

Ministry of Environment,
Spatial Planning and Infrastructure

ANNUAL REPORT ON THE STATE OF THE AIR 2023

Prishtina, 2024

AMMK

ANNUAL REPORT ON
THE STATE OF THE AIR 2023

Introduction

The report contains air quality data based on the data collected from 12 static stations and one mobile station throughout the territory of the Republic of Kosovo for the calendar year 2023.

This report provides an overview of the data on air quality and emissions, investments in the air sector, legal infrastructure and recommendations for improving the situation.

The data collected by the Hydrometeorological Institute of Kosovo have been processed and evaluated by the Environmental Assessment Sector in the Environmental Assessment Directorate of the Kosovo Environmental Protection Agency.

The air quality parameters that have been assessed by the Environmental Assessment Sector are:

- Carbon monoxide (CO),
- Ozone (O_3),
- Sulfur Dioxide (SO_2),
- Nitrogen Dioxide (NO_2),
- Dust particles smaller than 10 and 2.5 microns in diameter, respectively PM_{10} & PM $_{2.5}$.

Air emissions data include estimates for air emissions of NOx, SO_2 and Total Dust from economic operators: TCA and TCB, New Co Feronikel and Sharr Cem.

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1. Legal framework

The law on protection of air from pollution, Law No. 08/L-025, 2022, is the basic law on protection of air from pollution.

The legal infrastructure for the protection of air from pollution is also supplemented with AIs (sub-legal acts), such as:

- Administrative Instruction MESPI No. 09/2023 on the method of air Quality monitoring, data collection, criteria and methodology
- Administrative Instruction (GRK)-No. 07/2021) on the rules and standards of the discharges on air by the stationary sources of pollution;
- Administrative Instruction (GRK) No. 04/2009 on controlling the volatile organic compounds emissions during the storage, filling, discharging, packaging and transfer of fuels;
- Administrative Instruction (MESP minister) No. 02/2011 on Air Quality Norms;
- Administrative Instruction MESPI No. 09/2023 on the method of air quality monitoring, data collection, criteria and methodology;
- Administrative Instruction (GRK) -No.08/2016 on the permitted norms of discharges in the air from the mobile sources of pollution.

2. Air Quality

2.1. Information on air quality alert limits

Information and alert limits on air quality are determined according to the Law No. 08/L-025 on Protection of Air from Pollution and the AI 02/2011 on Air Quality Norms (Fig.1).

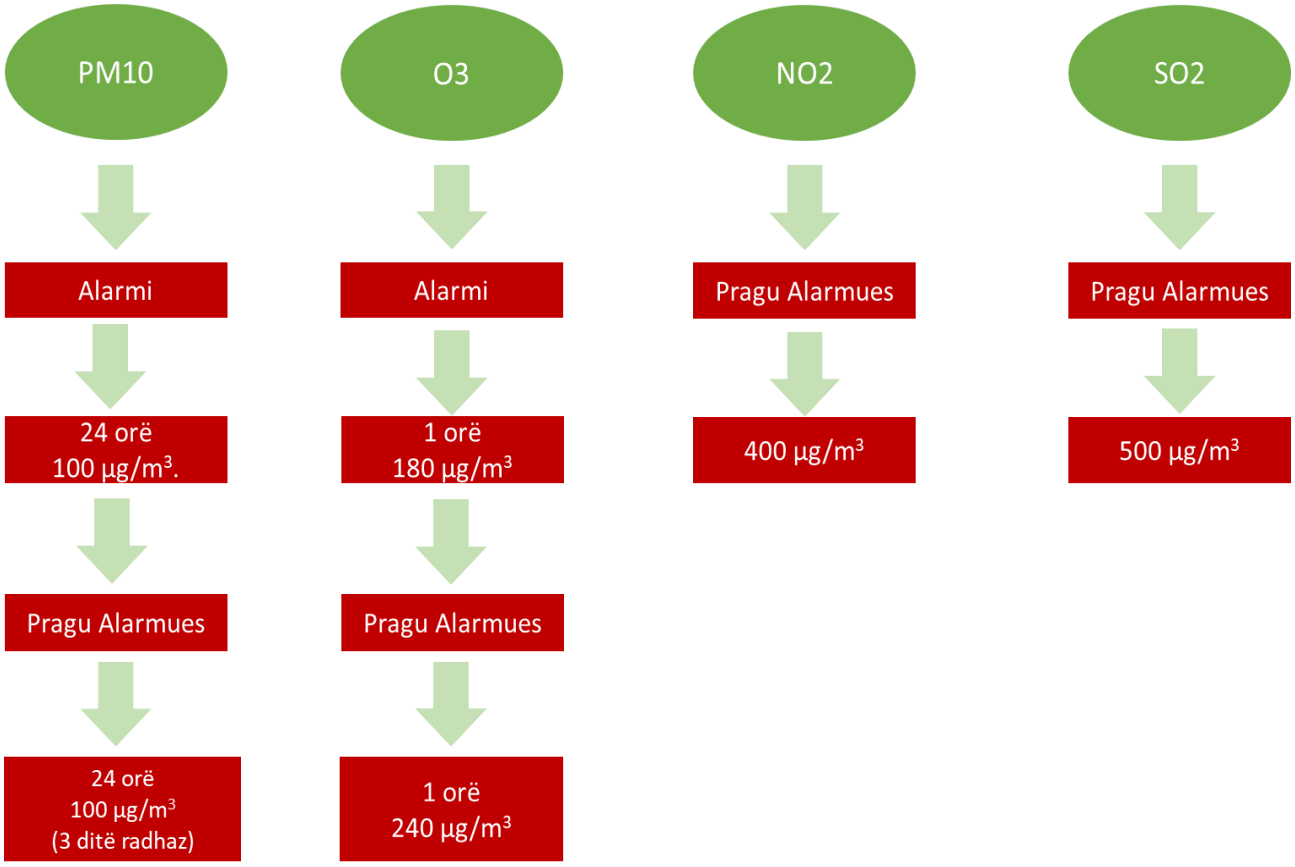


Fig.1. The alert thresholds for the air quality parameters

1.2.Description: Air pollutants

Nitrogen dioxide

NO_2 is the chemical formula for nitrogen dioxide, a gas composed of one nitrogen atom (N) and two oxygen atoms (O). This gas is one of the air pollutants, and is part of the group of nitrogen oxides (NO_x). The main source of NO_2 emission comes from human and natural activities. Some common sources of NO_2 emissions include:

Transport: Vehicles and other means of transportation are an important source of NO_2. Cars that use fossil fuels appear as important sources of nitrogen dioxide.

Industrial production: Industrial processes, especially those using high temperatures and combustion processes, can produce considerable amounts of NO_2.

Energy production: The use of fossil fuels for energy production is another source of NO_2 emissions to the atmosphere.

Natural processes: Sometimes, natural processes such as snow radiation and self-diffusion of chemical substances from the ground can contribute to the level of NO_2 in the air.

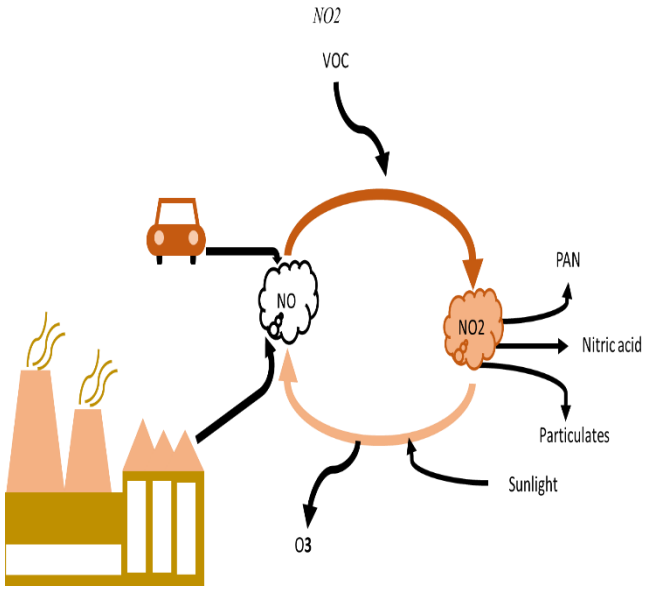


Fig.2. NO_2 Sources

Pollution from NO_2 can have harmful effects on human health and the environment. NO_2 can cause respiratory problems and affect air quality. Therefore, monitoring and controlling NO_2 levels are important to combat pollution and protect public health and the environment.

Sulfur Dioxide (SO_2)

SO_2 is the chemical formula for sulfur dioxide, a gas which is formed by the combination of sulfur (S) with oxygen (O_2). This gas is released into the atmosphere through natural and anthropogenic processes.

Natural sources of SO_2 include volcanic eruptions, release of sulfur from the ocean, and natural geochemical processes. Anthropogenic sources include pollution from industrial processes, such as power plants using sulfur-based fuel, incinerators, and the use of sulfur-containing chemical products.

SO_2 can have harmful effects on human health and the environment.

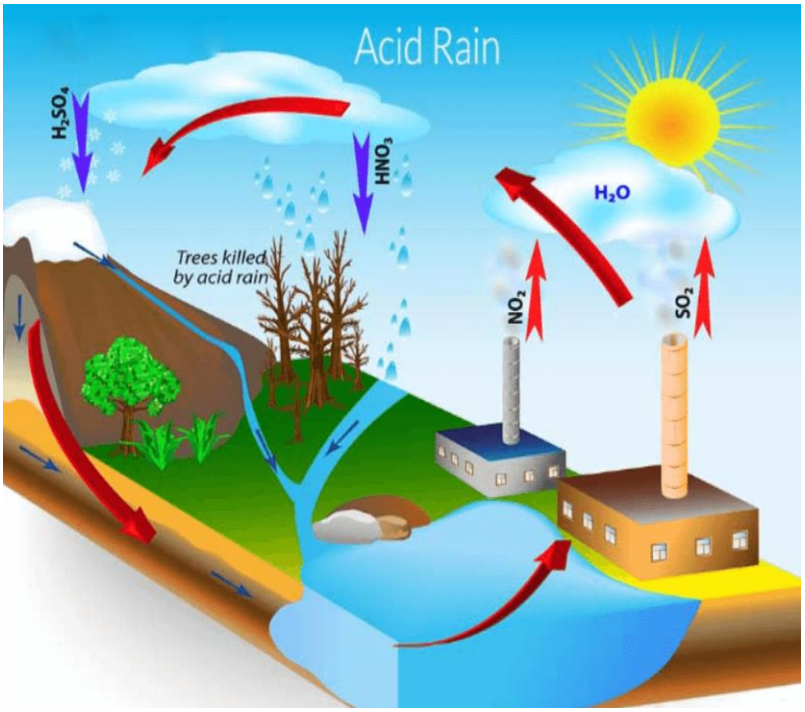


Fig.3. SO_2 Sources

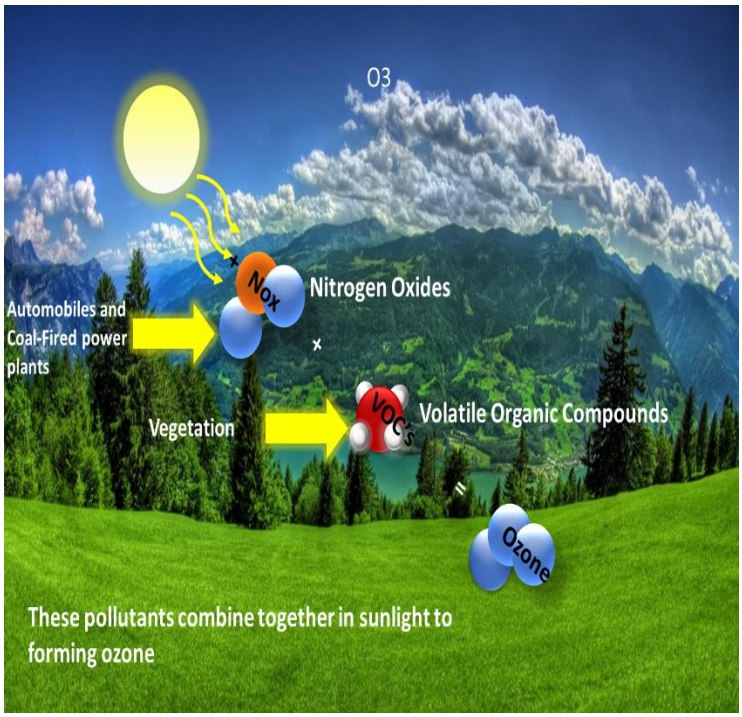
In addition, it has an important role in the formation of sulfuric acid in the atmosphere, causing acidification of water and soil.

For this reason, efforts to control SO_2 emissions are important for the protection of the environment and public health.

Ozone (O_3)

O_3 is the chemical formula for ozone, It contains three oxygen atoms bonded in a molecular structure. Ozone is found in the upper atmosphere, known as the stratosphere, and plays a critical role in protecting the earth from the sun's harmful rays by creating the ozone layer.

Natural sources of ozone include atmospheric processes, such as the interaction of ultraviolet (UV) rays with the molecules of oxygen and nitrogen dioxide.
However, there are also anthropogenic sources of ozone emissions, including the use of substances that can cause air pollution, such as gases which contain oxygen and react in the atmosphere.



However, it is important to distinguish between the ozone layer in the stratosphere and the ozone in the troposphere. The ozone layer in the stratosphere has an important role in filtering UV rays, while ozone in the troposphere can be seen as an air pollutant and can have a harmful impact on human health and the environment at the local level. For this reason, the control of the emission of substances that cause the formation of ozone in the troposphere is important for the protection of clean air and public health.

Carbon monoxide

CO Carbon monoxide is a molecule composed of a carbon atom (C) and an oxygen atom (O). In its gaseous state, this molecule (CO) is completely colorless and odorless and is not detected by humans because it does not irritate the eyes or respiratory tract. This gas quickly diffuses into the atmosphere and is absorbed by the lungs during breathing. It is a very toxic gas for humans.

Sources: Incomplete Combustion: One of the main sources of carbon monoxide is the incomplete combustion of carbon-containing fuels. This can happen in cars, industrial processes, power plants and residential heating systems.

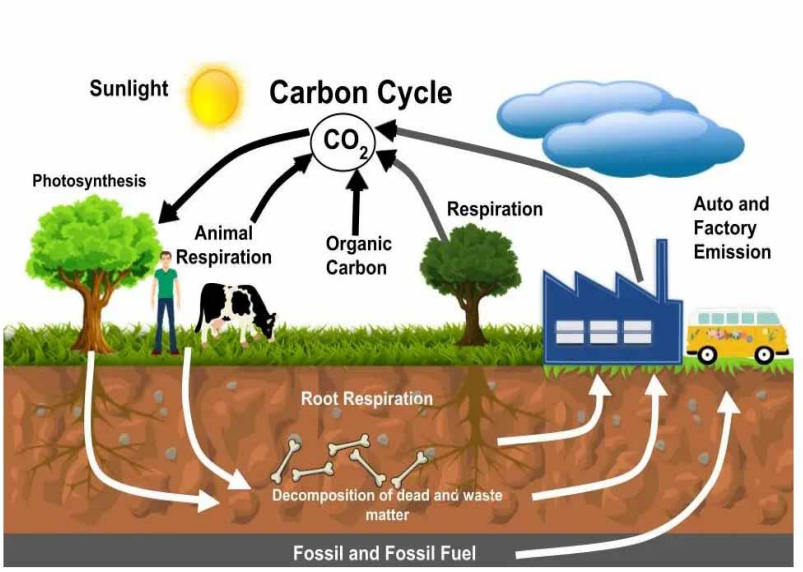


Fig.5. The carbon cycle

Vehicle Emissions: Cars, trucks, buses and other vehicles release carbon monoxide as a product of burning gasoline or diesel. This is important especially in urban areas with major traffic threats.

Industrial Processes: Various industrial activities, such as manufacturing, refining and chemical production, can generate carbon monoxide emissions. This includes processes such as metal smelting, coal production, and oil refining.

Biomass Burning: Natural events such as forest fires and forced fires release carbon monoxide into the atmosphere. Also, the burning of biomass for cooking, heating and agricultural purposes can contribute to CO emissions, particularly in rural areas.

PM_{10} and $PM_{2.5}$

PM_{10} (Particulate Matter 10 microns) refers to particles in the air that have a diameter of 10 micrometers or less. These particles can come from a variety of sources, both natural and man-made. Here are some common sources of PM_{10}:

Road transport: Vehicles running on fossil fuel emit particulate matter, including PM_{10}, as a by-product of combustion. This includes cars, trucks, buses, motorcycles and other modes of transport.

Industrial processes: Factories, power plants and industrial facilities that burn fossil fuels or are involved in processes that generate dust or particulate matter can be significant sources of PM_{10} emissions.

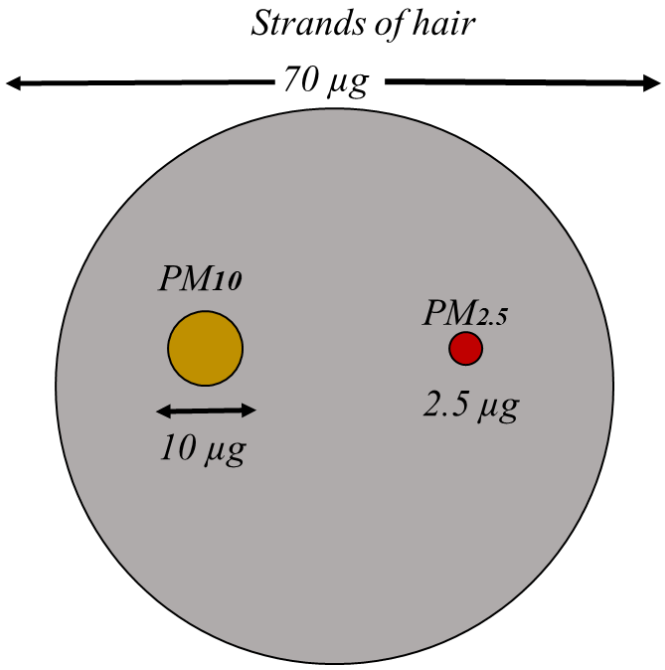


Fig.6. Comparison of the diameter of a human hair and the diameter of PM_{10} and $PM_{2.5}$

Construction activities: Demolition, excavation and construction work can generate dust and particles, especially in urban areas where construction is ongoing.

Agricultural activities: Activities such as ploughing, harvesting and livestock can release particulate matter into the air, particularly during dry and windy conditions.

Domestic heating: Burning wood, coal and other solid fuels in living rooms, fireplaces and open fires can produce PM10 emissions.
PM10 has a harmful potential on human health, since such small particles can penetrate deep into the respiratory system and cause health problems.

$PM_{2.5}$: Consists of particles smaller than 2.5 micrometers in diameter. These particles are very small and can penetrate deep into the airways of the lungs and can have harmful effects on people's health.
Control of particle emissions is important to protect public health and to improve the environmental air quality. Various standards and regulations have been put in place to monitor and limit the levels of particulate matter in the atmosphere.

2.3.Air quality monitoring

Air quality monitoring is divided into two zones; the Agglomeration AKS1 and the Zone ZKS1. In the Agglomeration AKS1, air quality monitoring is monitored by 5 monitoring stations, while in the Zone ZKS1, air quality is monitored by 7 stations. See the Map.

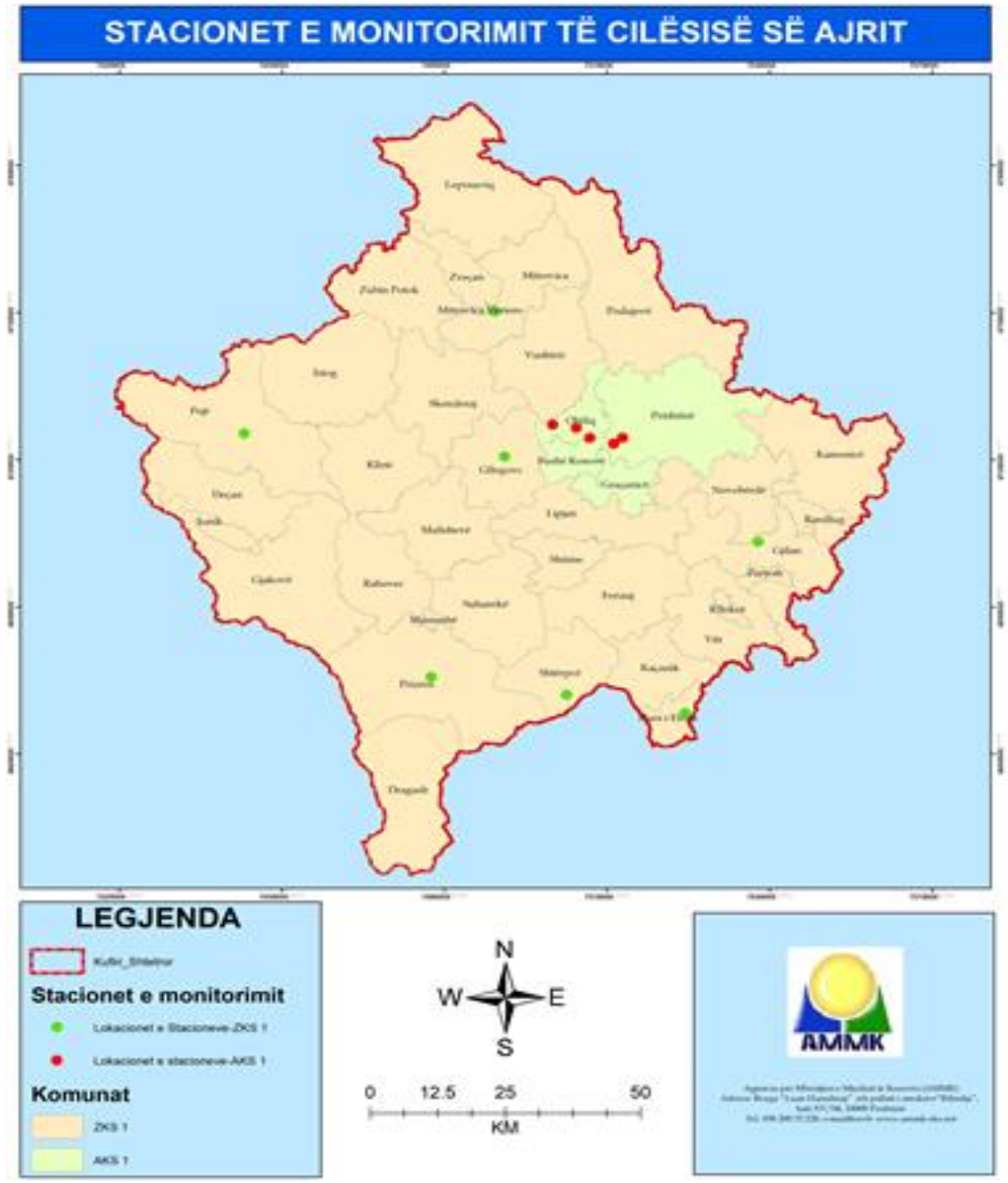


Fig.7. Locations of air quality monitoring stations



Photo 1. Dukagjini Plain

2.4.Air quality in the Agglomeration AKS1

PM_{10}

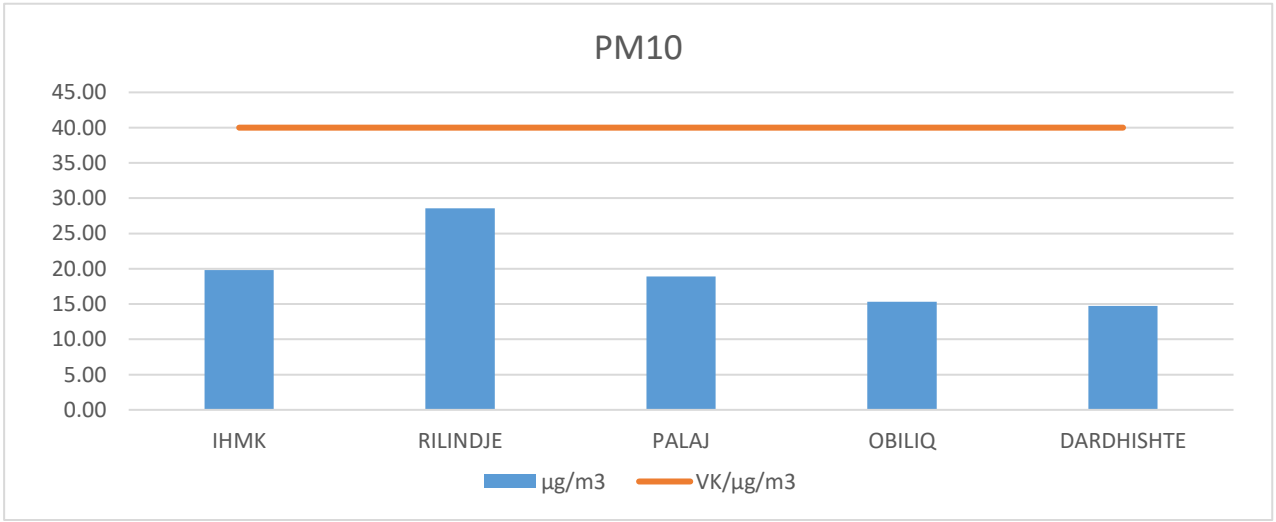
This parameter was monitored throughout the year 2023, at all monitoring stations placed in the Agglomeration AKS1. The data show that PM_{10} had exeedance of the daily standard of 50 µg/m^3 in the monthly average only at the Rilindja Station in December. See tab. 1.

Table 1. Average monthly values of PM_{10} in the Agglomeration AKS1

Month	HMIK	Rilindje	Palaj	Obiliq	Dardhishte
January	27	37	20	35	23
February	30	40	24	28	27
March	16	26	14	11	18
April	14	22	12	9	14
May	11	19	9	12	10
June	12	18	8	10	7
July	16	22	13	11	5
August	15	21	12	18	4
September	14	25	12	12	12
October	19	28	16	17	19
November	16	26	11	19	12
December	48	59	26	45	33
Avg. 2023	19.83	28.58	14.75	18.92	15.33

The graph shows the annual average for the PM10 parameter, which was within the annual standard of 40 µg/m^3, see fig.8.

Fig. 8. Annual Average Values of PM_{10} in the Agglomeration AKS1, 2023



$PM_{2.5}$

$PM_{2.5}$ was monitored throughout the year 2023. Based on these data received, there were high values in some monitoring stations, particularly during the winter season, such as:

- HMIK / Prishtinë, (December 2023),
- Rilindje/ Prishtinë, (January, February and December 2023),
- Obiliq, (January and December 2023)
- Dardhishtë/Obiliq, (December 2023), See Tab.2.

Table 2. Average monthly values of $PM_{2.5}$ in the Agglomeration AKS1

Month	HMIK	Rilindje	Palaj	Obiliq	Dardhishte
January	23	32	16	31	21
February	21	30	16	24	20
March	11	18	9	9	12
April	10	16	8	8	11
May	8	12	6	9	7
June	8	12	5	8	5
July	9	11	8	6	3
August	10	12	8	10	3
September	8	13	7	8	7
October	12	15	10	12	11
November	13	18	8	17	11
December	36	43	22	41	28
Avg. 2023	14.08	19.33	10.25	15.25	11.58

The Graph shows the average annual values for the $PM_{2.5}$ parameter, which was within the annual standard of 25 µg/m^3, see fig.9

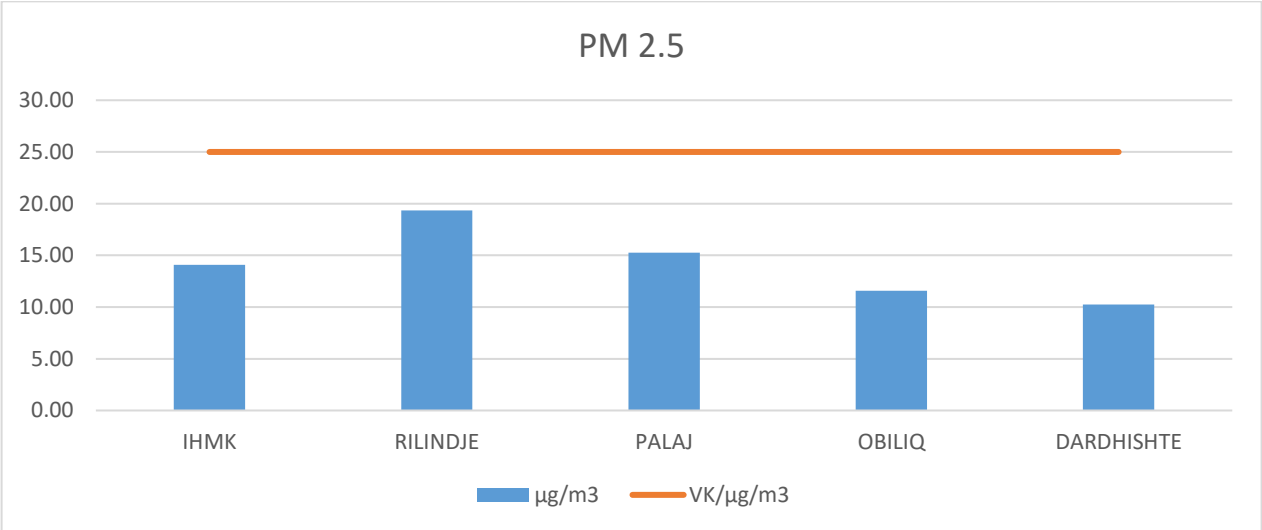


Fig. 9. Annual limit values of $PM_{2.5}$ µg/m^3 in AKS1 for the year 2023

Ozone (O_3)

Table 4 shows the monthly and annual averages for the O_3 parameter, and it is estimated that there were no exceedances of the standard of 120 µg/m^3 during the year 2023.
The highest values recorded at the monitoring stations on a monthly average are:

- Rilindja in the month of August,
- Palaj during the months, June, July, August, September, October and November and
- Dardhisht, June, July, August, September and October. See Tab. 3

Table 3. Average monthly values of O_3 in the Agglomeration AKS1, 2023

Month	HMIK	Rilindje	Palaj	Obiliq	Dardhishte
January	19	23	38	12	7
February	19	38	50	17	14
March	19	48	51	21	14
April	50	57	44	23	21
May	52	55	49	16	35
June	45	51	61	10	74
July	49	58	68	20	86
August	54	60	88	24	89
September	53	48	74	16	83
October	37	29	68	8	63
November	30	18	60	27	57
December	17	11	49	20	40
Avg. 2023	37.00	41.33	58.33	17.83	48.58

The Graph shows the annual average values for the O_3 parameter, which during 2023 was below the permitted values according to the standard, which is 120 µg/m^3. See fig. 10.

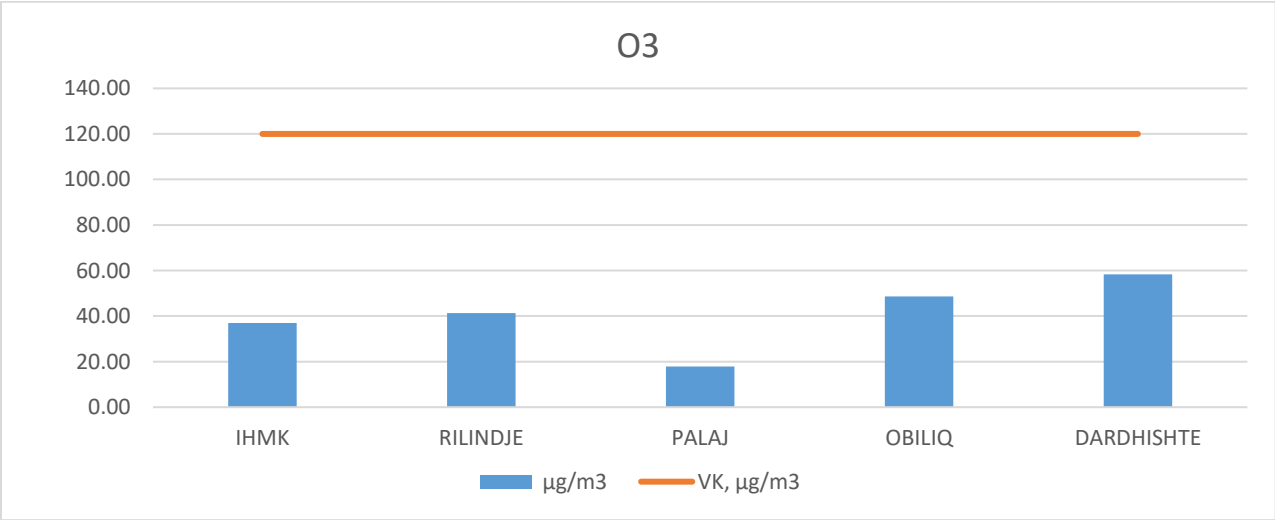


Fig. 10. Annual limit values of O_3 µg/m^3 in AKS1 for the year 2023

Sulfur Dioxide (SO_2)

Sulfur dioxide (SO_2) has been monitored throughout the year 2023 and based on the estimated data, it was found that there were no exceedances of the standard values of 125 µg/m^3 during the year 2023. The table shows monthly and annual average values for SO_2. See Tab. 4.

Table 4. Average monthly values of SO_2 in the Agglomeration AKS1, 2023

Month	HMIK	Rilindje	Palaj	Obiliq	Dardhishte
January	9	9	2	14	13
February	8	6	3	5	8
March	9	6	2	7	6
April	11	8	3	8	5
May	12	9	6	9	1
June	12	11	6	10	3
July	4	10	9	9	2
August	15	17	5	3	4
September	20	2	3	3	5
October	22	3	5	7	4
November	16	4	11	15	4
December	18	3	16	21	8
Avg. 2023	13.00	7.33	5.92	9.25	5.25

The graph shows the annual average data for the SO_2 parameter, which average was within the standard of 125 µg/m^3. See fig. 11.

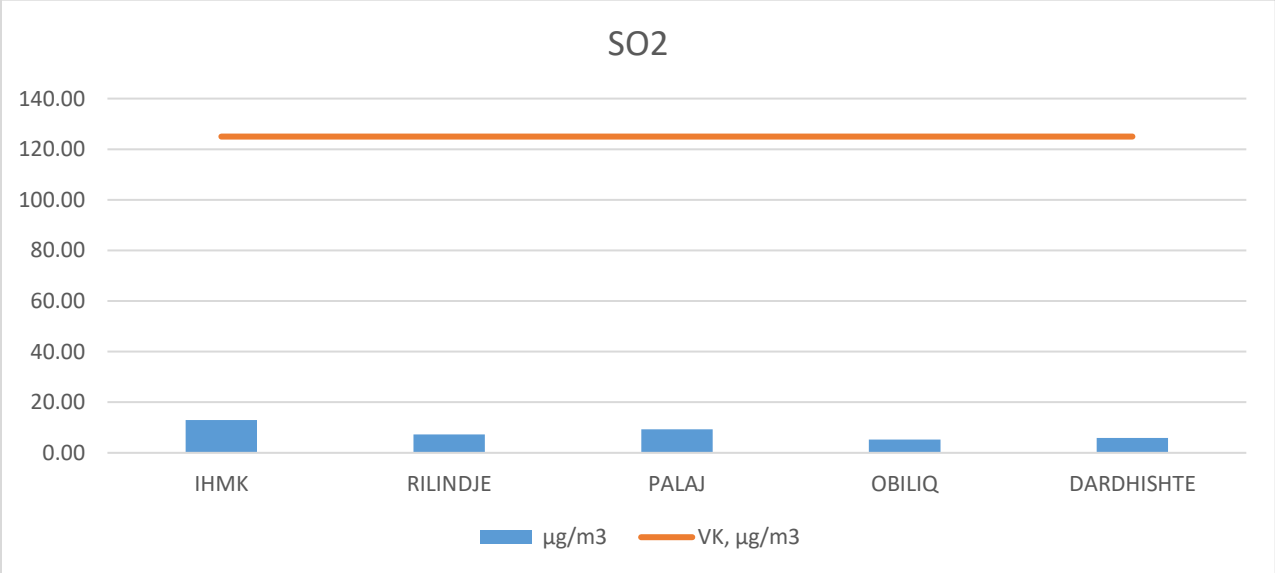


Fig. 11. Limit values of SO_2 µg/m^3 in AKS1 for the year 2023

Nitrogen Dioxide (NO_2)

The level of the presence of NO_2 in the air quality has not been in the problematic values and exceedance of the permitted value. In table 5, there are presented the monthly and annual average values for the NO_2 parameter, and it is estimated that there were no exceedances of the limit values during the year 2023. The highest values were recorded at the air quality monitoring station at the monitoring stations, HMIK, Rilindja and Obiliq.

Table 5. Average monthly values of NO_2 in the Agglomeration AKS1, 2023

Month	HMIK	Rilindje	Palaj	Obiliq	Dardhishte
January	23	10	12	17	6
February	53	9	9	24	13
March	6	7	8	18	12
April	23	28	7	22	11
May	15	5	6	16	7
June	18	4	6	11	8
July	21	23	7	10	10
August	22	24	7	12	10
September	19	26	7	19	9
October	24	7	10	16	15
November	24	11	10	11	14
December	34	18	17	15	18
Avg. 2023	23.50	14.33	8.83	15.92	11.08

The graph presents the annual average data for the NO_2 parameter, the average of which was below the permitted values according to the standard, which is 40 µg/m^3. See fig. 12.

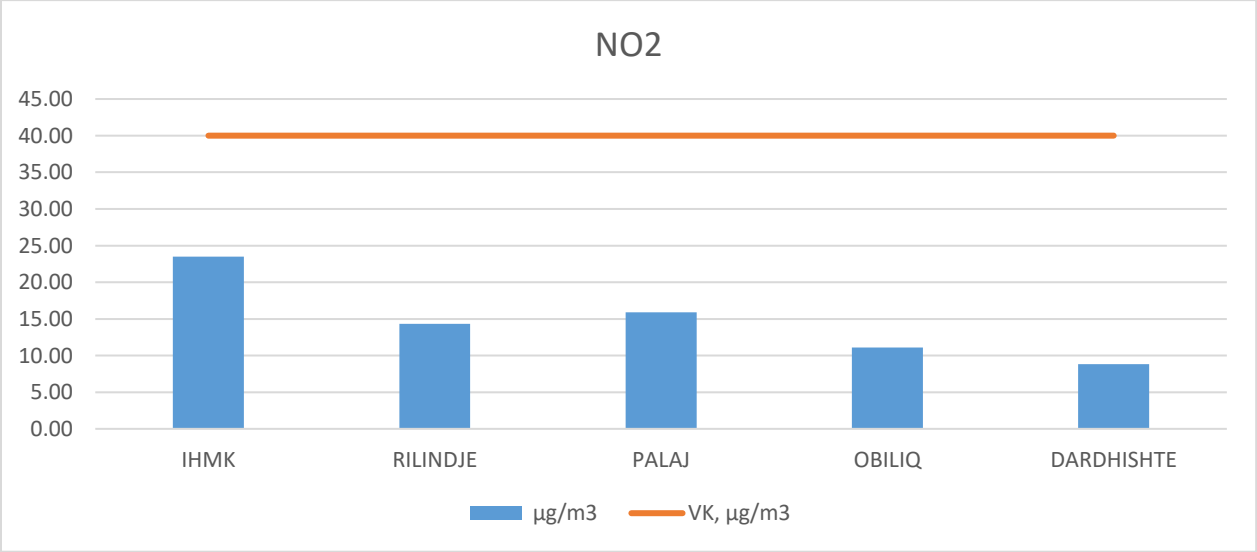


Fig. 12. Annual limit values of NO_2 µg/m3 in AKS1 for the year 2023

Carbon monoxide (CO)

The CO parameter was evaluated without exeedance of the limit values during the year 2023.
The highest values for this parameter were recorded at the stations of HMIK, Obiliq and Dardhishte. See tab. 6.

Table 6. Average monthly values of CO in the Agglomeration AKS1, 2023

Month	HMIK	Rilindje	Palaj	Obiliq	Dardhishte
January	0.9	0.3	0.1	1	1
February	1.2	0.3	0.1	0.9	0.8
March	0.9	0.2	0.1	0.7	0.8
April	1.4	0.3	0.1	0.7	1.1
May	1	0.3	0.1	0.6	1
June	0.6	0.4	0.1	0.6	0.3
July	0.5	0.4	0.1	0.5	0.6
August	0.4	0.5	0.1	0.7	1
September	0.8	0.5	0.1	0.8	1
October	0.5	0.5	0.03	1	1.6
November	0.8	0.6	0.1	1	0.8
December	1.7	0.8	0.1	1.6	1.6
Avg. 2023	0.89	0.43	0.09	0.84	0.97

The graph presents the data in annual average of CO, which average was within the permitted values of 10 mg/m^3. See fig. 13

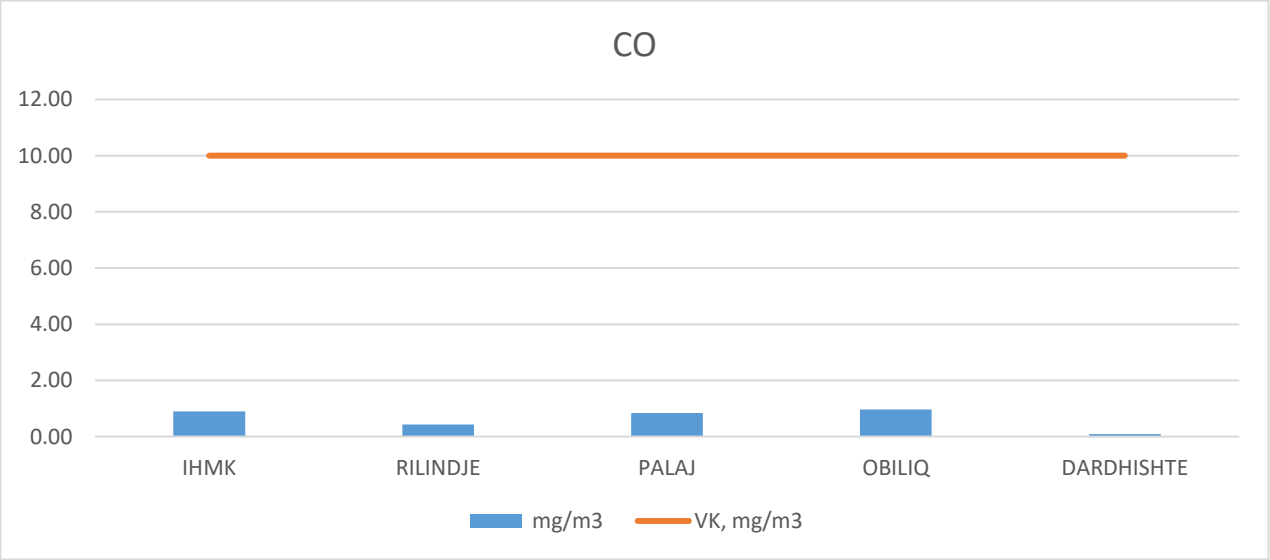


Fig. 13. Permitted annual average values of CO mg/m^3 in AKS1 for the year 2023

2.5. ZONE ZKS1 – Air quality

PM_{10}

The table shows the average monthly and annual values for the PM_{10} parameter and based on these data we conclude that there was no exceedance of the limit values according to the standard.
The highest values have turned out to be in the monitoring stations of Gjilan, Peja and Mitrovica.
See tab. 7.

Table 7. Average monthly values of PM_{10} in ZKS1, 2023

Month	Drenas	Mitrovicë	Pejë	Prizren	Brezovicë	Hani Elezit	Gjilan
January	26	32	38	31	4	25	46
February	23	41	33	24	9	30	50
March	14	23	20	16	5	20	28
April	11	16	15	12	7	14	21
May	10	17	11	12	9	12	15
June	13	16	13	12	14	12	13
July	14	20	16	15	17	13	13
August	18	20	14	16	19	12	5
September	14	19	13	14	13	13	5
October	15	20	17	13	10	14	9
November	11	21	20	13	2	16	26
December	25	41	45	35	2	30	62
Avg. 2023	16.17	23.83	21.25	17.75	9.25	17.58	24.42

The graph presents the annual average data for the PM_{10} parameter, we estimate that they were below the permitted values according to the annual standard, which is 40 µg/m^3. See fig. 14.

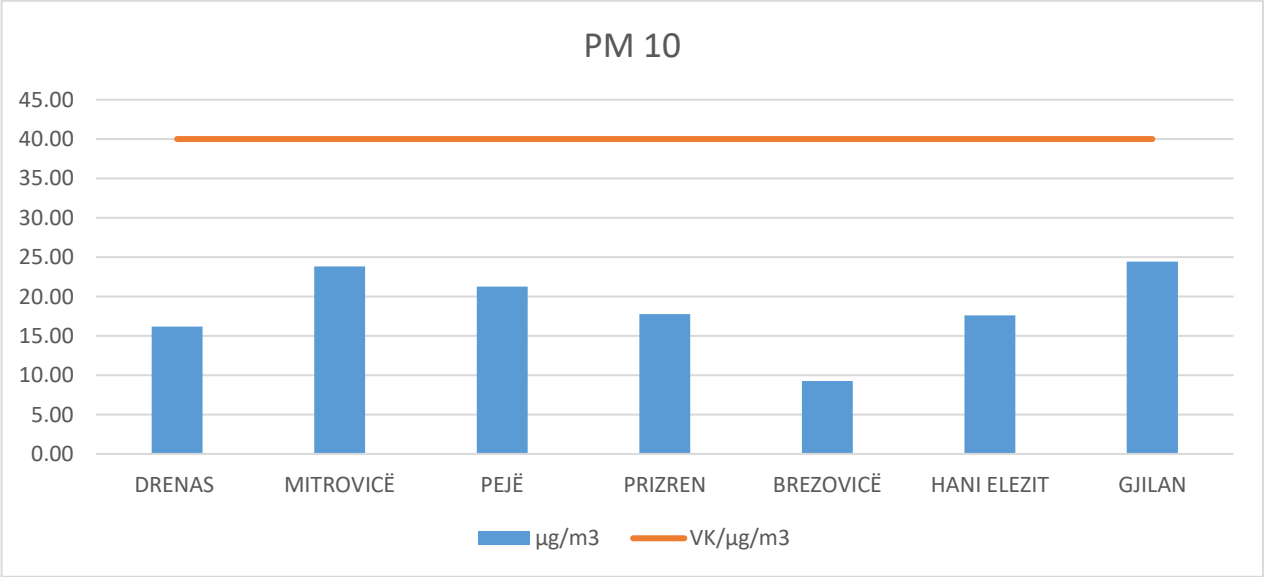


Fig. 14. Average monthly values of PM_{10} in ZKS1, 2023

$PM_{2.5}$

Based on the evaluated data, we conclude that there were no exceedances of the limit values in the monthly averages at the air quality monitoring stations in the Zone ZKS1 area.
While the highest values were noticed during the months of January, February and December in all monitoring stations except for the monitoring station in Brezovica. See Tab. 8.

Table 8. Average monthly values of $PM_{2.5}$ in ZKS1, 2023

Month	Drenas	Mitrovicë	Pejë	Prizren	Brezovicë	Hani Elezit	Gjilan
January	23	29	34	26	2	22	43
February	18	28	26	18	6	22	43
March	12	16	16	12	4	14	24
April	10	12	11	9	6	10	17
May	8	11	7	8	8	9	10
June	9	10	8	8	12	8	10
July	8	10	8	7	12	8	9
August	10	12	8	10	15	8	7
September	8	10	7	8	9	8	7
October	10	12	11	8	7	10	11
November	9	16	16	11	1	13	22
December	22	32	37	30	2	26	52
Avg. 2023	12.25	16.50	15.75	12.92	7.00	13.17	21.25

The graph presents the annual average data for the PM_{10} parameter, which average was below the permitted values according to the standard, which is 25 µg/m^3. See fig. 15.

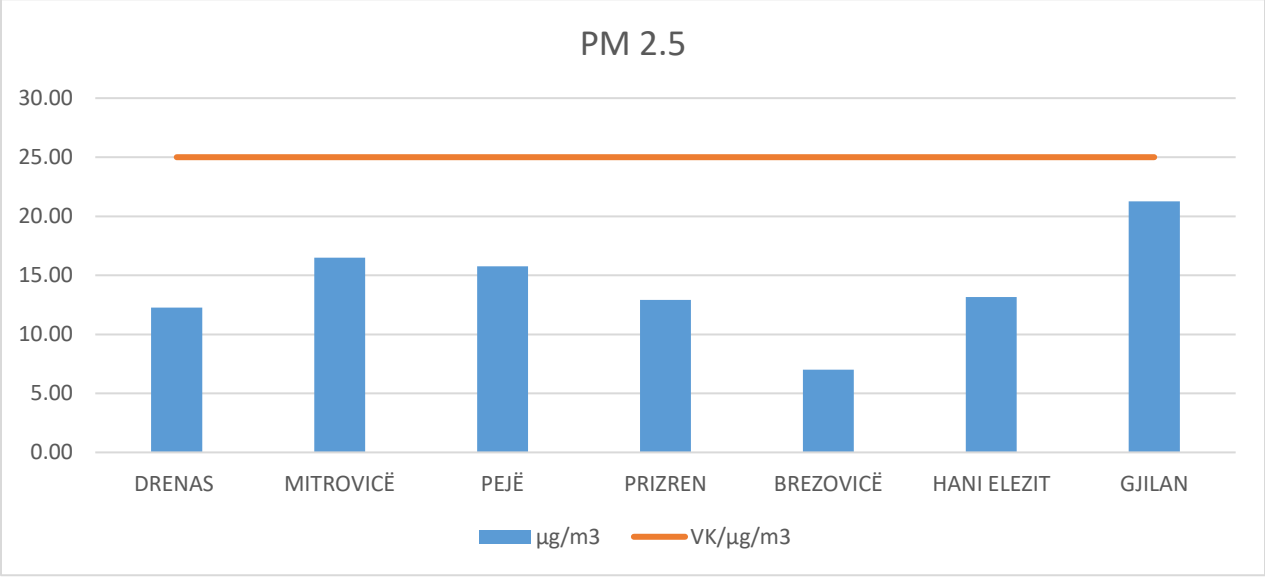


Fig. 15. Annual limit values of $PM_{2.5}$ µg/m^3 in ZKS1 for the year 2023

Ozone (O_3)

The data evaluation for the O_3 parameter presented in the table in monthly averages shows that in all monitoring stations there were no exceedances of the limit values during the year 2023.
The highest monthly average values were recorded at the monitoring station in Brezovica, mainly during the months of Spring and Summer. Figure Tab. 9.

Table 9. Average monthly values of O_3 in ZKS1, 2023

Month	Drenas	Mitrovicë	Pejë	Prizren	Brezovicë	Hani Elezit	Gjilan
January	32	19	26	26	68	32	31
February	53	30	50	51	79	54	44
March	61	37	60	57	86	41	52
April	66	43	71	63	91	62	60
May	62	27	64	58	89	37	59
June	59	20	61	59	90	51	60
July	68	29	66	81	82	69	72
August	67	32	71	75	98	78	74
September	65	28	67	70	81	65	65
October	46	20	43	47	77	43	45
November	45	19	28	36	72	27	34
December	34	15	21	30	75	24	23
Avg. 2023	54.83	26.58	52.33	54.42	82.33	48.58	51.58

The graph presents the annual average data for the NO_2 parameter, which average was below the permitted values according to the standard, which is 125 µg/m^3. See fig. 16.

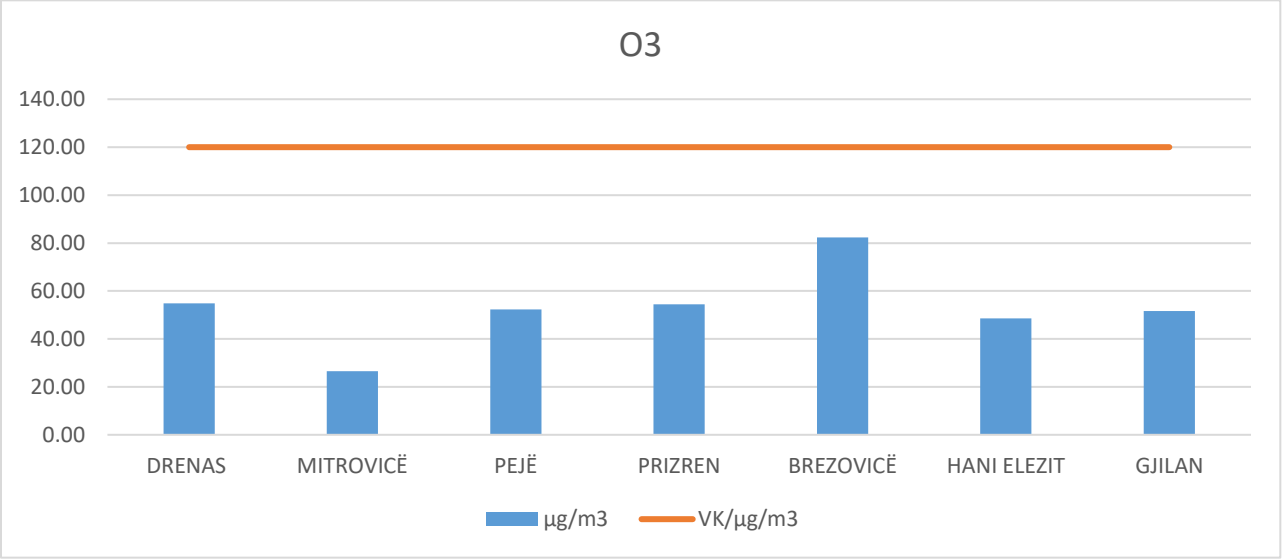


Fig. 16. Annual limit values of O_3 µg/m^3 in ZKS1 for the year 2023

Sulfur dioxide (SO_2)

The table presents the data for the monitored SO2 parameter at the air quality monitoring stations, and based on these data we estimate that there are no exceedances at any of the monitored stations in ZKS1. See Tab. 10.

Table 10. Average monthly values of SO_2 in ZKS1, 2023

Month	Drenas	Mitrovicë	Pejë	Prizren	Brezovicë	Hani Elezit	Gjilan
January	6	28	4	5	6	11	11
February	7	25	8	7	7	3	9
March	5	26	8	52	6	5	4
April	4	29	8	4	9	5	2
May	4	28	8	3	6	4	4
June	5	14	10	3	5	5	8
July	6	9	8	4	3	5	5
August	8	12	3	6	2	6	4
September	19	21	3	7	3	7	3
October	4	28	4	6	3	9	4
November	3	25	4	4	3	7	9
December	6	24	5	6	3	8	20
Avg. 2023	6.42	22.42	6.08	8.92	4.67	6.25	6.92

The graph presents the annual average data for the SO_2 parameter, which average was below the permitted values according to the standard, 125 µg/m^3. See fig. 17.

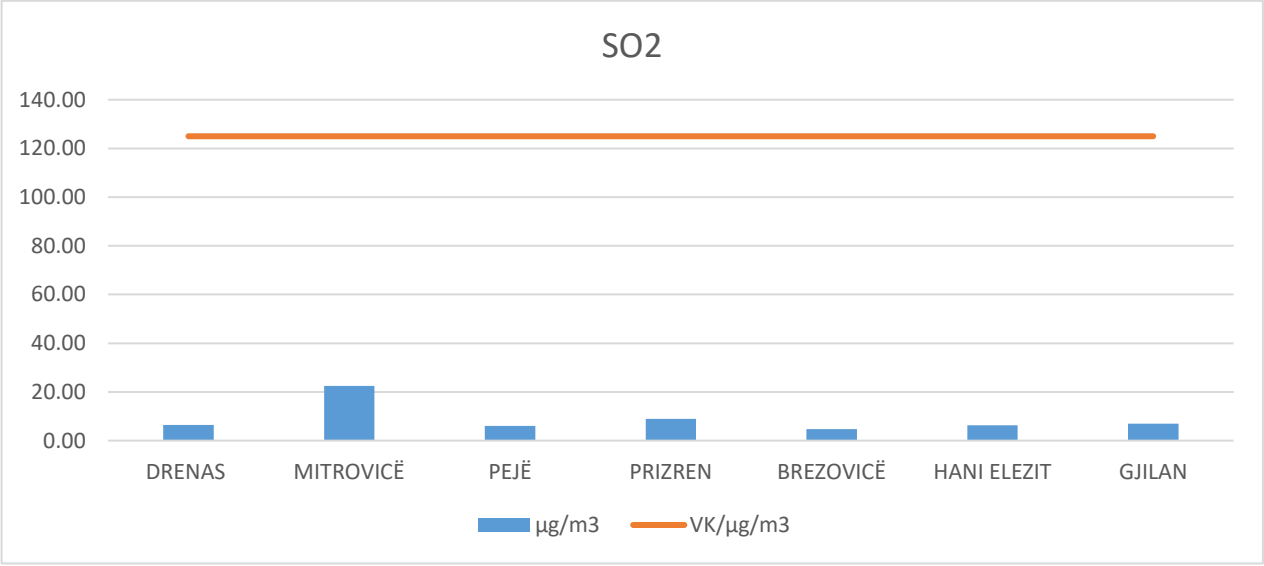


Fig. 17. Annual limit values of SO_2 µg/m^3 in AKS1 for the year 2023

Sulfur dioxide (SO_2)

The table presents the data for the monitored SO2 parameter at the air quality monitoring stations, and based on these data we estimate that there are no exceedances at any of the monitored stations in ZKS1. See Tab.10.

Table 10. Average monthly values of SO2 në ZKS1, 2023

Month	Drenas	Mitrovicë	Pejë	Prizren	Brezovicë	Hani Elezit	Gjilan
January	6	28	4	5	6	11	11
February	7	25	8	7	7	3	9
March	5	26	8	52	6	5	4
April	4	29	8	4	9	5	2
May	4	28	8	3	6	4	4
June	5	14	10	3	5	5	8
July	6	9	8	4	3	5	5
August	8	12	3	6	2	6	4
September	19	21	3	7	3	7	3
October	4	28	4	6	3	9	4
November	3	25	4	4	3	7	9
December	6	24	5	6	3	8	20
Average 2023	6.42	22.42	6.08	8.92	4.67	6.25	6.92

The graph presents the annual average data for the SO2 parameter, the average of which was below the allowed values according to the 125 µg/m3 standard.17.

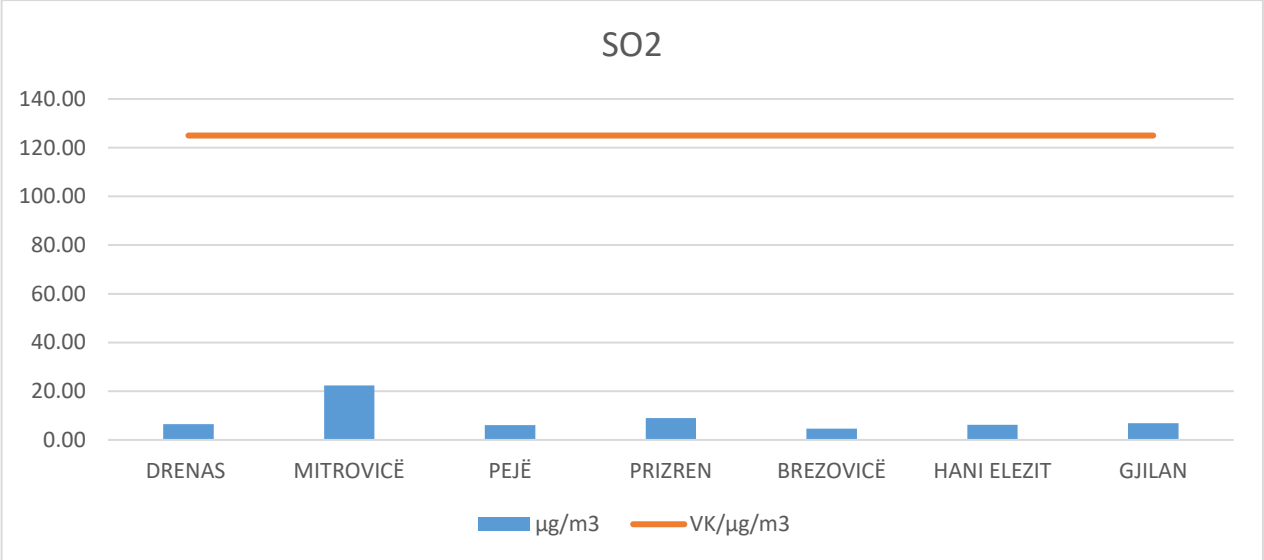


Fig. 17. Annual limit values of SO_2 µg/m^3 in AKS1 for the year 2023

Nitrogen Dioxide (NO_2)

The table presents the monitored data for the NO_2 parameter and on the basis of these data, we estimate that we have not exceeded the limit values during 2023.
The highest values in the monthly averages are from the monitoring stations: Gjilan, Pejë, Prizren and Hani Elezit. See tab.11.

Table 11. Average monthly values of NO_2 in ZKS1, 2023

Month	Drenas	Mitrovicë	Pejë	Prizren	Brezovicë	Hani Elezit	Gjilan
January	16	8	22	23	2	17	27
February	12	11	21	19	2	17	29
March	11	8	14	17	2	21	22
April	9	5	12	15	2	13	18
May	8	5	9	12	2	11	14
June	8	7	8	10	1	10	11
July	9	10	10	11	1	11	13
August	14	11	9	11	1	9	15
September	9	11	11	12	1	12	16
October	15	10	16	16	1	17	21
November	13	18	19	20	1	18	22
December	18	9	28	27	1	22	33
Average 2023	11.83	9.42	14.92	16.08	1.42	14.83	20.08

The graph presents the annual average data for the NO_2 parameter, the average of which was below the allowed standard values of 40 µg/m^3. See fig. 18.

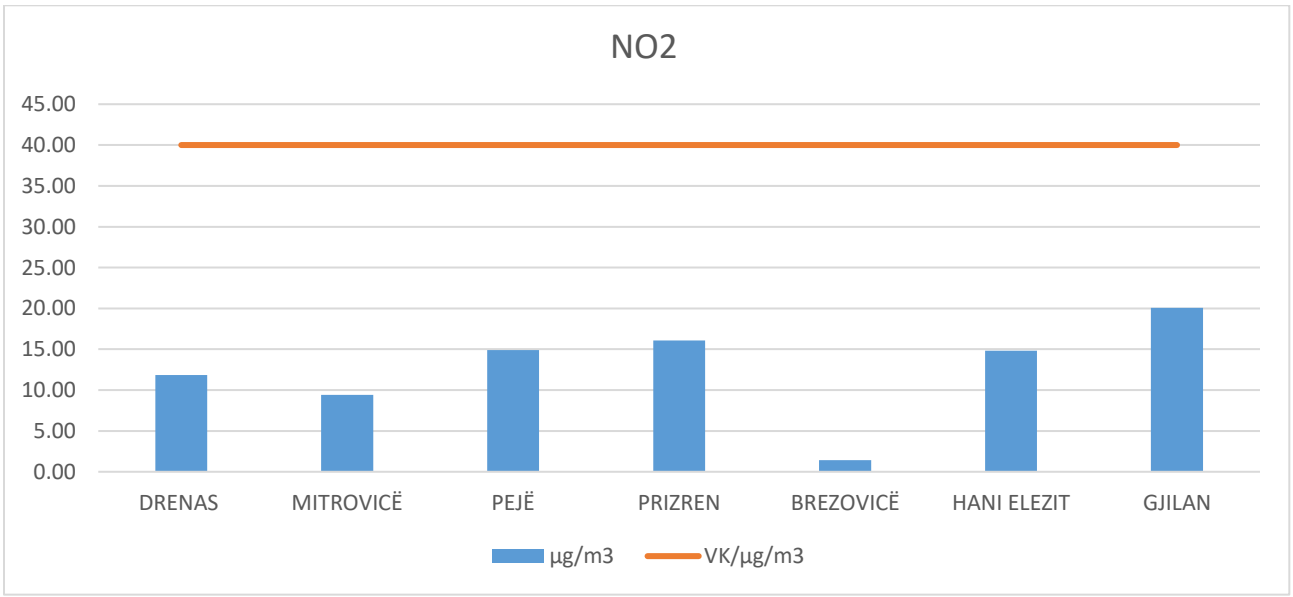


Fig. 18. Annual limit values of NO_2 µg/m^3 in ZKS1 for the year 2023

Carbon monoxide (CO)

The table presents air quality data in monthly and annual averages for the year 2023, and based on these data, we estimate that we do not have exceedances of the limit values. The highest monthly average value is estimated to be during January 2023 at the Peja station. See Tab.12.

Table 12. Average monthly values of CO in ZKS1, 2023

Month	Drenas	Mitrovicë	Pejë	Prizren	Brezovicë	Hani Elezit	Gjilan
January	0.8	0.6	0.8	0.9	0.7	0.7	0.7
February	0.7	0.5	1	0.6	0.7	0.5	0.9
March	0.5	0.3	0.7	0.7	0.1	0.5	0.4
April	0.6	0.3	0.5	0.7	0.8	0.4	0.3
May	1	0.3	0.7	0.6	0.1	0.4	0.1
June	0.8	0.3	0.6	0.7	0.1	0.4	0.2
July	0.4	0.3	0.7	0.2	0.1	0.4	0.1
August	0.5	0.4	0.8	0.4	0.7	0.5	0.1
September	0.5	0.5	1	0.4	1	0.4	0.1
October	0.7	0.5	0.6	0.6	0.3	0.5	0.2
November	0.6	0.7	1	1	0.6	0.6	0.6
December	0.8	1.1	1.5	1.3	0.3	1.1	1.4
Average 2022	0.66	0.48	0.83	0.68	0.46	0.53	0.43

The graph presents the annual average data for the CO parameter, the average of which was below the allowed values according to 10 mg/m3. See fig.19.

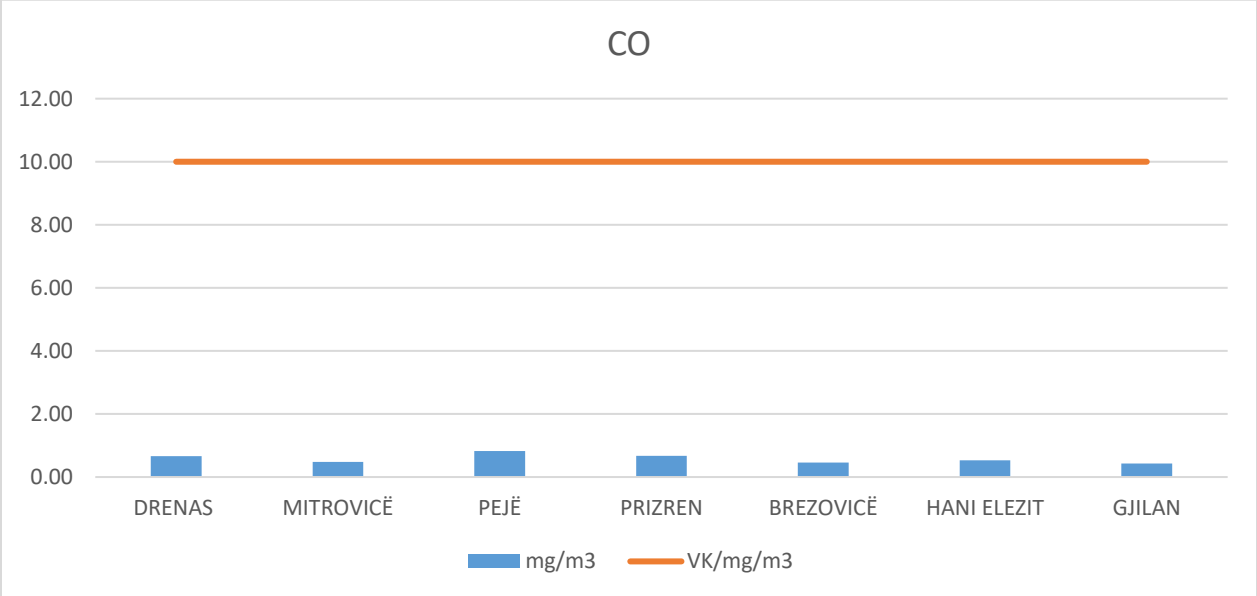


Fig. 19. Annual limit values of CO mg/m^3 in ZKS1 for the year 2023

Days with exceedances for PM_{10} during 2023

Based on the data for the days with exceedances within the year 2023, we find that we have exceeded the annual standard of 35 only in the air quality monitoring stations in Rilindja (AKS1) and Gjilan (ZKS1), but compared to the two preliminary years' which were in 2021 and 2022, in total there were 299 days, while in the year we left behind, we have a significantly lower number with 216 days for this parameter (PM_{10}). See Tab. 13.

Table 13. Days with exceedances for PM_{10} during 2023

Months	Jan.	Febr.	Mar.	April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
IHMK	6	2	0	0	0	0	0	0	0	0	0	12	20
Rilindja	9	4	2	2	0	0	0	0	1	0	2	16	36
Palaj	1	1	0	0	0	0	0	0	0	0	0	4	6
Obiliq	8	1	0	0	0	0	0	0	0	0	0	11	20
Dardhishtë	5	1	0	0	0	0	0	0	0	1	0	7	14
Drenas	4	0	0	0	0	0	0	0	0	0	0	4	8
Mitrovicë	8	7	0	0	0	0	1	0	0	0	1	8	25
Pejë	8	4	0	0	0	0	0	0	0	0	0	12	24
Prizren	6	2	0	0	0	0	0	0	0	0	0	7	15
Brezovicë	1	0	0	0	0	0	0	0	0	0	0	0	1
Hani Elezit	1	2	0	0	0	0	0	0	0	0	0	1	4
Gjilan	10	12	1	1	0	0	0	0	0	0	3	16	43
2023	67	36	3	3	0	0	1	0	1	1	6	98	216

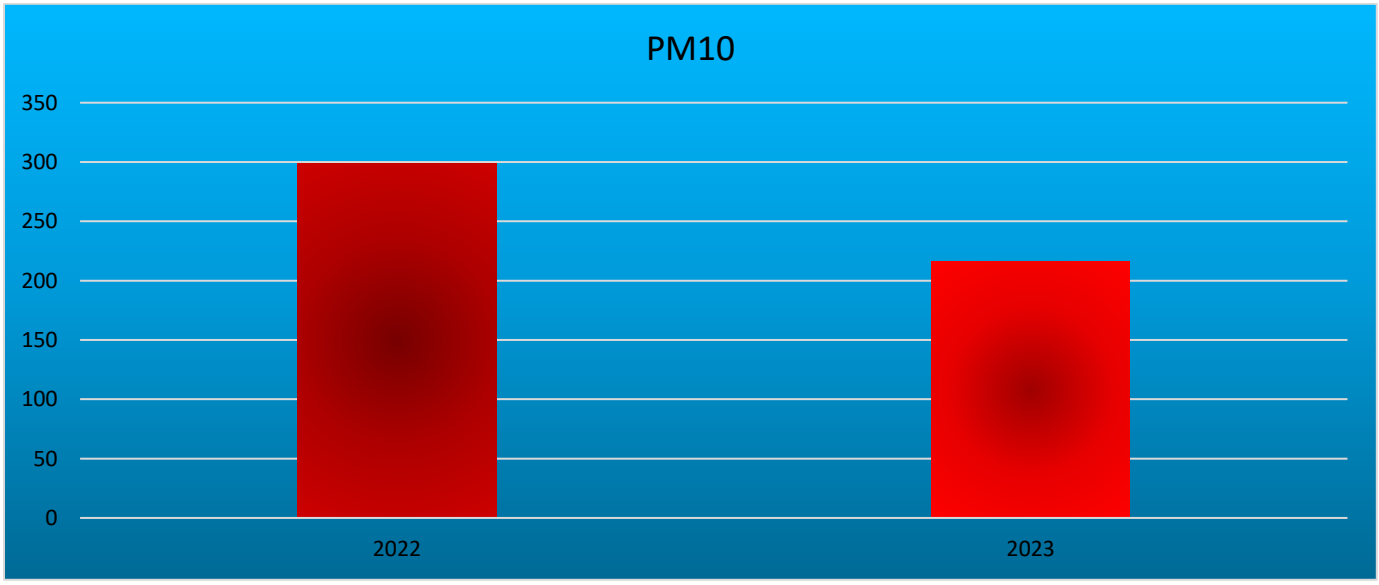


Fig. 20. Number of days with exceedances for the year 2023

2.4. The air quality trend 2013-2023

The air quality trend presents the state of air quality in the annual average throughout the territory of the Republic of Kosovo, for the main air pollutant parameters (PM10, PM2.5, O3, SO2, NO2 and CO). According to the air quality trend 2013-2023, we estimated that the air quality situation from 2020, there has been a significant improvement for the parameters PM10, PM2.5, SO2, NO2 and CO, and in particular for the parameter PM10, here, by excluding Ozone, which has had an increase but that this increase is within the standard of 120 µg/m3. See Tab. 14

The year 2023 is the best year compared to the previous years and with a very good coverage of the air quality monitoring network. In conclusion, we find that all pollutant measurement parameters are within the standards according to directive 2008/50 and law 08/L-025 on Air Pollution Protection.

Table 14. The air quality data for the year 2013-2023

Years	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
PM 10	45.71	37.52	48.91	33.86	34.71	41.57	28.94	28.47	23.10	22.21	18.97
PM 2.5	28.86	18.73	33.87	17.91	25.36	25.43	20.75	20.58	16.66	16.06	14.11
O3	59.90	41.37	38.09	47.66	26.22	45.18	43.02	48.99	50.57	47.05	47.81
SO2	6.37	13.60	14.70	20.63	16.19	34.65	11.05	12.55	10.64	9.40	8.53
NO2	15.57	16.56	21.45	27.35	26.22	26.45	23.91	15.04	12.25	15.12	13.52
CO	0.72	1.20	2.18	2.36	1.93	1.87	1.05	0.98	0.80	0.70	0.61

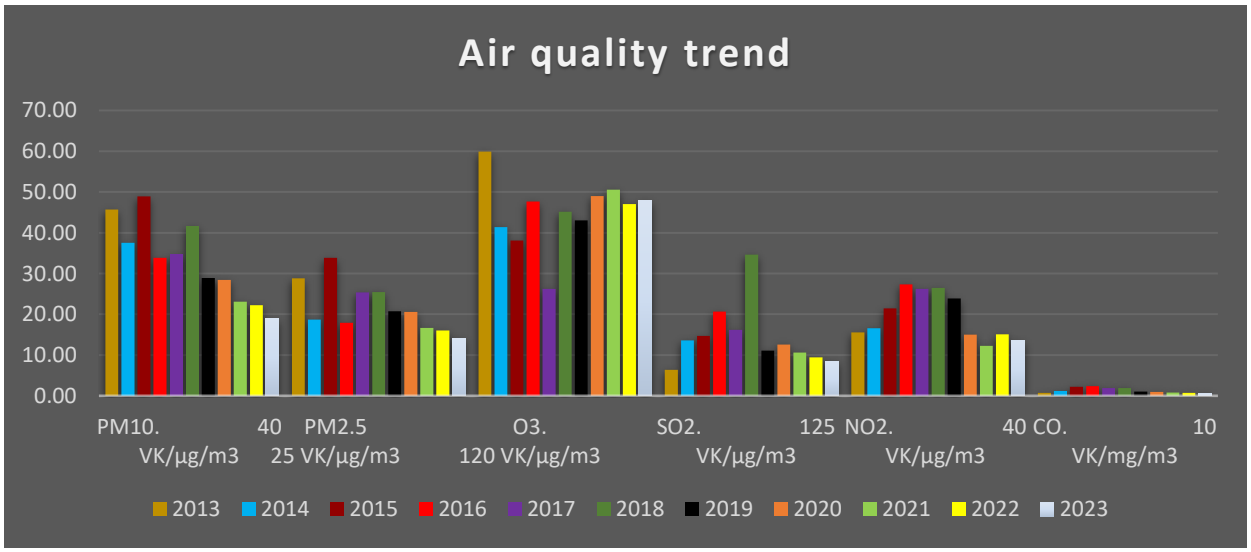


Fig. 21. The air quality trend for Years 2013-2023

3. Assessment of air emissions

3.1. Assessment of air emissions from the Energy Corporation of Kosovo

In TC Kosova A, the parameters of SO_2, NOx are calculated (except the dust emission, which is measured), while in TC Kosova B, all the parameters of pollutant emissions are calculated.
In TC Kosovo A, namely in blocks A3, A4, A5, equipment has been installed for continuous monitoring of dust - particle emissions. It is worth noting that the measurements are controversial due to poor maintenance of the measuring equipment.
In TC "Kosova-B" the devices for the continuous measurement of dust, SO_2, NOx emissions have been placed, which currently do not work, therefore, the calculations of the dust emissions and discharged gases are still being made.

According to "Administrative Instruction (GRK) No. 07/2021 On the Rules and Rates of Air Emissions from Stationary Pollutant Sources"

- ***Dust***.....*20 mg/Nm^3*
- ***SO_2***.....*400 mg/Nm^3*
- ***NOx***.....*400 mg/Nm^3*

3.1.1. **Dust emissions in TC A and B**

In figure 22, the dust emissions in TC A and TC B are presented, for the months that they have been in operation. According to the evaluations, we have exceeded the allowed limit values for both TC A and B.
It is worth noting that in TC B the values are much higher than in TC A, during the months of January, February, March, October, November and December of 2023.

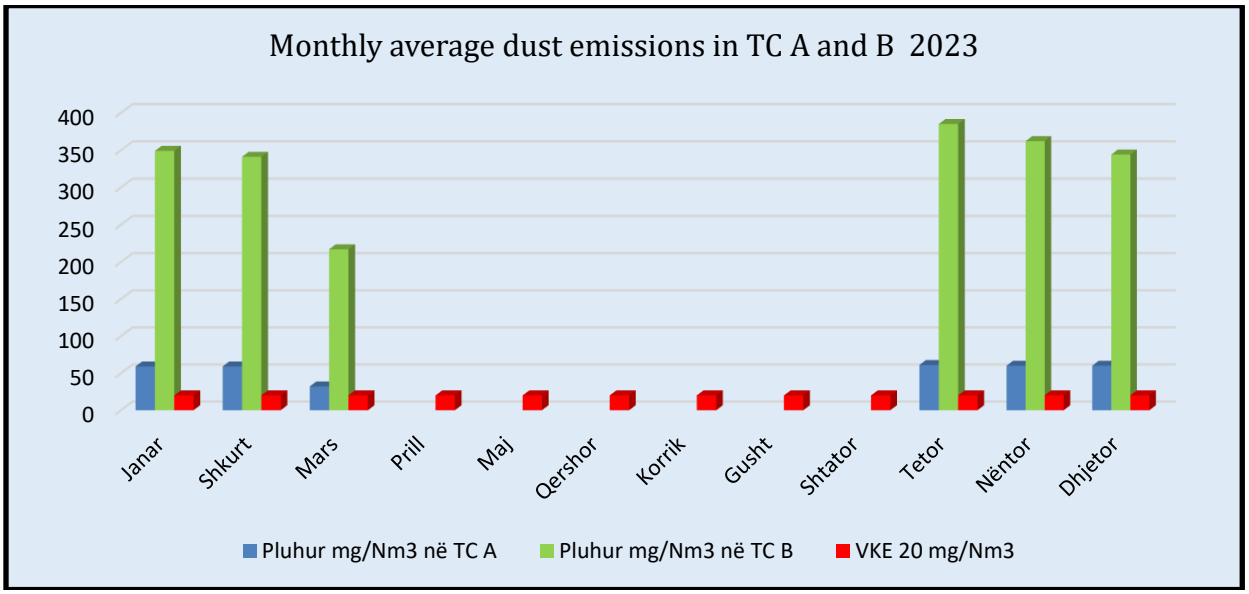


Fig.22. Dust emissions in TC A and B,2023

3.1.2. **SO_2 emissions in TC A and B**

In figure 23, SO_2 emissions are presented in TC A and B, for as many months as they have been in operation. According to the evaluations in TC A and B, there were exceedances of the limit values of emissions (LVE *orig.`VKE`*) during the months of January, February, March, October, November and December of 2023.

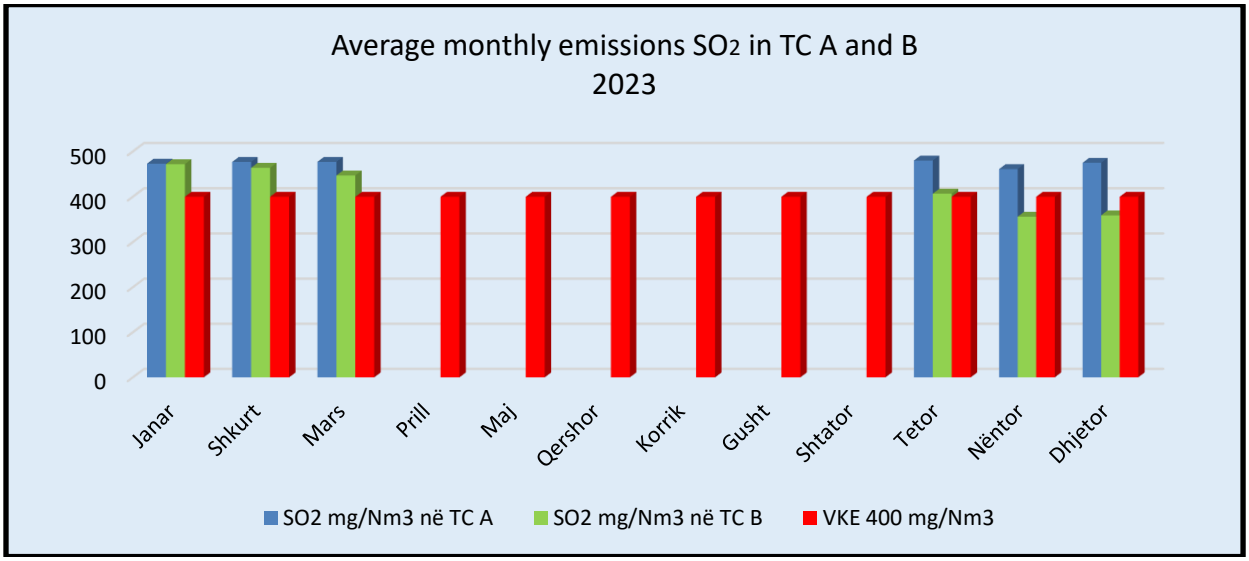


Fig.23. SO_2 emissions in TC A and B, 2023

3.1.3. NOx emissions in TC A and B

From the assessments made, it can be observed that NOx emissions in TC A and B have exceeded the limit values of emissions (LVE, *orig.`VKE`*) during the months of January, February, March, October, November and December of 2023. See figure 24.

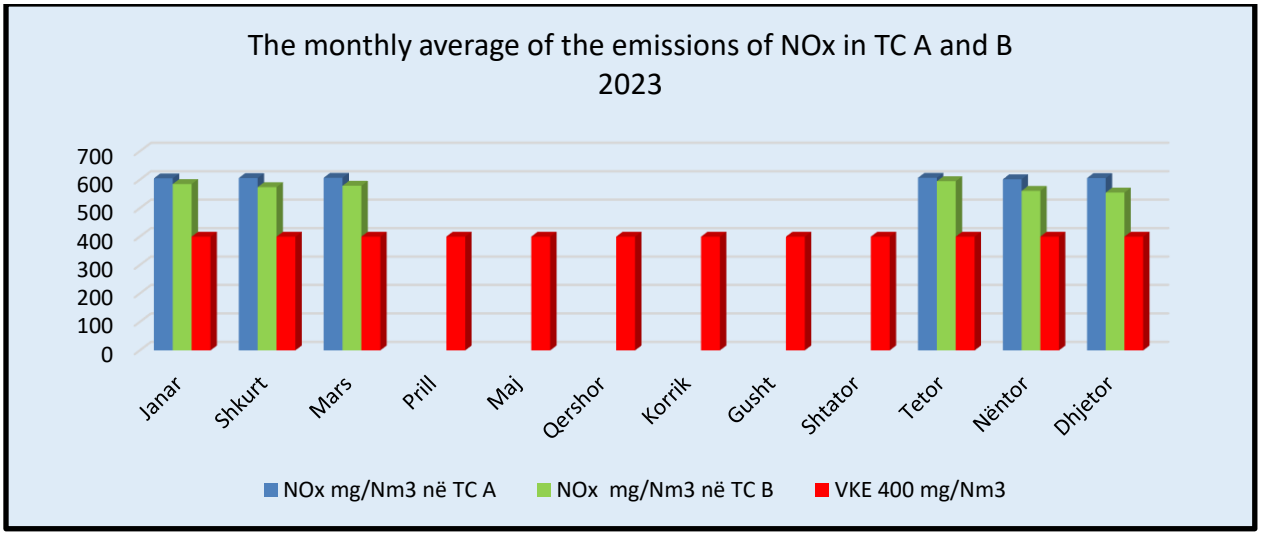


Fig.24. NOx emissions in TC A and B, 2023

3.3.Assessment of air emissions from Feronikel

The assessment of emissions in the air by the industrial operator of Feronikel, were made for the months June - October 2023, for as long as it has been in operation.
These data are not sufficient to present the state of the entire year.

According to "Administrative Instruction (GRK) No. 07/2021 On the Rules and Rates of Air Discharges from Stationary Pollutant Sources"

- *Dust .....20 mg/Nm^3*
- *SO_2.....400 mg/Nm^3*
- *NOx.....400 mg/Nm^3*
- *CO .....800 mg/Nm^3*

The results represent the measurements that were performed in:

1. Chimney of Rotary Kiln;
2. Chimney of Converters;
3. Chimney of the Electric Kiln no.1.

3.2.1. Dust Emissions in the Chimney of Rotary Kiln

In figure 25, the average monthly value of dust emissions in the rotary kiln, it is observed that there were no exceedances of the allowed limit values during the months of June - October 2023.

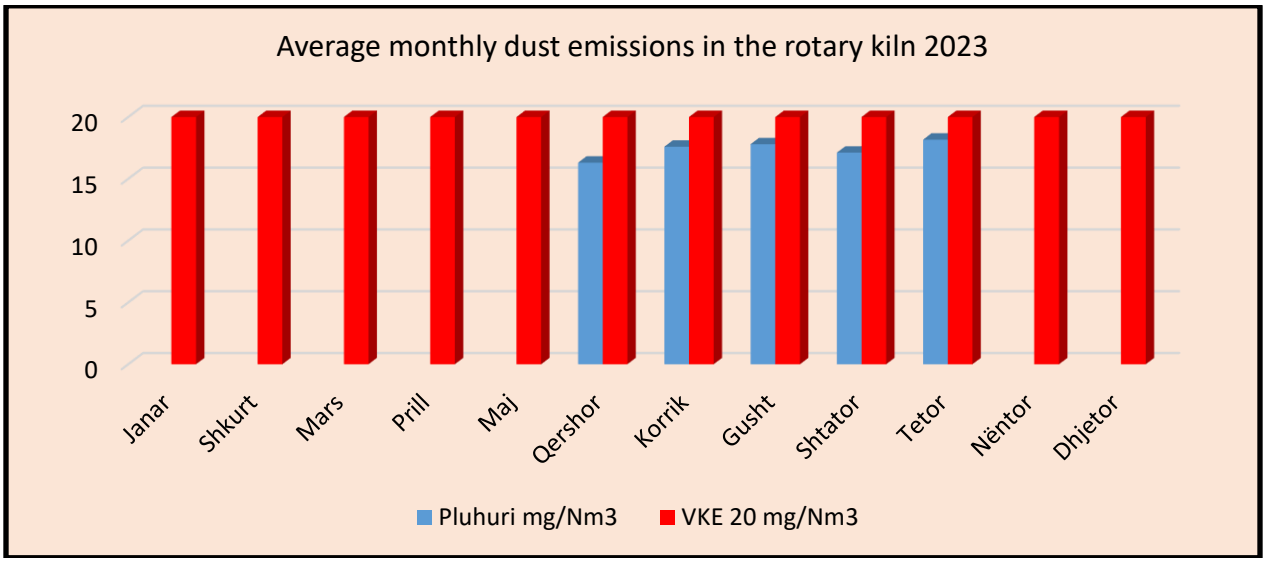


Fig.25. Average monthly value of dust emissions in the Rotary Kiln, 2023

3.2.2. CO emissions in the rotary kiln

Based on the estimates of CO emissions, they show that the average monthly values of CO in the rotary kiln did not exceed the permitted limit values. See fig. 26.

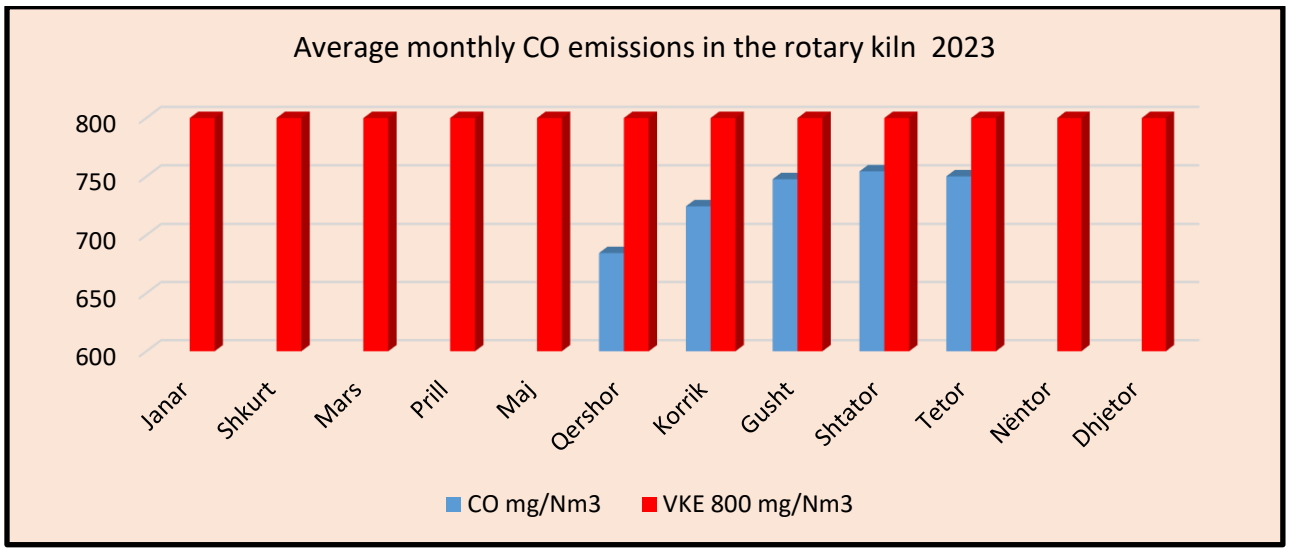


Fig.26. Average monthly value of CO emissions in the Rotary Kiln, 2023

3.2.3. SO_2 Emissions in Rotary Kiln

In figure 27, the average monthly value of SO_2 in the rotary kiln is presented, values which show that there was no exceedance of the allowed limit values.

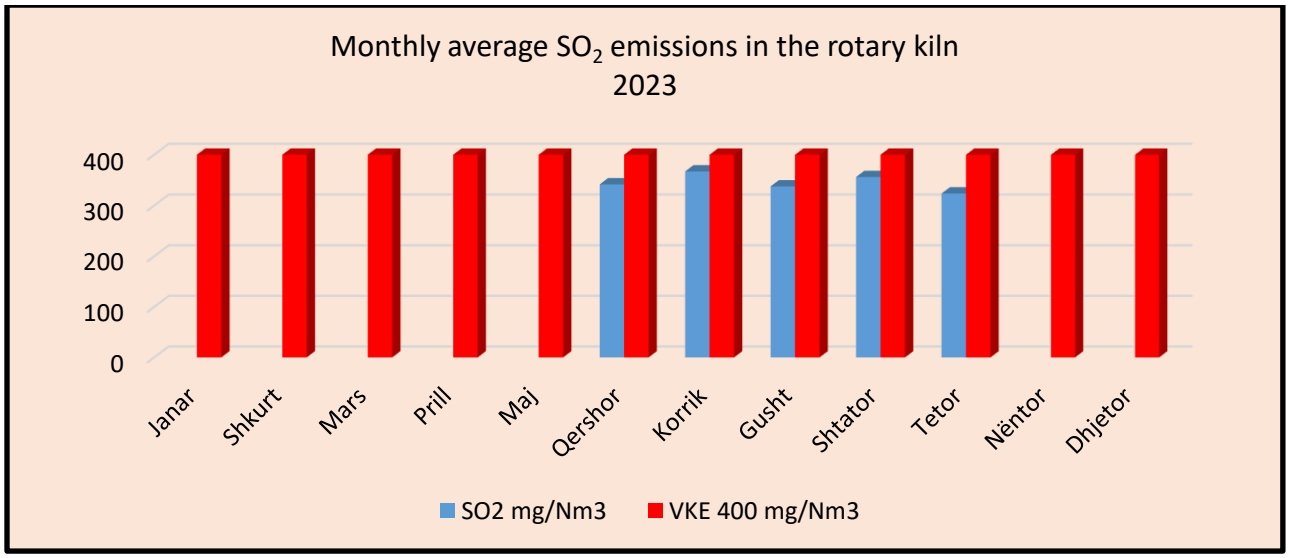


Fig.27. Average monthly value of SO_2 emissions in the Rotary Kiln, 2023

3.2.4. NO_2 Emissions in Rotary Kiln

The average monthly value of NO_2 in the rotary kiln, from the assessments made, show that there were no exceedances of the allowed limit values. See fig. 28.

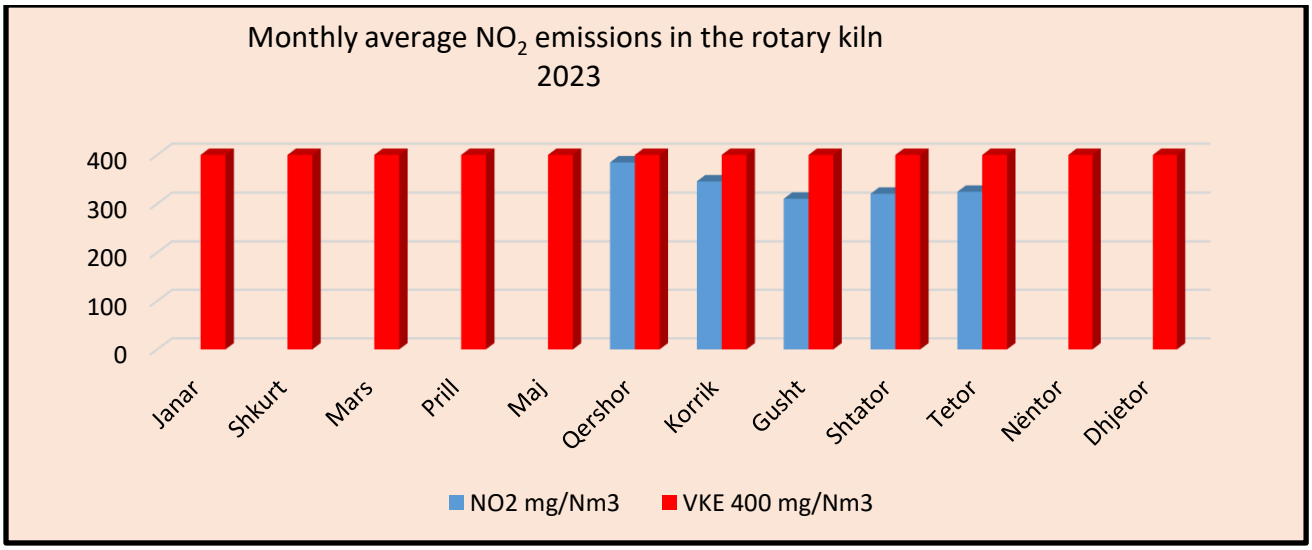


Fig.28. Average monthly value of NO_2 emissions in the Rotary Kiln, 2023

3.2.5. Dust Emissions in the Converter Chimney

In figure 29, the average monthly value of dust in the converter, show that there was no exceedance of the allowed limit values during the months of June - October 2023.

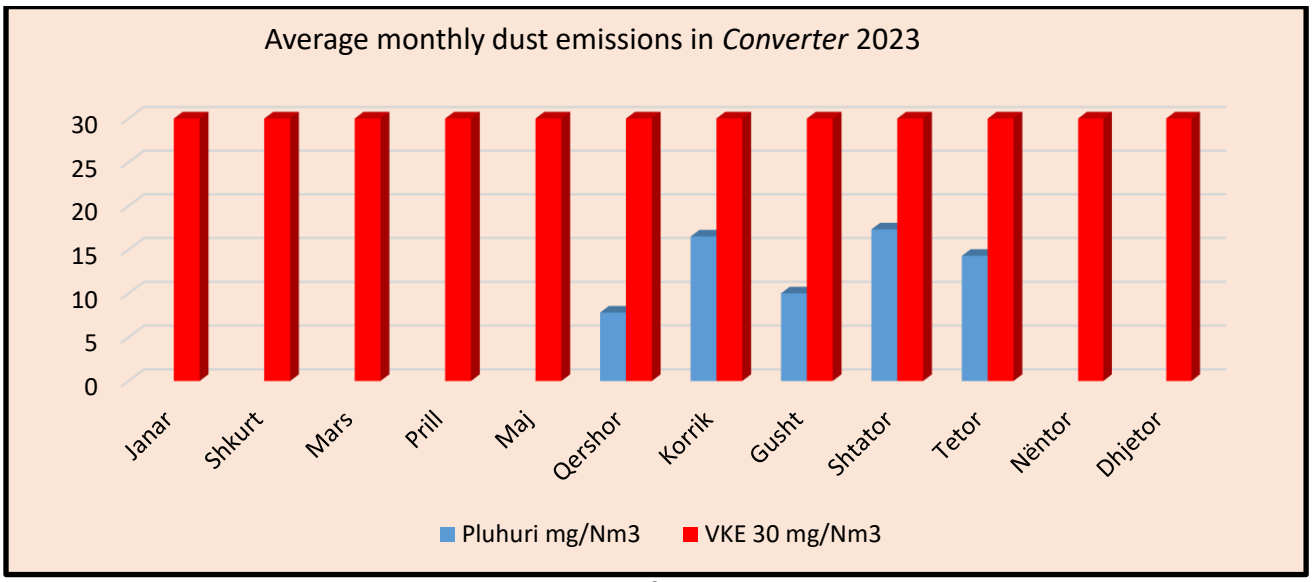


Fig.29. Average monthly value of dust emissions in Converter, 2023

3.2.6. CO emissions in the converter

The monthly average value of CO in the converter during 2023, show that there were no exceedances of the allowed limit values during the months of June - October 2023. See fig.30.

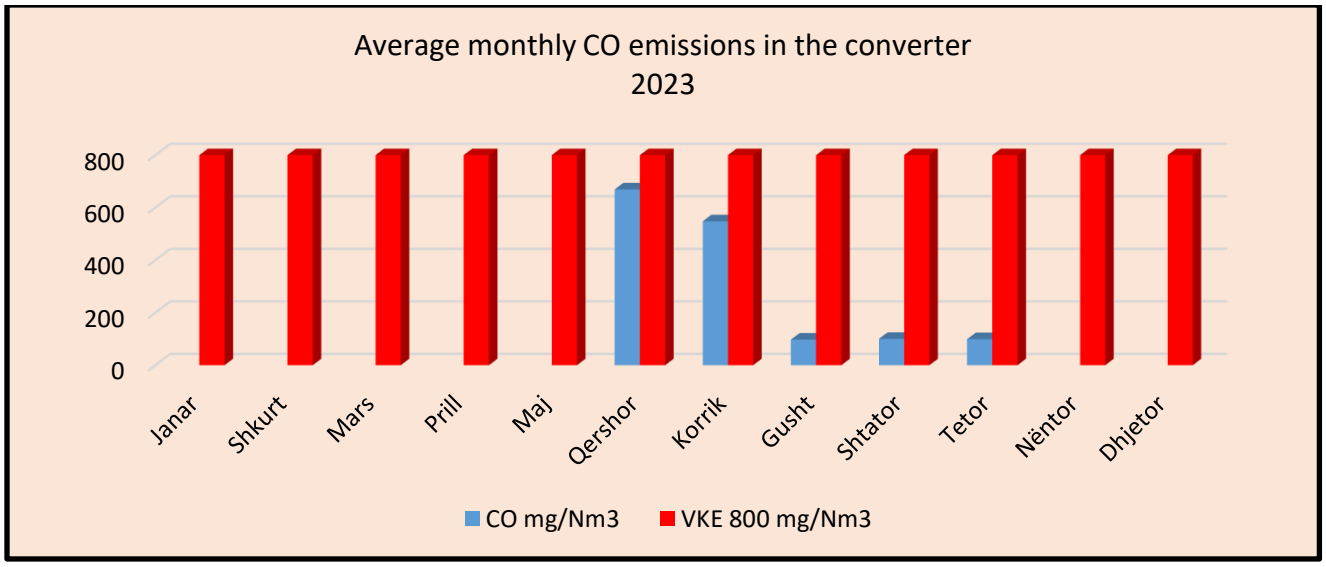


Fig.30. Average monthly values of CO emissions in Converter, 2023

3.2.7. SO_2 Emissions in the Converter

In figure 31, the monthly average values of SO_2 in the converter are presented, these values show that there were no exceedances of the allowed limit values during 2023.

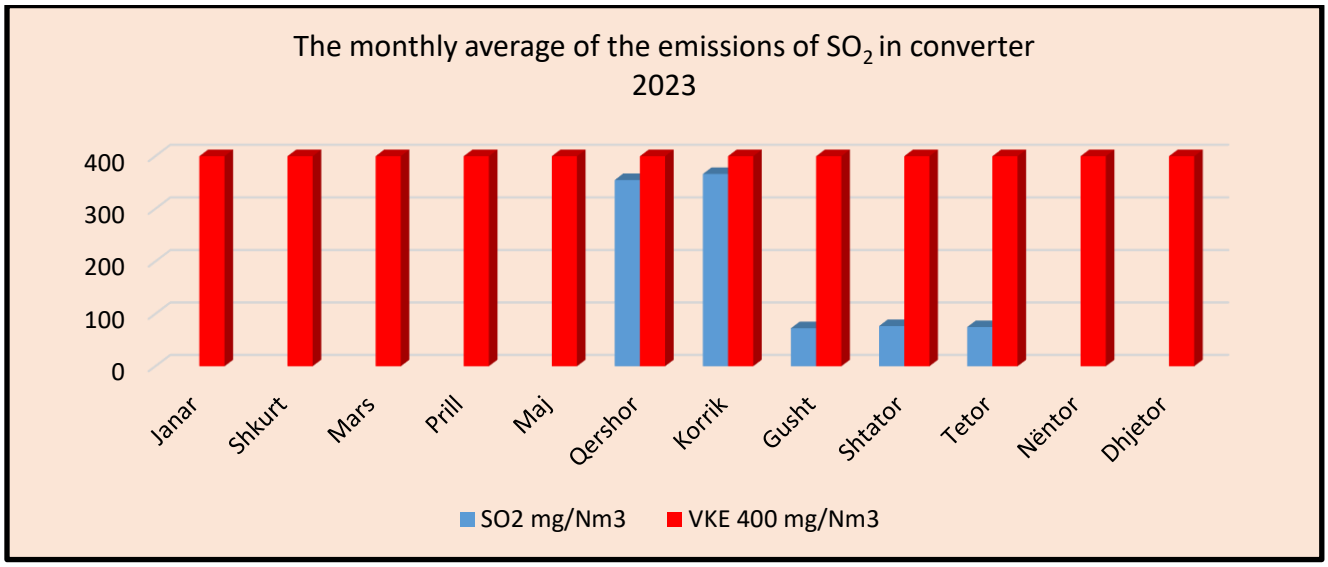


Fig.31. Average monthly value of emissions of SO_2 in the Converter, 2023

3.2.8. Emissions of NO_2 in the Converter

The average monthly value of NO_2 in the Converter shows that during the monitoring months there were no exceedances of the allowed limit values. See fig. 32.

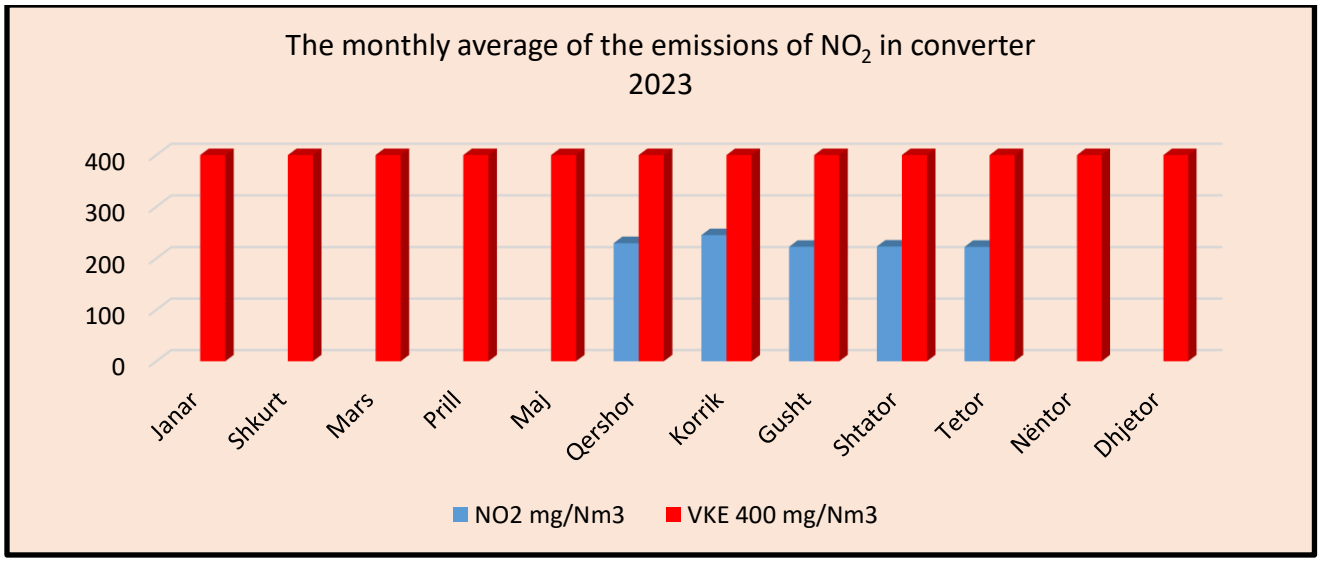


Fig.32. Average monthly value of emissions of NO_2 in the Converter, 2023

3.2.9. Emissions of Dust in the Electric Kiln no.1

In figure 33, only the average values of the dust in the electric Kiln no. 1 are presented, and from the evaluation of the measurements, you can see that there were no exceedances of the allowed values, during the months of June - October 2023.

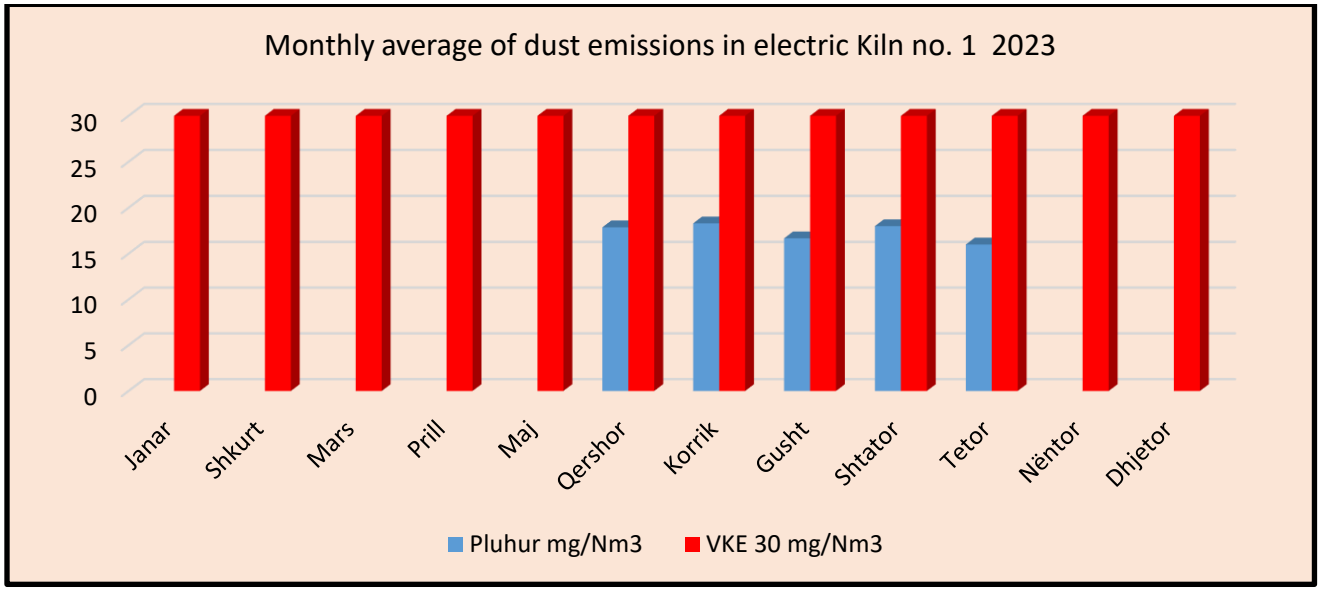


Fig.33. Average monthly value of emissions of Dust in the electric kiln no.1, 2023

3.3. Evaluation of air emissions by Sharrcem

The standards of pollutant discharges from the Sharrcem Industry are determined according to "Administrative Instruction (GRK) No. 07/2021 On the Rules and Rates of Air Emissions from Stationary Pollutant Sources".

3.3.1. Emissions of Dust

Emissions of Dust are monitored and evaluated by two sources of Sharrcem, such as:

- Emissions of Dust in the kiln - raw material mill;
- Emissions of Dust in the clinker cooler and the cement mill.

3.3.2. Emissions of Dust at the kiln - raw material mill

In figure 34, the Average monthly values of Dust emissions at the furnace - raw material mill are presented, for the Months January - December of 2023, from which you can see that the values are very low compared to the limit value of the emissions. (LVE).

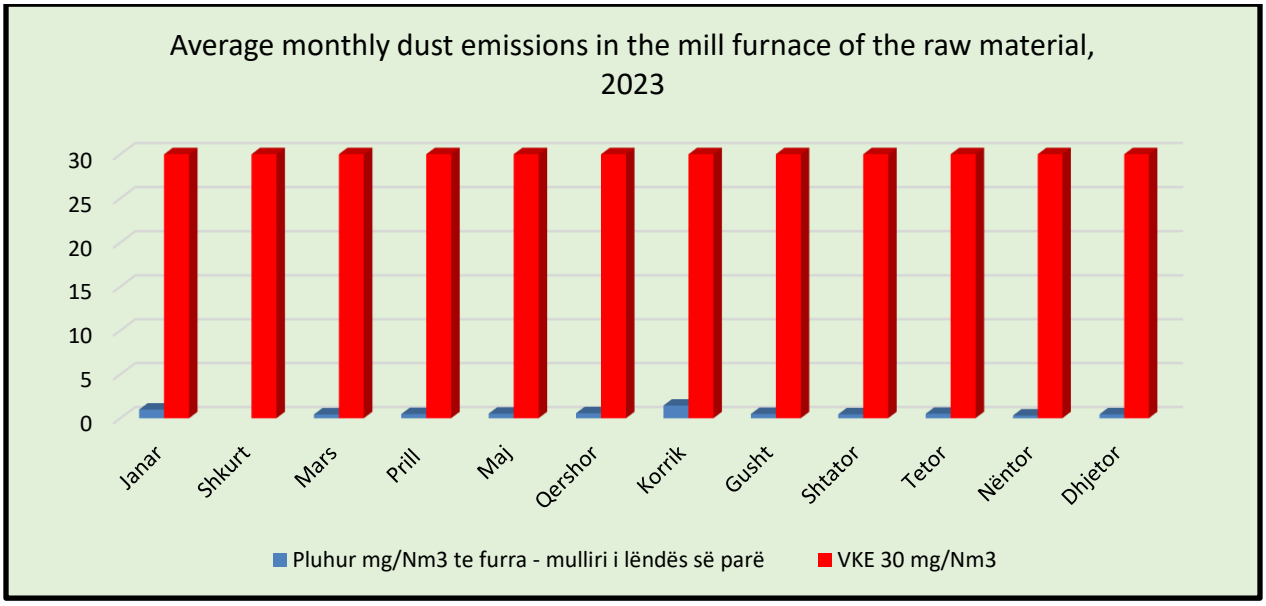


Fig.34. Emissions of Dust in the furnace - raw material mill, 2023

3.3.3. Emissions of Dust in the clinker cooler and the cement mill

It is worth noting that here the emission limit value is taken as a basis (LVE) 20 mg/Nm^3.

In figure 35, the Average monthly values of Dust emissions at the clinker cooler and the cement mill are presented, and according to estimates, the values show that they are very low compared to the limit value emission (LVE).

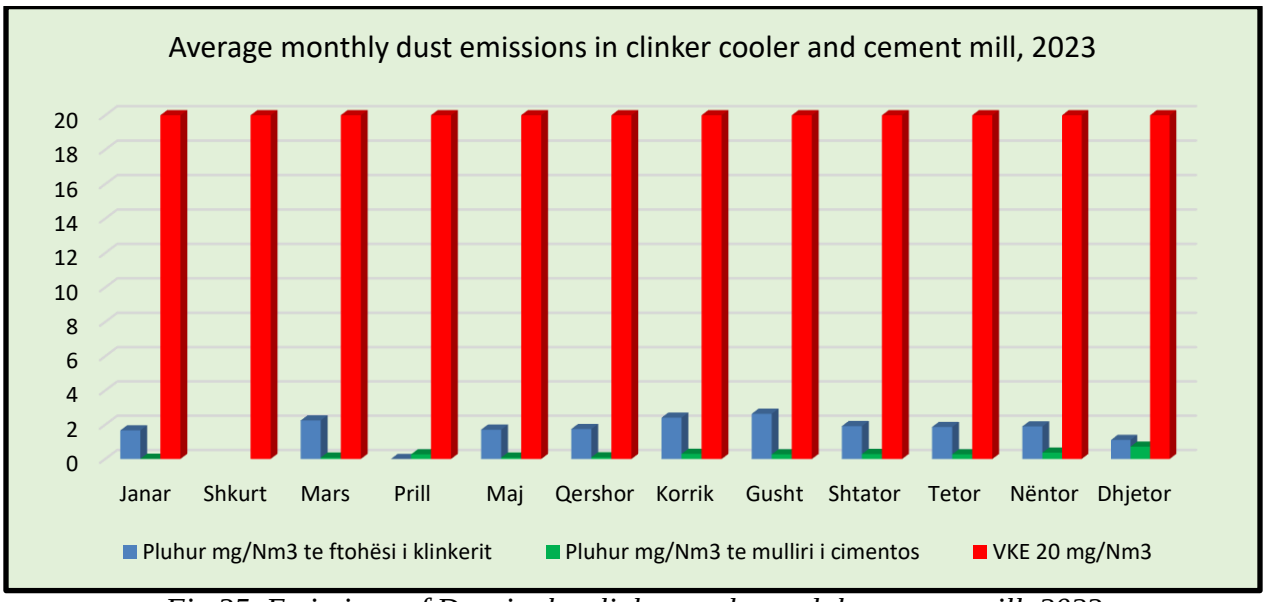


Fig.35. Emissions of Dust in the clinker cooler and the cement mill, 2023

3.3.4. Emissions of SO2 in the furnace - raw material mill

The average values of SO2 emissions at the furnace - raw material mill, during the monitoring months, show that the values are low compared to the emission limit value (LVE). See fig.36.

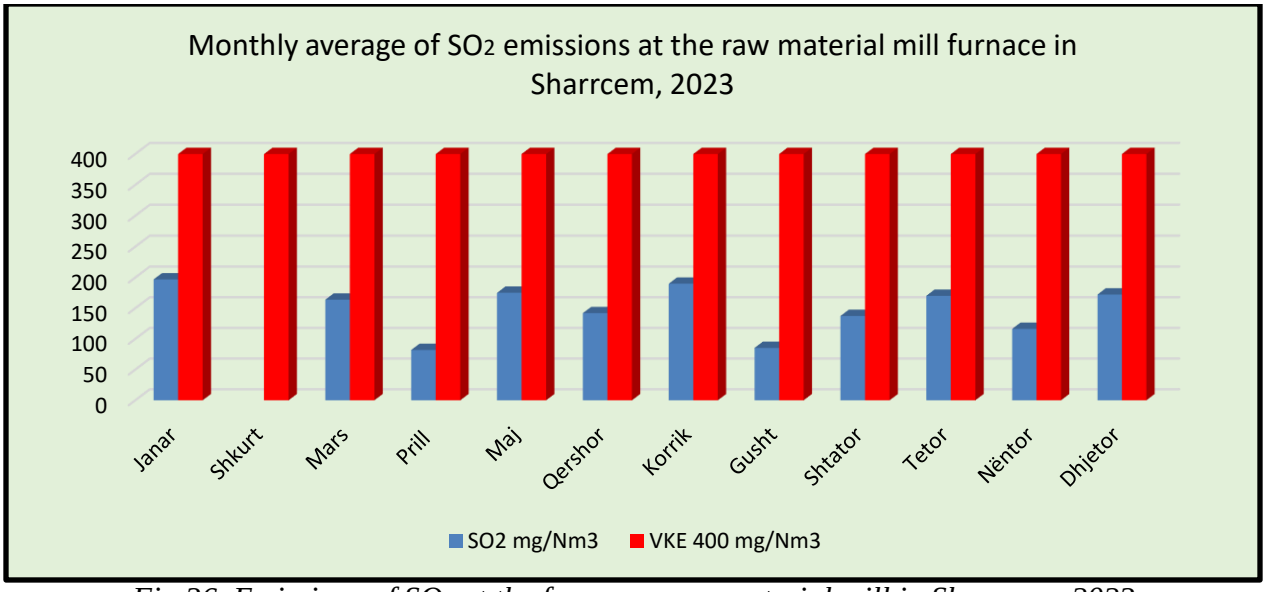


Fig.36. Emissions of SO_2 at the furnace - raw material mill in Sharrcem, 2023

3.3.5. Emissions of NOx in the furnace - raw material mill

In figure 37, the Average monthly values of NOx emissions at the raw material furnace - mill are presented, and according to the data evaluations, they show that there are no exceedances of the values compared to the limit value of emissions (LVE).

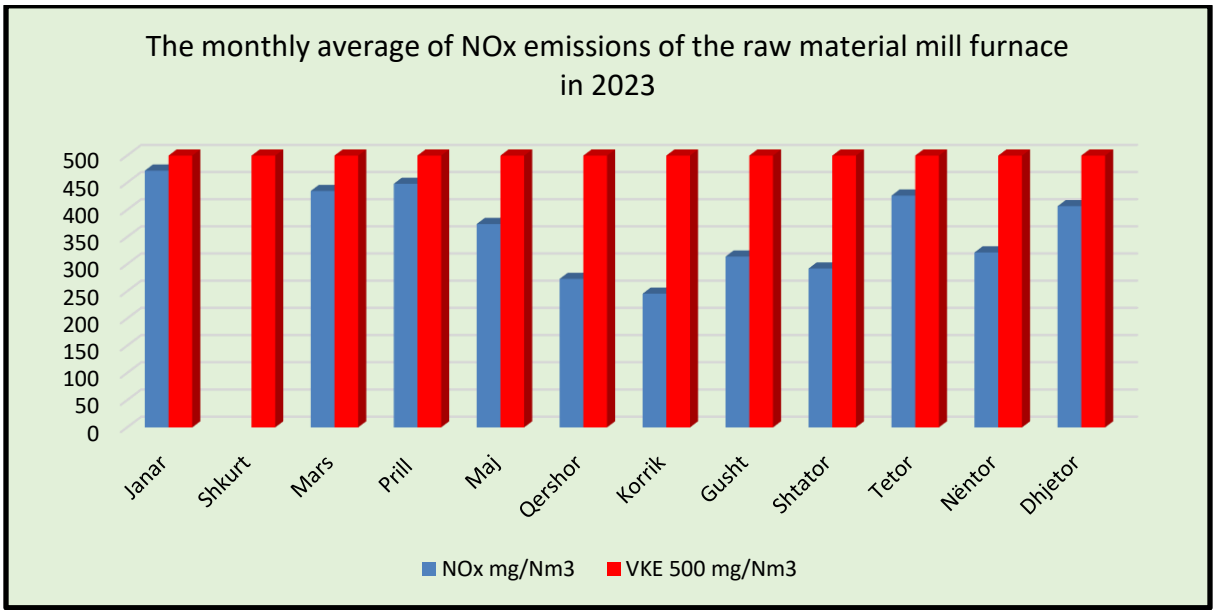


Fig.37. Emissions of NOx to the furnace - raw material mill, 2023

4. Progress report for the year 2023

The Progress Report for the year 2023, drafted by the European Commission, has issued estimates in relation to the progress that Kosovo has shown in air quality. According to the Progress Report, air quality, especially pollution, continues to be a great threat to the health of people in Kosovo. Although the detailed identification of the sources of air pollution has been completed, the Institutions must implement adequate measures to correct and prevent air pollution. The government should start preparing the implementation of the new National Policy on the Emissions Ceiling. Measures to ban the use of coal for heating must be effectively implemented. Air quality plans must be approved for areas where pollutant levels exceed limit values.
Real-time monitoring, identification of air pollution sources and air quality reporting have been improved.

5. Investments in the air sector for the year 2023

Investments for the air sector from the budget of the Republic of Kosovo in 2023-2026.

Tab. 15. Investments in the Air Sector from the budget of the Republic of Kosovo for 2023-2026.

Type of investment	Value	Year
Maintaining air quality applications and informing the public about the three-day air quality forecast	252,756.00	2023-2025
Maintenance of monitoring stations for air quality, for the period of 3 years	600,000.00	2023-2026

Tab.16. Investments for the air sector by the JICA donor for the year 2023

Type of investment	Value	Year
Capacity Development for Air Pollution Control - Second Phase	2,700,000	2022-2026

6. Conclusions and recommendations

6.1. Conclusions

- Data from monitoring for the year 2023 show that we still have high PM10-PM2.5 values, especially in industrial and urban areas.
- Average monthly values with PM10 exceedances in the AKS1 Area were recorded at the Rilindja station, in December with 59 µg/m3, while PM2.5 exceedance values were recorded at the Rilindja monitoring stations with 43 µg/m3 and in Obiliq with 41 µg/m3.
- In the ZKS1 area, the values with PM10 exceedances were recorded as the highest at the Gjilan station, with the highest average monthly values of 62 µg/m3, while the PM2.5 exceedance values were the highest recorded in Gjilan stations with 52 µg/m3.
- In both air quality monitoring areas, 216 days with exceedances were found.
- The year 2023 is the best year compared to previous years and with a very good coverage of the air quality monitoring network.
- According to estimates, we have exceeded the limit values allowed for both TC A and B for polluting emissions such as; Dust, SO2, Nox.
- At the industrial operator of Ferronickel, as pollution sources, which are: the Chimney of Rotary Furnaces, the Chimney of Converters and the Chimney of Electric Furnace 1, it has been assessed that there was no exceedance of the allowed values for the parameters; Dust, SO2, NOx and CO.
- At the industrial operator of Sharrcem, Emissions of Dust that have been monitored and evaluated from two polluting sources, such as: Emissions of Dust from the furnace - raw material mill and Emissions of Dust from the clinker cooler and cement mill, as well as other pollutants such as SO2, NOx, show that there was no exceedance of the allowed values during 2023.
- During 2023, no other annual report has been received from industrial operators who have Integrated Permits, even though it is estimated that there are over 25 operators who have such Permits.

6.2. Recommendation

From the findings of the report, recommendations are drawn as a measure that should be taken to improve air quality.

- To implement the legislation and all legal acts in force for the protection of the environment, namely the air protection;
- To implement the approved environmental policies and strategies for the protection of the environment and with particular emphasis on the protection of the air from pollution;
- Municipalities must draft Local Action Plans for Air Quality, and implement them according to the obligations provided for in Law no. 03/L-160 for the protection of air from pollution;
- To draw up favorable policies for the use of alternative energy and as little as possible of the use of fuels;
- To avoid as much as possible the use of coal that is used for the production of energy, heating and other needs for the family economy;
- To increase the use of urban traffic in urban settlements, and to reduce the use of cars to the maximum;
- To apply the sub-legal acts on the permitted rates of discharge into the air from mobile sources and from stationary sources;
- Making the control of gas emissions from Technical Control Centers mandatory according to the requirements of the relevant legal acts;
- To oblige the polluting operators to respect the environmental standards of discharges into the environment;
- To increase inspection at the central and local level for polluting operators;
- To be a priority focus of air quality protection by the Government of the Republic of Kosovo;
- To be allocated many financial means by the Government of the Republic of Kosovo for air quality management;
- Increase cooperation between relevant environmental institutions, operators and citizens in information, reporting and protection of air pollution.

7. List of Abbreviations, Figures and Tables

7.1. List of Abbreviations

MESPI- Ministry of Environment, Spatial Planning and Infrastructure

KEPA - Environmental Protection Agency of Kosovo

IHMK - Hydrometeorological Institute of Kosovo

TCA - Kosova A thermal power plant

TCB - Kosovo B thermal power plant

EEA – European Environment Agency

EU- European Union

WHO - World Health Organization

AQI - Air Quality Index.

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Annex 1: Air quality standards according to the Administrative Instruction No.02/2011

The parameter	***Limit value***	***Unit of measurement***	***Limit value (border)µg/m³***	***Overages allowed within the year***
NO2	Limit value for 1 hour, for the protection of human health	µg/m³	200	18
	Annual limit value, for the protection of human health	µg/m³	40	It is not foreseen
	Annual limit value for vegetation protection	µg/m³	30	It is not foreseen
SO2	Limit value for 1 hour, for the protection of human health	µg/m³	350	24
	Limit value for 24 hours, for the protection of human health	µg/m³	125	3
CO	Limit value for the daily average of the 8-hour maximum, for the protection of human health	mg/m³	10	It is not foreseen
PM10	Limit value for 24 hours, for the protection of human health	µg/m³	50	35
	Annual limit value, for the protection of human health	µg/m³	40	It is not foreseen
PM2.5	Annual limit value, for the protection of human health	µg/m³	25	It is not foreseen
O3	The long-term objective is to protect human health	µg/m³	120	It is not foreseen

Annex 2: Air Quality Index

Quality	**Good**	**Acceptable**	**Average**	**Poor**	**Very weak**	**Extremely weak**
Dust particles smaller than 2.5 µm ($PM_{2.5}$)	0-10	10-20	20-25	25-50	50-75	75-800
Dust particles smaller than 10 µm (PM_{10})	0-20	20-40	40-50	50-100	100-150	150-1200
Nitrogen dioxide (NO_2)	0-40	40-90	90-120	120-230	230-340	340-1000
Ozone (O_3)	0-50	50-100	100-130	130-240	240-380	380-800
Sulfur dioxide (SO_2)	0-100	100-200	200-350	350-500	500-750	750-1250
The level of the Air Quality Index (based on the concentration of pollutants, expressed in µg/m³)						

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