

Implementation of the Air Quality Directive by Western Balkan countries – 2022 update

Introduction

The Western Balkan countries¹ are striving for integration into the European Union, and through the process of approximation with EU legislation and rules have adopted numerous practices. In the field of environmental protection, all of these countries are struggling to meet EU standards in every sub-sector.

Ambient air quality is among the biggest environmental problems in the region. Efforts to improve air quality are mostly driven by EU legislation such as the Ambient Air Quality Directive (the AQ Directive), the National Emission Ceilings Directive, the Large Combustion Plants Directive and the Industrial Emissions Directive. The following assessment is an overview of each country's progress on the transposition and implementation of the AQ Directive.²

This assessment is done with the AQ Directive fitness check³ as a framework, using publicly available legislation, strategies, plans and reports. The data assessed in this analysis is the latest data available for each country at the end of 2021. The available information is analysed from an annual compliance perspective. The country progress reports prepared by the European Commission are also sometimes used as reference.

¹ The Western Balkan countries are Albania, Bosnia and Herzegovina, Kosovo, Montenegro, North Macedonia and Serbia. This briefing covers all these countries except Albania because it focuses on the countries where there are significant exceedances of the air pollution standards and major sources of emissions into the 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 European Commission, [Fitness Check of the Ambient Air Quality Directives](#), *European Commission*, 28 November 2019.

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Assessment of level of implementation by country

Bosnia and Herzegovina

Level of transposition of the AQ Directive

In Bosnia and Herzegovina, the air quality legislative framework and the responsibilities arising from it are split between the two entities – the Federation of Bosnia and Herzegovina (FBiH) and Republika Srpska (RS).

In the FBiH, the basic legal framework is given in the Law on Air Protection, but most of the AQ Directive is transposed in the Ordinance on the Manner of Air Quality monitoring and Defining the Types of Pollutants, Limit Values and Other Air Quality Standards. The Ordinance was initially adopted in 2012 and has been updated twice, in 2019 and 2021.

In the RS, the main provisions of the AQ Directive are transposed in the 2011 Law on Air Protection, updated once in 2017; some parts, such as the limit values and monitoring standards, are found in secondary legislation.

Separately, both entities have a fairly good level of harmonisation with the AQ Directive, but the main issue is that there are some differences between the two. This is often highlighted in the country progress reports from the European Commission, where the need for a countrywide monitoring network, zoning and programme for air quality improvement is seen as one of the main reasons why implementation remains limited.⁴

Monitoring and assessment (zones and agglomerations, monitoring stations)

The FBiH has not yet officially established zones and agglomerations for air quality assessment and management, but in 2020 in cooperation with the Swedish Environmental Protection Agency, a proposal was developed to establish four zones.⁵

The RS, on the other hand, established six agglomerations and one zone in 2012 with the Decree on Establishing Zones and Agglomerations. The agglomerations are Banja Luka, Bijeljina, Doboj, Prijedor, East Sarajevo and Trebinje, and the zone is defined as the entire territory of the entity. This is different from what is usually established through the AQ Directive, as the zones and agglomerations should not overlap.

The national monitoring network in the FBiH consists of 26 monitoring stations operated by different operators. All the data is collected and processed by the Federal Hydrometeorological Institute. Eight of the stations are located in the capital Sarajevo.

⁴ European Commission, [Bosnia and Herzegovina Report 2021](#), European Commission, 19 October 2021.

⁵ Federal Hydrometeorological Institute - Sarajevo, [Annual Report on Air Quality in the Federation of Bosnia and Herzegovina for 2020](#), Federal Hydrometeorological Institute - Sarajevo, April 2021, 14.

The network in the RS has nine monitoring stations, out of which three are in the entity's capital Banja Luka; the rest are spread out in the other agglomerations. Air quality data is processed by the Hydrometeorological Institute of Republika Srpska.

Air quality standards⁶

Although defined in separate secondary legislation, both entities have the almost the same standards and limit values, with one exception – the hourly limit value for NO₂ in the RS is lower than the one in the FBiH and in the AQ Directive. All other limit values from the Directive are completely transposed. However, both entities have additional limit values that are not part of the AQ Directive: annual for SO₂, daily for NO₂, and daily and annual for CO. All limit values are given in Annex I: Comparison of AQ limit values from the AQ Directive, WHO recommended values and national legislation of Western Balkan countries.

Both entities have published annual reports on air quality for the year 2020.

In the FBiH, the measurements show significant breaches of the standards for PM10, PM2.5 and SO₂.⁷

SO₂ concentrations were measured at 20 stations in 2020, but three of them did not have enough valid data.⁸ Of the 17 stations analysed in the report, 12 had exceedances of both the hourly and daily limit values. The station in Zenica, where only 30 per cent of the year's data was valid, also recorded exceedances of the standards. The number of breaches of the hourly limit value was the highest in Kakanj, with 126 exceedances, compared to the allowed 24.

⁶ An air quality standard consists of a limit value (concentration), averaging period and number of permitted exceedances during one calendar year. Collected air quality measurements are evaluated using these basic components.

⁷ Federal Hydrometeorological Institute - Sarajevo, [*Annual Report on Air Quality in the Federation of Bosnia and Herzegovina for 2020*](#).

⁸ According to the Air Quality Directive and the national legislation of Western Balkan countries, a minimum required proportion of valid data needs to be collected for checking validity when aggregating data and calculating statistical parameters. The requirements are: 75 per cent (i.e. 45 minutes) for assessment of one-hour values; 75 per cent (i.e. six hours) for eight-hour values; 75 per cent of the hourly averages (i.e. at least 18-hour values) for 24-hour values; and 90 per cent of the one-hour values or (if not available) 24-hour values over the year for annual mean. If less than the required data is available during the analysed period, the average value for that period is not considered valid.

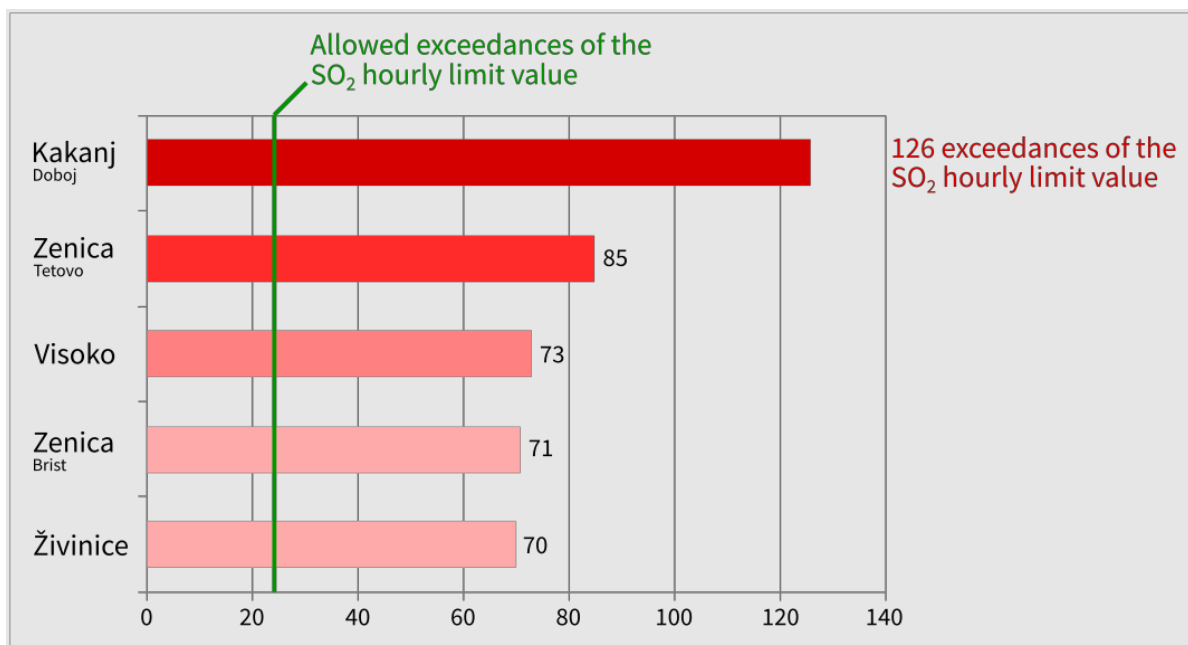


Image 1. Five monitoring stations with the most exceedances of the SO₂ hourly limit value in the FBiH (source: Annual Report on Air Quality in the Federation of Bosnia and Herzegovina for 2020)

The station in Zenica recorded the most exceedances of the daily limit value, 97 exceedances. The allowed number of three was breached at 12 of the stations, and seven of those had more than 50 breaches.

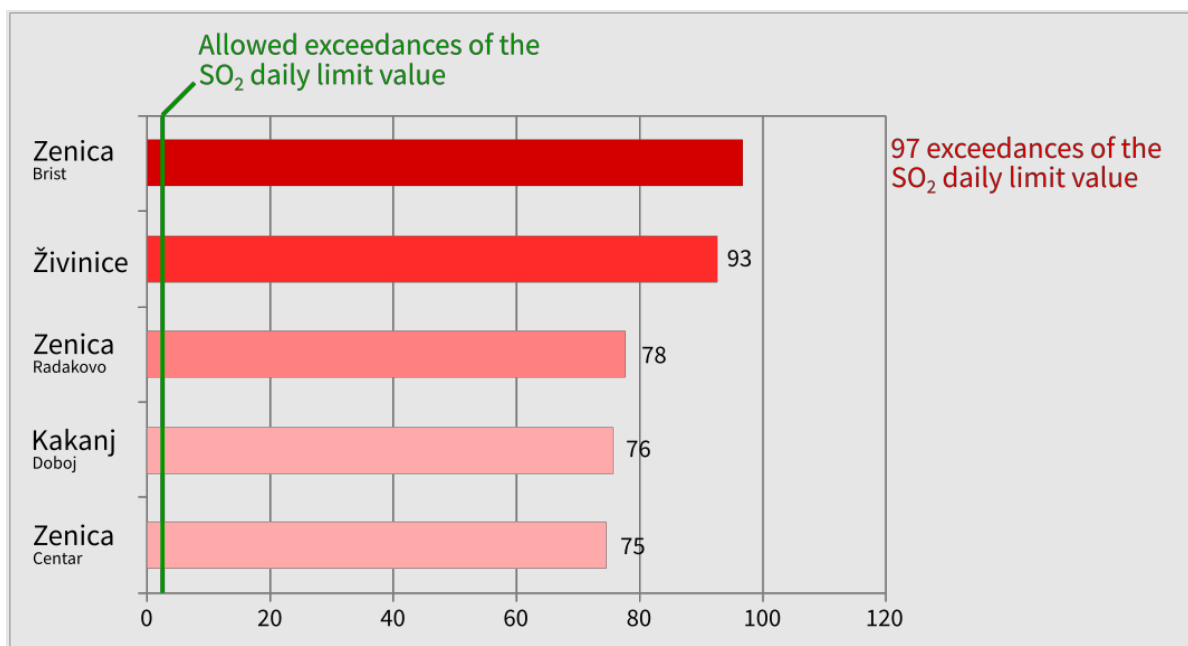


Image 2. Five monitoring stations with the most exceedances of the SO₂ daily limit value in the FBiH (source: Annual Report on Air Quality in the Federation of Bosnia and Herzegovina for 2020)

NO₂ concentrations at all 16 stations where they were monitored were within the established standards, which is an improvement compared to previous reports. The biggest improvement can be seen in the capital Sarajevo, where NO₂ standards were continuously breached in the previous five years.

Thirteen of the sixteen stations that monitored PM₁₀ concentrations provided enough valid data. Fifteen of the stations recorded exceedances of the PM₁₀ standards, although some were only monitoring for a short period. The daily limit was exceeded the most frequently at the station Ilijas in Sarajevo – 180 times. Eleven other stations recorded more than 90 exceedances of the daily limit, many times more than the allowed 35. The annual limit value was exceeded at nine of the monitoring stations, with the Ilijas station again having the highest annual average of 75 micrograms per cubic metre of air (µg/m³).

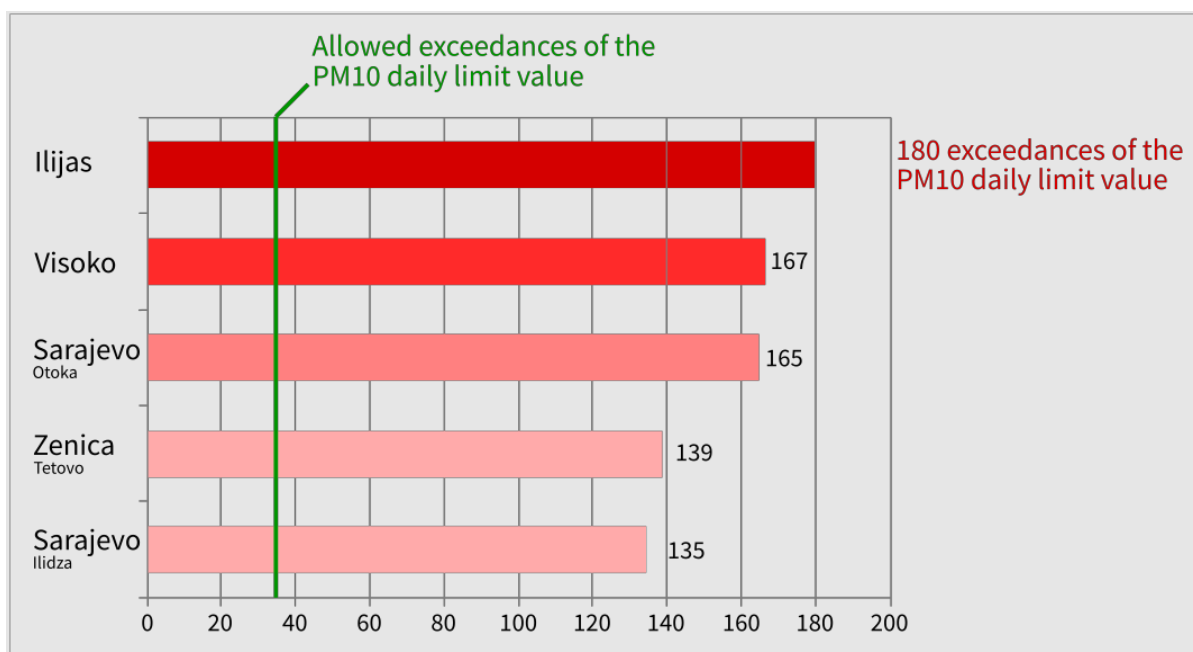


Image 3. Five monitoring stations with the most exceedances of the PM₁₀ daily limit value in the FBiH (source: Annual Report on Air Quality in the Federation of Bosnia and Herzegovina for 2020)

PM2.5 concentrations were measured at nine locations and the annual limit value was exceeded at all of them. The highest annual average was recorded in Tuzla, with 47 $\mu\text{g}/\text{m}^3$.

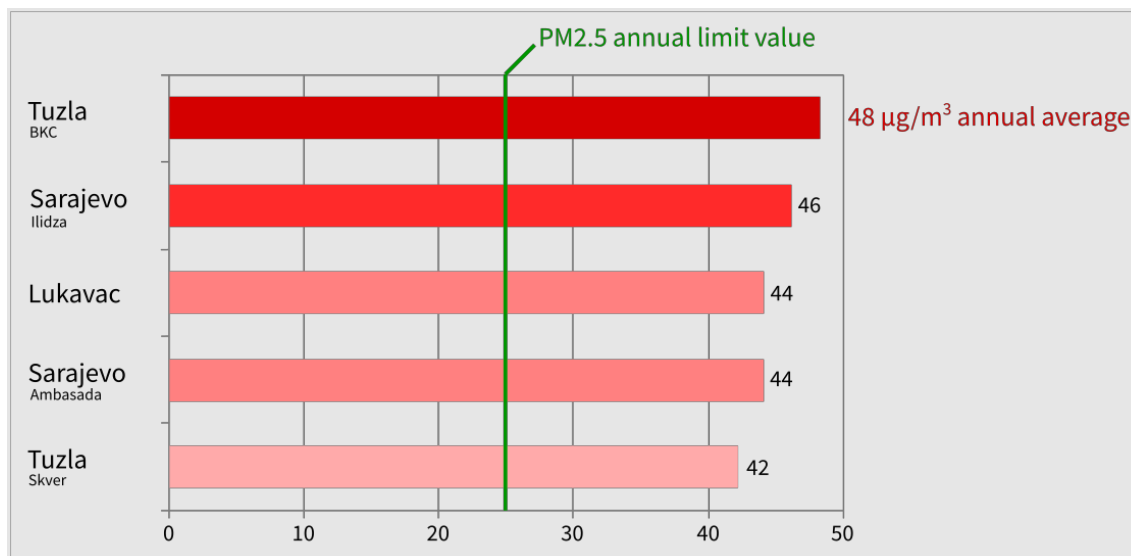


Image 4. Five monitoring stations with the highest PM2.5 annual average in the FBiH (source: Annual Report on Air Quality in the Federation of Bosnia and Herzegovina for 2020)

The standard for O_3 pollution was exceeded at three locations where more than 25 breaches of the eight-hour limit value were recorded. The highest number of exceedances, 33, was in Kakanj.

CO concentrations were within the limit values.

In the RS, the situation with SO_2 concentrations is better than in the FBiH.⁹ The only recorded exceedance of the standards was at the station in Ugljevik, where the daily limit value was breached on six days.

At the **coal power plant in Ugljevik**, the desulphurisation equipment is still not functioning 12 years after the financing contract was signed. Financed by a loan from the Japan International Cooperation Agency (JICA) signed back in 2009,¹⁰ works on the de- SO_x equipment started only in 2017 and test operations began in December 2019.¹¹ It seemed likely that in 2020, SO_2 emissions would be significantly lower, finally justifying the EUR 85 million investment.¹² However, in February 2020, technical problems were reported. The plant's dust filters, overhauled more than three years ago by the Czech company Termochem at a cost of around EUR 10 million, were faulty, and their proper functioning is a precondition¹³ for desulphurisation. As of February 2021, the plant still did not have an operating permit for the new installation.

⁹ Hydrometeorological Institute of Republika Srpska, *Annual Report on Air Quality in Republika Srpska for 2020*, Hydrometeorological Institute of Republika Srpska, July 2021.

¹⁰ Japan International Cooperation Agency, 'Commencement of works in Ugljevik TPP in Bosnia and Hercegovina', 15 May 2017.

¹¹ Iskra Pavlova, 'Bosnia's Ugljevik 82 mln euro desulphurisation project nears completion', SeeNews, 2 July 2019.

¹² 'RiTE Ugljevik: Postrojenje za odsumporavanje predato na upravljanje preduzeću', RTRS, 27 October 2020.

¹³ Dejan Tovilović, 'Zbog nemara ugrožena investicija od 83 miliona evra', Capital.ba, 27 February 2020.

The situation with NO₂ is similar. Only one station recorded an exceedance of the standards, the one near the heating plant in Bijeljina, where the annual average concentration was 62 µg/m³ compared to the limit value of 40 µg/m³.

PM10 pollution exceeded the standards at six of the nine monitoring stations where more than the 35 allowed breaches of the daily limit were recorded. The station in Prijedor recorded 114 breaches, the most in the RS.

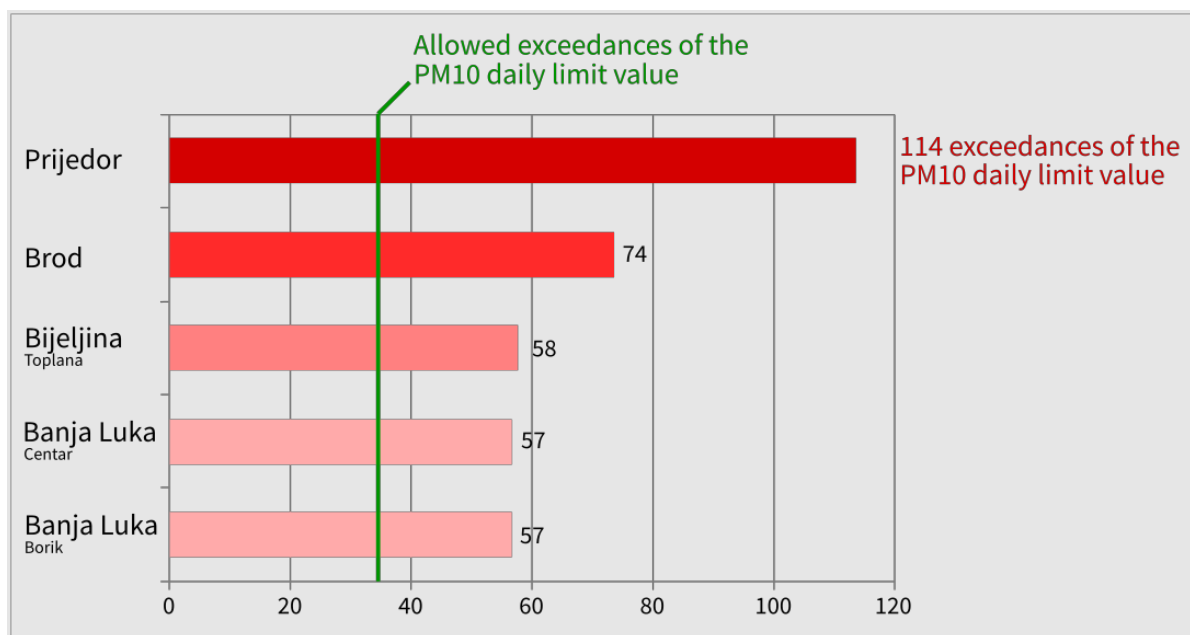


Image 5. Five monitoring stations with the most exceedances of the PM10 daily limit value in the RS (source: Annual Report on Air Quality in Republika Srpska for 2020)

The annual limit value was exceeded at three of these locations.

PM2.5 concentrations were monitored at seven of the stations and the annual limit value was exceeded at six of them. The highest annual average, 33 µg/m³, was in Prijedor.

CO and O₃ pollution did not exceed the limit values.

Reporting and public information

Real-time air quality measurements in both entities are available on their respective hydrometeorological institutes' websites. The [FBiH website](#) also has daily averages and annual reports.

The [RS website](#) has additional daily and monthly reports. The Hydrometeorological Institute of the RS is developing a new software for air quality monitoring, which will be implemented in 2022. The data for 2020 and 2021 is missing, since the new website is being developed.

The legislative framework is available on the same websites.

Bosnia and Herzegovina reports regularly to the European Environment Agency, and reported measurements are part of the Air Quality in Europe annual reports.

Air quality plans

Both entities foresee different air quality strategies, plans and short-term action plans in their respective legislation.

In the FBiH, the Air Quality Strategy is part of the Environmental Protection Strategy of the Federation of Bosnia and Herzegovina. The last Strategy was for the period from 2008 to 2018. The strategy had clear implementation deadlines and included a budget for the improvement of the monitoring network, but most of the measures were legislative changes or pointed to other strategic documents. In 2019, the preparation of the next strategy for the period from 2020 to 2030 started, but the strategy has not been adopted yet.

In the RS, an extensive Air Quality Strategy was adopted in 2011 that includes an overview of all sectors that impact air quality, but the measures in the strategy are general and without any implementation deadlines or financing mechanisms.

The City of Banja Luka had an Air Quality Plan that lasted until 2021. A new plan was developed and currently is in the process of adoption by the City Council of Banja Luka.

The only other municipality in the country that has such a plan besides Banja Luka is the City of Prijedor.

Kosovo

Level of transposition of the AQ Directive

The AQ Directive is partially transposed in Kosovo's Law on Air Protection from Pollution. The Law requires updates to include some important provisions from the AQ Directive, such as the short-term action plans, requirements for the establishing of zones and agglomerations, and air quality plans. Specific provision, such as the limit values, are transposed in secondary legislation.

Monitoring and assessment (zones and agglomerations, monitoring stations)

Kosovo is split into one agglomeration (AKS1) and one zone (ZKS1) for air quality assessment and management. The agglomeration includes the capital Prishtina, as well the village of Obiliq, home to the country's two coal-fired power plants, and several other small settlements in the area. The zone is the rest of the country.

The national monitoring network has 12 fixed stations and one mobile station. Five of the stations are in the agglomeration and the rest are spread out in the zone. Almost all stations monitor all primary pollutants, which is uncharacteristic for the Western Balkan countries.

Air quality standards

The Administrative Instruction on Limited Values of Air Quality sets the same standards and limit values as the AQ Directive. They are given in Annex I: Comparison of AQ limit values from the AQ Directive, WHO recommended values and national legislation of Western Balkan countries.

The last Annual Report on the State of Air is from 2019.¹⁴ At the time of writing of this analysis, the 2020 report is pending adoption in the Parliament. The Annual Report contains monthly and annual averages for air pollutants, but it does not contain all the necessary information to compare the air quality to the standards.

In the report, the monthly and annual average SO₂ concentrations are compared to the daily limit value, which does not give any indication of whether the daily concentrations (which are not reported) comply with the standard, which is defined through a daily limit value.

The annual limit value for NO_x was exceeded only at the monitoring station in Rilindja. The data given in the report make it impossible to evaluate NO_x concentrations against the hourly limit value.

PM10 standards were exceeded at eight of the 13 monitoring stations, where the daily limit value was breached on more than 35 days. The station in Obiliq recorded the most exceedances – 72. The annual limit value was not exceeded at any of the monitoring stations.

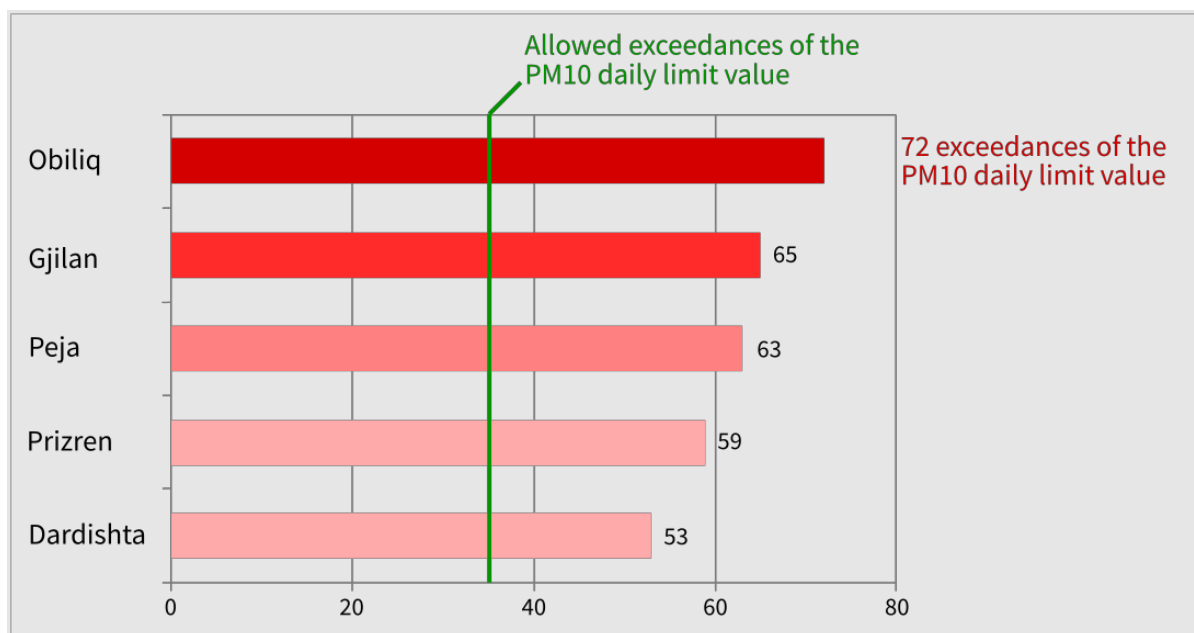


Image 6. Five monitoring stations with the most exceedances of the PM10 daily limit value (source: Annual Report on the State of Air in Kosovo 2019)

¹⁴ Kosovo Environmental Protection Agency, [Annual report on the State of Air in Kosovo 2019](#), Kosovo Environmental Protection Agency, May 2020.

The annual PM_{2.5} limit value was exceeded at two monitoring stations, in Obiliq and Peja. The Peja station recorded the highest annual average concentration of 27.1 µg/m³.

The information provided on CO and O₃ pollution is not relevant for comparison with the legal air quality standards. As with SO₂, the report contains monthly and annual average values, but does not contain eight-hour mean values which are assessed through the AQ Directive.

Reporting and public information

Real-time air quality measurements are available from a [dedicated website](#) from the Hydrometeorological Institute, and historical data is available starting from 2018.

The legislative framework is available on the website of the Ministry of Environment, Spatial Planning and Infrastructure.

Kosovo reports regularly to the European Environment Agency and the reported measurements are part of the Air Quality in Europe annual reports.

Air quality plans

According to the Law on Air Protection from Pollution, air quality protection is based upon the Strategy on Air Quality, the national Action Plan for Air Quality and local action plans for air quality.

The country is seriously falling behind in the adoption and implementation of plans. The latest country progress report from the European Commission for 2021 summarises the situation best:

Air quality continues to pose a major threat to health. Air pollution, notably from outdated thermal power plants, household heating, traffic, industrial emissions and the incineration of waste and other toxic materials, calls for urgent action. The authorities failed to adopt and implement concrete measures to improve it, in particular through an emissions reduction plan. The air quality Strategy is not enforced. Measures to enforce the ban on coal for heating are limited and not effective. Subsidies and investments for other forms of heating should be introduced. Air quality plans have not yet been prepared for zones in which pollutant levels clearly exceed limit values. There has been some progress on the real time monitoring, identification of air pollution sources and reporting of air quality.¹⁵

Montenegro

Level of transposition of the AQ Directive

Montenegro is more advanced in the transposition of European environmental legislation than the rest of the Western Balkan countries. It has achieved almost full harmonisation with the Air Quality Directive through its

¹⁵ European Commission, [Kosovo Report 2021](#), European Commission, 19 October 2021.

Law on Air Protection, adopted initially in 2010 and amended two times, in 2011 and 2015, and through accompanying secondary legislation.

Monitoring and assessment (zones and agglomerations, monitoring stations)

According to the Decree on the Establishment of a Network of Measuring Points for Air Quality Monitoring, the country is split into three zones for air quality assessment and air quality management – the northern, central and southern zones.

The zones are significantly different from one another, both in terms of population size and density and of pollution sources. The southern zone is the coastal area, with smaller towns and a lower level of industrialisation. The central zone contains the capital Podgorica and other bigger towns, and has a higher population density and more sources of pollution. The northern zone is not as densely populated, but is home to many of the heavy industrial complexes, like the coal power plant in Pljevlja.

The national monitoring network has only nine monitoring stations out of which two are in Podgorica. Very often, the stations are plagued by defects, and they do not monitor all pollutants. The number of stations is insufficient because of the layout of the country and the many different conditions within each zone.

Air quality standards

The Decree on the determination of types of pollutants, limit values and other air quality standards sets the same standards as the AQ Directive. They are given in Annex I: Comparison of AQ limit values from the AQ Directive, WHO recommended values and national legislation of Western Balkan countries.

According to the last available report on ambient air quality,¹⁶ the three zones had significantly different results in 2020. Pljevlja in the northern zone has the worst overall air quality, with both PM and SO₂ being well above the standards. The central zone has mostly a problem with PM₁₀ and PM_{2.5} pollution. The air quality in the southern zone is within the established standards because of favourable meteorological conditions in the coastal area and limited sources of pollution.

SO₂ concentrations exceeded the standards only in Pljevlja. The hourly limit value was breached on 48 occasions, twice than what is allowed, and the daily limit value was breached 14 times compared to the three times that are allowed. The only other monitoring station that registered breaches of the limit values, although not more than allowed, was at the nearby station in Gradina which is probably also influenced by the pollution in Pljevlja.

NO_x concentrations were the highest at one of the stations in Podgorica, although the hourly value was exceeded only three times, which is within the established standards. The annual values were not breached at any of the monitoring stations.

¹⁶ Montenegro Environmental Protection Agency, [*Information of the State of the Environment in 2020*](#), Montenegro Environmental Protection Agency, 2021.

PM10 standards were exceeded at five of the seven monitoring stations that measured this pollutant. The most breaches of the daily limit value were observed at the station in Bijelo Polje – 112 days. Pljevlja had the highest annual average concentration with $58 \mu\text{g}/\text{m}^3$.

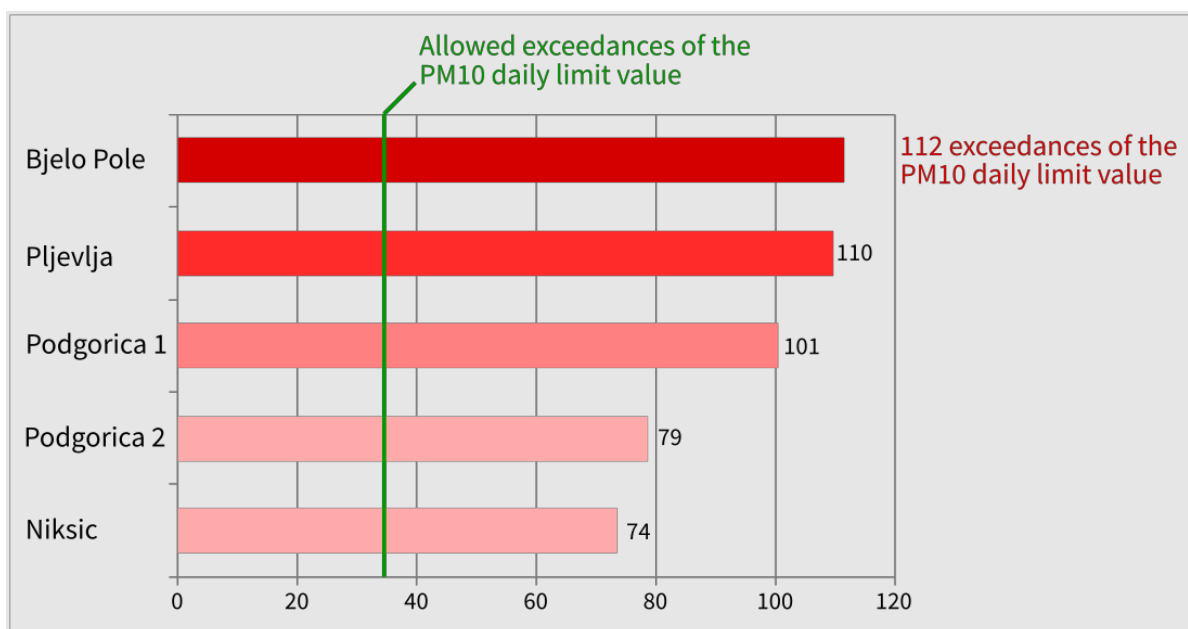


Image 7. Five monitoring stations with the most exceedances of the PM10 daily limit value (source: Information of the State of the Environment in Montenegro in 2020)

PM2.5 concentrations were measured at five monitoring stations, and all of them except one recorded an annual average higher than the annual limit value. The highest average was again in Pljevlja – $43 \mu\text{g}/\text{m}^3$.

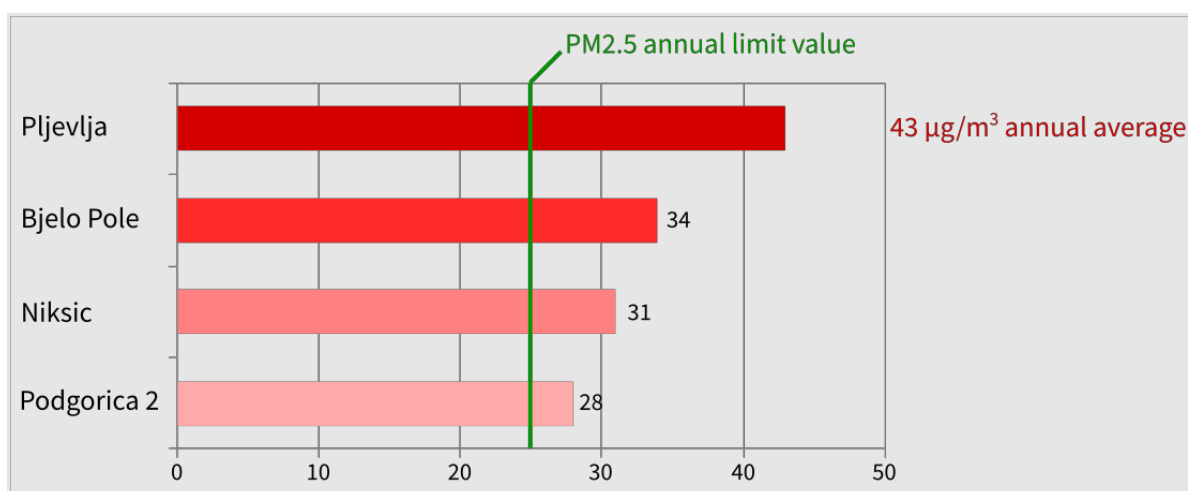


Image 8. Four monitoring stations exceeding the PM2.5 annual limit value (source: Information of the State of the Environment in Montenegro in 2020)

CO and O₃ pollution was well within the limit values at all stations where it was monitored.

Reporting and public information

Real-time and historical air quality data is available on the [website](#) of the Environmental Protection Agency. The Agency regularly publishes monthly reports on the state of air quality and annual reports of the state of the environment which include an analysis of the air quality data.

The legislative and strategic framework is available on the same website.

Montenegro reports regularly to the European Environment Agency, and reported measurements are part of the Air Quality in Europe annual reports.

Air quality plans

The Law on Air Protection foresees the preparation of a National Strategy for Air Quality Management, as well as Air Quality Plans and Short-term Action Plans for the municipalities that have recorded exceedances of the limit values.

The first National Strategy for Air Quality Management with Action Plan was adopted in 2013 and was valid until 2016. It focused more on the necessary legislative changes, increasing the capacities of the Environmental Protection Agency and following the implementation of other sectoral strategies that have an impact on air quality. The only major planned investment was the reconstruction of the Pljevlja coal-fired power plant, which did not happen.

This Strategy was followed by an Action Plan for its further implementation for the period from 2017 to 2020. Both of these documents had limited to no impact on air quality. According to the Air Quality in Europe reports by the European Environment Agency, average PM2.5 pollution even increased during the second period (2017 to 2020).

The draft National Strategy for Air Quality Management for 2021-2029 has been prepared and is awaiting adoption. It again contains the reconstruction of the Pljevlja coal power plant as the major investment, as well as some other measures aimed at household heating and traffic. However, just as the previous strategies did, it lacks clear implementing and financing mechanisms to bring significant improvements to the air quality in Montenegro.

During the same period, air quality plans were prepared for three municipalities – Pljevlja, Nikšić and Podgorica. The measures for the Pljevlja and Nikšić plans were simply copied from the Strategy without including more specifics for the municipalities, and even included measures that are well outside their jurisdiction, such as legislative changes. The plan for Podgorica has a more specific list of measures, but they are again too general and their implementation is impossible to follow on the ground. Other municipalities that exceed the limit values do not have air quality plans.

North Macedonia

Level of transposition of the AQ Directive

The Air Quality Directive in North Macedonia is transposed into the Law on Ambient Air Quality and a number of pieces of secondary legislation that contain the annexes of the Air Quality Directive. The Law was initially passed in 2004 and at the time it was a transposition of Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management. Later, it was amended several times: in 2007, 2010, 2012, 2013 and 2015. The amendments from 2010 onward have aligned the Law with the AQ Directive. The Commission has assessed its transposition as almost complete, according to the 2018 and 2019 country progress reports, with around 95 per cent of the Directive transposed into national legislation.

In 2021, another amendment was made to the Law. The main changes included the introduction of air quality plans for all municipalities that have a population of 35,000 or more citizens, regardless of whether those municipalities have recorded breaches of air quality limit values. This change goes beyond the requirements of the AQ Directive, but it should in theory improve the implementation of measures to reduce pollution at a local level.

Monitoring and assessment (zones and agglomerations, monitoring stations)

For the purposes of air quality assessment and air quality management, two zones (eastern and western) and one agglomeration (Skopje) were established in the country in 2009 with a decision from the Ministry of Environment and Physical Planning (MoEPP). The zoning is in line with the general criteria set out in the AQ Directive.

However, air quality and sources of pollution vary significantly in different municipalities in the zones, and this makes implementation of air quality improvement measures complicated across zones. The latest change in the Law on Ambient Air could remedy this, but establishing additional zones for areas that are heavily impacted by individual sources of industrial pollution is also a possible solution through the AQ Directive that should be considered.

The monitoring stations that are part of the country's automatic monitoring system for ambient air quality are evenly distributed throughout the zones and agglomeration. There are 20 stations in 2021, one of them a mobile station. Seven of these stations are located in the Skopje agglomeration, six in the eastern zone and seven in the western zone. The latest station was installed in Gevgelija (eastern zone) in 2020. A short description of all monitoring stations, with their location and a photo, is provided on the air quality portal maintained by the Macedonian Environmental Information Centre, a unit within MoEPP.

Many of the country's larger municipalities are not part of the national monitoring yet. Four of them fall under the Law's new requirement to prepare air quality plans, and they should be included in the national network as soon as possible in order to plan proper measures and assess their effectiveness. The provision of the AQ Directive for the assessment of contributions to pollution from industrial sources, where at least one sampling

point must be installed in the settlement nearest to the industrial source, is also not properly implemented. The major industrial sources have an obligation to monitor ambient air quality through their Integrated Pollution Prevention and Control (IPPC) permits, but that data is not released in real time and is only available through freedom of information requests. As the EU progress report for 2020 also states, although the national network has been upgraded, ‘it still requires considerable reinforcement’.¹⁷

Air quality standards

The air quality standards from the AQ Directive are completely transposed in the Decree on limit values for levels and types of pollutants in ambient air and alert thresholds, deadlines for reaching limit values, margins and tolerance for limit value, target values and long-term goals. The limit values are given in Annex I: Comparison of AQ limit values from the AQ Directive, WHO recommended values and national legislation of Western Balkan countries.

The biggest problem in the country is PM10 and PM2.5 pollution. While there has been some improvement over the years, the levels are still high above the limit values. In contrast, SO₂ pollution is constantly within the limit values, although there are significant emissions from stationary sources, like the Bitola coal power plant.

The most recent annual report on air quality that is publicly available is for the year 2020.¹⁸

According to that report, none of the 15 monitoring stations that measured SO₂ recorded any breaches of the hourly and daily limit values.

NO_x concentrations are also within the limit values. However, five of the monitoring stations had less than 75 per cent coverage with data during the calendar year and their measurements were not taken into account. Two of these are traffic monitoring stations that are extremely relevant for NO_x pollution.

Thirteen of the then eighteen stations had enough PM10 measurements through 2020 to be included in the annual report. Some of the stations that were not included traditionally have among the highest average PM10 concentrations, especially the ones in Bitola and Skopje. From the thirteen in the report, nine recorded breaches of the annual limit value of 50 µg/m³. All stations, except the background station,¹⁹ recorded more than the allowed 35 breaches of the daily limit value. The station with the highest number was in Kavadarci, with 153 days above the daily allowed limit. Eight other stations recorded more than 90 breaches of daily limit value.

¹⁷ European Commission, [North Macedonia Report 2020](#), European Commission, 6 October 2020.

¹⁸ Macedonian Information Centre for Environment, [Quality of the Environment in the Republic of North Macedonia – Annual Report 2020](#), Macedonian Information Centre for Environment, 2021.

¹⁹ A background station is a station installed ‘to monitor background concentration levels of air polluting substances that are significant for a given region or for the globe as a whole. Regional stations are located far enough away from industry and urban areas in order not to pick up day-by-day fluctuations in pollution levels. The purpose is to measure long-term changes in the composition of the atmosphere.’ - [European Environment Agency Glossary](#), accessed 22 January 2022.

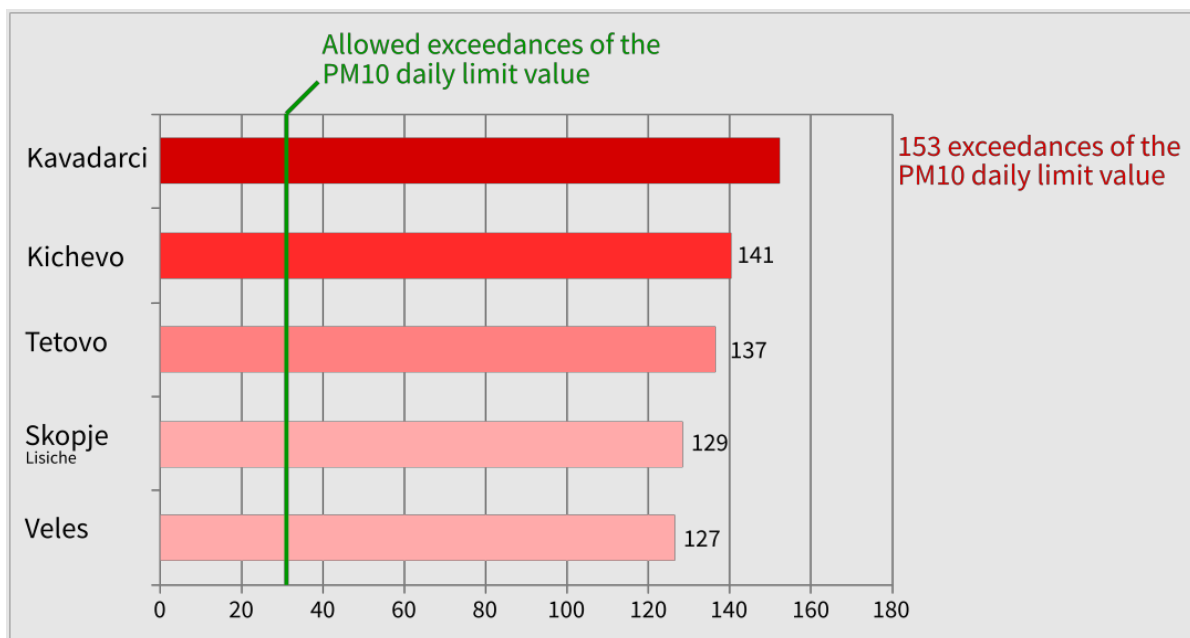


Image 9. Five monitoring stations with the most exceedances of the PM10 daily limit value (source: Quality of the Environment in the Republic of North Macedonia – Annual Report 2020)

PM2.5 pollution was measured at five locations. All of them recorded a breach of the annual limit value of $25 \mu\text{g}/\text{m}^3$, and the station in Tetovo had the highest annual average of $38 \mu\text{g}/\text{m}^3$.

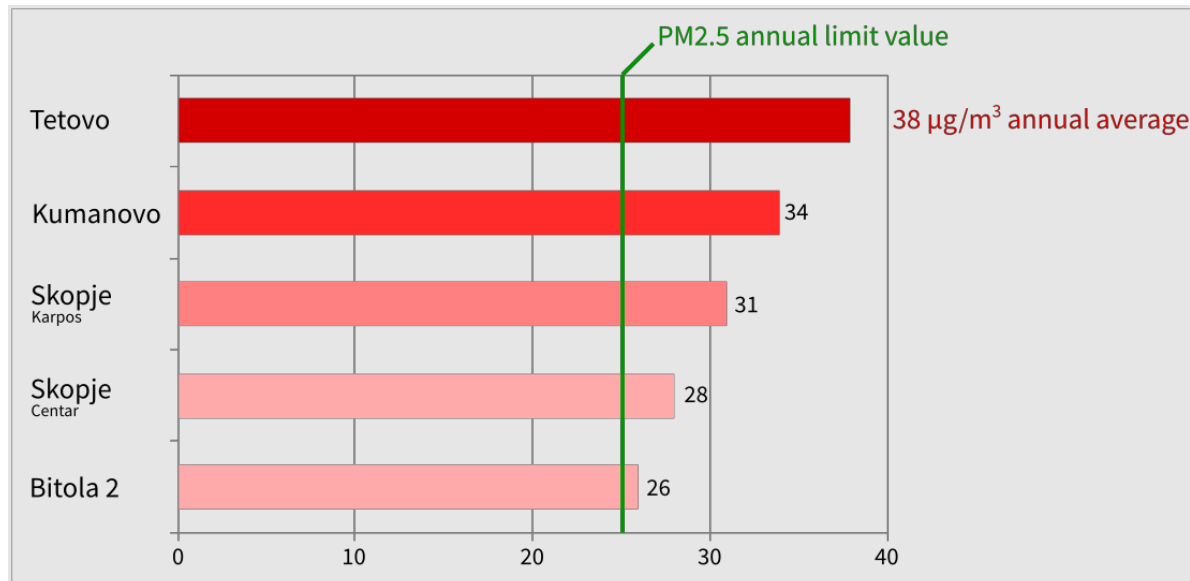


Image 10. Five monitoring stations with the highest PM2.5 annual average (source: Quality of the Environment in the Republic of North Macedonia – Annual Report 2020)

The limit value for CO concentration was breached at only one of the monitoring locations, Lisiche in Skopje, where the average eight-hour mean value reached above $10 \mu\text{g}/\text{m}^3$.

Three of the monitoring locations recorded a breach of the O₃ limit value for the protection of human health, meaning that they had more than the allowed 25 breaches in a calendar year. The highest number was recorded at the background station, which recorded 73 breaches. The long-term target value for the protection of vegetation was exceeded at two of the monitoring locations.

Reporting and public information

The national [air quality portal](#) provides real-time access to the measurements of the national monitoring network, but also access to historical measurements for all stations. It also provides an overview of the legislative and strategic framework, basic information on the siting of the stations, descriptions of the pollutants and other important information.

On the same portal, daily, monthly and annual air quality reports are published. The daily and monthly reports are published regularly. The latest annual report available is for the year 2018 and the website should be updated with new reports.

North Macedonia reports regularly to the European Environment Agency and reported measurements are part of the Air Quality in Europe annual reports.

Air quality plans

The Law on Ambient Air Quality foresees the preparation of the following strategic documents relevant to the AQ Directive:

- National Plan for Protection of the Ambient Air
- Plan for Improvement of the Ambient Air Quality
- Short-term Action Plan for Protection of the Ambient Air

The National Plan was for the strategic period 2013 to 2018, and its update is long overdue. Its effectiveness was also limited, as many of the action points were never implemented, mostly due to the lack of allocated finances. The plan was somewhat replaced by an unofficial Plan for Clean Air during 2018 and 2019, which for the first time had a specific budget for implementation, but the short implementation period proved to be a major obstacle to producing results. The preparation of a new national plan is planned for a project that is supposed to start in 2022.

The Plans for Improvement of the Ambient Air Quality are in fact the Air Quality Plans from the Directive. Five of these have been prepared, one for the Skopje agglomeration and four for the municipalities of Bitola, Tetovo, Veles and Strumica.

The Directive and the Law require that the plans are prepared for the zones where breaches of the limit values are recorded. According to sources from the Ministry of Environment, the big differences between municipalities proved that it is impossible to prepare a plan for an entire zone and it was decided that they will be done at the municipal level. Because of this, the legality of the municipal plans is questionable. With the

latest change of the Law requiring all municipalities with a population higher than 35,000 to have an air quality plan, this issue was seemingly remedied.

A bigger issue is the implementation of these plans. Administrative capacity at the local level remains low, allocated finances are insufficient, and inter-sectoral cooperation and coordination between central and local authorities remains weak. This limits the capacity of the municipalities to implement planned measures, but also limits the effectiveness of the implemented measures, which are intermittent and do not provide systemic change.

Serbia

Level of transposition of the AQD

The Air Quality Directive in Serbia is transposed into the Law on Air Protection and a number of pieces of secondary legislation that contain the annexes of the Air Quality Directive. The Law was initially passed in 2009 and was amended twice, in 2013 and 2021. The transposition of air quality acquis is assessed by the European Commission as good according to the 2021 country progress report.²⁰

Monitoring and assessment (zones and agglomerations, monitoring stations)

With a government decree from 2011, three zones (Serbia, Vojvodina, and Kosovo and Metohija) and eight agglomerations (Belgrade, Novi Sad, Niš, Bor, Užice, Kosjerić, Smederevo and Pančevo) were established in Serbia for the purpose of air quality assessment and air quality management. The zoning is in line with the criteria set out in the AQ Directive and it is somewhat an example of good practice because it provides distinct agglomerations for small municipalities with heavy industrial activity, like Bor and Kosjerić.

There are 54 official monitoring stations in Serbia. Thirty-seven of these are established and maintained by the Serbian Environmental Protection Agency (SEPA) and the rest are from the Institute for Public Health or from the municipal networks. Fourteen of them are in the Belgrade agglomeration, and the rest spread out in the other zones and agglomerations, with the exception of Kosovo which has a separate monitoring network. The latest station that was installed is the one in Pirot (Serbia zone) in 2021. Basic information, like location, classification, and start of operation are provided on the air quality portal maintained by SEPA.

The monitoring network is extensive, but still needs to be improved. Many settlements, most notably in the Vojvodina zone, do not have monitoring stations yet. Some of the stations do not measure the AQ Directive's primary pollutants, like PM₁₀ and PM_{2.5}. The provision of the AQ Directive for the assessment of contributions to pollution from industrial sources, where at least one sampling point must be installed in the nearest settlement, is also not properly implemented. The EU progress report for 2020 also concludes that although the national network is being extended and upgraded, it 'still needs to be considerably strengthened'.²¹

²⁰ European Commission, [Serbia Report 2021](#), European Commission, 19 October 2021.

²¹ European Commission, [Serbia Report 2020](#), European Commission, 6 October 2020.

The Public Health Institute Dr Milan Jovanović Batut in its annual report on air pollution²² provides some clarity as to why the data of the monitoring stations is insufficient. According to them, there are several practices that limit data availability, like moving stations or even shutting them down in the middle of the year, that contradict basic scientific practices on ambient air quality assessment. Also, the stations are distributed in only 26 settlements, which makes any nation-wide assessment extremely difficult.

Air quality standards

The air quality standards from the AQ Directive are transposed in the Decree on requirements for monitoring and air quality standards. As can be seen from the limit values given in Annex I: Comparison of AQ limit values from the AQ Directive, WHO recommended values and national legislation of Western Balkan countries, Serbian legislation has additional limit values that are not part of the AQ Directive, such as an annual limit value for SO₂, a daily limit value for NO₂, and daily and annual limit values for CO. In addition to this, the hourly limit value for NO₂ in Serbia is 150 µg/m³, which is more stringent than the EU limit value of 200 µg/m³.

As in the rest of the Balkan countries, PM10 and PM2.5 pollution is the biggest problem in Serbia. There is a small number of exceptions, but usually the rest of the pollutants are within the limit values. However, according to the last available annual report on air quality (2020),²³ the air quality in Serbia has worsened in the last two years compared to previous years.

According to that most recent report, five of the monitoring stations recorded SO₂ pollution above the prescribed standards. Four of these stations registered more than the prescribed three exceedances of the daily limit value, and all five registered more than the prescribed 24 exceedances of the hourly limit value for SO₂. Three of these monitoring stations are in the town of Bor, and one of them registered an astonishing 58 breaches of the daily limit and 374 breaches of the hourly limit of 350 µg/m³, a value that is considered extremely poisonous.

²² Public Health Institute 'Dr Milan Jovanović Batut', [*Pollution of Urban Air on the territory of the Republic of Serbia as measured by the Public Health Institute's monitoring network in 2020*](#), Public Health Institute 'Dr Milan Jovanović Batut', 2021.

²³ Serbian Environmental Protection Agency, [*Annual Report on the State of Air Quality in the Republic of Serbia in 2020*](#), Serbian Environmental Protection Agency, 2021.

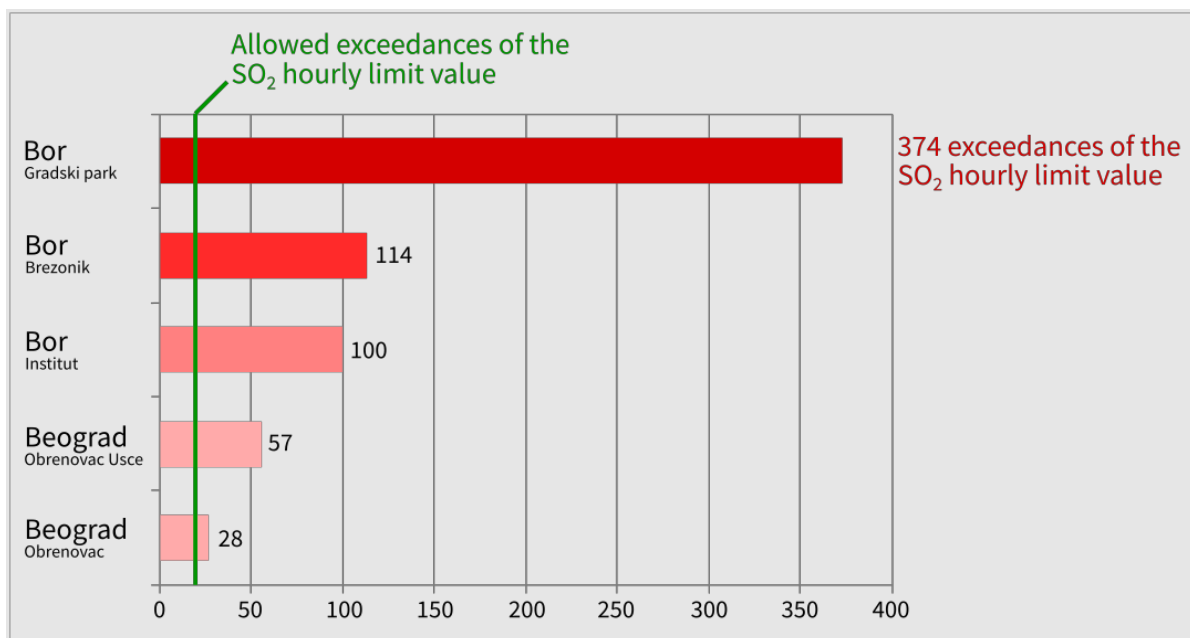


Image 11. Five monitoring stations with exceedances of the SO₂ hourly limit value (source: Annual Report on the State of Air Quality in the Republic of Serbia in 2020)

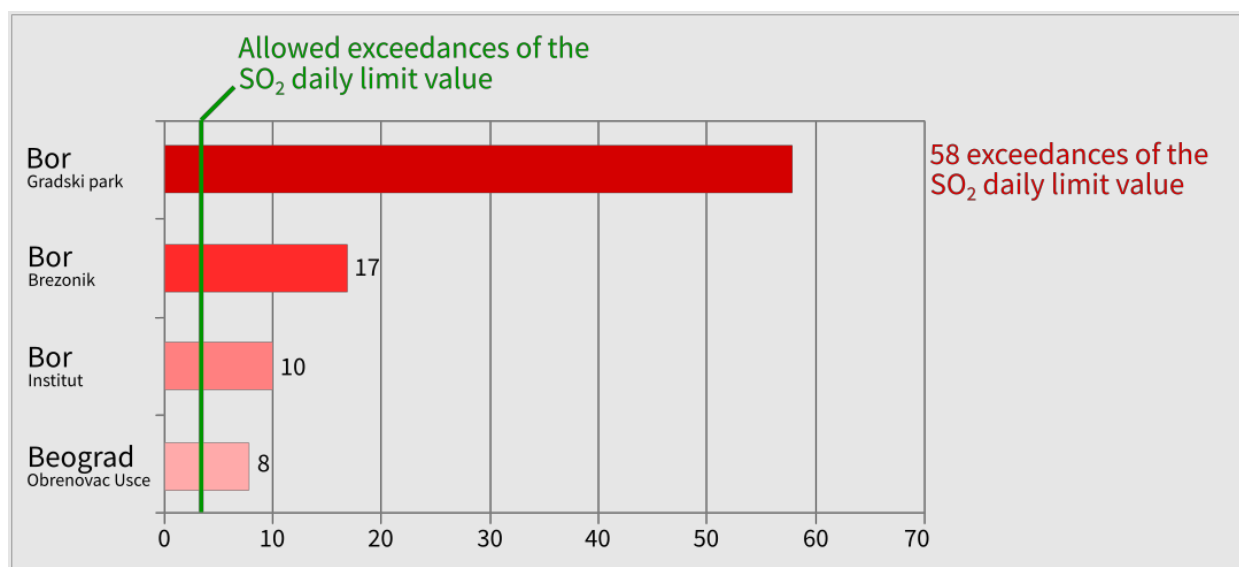


Image 12. Four monitoring stations with exceedances of the SO₂ daily limit value (source: Annual Report on the State of Air Quality in the Republic of Serbia in 2020)

NO₂ hourly concentrations were higher than the Serbian limit value at one of the monitoring stations, in the capital, Belgrade. The limit was breached 56 times, 38 times more than is allowed. But because of the different limit value, it is not clear whether the same number of breaches would happen if compared to the AQ Directive standards. The annual limit value was not exceeded at any of the monitoring stations.

PM₁₀ pollution exceeded national and AQ standards at 39 of the 46 monitoring stations that were included in the annual report. Eighteen, almost half of these, breached the annual limit value, and the rest exceeded the

daily limit on more than the allowed number of days. Monitoring stations in Smederevo and Valjevo recorded the most exceedances, 148 and 147 respectively, but 11 other monitoring stations recorded more than 100 exceedances. The 39 locations that exceed PM10 standards are spread out across the entire country.

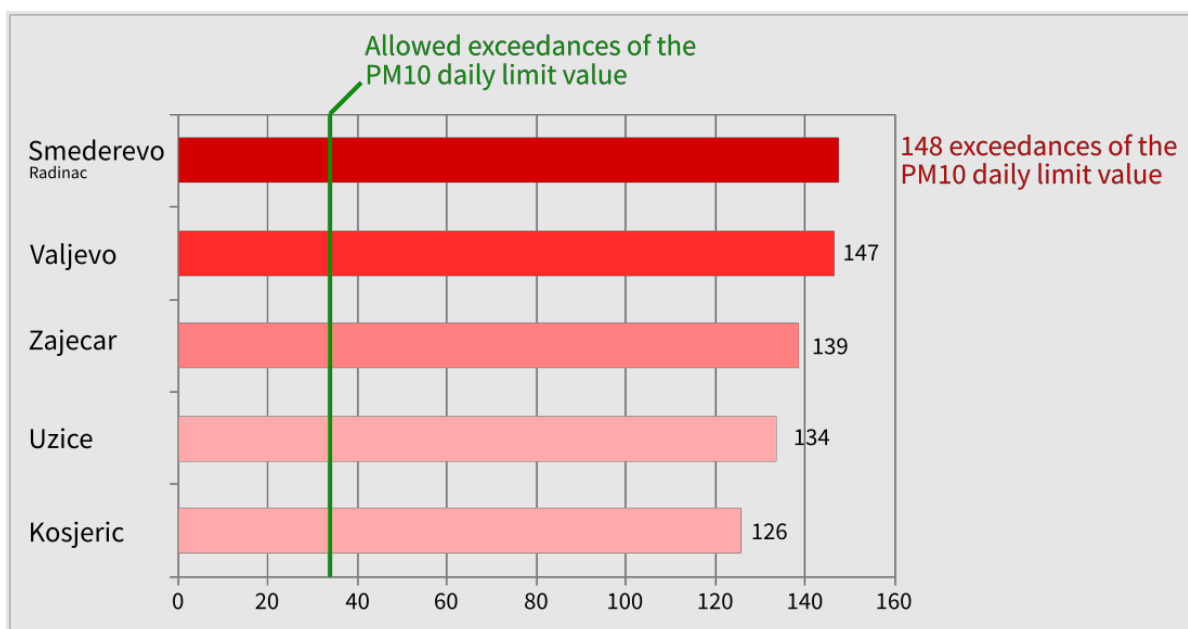


Image 13. Five monitoring stations with the most exceedances of the PM10 daily limit value (source: Annual Report on the State of Air Quality in the Republic of Serbia in 2020)

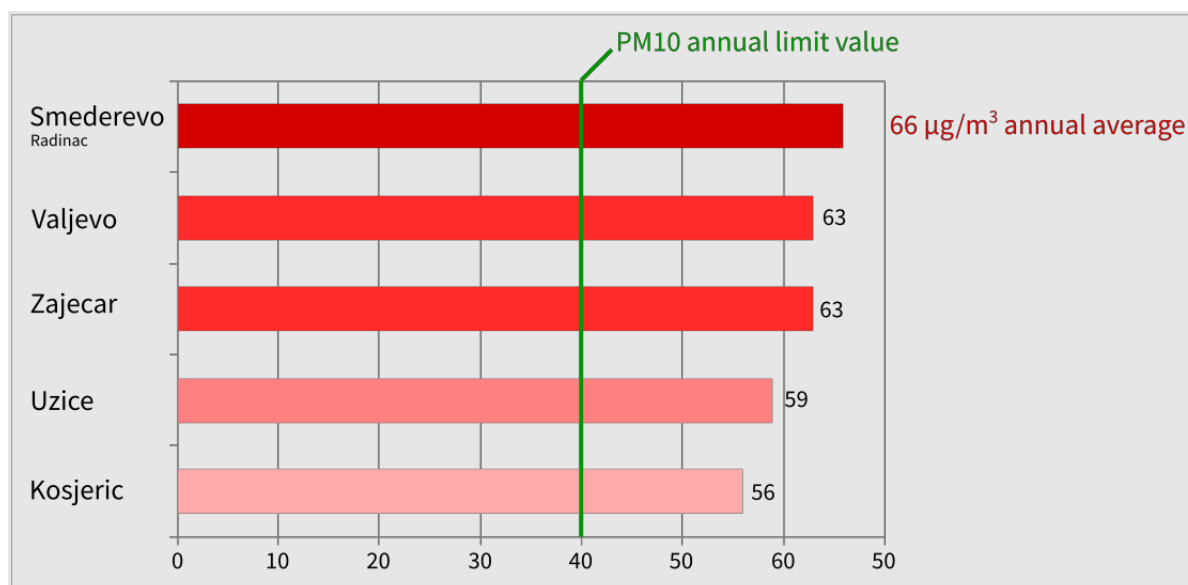


Image 14. Five monitoring stations with the highest PM10 annual average (source: Annual Report on the State of Air Quality in the Republic of Serbia in 2020)

The annual PM2.5 value was exceeded at 16 of the 28 locations where it was monitored. The town of Valjevo had the highest annual mean value, 45 µg/m³.

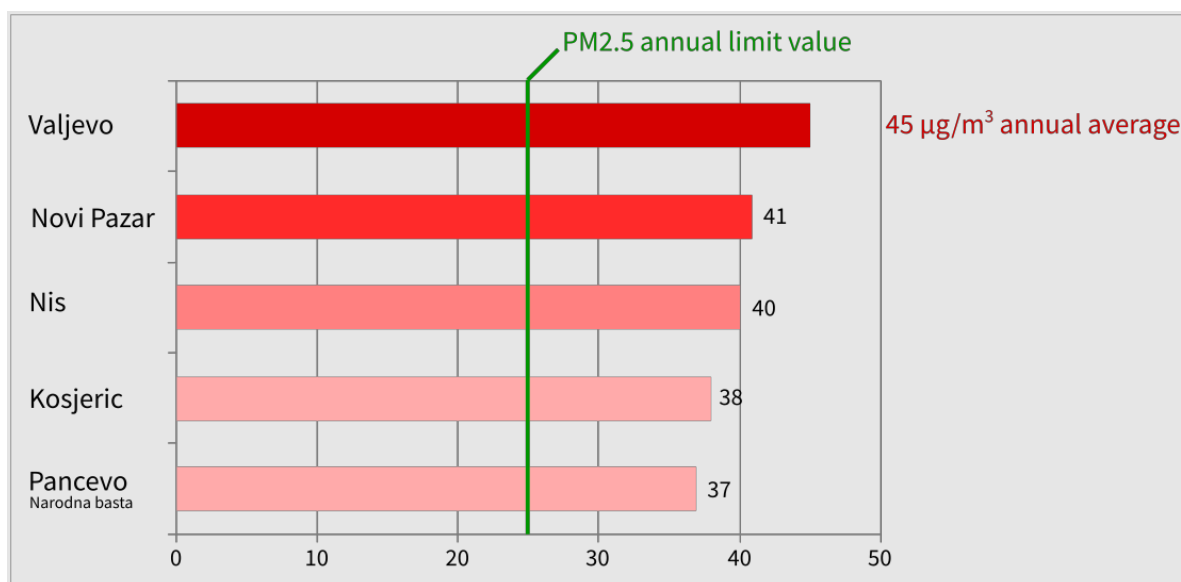


Image 15. Five monitoring stations with the highest PM2.5 annual average (source: Annual Report on the State of Air Quality in the Republic of Serbia in 2020)

CO concentrations were well within the limit values, with the exception of in Zaječar where the maximum allowed eight-hour concentration of 10 mg/m³ was exceeded two times during the year.

Five of the 23 monitoring stations that monitored O₃ pollution exceeded the standards, and three of these were in Belgrade. The maximum allowed eight-hour concentration of 120 µg/m³ was exceeded the most times at one of the Belgrade stations – 69 times, compared to the 25 exceedances that are allowed.

Reporting and public information

The [air quality portal](#) managed by the Serbian Environmental Protection Agency provides real-time access to the measurements of all stations. Historical data is available only for the last 30 days. It also contains information on the monitoring stations and the limit and target values. Additionally, the Agency has a mobile app where air quality can also be followed in real time.

The legislative and strategic framework, as well as annual reports on air quality, are available on the Agency website.

Serbia reports regularly to the European Environment Agency and reported measurements are part of the Air Quality in Europe annual reports.

Air quality plans

The Law on Air Protection requires the preparation of an Air Protection Strategy, Air Quality Plans and Short-term Action Plans for Air Quality.

Although the legal deadline for the preparation of the Strategy was two years after the adoption of the Law, in 2011, it was only developed in late 2021 and has not been officially adopted yet.

Air quality plans should be prepared for the zones and agglomerations where breaches of the limit values are recorded. So far, six plans are adopted – for Bor, Belgrade, Pančevo, Novi Sad, Smederevo and Užice. Considering that Serbia's annual air quality report for 2019 lists 13 agglomerations with air pollution above the limit, there are still at least seven plans that need to be developed and adopted.

The Plan for Belgrade that was adopted recently, in 2021, encountered significant resistance from the civil society. Before it was adopted, several civil society organisations working on air quality issued a statement²⁴ that the Plan was not made according to the Rulebook on the content of air quality plans, does not contain pollution reduction objectives against which its effectiveness should be measured, and that the measures are descriptive and without clear implementation timelines which make monitoring of the implementation nearly impossible. The Plan also does not contain any information on the impact of air pollution on public health and the environment.

Since the quality of ambient air in Serbia is becoming worse, the implementation of the existing plans needs to be sped up and their effectiveness re-evaluated. Administrative and financial capacity of central and local authorities is the main obstacle for the long-term improvement of air quality.

Conclusions

Although the Western Balkan countries have been in the process of transposing and implementing the Air Quality Directive for two decades, their progress can be best described as limited.

Only one country, Montenegro, has achieved full harmonisation with the Directive, which is disappointing given the amount of time each country had to make the changes. All of them have the basic framework and the same air quality standards as the AQ Directive in place, which should have allowed for some progress.

Other than the Federation of Bosnia and Herzegovina, all the countries have established zones and agglomerations for air quality assessment and management. However, the way they are set up is questionable and probably harms pollution reduction efforts.

All of the countries have established some national air quality monitoring network, but only to meet minimum legal requirements. None of the networks is sufficient to allow for proper air quality assessment and management within the zones and agglomerations. Monitoring stations are often plagued by defects and do not provide the minimum amount of data for assessment.

None of the countries is even close to meeting the air quality standards. In some of the zones and agglomerations they would need to reduce the emissions of pollutants by four to five times to bring the air

²⁴ Belgrade Open School (BOS), Regulatory Institute for Renewable and Environmental Regulatory Institute (RERI) and RES Foundation, [Joint statement on the Draft Air Quality Plan for Belgrade](#), 2021.

quality within the standards. Pollution with PM10 and PM2.5 remains the biggest issue in all countries, with SO₂ pollution also exceeding standards in industrialised areas and coal regions.

Reporting is different in all countries, but at least most of the time real-time data is available in all of them. Annual reports are published regularly and they all report to the European Environmental Agency.

The national strategies are not adopted regularly, and when they are, they are not specific and do not contain measurable objectives. Air quality plans are not adopted for all zones and agglomerations that have exceedances of the air quality standards in any of the countries. When they are prepared and adopted, the plans are usually done on a municipal level, not for the zones. Sometimes this significantly limits their effectiveness because of big polluters in neighbouring municipalities that do not have such a plan. The quality of the plans remains low in all countries, and even the most recent ones do not have pollution reduction targets, measurable actions and implementation deadlines. The level implementation of the existing plans also remains low, as can be seen from the continuous exceedances of the air quality standards.

Recommendations

The Western Balkan countries have to step up their efforts to improve ambient air quality.

The zones and agglomerations need to be re-evaluated, and in the case of the FBiH established in way that will be representative of the geography, climate and sources of pollution, so that the air quality within whole agglomerations can be properly assessed and the measures for the air quality plans can be properly drafted.

Monitoring networks within the zones and agglomerations need to be expanded into all larger settlements. Establishing municipal monitoring networks can significantly increase the amount and quality of data, and contribute to better air quality plans.

Air quality plans must be adopted for all zones and agglomerations where air quality standards are exceeded. The plans must have clear implementation deadlines and pollution reduction objectives so that their implementation and effectiveness can be properly followed and evaluated. Existing plans need to be reviewed and updated as well to meet this criteria.

In order for this to be achieved, the countries need to allocate sufficient funding for increasing the capacities of the municipal authorities, and significantly increasing the cooperation between all institutions, local and national, that are relevant in the air quality sector.

Future national air quality strategies need to be planned in a way that will provide systemic and long-term changes.

International institutions can have a positive impact on the implementation of the AQ Directive in Western Balkan countries as well. The European Commission can use the Energy Community Treaty, as well as the process of the revision of the Air Quality Directive to establish better implementation mechanisms for non-EU countries. Requiring the countries to report their air quality plans to the Commission or the Energy Community Secretariat can be one way to improve their quality.

Annex 1 – AQ limit values

	AQ Directive	WHO	North Macedonia	Serbia	Federation BiH	Republika Srpska	Montenegro	Kosovo
SO₂ – 10-minute		500 µg/m ³						
SO₂ – 1-hour	350 µg/m ³ , not to be exceeded more than 24 times a calendar year		350 µg/m ³ , not to be exceeded more than 24 times a calendar year	350 µg/m ³ , not to be exceeded more than 24 times a calendar year	350 µg/m ³ , not to be exceeded more than 24 times a calendar year	350 µg/m ³ , not to be exceeded more than 24 times a calendar year	350 µg/m ³ , not to be exceeded more than 24 times a calendar year	350 µg/m ³ , not to be exceeded more than 24 times a calendar year
SO₂ – 24-hour	125 µg/m ³ , not to be exceeded more than 3 times a calendar year	40 µg/m ³ , 99 th percentile (i.e. 3-4 exceedances per year)	125 µg/m ³ , not to be exceeded more than 3 times a calendar year	125 µg/m ³ , not to be exceeded more than 3 times a calendar year	125 µg/m ³ , not to be exceeded more than 3 times a calendar year	125 µg/m ³ , not to be exceeded more than 3 times a calendar year	125 µg/m ³ , not to be exceeded more than 3 times a calendar year	125 µg/m ³ , not to be exceeded more than 3 times a calendar year
SO₂ – year				50 µg/m ³	50 µg/m ³	50 µg/m ³		
NO₂ – 1-hour	200 µg/m ³ , not to be exceeded more than 18 times a calendar year	100 µg/m ³	200 µg/m ³ , not to be exceeded more than 18 times a calendar year	150 µg/m ³ , not to be exceeded more than 18 times a calendar year	200 µg/m ³ , not to be exceeded more than 18 times a calendar year	150 µg/m ³ , not to be exceeded more than 18 times a calendar year	200 µg/m ³ , not to be exceeded more than 18 times a calendar year	200 µg/m ³ , not to be exceeded more than 18 times a calendar year

	AQ Directive	WHO	North Macedonia	Serbia	Federation BiH	Republika Srpska	Montenegro	Kosovo
NO₂ – 24-hour		25 µg/m ³ , 99 th percentile (i.e. 3-4 exceedances per year)		85 µg/m ³	85 µg/m ³	85 µg/m ³		
NO₂ – year	40 µg/m ³	10 µg/m ³	40 µg/m ³	40 µg/m ³	40 µg/m ³	40 µg/m ³	40 µg/m ³	40 µg/m ³
Benzene – year	5 µg/m ³		5 µg/m ³	5 µg/m ³	5 µg/m ³	5 µg/m ³	5 µg/m ³	5 µg/m ³
CO – 15-minute		100 mg/m ³						
CO – 1-hour		35 mg/m ³						
CO – daily 8-hour	10 mg/m ³	10 mg/m ³	10 mg/m ³	10 mg/m ³	10 mg/m ³	10 mg/m ³	10 mg/m ³	10 mg/m ³
CO – 24-hour		4 µg/m ³ , 99 th percentile (i.e. 3-4 exceedances per year)		5 mg/m ³	5 mg/m ³	5 mg/m ³		
CO – year				3 mg/m ³	3 mg/m ³	3 mg/m ³		

	AQ Directive	WHO	North Macedonia	Serbia	Federation BiH	Republika Srpska	Montenegro	Kosovo
PM10 – 24-hour	50 µg/m ³ , not to be exceeded more than 35 times a calendar year	45 µg/m ³ , 99 th percentile (i.e. 3-4 exceedances per year)	50 µg/m ³ , not to be exceeded more than 35 times a calendar year	50 µg/m ³ , not to be exceeded more than 35 times a calendar year	50 µg/m ³ , not to be exceeded more than 35 times a calendar year	50 µg/m ³ , not to be exceeded more than 35 times a calendar year	50 µg/m ³ , not to be exceeded more than 35 times a calendar year	50 µg/m ³ , not to be exceeded more than 35 times a calendar year
PM10 – year	40 µg/m ³	15 µg/m ³	40 µg/m ³	40 µg/m ³	40 µg/m ³	40 µg/m ³	40 µg/m ³	40 µg/m ³
PM2.5 – 24-hour		15 µg/m ³ , 99 th percentile (i.e. 3-4 exceedances per year)						
PM2.5 – year	25 µg/m ³	5 µg/m ³	25 µg/m ³	25 µg/m ³	25 µg/m ³	25 µg/m ³	25 µg/m ³	25 µg/m ³
O₃ – daily 8-hour	120 µg/m ³ , not to be exceeded on more than 25 days/year, averaged over 3 years	100 µg/m ³ , 99 th percentile (i.e. 3-4 exceedances per year)	120 µg/m ³ , not to be exceeded on more than 25 days/year, averaged over 3 years	120 µg/m ³ , not to be exceeded on more than 25 days/year, averaged over 3 years	120 µg/m ³ , not to be exceeded on more than 25 days/year, averaged over 3 years	120 µg/m ³ , not to be exceeded on more than 25 days/year, averaged over 3 years	120 µg/m ³ , not to be exceeded on more than 25 days/year, averaged over 3 years	120 µg/m ³ , not to be exceeded on more than 25 days/year, averaged over 3 years