the estimation of the emissions the radiography of the sources from the Bihor county was performed according to the classification of the Emissions Inventory Guide.

The result of this inventory is read in table 1.

Table 1

Inventory of emissions											
Code of category	Activity category	particles in suspension PM10	particles in suspension PM2.5	benzen	SO <sub>2</sub>	CO	Pb	As	Cd	Ni	Oxides azote (NO, Nox)
1.A.1.a	Energy production	x	x	x	x	x	x	x	x	x	x
1.A.2		x	x	x	x	x	x	x	x	x	x
1.A.3.a	Combustion processes in industry and construction	x	x	x	x	x					x
1.A.3.b	Aviation transport	x	x	x	x	x	x	x	x	x	x
1.A.3.c	Road transport	x	x	x		x	x	x	x	x	x
1.A.4	Rail transport	x	x	x	x	x	x	x	x	x	x
1.A.4	Small domestic burners and institutions	x	x	x	x	x	x	x	x	x	x
1.B.2.a.i	Mobile non road mobile sources			x							
1.B.2.a.v	Exploitation, production and transport of natural gas			x							
1.B.2.a.iv	Distribution of petroleum products	x	x	x	x	x	x	x	x	x	x
1.B.2.c	Fugitive emissions from crude oil storage	x	x	x	x	x	x	x	x	x	x
2.A.1	Oil extraction and a	x	x								
2.D.3.c	natural gas	x	x	x		x					
2.A.5.a	Production of cement	x	x								
2.A.5.b	Production and Asphaltting of Roads	x	x								
2.A.5.c	Extractive industry	x	x								
3.B	Construction and demolition	x	x								x
3.D	Storage, handling and transport of mineral products	x	x	x							x

## RESULTS AND DISCUSSION

The classification methodology approved by the Environmental Protection Authority was used in this study, namely:

- Stationary sources - point sources, mainly represented by industrial and burning chimneys, etc.
- Mobile sources - represented by transport sources
- Surface sources - represented by sources of diffuse emissions and especially of residential, agricultural, storage, construction sites / road upgrades, etc.

The table number 2 is presented the detailed situation of the pollutants by total source emission sources at the level of 2014 on the whole surface of the Bihor county.

*Table 2*

Situation of the pollutants by total source emission sources at the level of 2014 on the whole surface of the Bihor county

Road sign	Total amount of emissions (t/year)	
	stationary sources	
Suspension particles - PM2,5 (mg / m <sup>3</sup> )	stationary sources	168.884424
	mobile sources	224.695632
	surface sources	3960.011543
Suspension particles – PM10 (mg / m <sup>3</sup> )	stationary sources	324.648163
	mobile sources	373.344250
	surface sources	4462.995090
Nitrogen oxide (mg/mc)	stationary sources	3232.398057
	mobile sources	4355.671297
	surface sources	740.471265
Sulfure oxide (µg / m <sup>3</sup> )	stationary sources	23246.012957
	mobile sources	13.161777
	surface sources	236.180437
Carbon monoxide (mg/mc)	stationary sources	2263.987041
	mobile sources	9936.124700
	surface sources	28845.329400
Benzene (µg / m <sup>3</sup> )	stationary sources	NE
	mobile sources	60.605253
	surface sources	437.811079
Lead (µg / m <sup>3</sup> )	stationary sources	0.133221
	mobile sources	0.386308
	surface sources	0.216000
Arsenic (ng / m <sup>3</sup> )	stationary sources	0.059630
	mobile sources	0.000000

## CONCLUSIONS

In order to diminish the values of the air quality indicators, measures should be imposed by means of specific indicators. These measures need not necessarily be quantifiable but should contribute to improving the quality of life of target groups. The measures, their name, their description, the quantifiable indicators and the target group for each of them are presented in Table 3.

Table 3

Proposed measures	
Proposed measure quantifiable in terms of effects	Quantification
Romania's entry into Schengen space	It leads to diminishing with:
It decreases with 10% the number of dwellings / institutions heated by wood and the share of 5% of the total number of dwellings / institutions using unconventional sources of energy	0,007% of PM10 with 0,29% of PM2,5, 1% of benzene concentration and 21,4% of NO2, NOx of the value of emissions from surface sources
Identifying and realizing projects by which the public from school age to the elderly is informed about the need to maintain air quality, air pollution problems, Romania's commitments under the Partnership Agreements and the need to reach and compliance with these targets	1. Number of programs made
Develop a Communication Strategy of the Bihor County Council containing a chapter on communication in the field of environment	2.Number of citizens included in each program
Making a good practice guide to environmental protection	
Developing partnerships with specialized institutions, Universities,	Number of editions Communication strategies achieved
NGOs, experts to promote a cleaner environment and identify measures to improve air quality	Number of editions of the Best Practice Guide on Environmental Protection
Annual realization of air quality studies that could highlight any problems identified at county level or lead to proposals for legislative changes in the field	1. Number of partnerships achieved
Stimulating the population to participate in ensuring the sanitation of localities	2.Number of partnership documents
Performing a control of the car fleet at the level of the public institutions including the cars eliminated by elaborating annual statistics at the level of the county council	3.Mount the proposed measures within the documents
Stimulation of the partner institutions and of the companies holding the transport license at county level in the modernization of the auto fleet	1. Number of completed studies
Promoting the use of public transport by providing facilities to economic units that provide centralized employee transport	2.Number problems identified

Stimulating carriers with transport licenses to maintain the transport subscription to acceptable levels for the population	3.Number of proposed legislative changes
Identification of areas with running time high on the road and the measures to be applied for remediation	
Realization of bypasses in areas with agglomerations (cities, communes, villages)	Number of awareness projects completed
Encourage public service staff to use bicycle transport	1. Number of traffic units removed
Limiting road access to the center of urban agglomerations	2.Change traffic units replaced
Promoting and monitoring the creation of new traffic arteries, allowing the de-congestion of existing arts or ensuring constant and fluent running conditions, especially the Transylvania Highway and Timisoara-Baia Mare Express Road	1. Number of traffic units removed
Stimulation of rail and air transport	2.Change traffic units replaced
Modernization of the railway infrastructure existing at the county level and electrification of the runways	1.Number of economic units providing centralized transport
Stimulation of the construction of internal stations	2.Number of employees benefiting from centralized transport
Monitor and stimulate the implementation of measures necessary for Romania to enter the Schengen area	Number of subscriptions made
Promoting projects that provide for the heating of renewable energy sources or the use of natural gas; Promoting the use of thermal power plants	1.Number of identified areas
Identifying and realizing projects by which the public from school age to the elderly is informed about the need to maintain air quality, air pollution problems, Romania's commitments under the Partnership Agreements and the need to reach and compliance with these targets	2.Number problem identified
Develop a Communication Strategy of the Bihor County Council containing a chapter on communication in the field of environment	3.Mount the proposed measures
Making a good practice guide to environmental protection	4. Number of implemented measures
Developing partnerships with specialized institutions, Universities,	Number of bands / bypasses made
NGOs, experts to promote a cleaner environment and identify measures to improve air quality	Number of employees using the bicycle in the service / work shift
Annual realization of air quality studies that could highlight any problems identified at county level or lead to proposals for legislative changes in the field	Number of mounted banned panels / locality
Stimulating the population to participate in ensuring the sanitation of localities	Number of km of road

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