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CEE Bankwatch Network's mission is to prevent environmentally and socially harmful impacts of international development finance, and to promote alternative solutions and public participation.

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Alarming levels of air pollution in settlements in coal regions are choking Central and Eastern Europe

The year 2019 will be marked as the year the European Commission committed to step up its efforts to tackle climate and environmental-related challenges to preserve ecosystems, biodiversity, natural resources and human health.

Many of these challenges are unavoidably linked to the burning of fossil fuels. In addition to damaging our climate, the burning of fossil fuels for services like electricity, heating, or transport is also damaging air quality.

This is why curbing air pollution has been a central topic in recent EU climate discussions, resulting, among other things, in a commitment to align air quality standards more closely with the World Health Organization recommendations. The second EU Clean Air Forum¹ that took place in Bratislava in November 2019 revolved around this message, which was then incorporated in the European Green Deal roadmap² in December. The Green Deal proposes support for sectors such as energy to facilitate a transition from the most polluting sources to cleaner ones. This would include solutions for sites that create a significant amount of pollution, such as coal-fired power plants, open-pit coal mines, and ash disposal sites.

However, commitments are one thing and the amount of work that needs to be done is another, both in the EU and in the neighbouring European countries. Addressing the cross-border nature of air pollution, especially from major sources, will have to become the backbone of this work. Most European countries are no strangers to coal use, but the different standards applicable in Member States and neighbouring non-EU countries have the potential to sabotage any attempt to clean up the air they all share unless a true joint effort is undertaken.

In early 2019, the *Chronic Coal Pollution*³ report was published. The report showed that in 2016 the 16 old coal-fired power plants in the Western Balkans emitted as much SO₂ and dust pollution as the entire fleet of 250 plants in EU countries and that the majority of the health costs from this pollution, amounting to EUR 3.1-5.8 billion, is actually paid by EU citizens.

Later in the year, Bankwatch published the *Comply or Close*⁴ report that exposed Western Balkan countries' failure to implement the Large Combustion Plants Directive (LCPD). According to this report, none of the countries is in compliance

¹ https://ec.europa.eu/info/events/eu-clean-air-forum-2019-nov-28_en

² <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1576150542719&uri=COM%3A2019%3A640%3AFIN>

³ Health and Environment Alliance (HEAL), Climate Action Network (CAN) Europe, Sandbag, CEE Bankwatch Network, Europe Beyond Coal - <https://www.env-health.org/wp-content/uploads/2019/02/Chronic-Coal-Pollution-report.pdf>

⁴ <https://bankwatch.org/wp-content/uploads/2019/12/comply-or-close.pdf>

with the emissions limit values from this Directive, and in 2018 they emitted six times more SO₂ and almost two times more dust from the coal-fired power plants than they were allowed. The LCPD has already been superseded in the EU by the Industrial Emissions Directive which has even more stringent emissions limit values.

INDEPENDENT AIR POLLUTION MONITORING

Bankwatch's ongoing air pollution campaign continues to provide on-the-ground data from these major polluting locations. Since our last joint briefing on the results of our monitoring,⁵ we took one-month measurements at eight locations, six of which were completely new to this campaign. The results of our monitoring continue to provide evidence that coal facilities are detrimental to air quality, both in the Western Balkans and beyond.

METHODOLOGY

Every location is monitored for a period of around one month. Considering the short monitoring period, these measurements cannot replace long-term official monitoring of the locations, but they can provide indicative data from the location, identify potential major sources of air pollution when possible and provide evidence to support calls for official monitoring to be put in place.

The collected measurements are compared to the legally binding limit values for coarse (PM₁₀) and fine (PM_{2.5}) dust particles of the EU Air Quality Directive (AQD) and to the recommended health protective limit values given by the World Health Organisation (WHO). Because of the short monitoring period they are compared to the daily limit values. For PM_{2.5}, the AQD does not have a daily limit, only an annual one, which is why only the WHO daily limit is used in the analysis.

When possible, an estimate is given on how the measurements will influence the annual limit values. The limit values used are given in the following table:

The measurements are done with a GRIMM Environmental Dust Monitor 164,⁶ a light scattering aerosol spectrometer that measures the concentration of PM₁₀, PM_{2.5} and PM₁ particles. This is a recognised method to monitor particle size distributions and particle number concentrations. It was tested in Europe and approved for PM₁₀ (EN 12341) and PM_{2.5} (EN 14907) and has been successfully in use since. Field tests in the USA have also shown excellent accuracy in accordance with the reference systems and thus the method has successfully received the approval of the Environmental Protection Agency (EPA). The device is also equipped with GRIMM 158L sensor for temperature, relative humidity, barometric pressure, wind speed, and wind direction to provide basic meteorological information necessary to identify sources of dust pollution. The dust monitor is regularly serviced and calibrated by GRIMM.

	AQD daily limit value	AQD annual limit value	WHO daily limit value	WHO annual limit value
PM ₁₀	50 µg/m ³ that cannot be exceeded on more than 35 days in one calendar year	40 µg/m ³	50 µg/m ³ that cannot be exceeded on more than 3 days in one calendar year	20 µg/m ³
PM _{2.5}	N/A	25 µg/m ³	25 µg/m ³ that cannot be exceeded on more than 3 days in one calendar year	10 µg/m ³

⁵ <https://bankwatch.org/wp-content/uploads/2018/11/Air-pollution-briefing-Bankwatch-Nov2018.pdf>

⁶ <https://www.grimm-aerosol.com/products-en/environmental-dust-monitoring/mobile-pm-monitor/edm164/>

SUMMARY OF RESULTS PER LOCATION

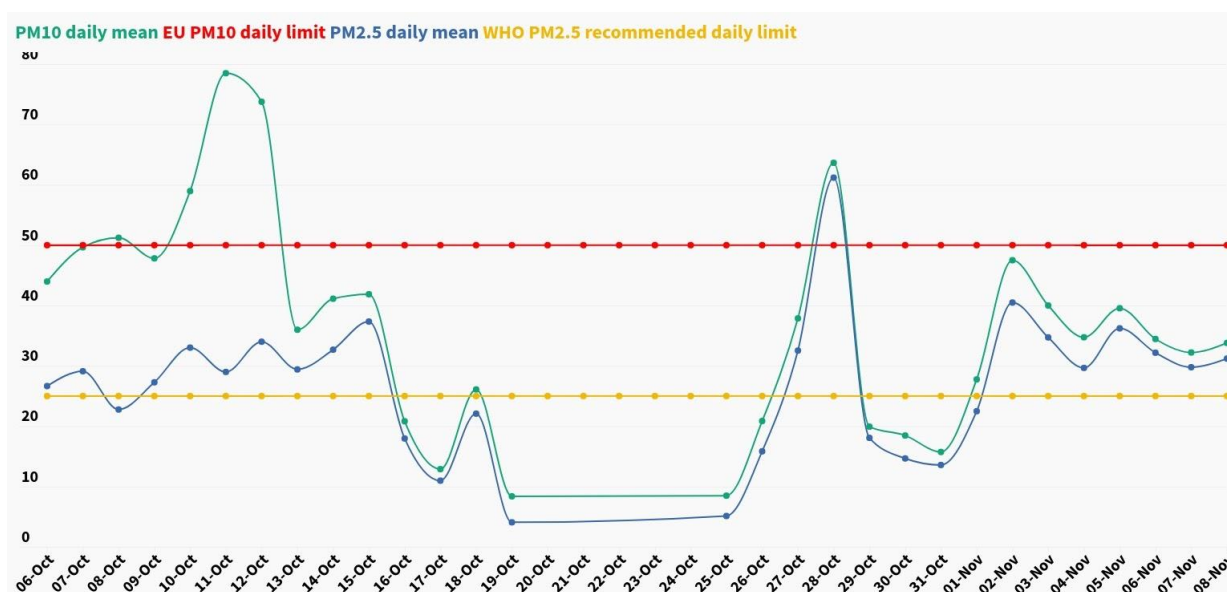
Sajókápolna, Borsod-Abaúj-Zemplén (BAZ) County, Hungary

Monitoring period: 06.10.2018 - 08.11.2018

Sajókápolna is a small village in the centre of BAZ County in north-eastern Hungary. The entire region has a long tradition of coal mining, with dozens of underground and open-cast coal mines operating throughout the last two centuries. Coal is also one of the main energy sources for household heating in smaller settlements, which inevitably results in deteriorating air quality.

We monitored the air quality in Sajókápolna over a 28-day period. During the observation period, the AQD daily limit for PM10 was exceeded on five days. It may not sound like much, but that is already a significant portion of the 35 allowed exceedances in one calendar year.

The WHO daily limit for PM2.5 was breached on 18 days, which is 64% of the observed time and six times more than the recommended 3 days. Furthermore, with additional mines in the pipeline, air quality can be expected to worsen.



Sajókápolna: daily average PM10 and PM2.5 concentrations

The high percentage of PM2.5 indicates that the biggest contributors to air quality deterioration in the village are local households that heat their houses with coal (which is provided at a low price by the lignite mine operator). In fact, the sole consumer of Sajókápolna coal is local communities. This location is a perfect example of how burning cheap lignite for household heating damages air quality and seriously contributes to greenhouse gas emissions even in a remote village surrounded by forests.

The fact that burning cheap lignite for household heating damages air quality and seriously contributes to greenhouse gas emissions is generally acknowledged, but not acted upon. For every citizen to have access to clean air, the whole energy sector of the country must be reconsidered. Individual household heating practices should be included in the energy transformation of the country, as they constitute an important part of the decarbonisation process.

Novaci, North Macedonia

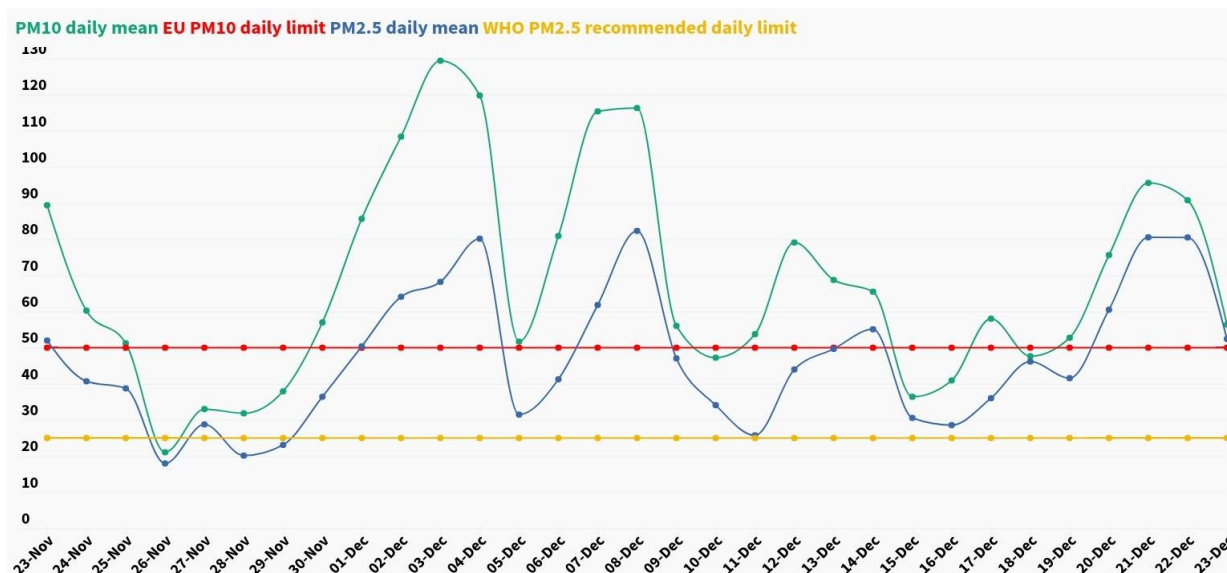
Monitoring period: 23.11.2018 - 23.12.2018

The Novaci municipality is home to Macedonia's REK Bitola complex, which consists of a 675 MW lignite power plant, a large area of mines and ash disposal sites. Spread out to the east of the village, the complex creates a high concentration of pollution in a small area. Novaci and several other surrounding villages are taking the main blow, but are still not monitored by the national air quality monitoring network.

In November-December 2018, we monitored air quality in Novaci over a 30-day period. The measurements show that the limit values for both PM10 and PM2.5 were exceeded almost every day.

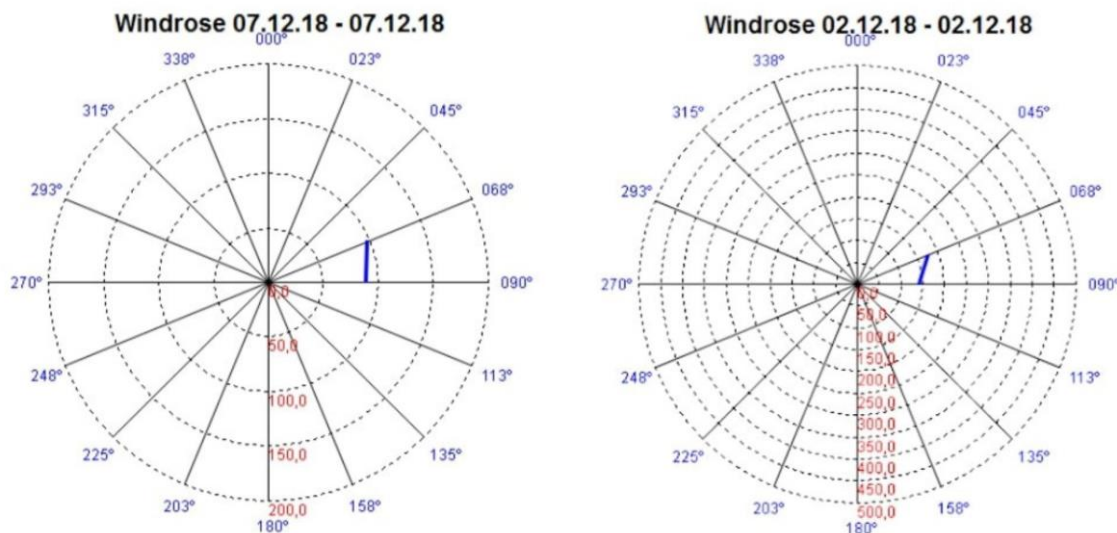
The AQD daily limit for PM10 was exceeded on 22 days in one month. This makes up nearly two-thirds of what is allowed for the whole year. Half of those exceedances were two or more times over the daily PM10 limit. A deeper analysis of the results shows hourly mean values of up to $400 \mu\text{g}/\text{m}^3$, with short-time values regularly going up to $800 \mu\text{g}/\text{m}^3$.

The WHO daily limit for PM2.5 was exceeded on 27 of the 30 days monitored, with values going up to three times above this limit-- pushing the monthly average to $47 \mu\text{g}/\text{m}^3$ during the observation period.



Novaci: daily average PM10 and PM2.5 concentrations

December 7 saw the highest hourly average of PM10 values. The wind direction analysis between 15:00 and 23:00, when these peaks were recorded, shows the wind blowing from the east, where REK's mining and ash disposal facilities are located. The same phenomenon was recorded on December 2, between 16:00 and 22:00, the day with the second highest PM10 spikes.



The year 2019 showed some signs of progress on the air pollution front in Macedonia, both on the government's side and by the legal system. In September, the public prosecutor's office in the city of Bitola filed criminal charges against the REK Bitola coal power plant and its former director for failure to implement mitigation measures at the plant's ash landfill. At the end of the year, after 13 years of delays, works on granting an environmental permit for the complex were restarted. The draft permit envisages reconstruction of the electrostatic filters before 2023 and the building of a desulphurisation unit before 2026. At the same time, the country's new energy strategy recommends closure of the power plant by 2025 in two out of three scenarios.

The year 2020 will be important for the future of REK Bitola. However, local communities in the area have been waiting too long for these decisions that are already way overdue.

Pljevlja, Montenegro

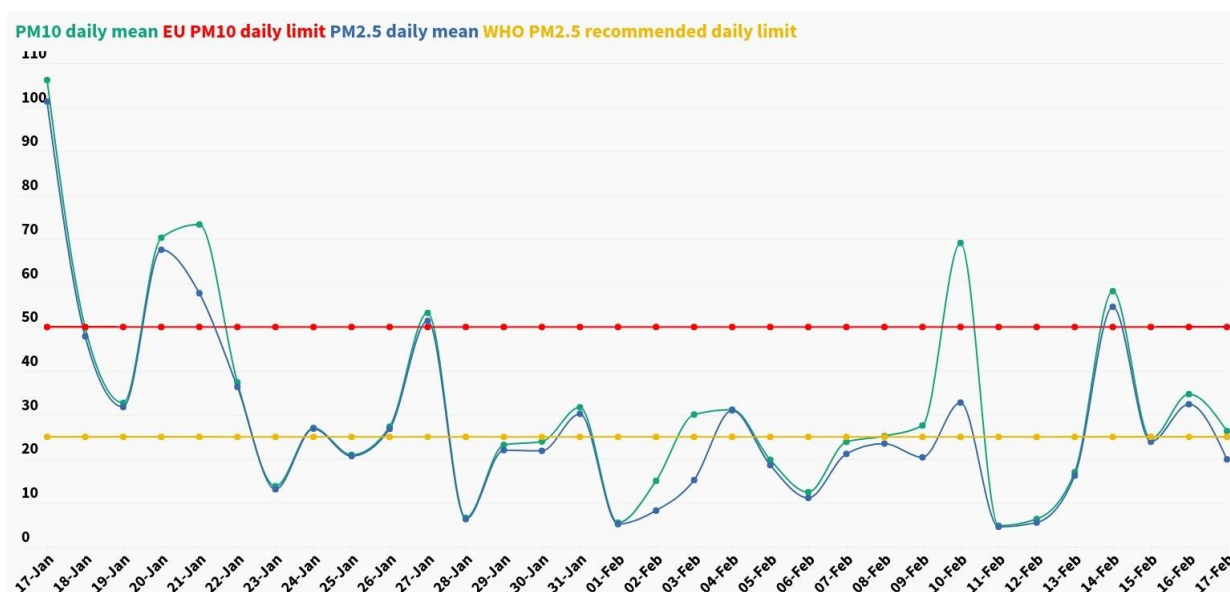
Monitoring period: 17.01.2019 - 17.02.2019

Pljevlja is home to the only lignite power plant in Montenegro-- both the coal mine and the power plant are within 2 kilometres of the town. These facilities, combined with the heavy use of cheap coal for household heating, create a toxic cloud that engulfs Pljevlja throughout the year.

Our second round of monitoring in Pljevlja took place during January-February 2019. We monitored PM 10 and PM 2.5 concentrations over a 30-day period. Ironically enough, the data for many of the monitored days is incomplete due to frequent power outages in the host's house. Also, weather conditions favourable to good air were driving air pollution away from the monitoring station. However, data collected over the observation period still shows occasional breaches of limit values and high hourly values.

According to collected measurements, the AQD daily limit for PM10 was exceeded on 6 of the 30 days. On those days hourly measurements from 150 up to 290 $\mu\text{g}/\text{m}^3$ were recorded.

Measured dust in large part consisted of PM2.5 particles, which is usually a sign that the dust emissions are produced by combustion processes. The WHO daily limit for PM2.5 was breached on 14 of the 30 days with hourly values regularly reaching over 100 $\mu\text{g}/\text{m}^3$.



Pljevlja: daily average PM10 and PM2.5 concentrations

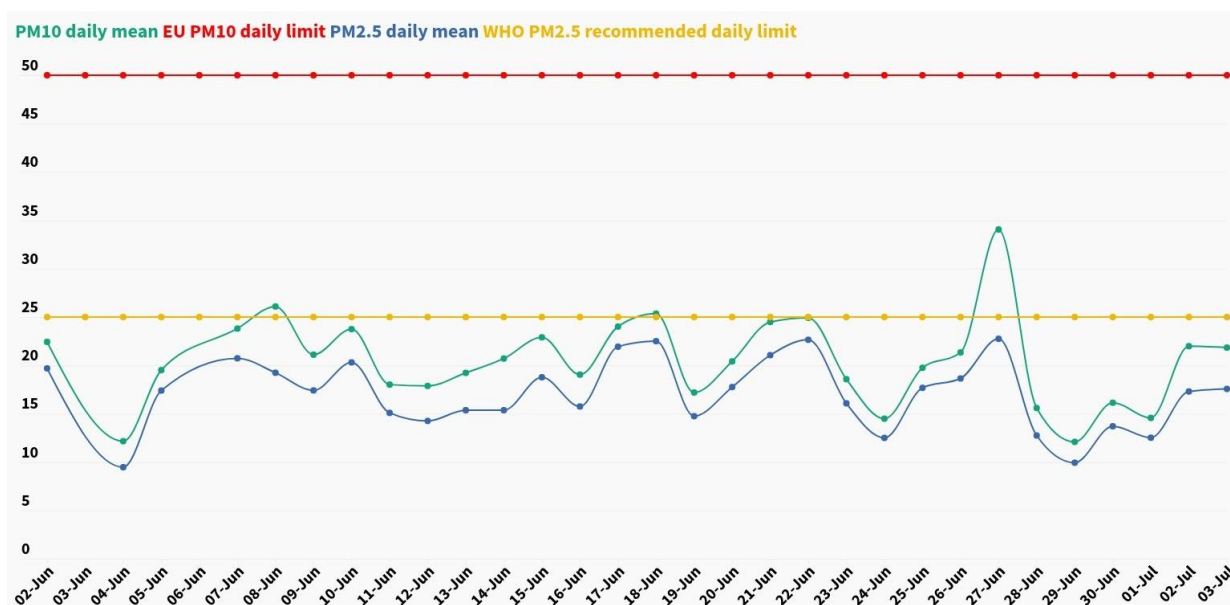
Fortunately for the citizens of Pljevlja, in 2019 the government canceled plans to build a second unit in the power plant, since the air quality is bad enough with just one unit. The Pljevlja I unit is going to operate for a total of 20,000 hours between 1 January 2018 and 31 December 2023 and has already used up more than half of those during 2018 and 2019. It will have to undergo a retrofit to comply with emissions limit values before 2023 if it is to continue operation, and has already obtained an environmental permit for it, but the specific timeline for the retrofit remains unclear for now.

Veliki Crljeni, Kolubara, Serbia

Monitoring period: 02.06.2019 – 03.07.2019

The Kolubara A lignite-fired power plant is situated in the Veliki Crljeni settlement, 30 kilometres south-east of Serbia's capital Belgrade, where together with the nearby open-cast lignite mine it provides most of the employment for locals. It is the oldest operational thermal power plant in Serbia, with the first blocks put into operation in 1956. With an installed capacity of 270 MW, it had the biggest electricity production capacity in Serbia at the beginning of the 1980s, before the nearby Nikola Tesla A plant was built and upgraded.

We monitored the concentration of dust pollution in Veliki Crljeni for 31 days. Most likely because of low electricity demand during the period, the plant was not operational during the time of our monitoring. This is why we did not register any breaches of the EU and national limit values and the WHO recommended values. The results, as can be seen from the graph, were even surprisingly low – showing that this village can have mountain-clean air when the plant is not working. But this does not change the fact that according to the municipal monitoring station, during the first 5 months of 2019, the 24-hour legal limit for PM10 was breached an astonishing 86 times – 250% more than the allowed 35 breaches during one calendar year.



Veliki Crljeni: daily average PM10 and PM2.5 concentrations

Because of its old age and the lack of investments that would be needed to bring it in line with the LCPD emission limit values, the power plant is the third biggest emitter⁷ of particulate matter (PM10) in Europe, in spite of the fairly low production capacity compared to the other most polluting plants. Its capacity can be easily replaced with renewable energy facilities and it is ripe for closure.

Stanari, Bosnia-Herzegovina

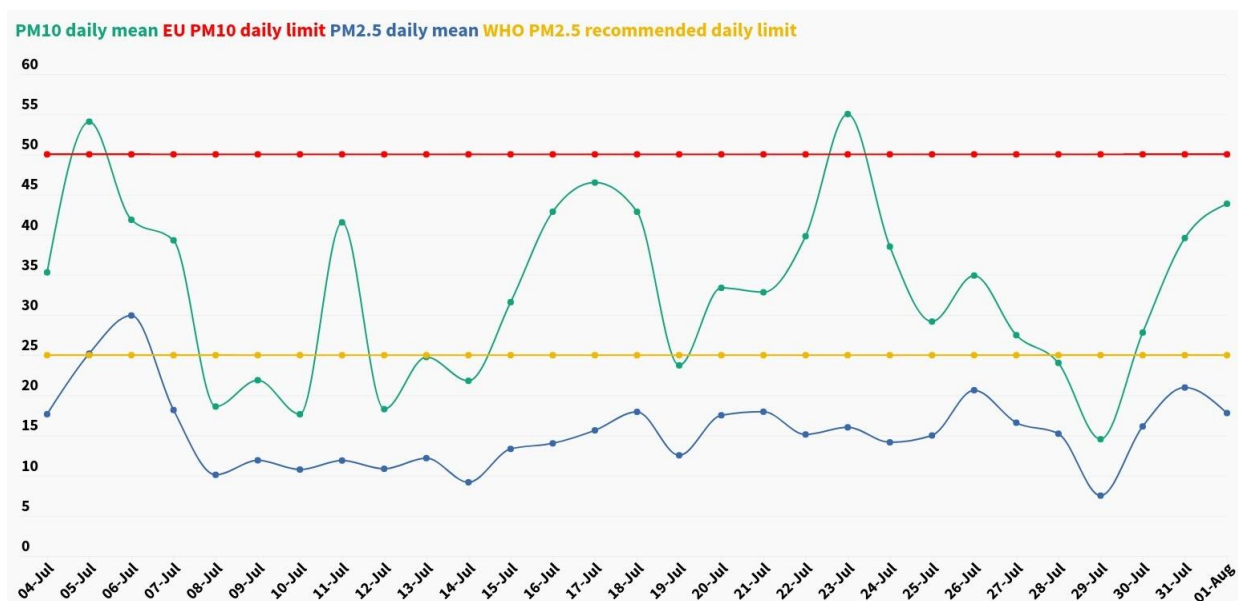
Monitoring period: 04.07.2019 - 01.08.2019

Stanari power plant is owned by EFT Rudnik i Termoelektrana Stanari d.o.o., a subsidiary of the UK-headquartered EFT Investments SE. The power station is located near the Stanari coal mine, which is located approximately 70 kilometres east of Banja Luka in Republika Srpska. It is the first privately-owned power plant in the Western Balkans and the first one built in the region in the last 30 years. The project was initiated by Energy Financing Team (EFT) and financed by the state-owned China Development Bank (CDB). Construction was carried out by Dongfang Electric Corporation from China. Originally the project was planned and permitted to be 420 MW, using supercritical technology, but was later changed to 300 MW and lower efficiency subcritical technology. No updated EIA was carried out based on the new plans.

We monitored the dust pollution in Stanari between 4 July and 1 August 2019. The chosen location was at a similar distance from the power plant and from the mine in order to try to evaluate how they are impacting air quality separately.

As can be seen from the graphs below, and as was expected for the summer period, there were not many breaches of the PM10 and PM2.5 limit values – the national (and EU) daily limit for PM10 was exceeded twice and so was the WHO recommended daily limit for PM2.5. However, short-term dust pollution peaks were alarming, regularly reaching values over 400 $\mu\text{g}/\text{m}^3$ with the highest peak being 830 $\mu\text{g}/\text{m}^3$.

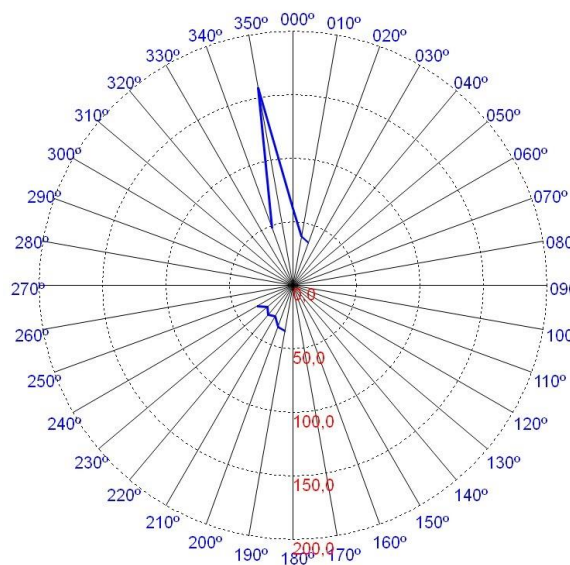
⁷ <https://beyond-coal.eu/data/>



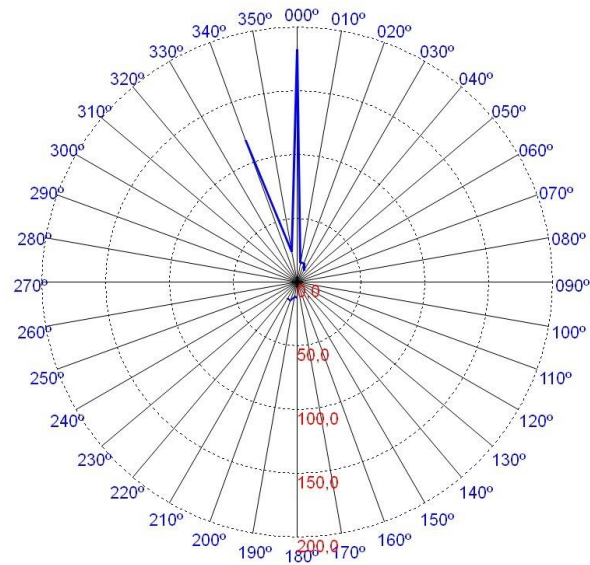
Stanari: daily average PM10 and PM2.5 concentrations

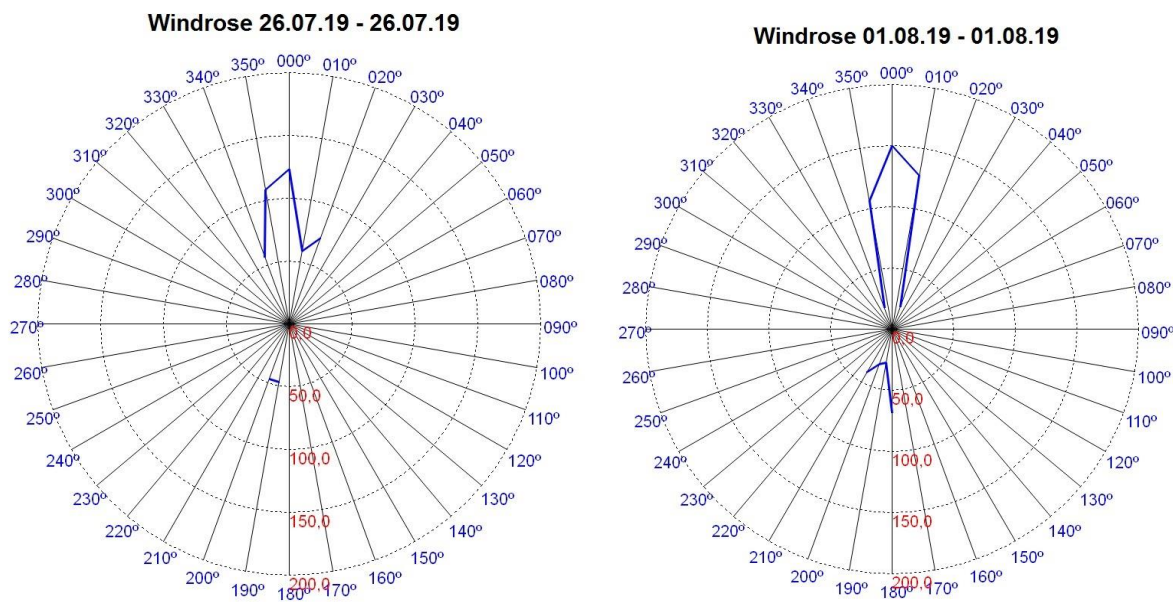
An analysis of the results reveals that the ash disposal site, the lignite mine and the conveyor belts, spread out north of the location of where the dust monitor was installed, are an enormous source of particulate matter pollution. Every time the wind was blowing from the side of the mine, the monitor recorded high peaks of pollution regularly surpassing $300 \mu\text{g}/\text{m}^3$ – with the highest one on the morning of 17 July reaching $828 \mu\text{g}/\text{m}^3$.

Windrose 07.07.19 - 07.07.19



Windrose 11.07.19 - 11.07.19





The Air Quality Directive requires continuous monitoring in the nearest residential area to industrial sources for the purpose of health protection, which Stanari does not have. Through such monitoring, sources of air pollution can be properly identified and mitigation measures can be taken; only by reducing emissions from all sources can pollution levels be kept within legal limits.

Since we have now shown that the mine is a major source of particulate matter, urgent measures, in the form of an automated sprinkler system and a properly-placed protective tree belt, should be taken as soon as possible. Continuous air quality monitoring with real-time, publicly available information must be installed in Stanari to monitor the effectiveness of the measures taken and to provide input for their future improvement, as well as to alert residents when pollution peaks occur so they can protect themselves. The plant's emissions for 2018 must be reported to the Bosnia-Herzegovina government as it is legally required by the LCPD and then submitted to the European Environmental Agency.

Șimnicu de Sus, Craiova, Romania

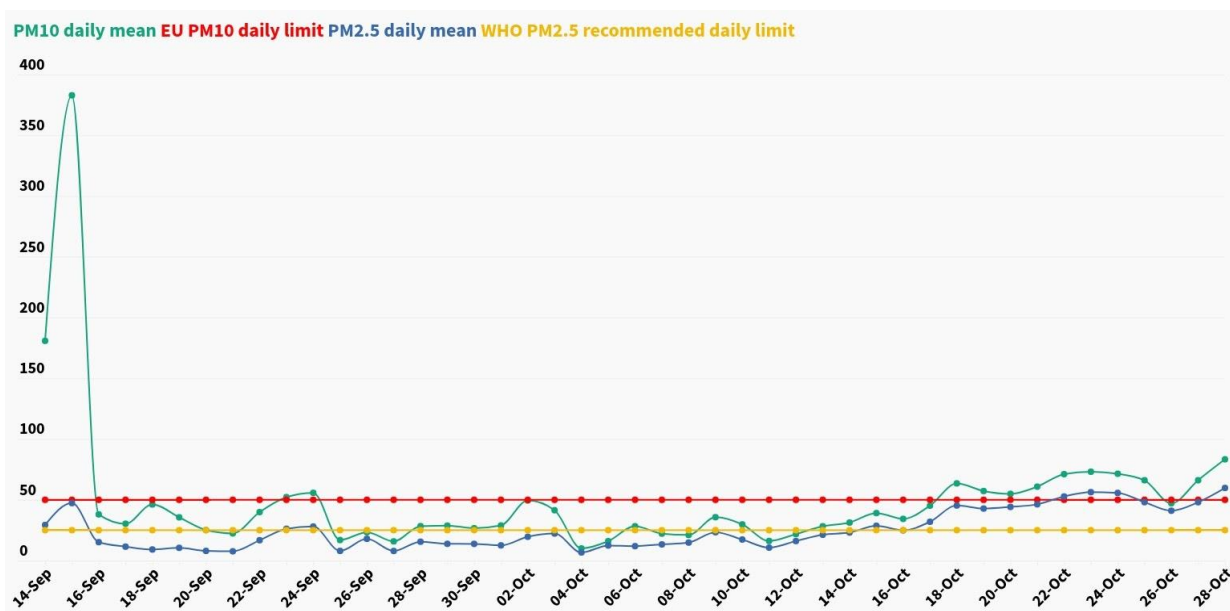
Monitoring period: 14.09.2019 - 28.10.2019

Șimnicu de Sus is a small village several kilometres north of Craiova – the biggest city in Romania's lignite region. The wider city area is home to two coal-fired power plants, Ișalnița and Craiova II, with installed capacity of 630 MW and 300 MW respectively. They dominate the landscape of the city – especially the Ișalnița power plant with its 200 metre high chimney. What is not so easy to see is their ash disposal sites, one of which is located on the hill above Șimnicu de Sus.

In an effort to get more details on the occurrences of flying ash from the disposal site, we monitored the dust concentrations in Șimnicu de Sus for a total of 45 days between 14 September and 28 October 2019.

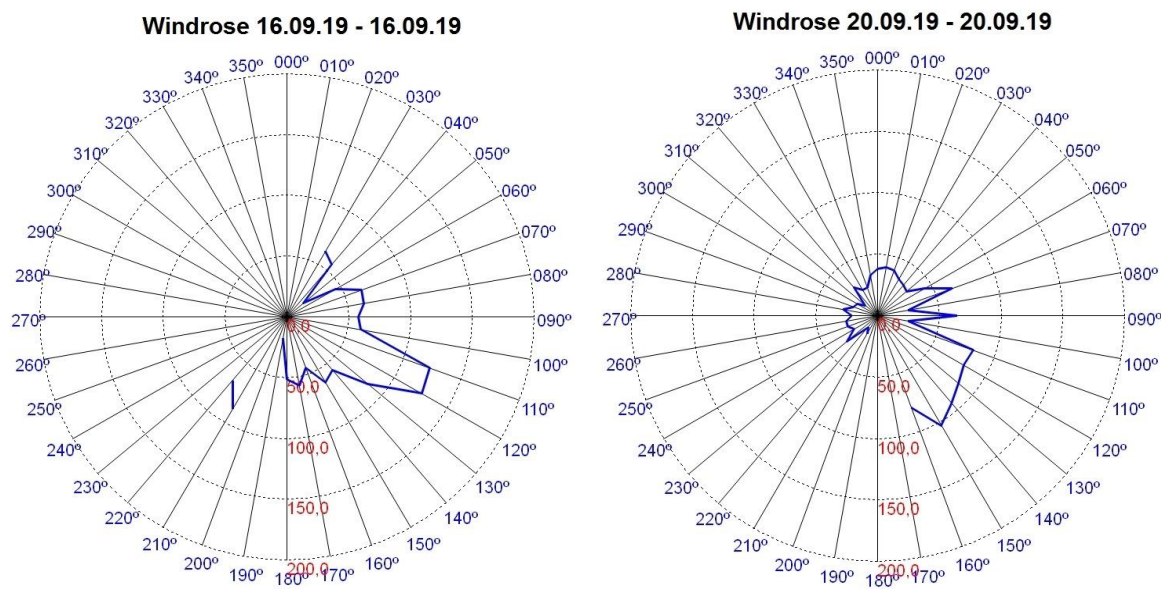
These daily limit values were exceeded on a significant number of days during our 45-day monitoring period. The AQD daily limit for PM₁₀ was breached on 14 days with an increasing trend in the 24-hour concentrations starting from mid-October. Assuming this trend continued, the limit of 35 exceedances seems impossible to achieve during one year.

PM_{2.5} daily mean concentrations show 17 breaches of the WHO recommended daily limit. Their trend also increased starting from mid-October, when we began to get regular 24-hour values two times higher than this health protective limit value recommended by the WHO.



Şimnicu de Sus: daily average PM10 and PM2.5 concentrations

By using wind direction to determine possible sources of air pollution, there are some cases where the ash disposal site, spread out east of the monitoring location (50-140° on the graphs), can be singled out as a major source. The most obvious ones are on 16th and 20th September, but similar results emerged on several other days.



At the end of 2018 the Romanian government published a draft decision for the expansion of Craiova II's ash disposal site, Valea Mănăstirii. Under the pretence that the project is of public interest, the state offers financial support for the cost (RON 2,775,721 or approximately EUR 580,000) of the expropriations necessary for the expansion. The money is supposed to be used by Olternia Energy Complex – the utility that operates both the power plant and the ash disposal site – to handle the expropriations, which should be done successively until 2025.

The Romanian Environmental Guard should also produce their own independent measurements of the PM pollution in the Șimnicu de Sus area. At the same time, they need to make sure that OEC respects the existing laws regarding air pollution with PM by making sure that OEC uses sprinklers to reduce emissions from the ash disposal sites. Furthermore, the Romanian government should cancel the plans to offer state aid to Oltenia Energetic Complex for the expansion of Valea Mănăstirii ash disposal site, stop using public money to support coal facilities and turn their investments into air pollution monitoring and reduction and energy transition.

Galabovo, Bulgaria

Monitoring period: 14.11.2019 - 09.12.2019

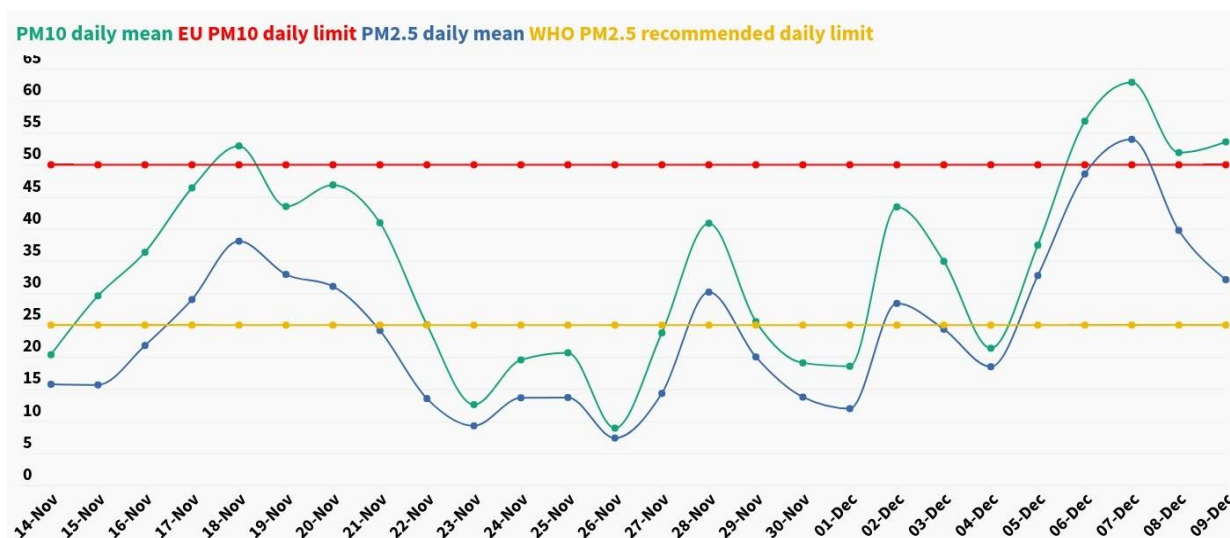
Galabovo is a small town in the heart of Bulgaria's coal region. It is located less than 10 kilometres from the biggest lignite mining operation in the country, Maritsa East, and it is home to two coal-fired power plants. The newer one is the 670 MW plant, AES Galabovo, that started operation in 2011. Right next to it is the dinosaur Maritsa East 1, also known as Brikel, that started operation in 1962. This one produces both electricity, with an installed capacity of 360 MW (supposedly only 180 MW are currently in use), and central heating, with an installed capacity of 170 MW, for the town. They are both less than 2 kilometres north-east from the outskirts of Galabovo. In addition, the town borders an ash disposal site to the north which is less than 500 meters from the nearest houses.

Brikel, together with the power plants Bobov Dol and Pernik, is part of the major waste burning scandal currently ongoing in Bulgaria. Apparently, these plants were using waste as a substitute fuel during 2019 without the necessary environmental permits.

With all these capacities around the town, even when best techniques and practices are applied, it is inevitable that the air quality will be affected. However, the official air quality monitoring station in Galabovo monitors only sulphur dioxide and nitrogen dioxide concentrations and does not monitor coarse (PM10) and fine (PM2.5) dust particles at all.

We installed our environmental dust monitor in the northern part of Galabovo, around one kilometre from the ash disposal and two kilometres from the power plants and we monitored dust concentrations for 26 days.

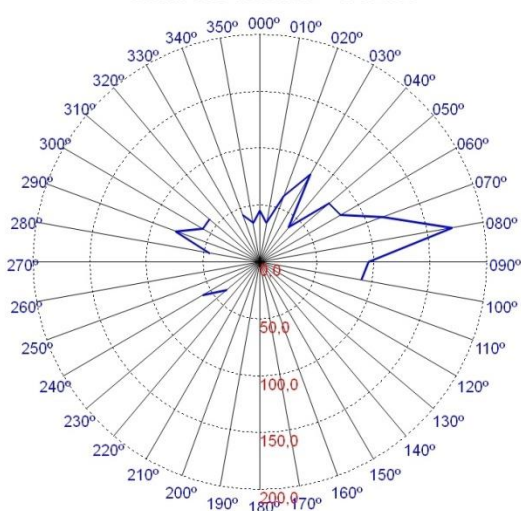
According to collected data, the AQD daily limit for PM10 was exceeded on 5 out of 26 days of monitoring. For the more health-damaging PM2.5, the WHO daily limit of 25 $\mu\text{g}/\text{m}^3$ was exceeded on 11 days, which is already a lot more than what WHO recommends for proper health protection of the population.



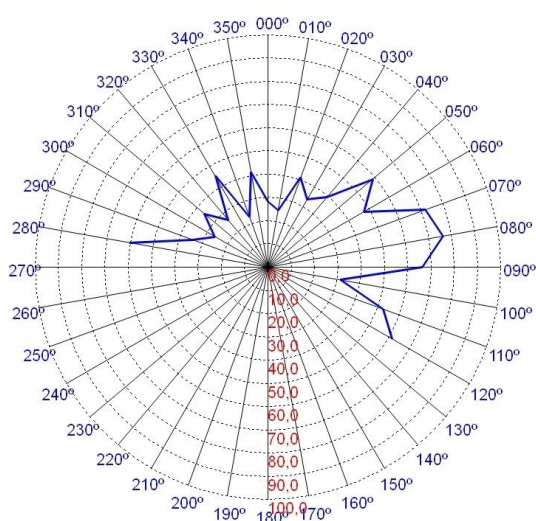
Galabovo: daily average PM10 and PM2.5 concentrations

By including the wind direction and wind speed data into the analysis of the high pollution peaks, it becomes visible that high levels of dust pollution originate from the direction of the ash disposal site and from the direction of the power plants.

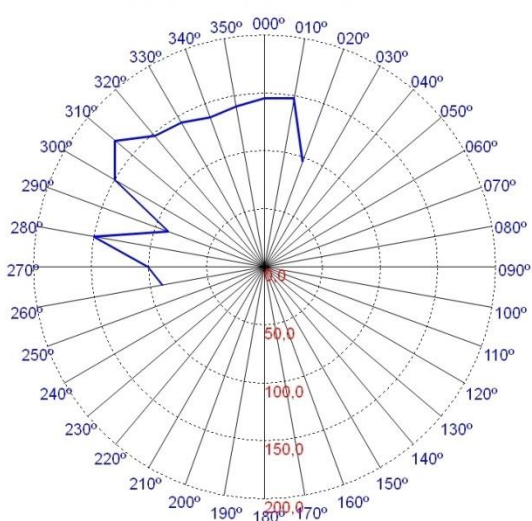
Windrose 17.11.19 - 17.11.19



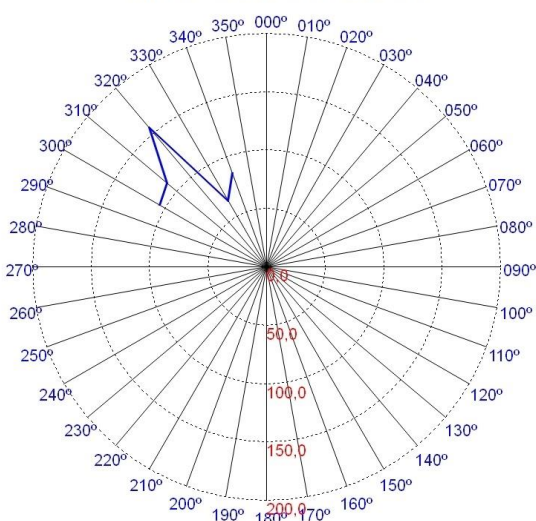
Windrose 21.11.19 - 21.11.19



Windrose 02.12.19 - 02.12.19



Windrose 07.12.19 - 07.12.19



As dust pollution is inevitable with coal utilities, the Bulgarian government should urgently include PM10 and PM2.5 monitoring in Galabovo. A protective tree belt must be planted between the ash disposal site and the town to reduce the exposure to dust particles of the population. The Maritsa East 1 power plant should be shut down soon as it is already working beyond its optimal lifetime.

CONCLUSIONS

The findings from CEE Bankwatch Network's independent air quality monitoring at this new set of coal-dependent locations continue to support the argument that air pollution standards can almost never be met as long as coal utilities are in place and that this is not limited to non-EU countries or outdated power plants. As seen above, even where coal-fired power plants are relatively new and have the minimal legal environmental standards in place, supporting facilities like open-pit mines and ash disposal sites remain a major source of dust pollution.

After almost four years of monitoring in 15 different locations in Central, Eastern and Southeast Europe, the inevitable conclusion is that the energy sector is in desperate need of prompt transformation towards decarbonisation as the only way to bring environmental conditions to acceptable levels. This is especially the case in Western Balkan countries where, unfortunately, except for Albania, North Macedonia and Montenegro, countries are still considering building new coal utilities instead of phasing-out the existing ones and switching to sustainable energy sources.

RECOMMENDATIONS

While long-term decarbonisation is becoming non-negotiable, the short-term protection of human health and the environment requires more urgent action on different levels.

To the national governments:

- Environmental authorities in the Western Balkan countries, Romania, Bulgaria and Hungary must ensure that existing official monitoring stations measure also PM and must make the measurements available in real-time. The national authorities in these countries are recommended to thoroughly monitor air pollution levels in locations prone to high emissions because of coal mining and combustion activity and to make this data available to the public.
- Fugitive emissions from coal-related facilities, such as mines and ash disposal sites, must be subject to continuous monitoring.
- In the Western Balkan countries, all lignite-fired power plants must install continuous monitoring of emissions and publish the data.
- Romania must include a coal phase-out year in the National Energy and Climate Plan.
- All Energy Community contracting parties must cancel all plans for new coal capacities.
- National authorities are encouraged to design a long-term vision that would prioritise decarbonised energy generation sectors across the region, putting energy efficiency first, and requiring cleaner/alternative fuels and electrification for all modes of transportation as well as strict enforcement of air quality standards.

To the Energy Community and the European Commission:

- The European Commission and Energy Community must ensure LCPD enforcement in Energy Community contracting parties. The countries must take all necessary investments and measures to bring emissions within the ceilings set out in the National Emissions Reduction Plans. This includes reducing operating hours during peak pollution periods.
- The European Commission should table a proposal for the adoption of the Air Quality Directive or National Emissions Ceilings Directive, adapted for network energy, in the Energy Community as soon as practicably possible. The Energy Community is recommended to adopt and implement this legislation promptly after a proposal is presented by the Commission, in order to avoid further worsening of air pollution and its deadly impacts on health.