BALKANS UNITED FOR CLEAN AIR

CONTENT

IN THE WESTERN BALKANS, WE LIVE IN A POISONOUS CLOUD

Western Balkans has the worst air quality level in Europe – causing 13,500 premature deaths in the region every year. The harmful effects of the region's obsolete coal-fired thermal power plants can be measured all the way to Egypt. Major health consequences are also caused by the use of fossil fuels in the industry, household heating boilers, agriculture, and transportation. How can we start breathing again?

Is there another burning dumpster in the neighborhood? Not likely, because the unpleasant smell can be sensed for miles around. It is absorbed by hair and clothes and irritates the eyes. You can feel it in your mouth. Spots of haze seem to appear between the branches in tree crowns, though the line of trees across the road can't be seen clearly either.

Air pollution approaches its task in an absolutely democratic fashion – it endangers everyone. We can listen to the warnings and shut our windows, give up jogging and football and not let our children out. To a certain extent, we can protect ourselves at home using air purifiers. But there is no true escape.

The entire Western Balkans is equally affected, especially during the heating season and when there is no wind to carry the poison elsewhere. Oftentimes, we can see and sense this common enemy. It has made it abundantly clear that it is by no means shy. As the old saying teaches us, we need to know it well to defeat it, and it is high time for all of us to wage a battle against pollution in this region.

There is no room for procrastination, and the coronavirus pandemic only worsens the situation. The consequences of air pollution can aggravate an infected person's symptoms, but also render an organism more prone to infections, including COVID-19.

According to World HealthOrganization's data, almost13,500 people died in 2016 due to exposure to ambient air pollution in the Western Balkans: 3,051 in Bosnia and Herzegovina, 486 in Montenegro, 1,451 in North Macedonia, 6,592 in Serbia, and 1,855 in Albania. The report contains no specific data on Kosovo.

WHO also determined that just exposure to airborne type PM2.5 solid particles emitted by coal-fired thermal power plants causes almost 9,500 premature deaths every year in the western Balkans, out of almost 13,500 deaths per year that occur because of the overall air pollution, most of the deceased being of working age.

A study published by HEAL, Sandbag, CAN Europe, CEE Bankwatch and Europe Beyond Coal has shown that 3,906 persons had prematurely died in 2016 due to air pollution produced just by coal-fired thermal power plants in the Western Balkans. In fact, the majority of those cases occurred outside of the region, in European Union member states.

According to the results of the 2019 research conducted by the United Nations Environment Programme (UNEP) only in 19 larger cities [1], not including Kosovo, direct exposure to polluted air prematurely claims the lives of almost 5,000 people every year.

States are not issuing consolidated data on the air pollution's economic consequences

State finances are under pressure, mainly because of the treatment costs and years of life lost. However, despite being one of the major cost items, air pollution-induced expenditures are not presented in consolidated form as part of the government budgets.

The aforementioned study specifies that coal-fired thermal power plants in the Western Balkans cause economic damages in the form of healthcare costs amounting to between €6.1 and €11.5 billion per year, more than half of which is borne by the EU.

The Western Balkans account for a third of the total, while the consequences can be felt as far as Russia and Egypt. The money which is lost this way in a year or two in our region would suffice for the construction of solar power plants which could replace almost all of the existing coal-fired power plants.

On the other hand, calculating the suffering of people who become ill due to air pollution or whose condition worsens during episodes of extreme pollutant concentrations is beyond expert assessment.

We also shouldn't exclude the consequences on their families and the companies in which they are employed. The most vulnerable groups include patients suffering from chronic diseases, children and the elderly.

One should also consider the fact that hazardous airborne substances and compounds propel climate change and that the bill in this department will be enormous, too – for instance, in the form of floods, droughts and epidemics.

[1] 1 Korçë, Banja Luka, Brod, Prijedor, Sarajevo, Tuzla, Zenica, Bar, Nikšić, Pljevlja, Podgorica, Tivat, Bitola, Skopje, Tetovo, Belgrade, Pančevo, Užice and Valjevo

Where pollutants come from

The permitted, i.e. tolerable concentration of air pollutants is often exceeded in this part of Southeast Europe. Unfavorable weather conditions can also be a negative contributor.

The previously discussed particulate matter, also called fine particles, has the most harmful effect on humans. These fine particles are mainly measured in categories of up to 2.5 micrometers (PM2.5) and up to ten micrometers (PM10), and their concentration is given in micrograms per cubic meter.

Only special masks can somewhat protect us from their penetration into our lungs and further into the organism since the particles are too small to be blocked by surgical and cotton masks. However, they penetrate the skin, too.

Exposure to particulate matter is linked with a series of diseases, ranging from cardiovascular and respiratory illnesses, diabetes and dementia, infertility, leukemia in children, and lung cancer. The smaller the particle, the deeper and easier will it penetrate the body.

The most commonly measured pollutants include ozone (O3), nitrogen oxides (NOx) carbon monoxide (CO), and sulfur dioxide (SO2). In certain locations, there is also a presence of airborne heavy metals, which come as a result of industrial processes and combustion. A specificity of sulfur dioxide is the fact that it reacts to form so-called secondary particulate matter in the atmosphere.

Coal-fired thermal power plants and the industry are among the main sources of sulfur dioxide emissions in the Western Balkans, whereas nitrogen oxide emissions stem predominantly from coalfired thermal power plants and traffic pollution. In most countries in the region, SO 2, NO x, and PM emissions from large plants exceed the limit values defined by national plans for the reduction of emissions.

Of all the air pollutants, fine particulate matter is the biggest killer

In Bosnia and Herzegovina, limit values are exceeded in the case of PM10, SO2, O3, and nitrogen dioxide (NO 2). Concentrations of PM10, NO2, and O3 in Serbia and North Macedonia often exceed the maximum permitted values. Albania's population is highly exposed to nitrogen dioxide and ozone.

Of the 37 countries submitting reports to the European Environment Agency, eight have exceeded the maximum recommended level of exposure to PM2.5 during 2018. Five of those are Western Balkan countries (all Western Balkan countries except Montenegro, for which no data was available).

The PM10 daily limit value in Western Balkan cities was exceeded on 120-180 days a year - the proscribed limit being 35 days a year. Citizens of Albania, Bosnia and Herzegovina, Montenegro, Kosovo, Serbia and North Macedonia suffer because of pollutants from power plants and heating plant chimneys, as well as factories using coal and oil products. Air is being poisoned by fossil fuel processing plants and obsolete household furnaces. Considerable pollution also comes as a result of construction and agricultural activities and
traffic.

Apart from the fact that public health and the environment are jeopardized by fires at uncontrolled landfills, in recent years a part of the population has been increasingly burning plastic, rubber and discarded varnished and painted wood in their household furnaces. This is not necessarily out of lack of knowledge or a whim, but rather a manifestation of poverty - energy poverty, in this case.

Furthermore, we are creating an increasing amount of waste, and the system has no adequate response, nor does it with regard to other air quality issues.

Pressure and association as means for getting clean air

What is left to be done then? First and foremost, institutions are responsible to the citizens. United Balkans for Clean Air joins the solidary, common struggle by citizens of every street, neighborhood, village and city in the Western Balkans to be able to breathe clean air.

On a global level, coal is becoming an ugly memory. It is already more profitable to build solar power plants and wind farms than to maintain the majority of existing thermal power plants, even the newer ones. Equipment for the production of energy from renewable sources is becoming drastically cheaper. Companies that produce and use coal face increasing expenses for obtaining licenses to emit carbon dioxide and complying with environmental regulations. They are speeding up their plans to shut down or, at least, switch to other fuels.

Sixteen coal-fired thermal power plants in Western Balkan countries have emitted more sulfur dioxide in 2016 than all of the 250 plants in the EU combined.

According to the data from the 2016 report published by HEAL and other organizations, sixteen coalfired thermal power plants in the Western Balkans, which remains their number to this day, have emitted more sulfur dioxide (SO 2) than all of the 250 such plants operating in the European Union combined. According to the data gathered by Europe Beyond Coal, there are only 219 active coal- fired thermal power plants with capacity larger than 15 MW left in the EU and Great Britain. In the wider region which includes Turkey, only last year, investors have cancelled plans for the construction of nine plants and shut down or announced the shutting down of an additional 68.

It is almost certain that the few remaining projects will be halted, the question remaining what will happen with the ones in mid-construction. Almost half of EU members intend to completely phase out coal within ten years, and this number could easily increase. There are similar tendencies in Japan, China, and the United States. Meanwhile, Serbia and Bosnia and Herzegovina are still pushing their plans for new thermal power plants.

The dirty coal industry should not be financed with public money.

One way or another, countries in the region spend enormous amounts of taxpayers' money on coalmines and the construction, maintenance and reconstruction of thermal power plants. As this sector is losing its market battle against renewable energy sources, it cannot survive without subsidies. It doesn't take a genius to conclude that these funds could be used in a more sensible way.

The pollution monitoring station system still fails to comply with all the necessary criteria. Here, too, there is room for citizens' involvement. Numerous small household appliances for measuring air quality are networked via popular apps, thus controlling the at times unreliable official data on air pollution.

In North Macedonia, there are already incentives to replace fossil fuel heating appliances in households with cleaner solutions, which could be a positive example for the other countries in the region, as well.

There are modest improvements elsewhere in the Western Balkans, especially concerning the construction of heating plants that use renewable energy sources. Biomass plants are emerging all over Serbia and Bosnia and Herzegovina, and the entire region is witnessing an increased usage of geothermal pumps for heating and cooling.

The Balkans' energy transition can only be achieved by joining forces

Eliminating the use of coal is the most important factor for the improvement of air quality

The states in the region should be well aware of the fact that there is no future with obsolete thermal power plants and that an accelerated transition to solar and wind energy is the only choice. Since it depends on weather conditions, the functioning of such a system requires the connection of the Western Balkan countries' power grids and the construction of electricity storage facilities.

These are the most important measures to reduce air pollution. However, serious progress is also predicated on stricter air quality control standards and the improvement and strict implementation of regulations concerning polluters – both in the case of state-owned thermal power plants and those under private ownership.

In November last year, all six countries in our region have signed the Sofia Declaration, thus committing to the Green Agenda for the Western Balkans and to following the EU's policies and the European Green Deal. The latter envisions achieving climate neutrality by 2050. Regional cooperation is a path towards improving air quality, as is technological advancement and raising economic competitiveness, with the possibility of ambitions reaching beyond the goals defined in the document.

The Green Agenda for the region implies regulating the cross-border impact of air pollution, adopting strategies for the improvement of air quality, and raising the capacity of measuring systems.EU leaders have hinted that access to non-refundable funds and cheap loans will not be possible if the objectives are not being fulfilled.

The process of installing renewable energy production devices in households should be made easier for citizens. Furthermore, energy efficiency projects in the field of building design and construction, as well as incentives and tax breaks, could significantly decrease energy consumption.

All this so that the air becomes transparent and odorless again, except for the smell of nature. Tasteless, too! Let there be real fog again, instead of smog and dust clouds.

MISFORTUNE NEVER COMES ALONE: AIR POLLUTION AND COVID-19

For years, Western Balkans has been one of the regions in Europe most affected by air pollution. Cities in this region frequently top the lists of the world's most polluted cities. When one adds to this the global COVID-19 pandemic which to a great extent marked 2020 and is still ongoing, results in an additional increase in respiratory disease and higher mortality rates.

Misfortune never comes alone – this is a well-known saying in Western Balkans. It was practically reinforced by the year 2020 when the impoverished, air pollution-affected societies were additionally hit by the COVID-19 pandemic.

The main cause of air pollution in the Western Balkans is particulate matter (PM), which has a negative influence on the same cells and cell components in the human organism as the coronavirus does. For that reason, persons who are exposed to air pollution on a daily basis have weaker immune systems, hence the organism's response to the presence of coronavirus is more volatile, which contributes to the development of more severe forms of COVID-19, including more frequent deaths.

Long-term exposure to harmful airborne substances increases the risk of acute and chronic diseases, mostly those affecting the respiratory system. As a result of its impaired function, it becomes more prone to the influence of virus infections, including the one caused by the coronavirus (SARS-CoV- 2).

Air Pollution and COVID-19: What are the causal links?

At the very beginning of the pandemic, research and studies have emerged which link the increased number of COVID-19 infections and deaths in regions with polluted air.

Before we present individual research results, it should be noted that a positive correlation between air pollution and the number of COVID-19-infected persons is a priori expected, given that air pollution correlates with high population density, hence with a high number of deaths. A clear conclusion on whether air pollution contributes to the risk of death from COVID-19 requires long-term epidemiological studies and the consideration of numerous factors. Such scientific papers are still being drafted and we cannot state with absolute certainty whether there is a causal link between air pollution and COVID-19.

Research from China, England, the USA, Germany, the Netherlands, and Italy have shown that increased air pollution can cause an increase in the number of infections, as well as higher COVID-19 mortality rates. [2] Research in Germany shows that a PM10 increase also raises mortality in COVID-19 patients aged over 80, by 30% in men, and 35% in women. [3] When comparing this data, one can conclude that air pollution increases COVID-19 mortality rates, by 15% globally, and by 19% in Europe. [4] As previously stated, the main cause of air pollution is particulate matter, and an increase in its concentration by 1 microgram per cubic meter increases COVID-19 mortality by 11%. [5]

Unfortunately, when it comes to the Western Balkans region there is still a lack of relevant studies and research, which prevents us from offering concrete data. It is very likely that this data would not differ with regard to this region, one even assumes that it would be worse. Even without the influence of COVID-19, air pollution in the region causes up to 13,500 premature deaths every year; so far, 693,902 people have contracted COVID-19, and 13,423 have died as a result of it.

How to improve the epidemiological situation and achieve cleaner air in the Western Balkans?

The number of evidence and scientific studies on the link between air pollution and COVID-19 is growing on a daily basis. However, as we have stated, one should take into account these studies' limitations. In order to react properly, it is necessary to make decisions based on valid information.

Therefore, the drafting of at least one, or even multiple studies, is necessary, analyzing the correlation between air pollution and COVID-19 in the Western Balkans region. Such analyses must be planned and carried out precisely, so that they can produce adequate conclusions and recommendations of measures to be taken.

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[2] Isphording, Ingo E. and Pestel, Nico, Pandemic Meets Pollution: Poor Air Quality Increases Deaths by COVID-19 (2020). CESifo Working Paper No. 8495, Available at: SSRN: https://ssrn.com/abstract=3680352

[3] Pozzer A,Dominici F,Haines A,Witt C,Munzel T.Lelieveld J, Regional and global contributions of air pollution to risk of death from COVID-19, Cardiovascular Research(2020),116:2247-2253, Available at: https://academic.oup.com/cardiovascres/article/116/14/2247/5940460

[4] Bhandary N., Air pollution a co-factor in COVID-19 mortality

[5] X Wu, R C Nethery, M B Sabath, D Braun, F Dominici, Air pollution and COVID-19 mortality in the United States: Strengths and limitations of an ecological regression analysis, Sci Adv.2020:6, November 4, 2020.

When recommending measures, one must also take into account the state of Western Balkan countries' healthcare systems. The course of the pandemic has laid bare the consequences of lacking hospital beds, a trend of doctors' and medical staff migration, insufficient ventilators and other equipment, as well as a general lack of investments. At a time when they are affected by the COVID19 pandemic, the pressure on these fragile healthcare systems often exceeds maximum levels. Hence, it is necessary to increase participation by healthcare sector representatives in decisionmaking processes, so as to ensure a timely integration of healthcare measures in policies directed at environmental protection.

Western Balkan governments must react and improve efficiency in the implementation of laws and decisions in the field of environmental protection in order to gain greater healthcare-related and economic benefits for all citizens. Alone the coal-fired thermal power plants in the Western Balkans cause economic damages in form of healthcare costs estimated at €1.9-3.6 billion, paid by the region's citizens every year.

Finally, it should be emphasized that COVID-19 will eventually be a thing of the past, but that air pollution must not remain the old "normal". A timely reaction implies that measures to improve air quality are introduced in public policies and COVID-19 relief plans in accordance with the commitments contained in the Green Agenda for the Western Balkans which was accepted by all of the states.

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WHAT IS POLLUTED AIR DOING TO US IN THE WESTERN BALKANS?

AIR POLLUTION AND ITS CONSEQUENCES ON MORTALITY RATES AND THE HEALTH OF WESTERN BALKANS CITIZENS

Breathing polluted air leads to increased mortality, shorter life expectancy, and a higher rate of chronic diseases. At the same time, healthcare expenses paid by Western Balkans citizens are increasing. Air pollution also causes a growing number of working days lost, along with the number of hospital days. Air pollution reduction is a public health measure that would directly help improve the citizens' quality of life and health and, indirectly, lower mortality rates.

Poor air quality in the Western Balkans places the region at the top of Europe's most polluted areas and causes a growing decline of public health. The region's countries are particularly jeopardized because air pollution combined with a lower level of economic development, poverty, and subpar healthcare systems, adds up to create a lethal situation.

Some of the main sources of air pollution in the Western Balkans include the use of coal for energy production, combustion of coal and wood in residential and commercial facilities, industry emissions, waste combustion, agriculture and construction activities, transport vehicles, and diesel generators. These sources are also the main locations of origin for particulate matter (PM2.5 and PM10), ozone, nitrogen oxides, sulfur dioxide, carbon dioxide, and heavy metals, which are globally responsible for millions of premature deaths every year. Harmful effects of polluted air cause increased mortality rates from stroke, heart disease, chronic pulmonary disease, lung cancer and acute respiratory infections. The effects of air pollution exposure range from clinical ones, such as lower respiratory tract infections, to premature death.

Apart from that, Western Balkans are among the regions most affected by the impact of climate change. During the last decades, a significant increase in heatwaves has been documented – today, their number has approximately doubled compared with the mid-20th century. Warmer weather conditions suit the formation of ozone, one of the main polluters during the warmer part of the year. Also, it has been indicated that warmer weather and higher carbon dioxide concentrations in the atmosphere contribute to longer vegetation and pollination periods. This causes higher pollen concentrations in the air, which can have negative effects on persons with allergies, as well as asthma patients.

Who is paying for the consequences of air pollution?

The consequences of inhaling poor-quality air is paid by all of us, with certain social groups being more vulnerable to it.

The price of air pollution is paid in human lives. According to World Health Organization's data for 2016, there have been around 13,500 premature deaths in our region, as a consequence of the worst air quality in all of Europe. According to estimates by the European Environment Agency from 2012, air pollution in Western Balkan countries has led to 22,670 premature deaths attributable to excessive particulate matter (PM2.5) pollution; 1,060 due to excessive ozone (O3) pollution; and 1,670 deaths due to excessive nitrogen dioxide (NO2) pollution.

The Joint Research Centre of the Evropske unije states that air pollution, on average, contributes between 4% and 19% of the total premature mortality rates, and decreases life expectancy by 0.4-1.3 years in countries of the Western Balkans.

Air pollution has a bigger effect on shortening the lives of the elderly population and children under the age of five, which is particularly the case in low-income countries. On a global level, around 75% of deaths caused by air pollution occur in people older than 60. In December, these facts have been confirmed in court for the first time. Namely, a British court admitted medical evidence that showed that a 9-year old girl had died from air pollution.

Persons of a lower socioeconomic status are often more exposed to air pollution since they tend to live in areas of high-intensity traffic and close to pollution sources, such as power plants and industrial facilities. In addition, in most cases poor people work "dirty" jobs which implies professional exposure to fumes, particulate matter, gases and heavy metals.

Finally, the price of air pollution is reflected by healthcare costs. It is estimated that just coal-fired power plants in the Western Balkans cause economic damages in the form of healthcare expenses ranging from
€1.2 to €3.4 billion every year.

How can we achieve better health and cleaner air in the Western Balkans?

Based on the presented data, the conclusion is clear: in order to save human lives and preserve public health, we must improve air quality as soon as possible, as well as the state of public health, by advancing healthcare systems.

It is necessary to define the reduction of air pollution as a national, regional and international priority, and integrate it in state and city development planning processes. However, most importantly, these measures must not remain a dead letter, and adequate resources must be provided for their implementation. Therefore, Western Balkan countries would have to increase their national and local budgets for air pollution control and set priorities which aim to reduce the impact of pollutant emissions on the population and the environment.

In order to advance oversight of polluters and improve air quality, multisectoral partnerships need to be established at local, national and regional levels. The prevention of noncommunicable diseases which come as a result of poor air quality should be made an integral part of environmental policy priorities. In addition, this must be accompanied by measures to address climate change, which increasingly influences almost all aspects of life.

Finally, the reduction of mortality rates, prolonging life expectancy and lessening the healthcare costs of breathing polluted air, also requires bottom-up citizens' action. Namely, the air pollution issue – one that knows no borders between Western Balkans states – can only be resolved in a solidary fashion, at a regional level.

MORE AIR POLLUTION, FEWER CHILDREN IN THE WESTERN BALKANS

Poor air quality is among the causes of increased infertility and growing sterility rates in women and men across the Western Balkans. It particularly affects women living in polluted areas, since air pollution may cause a reduced number of healthy egg cells and thus decrease fertility rates, also lowering in vitro fertilization success rates. Particulate matter PM 2.5 reduces fertility by 2% per 10 μg/m3 in the air. Polluted cities across the Western Balkans reach levels of more than 50 μg/m3 (PM 2.5), which is double the permitted annual value and can reduce fertility by up to 10% in women. In men, particulate matter pollution reaches the testicles where it decreases sperm production and motility, also causing more frequent miscarriages due to programmed cell death.

The human body is an adaptable, yet very delicate organism. Adaptability to different environmental conditions, including pollution, is paid for by shorter life expectancy, diseases, as well as reproductive problems. Air pollution causes additional contamination of fertile land, plants, animals, and the entire food chain, and by doing so, it increases the effect of harmful matter on human health. Also, it is a known fact that obsolete technology, lack of filtering, and environmental pollution by waste can lead to infertility and sterility.

Several international studies have linked air pollution with infertility, childbirth complications, a higher rate of congenital abnormalities in offspring, and stillbirths. The fertility rate is statistically decreasing with the increase in air pollution. Certain air pollutants, such as lead and copper, disrupt the function of glands in the human organism, which has a negative impact on reproduction.

Another cause is plastic pollution, particularly by micro-and nano plastics which is steadily growing, mirroring the increase in plastic manufacturing - surpassed only by the production of steel and cement.

Plastic pollution is a global problem, given that plastic particles are spread by rain and wind, after plastic waste decomposition and combustion, which is a particularly burdensome issue in countries of the Western Balkans. Recent research results [6] have clearly shown that polystyrene, a type of plastic, found in food, water, and air in its micro and nano form, affects early embryo development, which, at a later stage, could cause abnormal development and preterm birth.

Air pollution as a cause of female infertility

[6] Bojic et al., 2020

Poor air quality causes both female and male infertility. However, the consequences of inhaling polluted air vary slightly, in accordance with physiological differences. Several studies have proven that women who inhabit polluted areas have fewer vital egg cells, lower fertility rates, and a higher rate of unsuccessful embryo implantation during in vitro fertilization, compared with women who are not exposed to the impact of air pollution. Fine particulate matter PM2.5 decreases egg cell quality, reducing fertility by 2% per 10 μg/m32 in the air. [7] Western Balkan cities most affected by pollution record an annual average of over 50 μg/m3, which is double the maximum permitted annual values, whereas the daily levels often exceed 200 μg/m3. Long-term exposure to polluted air in the Western Balkans can reduce female fertility by more than 10%; high daily pollution levels reduce the chances of conception and increase the likelihood of miscarriage.

A study [8] from Brazil has shown that women exposed to high PM 10 levels (>56.72 μg/m3), which is the case in several cities across Western Balkans, have higher miscarriage rates, despite the fact that they have undergone the process of in vitro fertilization. At the same time, a 2010 study [9] focusing on the town of Labin, Croatia, shows that the incidence of miscarriages and stillbirths was significantly higher during the period of exposure to the air pollution produced by the nearby coal-fired power plant, compared to the period without such exposure. Sulfate compounds created by the process of coal combustion increase the risk of miscarriage by up to 13%, while exposure to PM2.5 and PM 10 reduces conception rates.

This data prompts the obvious conclusion that air pollution has a negative influence on female fertility and that a radical improvement of air quality is necessary so as to revert fertility rates to normal and render in vitro fertilization more efficient.

Air pollution as a cause of male infertility

During pregnancy, women are more vulnerable to air pollution; however, poor air quality causes infertility and sterility in men, too. Several studies 5 have indicated that PM10 and PM2.5 particulate matter, apart from being able to penetrate lung alveoli, can also reach the testicles and reduce fertility, cause fetal anomalies and increase the likelihood of miscarriage.

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[7] Conforti et al., 2018; Xue & Zhang, 2020

[8] Perin et al., 2010

[9] Mohorovic et al., 2010

Also, several experiments performed on animals have shown that prenatal exposure to exhaust fumes can lead to a significant decrease in daily sperm production.

A Czech study6 has shown that air pollution is also linked with a decline in sperm motility – a parameter of major importance for natural fertilization.

Air quality's impact on in vitro fertilization

In 2019, one in six couples in Serbia experienced problems conceiving7, and the situation was similar in other Western Balkan countries, too. This also causes a growth in the number of patients requiring medical assistance and who are increasingly undergoing in vitro fertilization.

Laboratory air pollution is an additional problem when tackling the issue of sterility since it decreases the vitality of egg cells, sperm, and embryo, thus also reducing in vitro fertilization success rates. For instance, in case of an internal filtering system malfunction, the pregnancy rates following in vitro fertilization drop significantly. After new filters are installed, the success rates return to normal values. However, if patients are constantly exposed to contaminated air, the problem of sterility and loss of pregnancy may persist regardless of modern laboratory technology.

In the USA, 7 out of 10 leading laboratories operate in clean rooms, where every possible form of contamination is eliminated. This example, along with a comprehensive reduction of ambient air pollution, should be followed by Western Balkan countries. Such conditions not only increase success rates, they also prevent harmful matter's impact on laboratory air. These include volatile organic compounds which can hamper early embryo development.

How can infertility rates in the WesternBalkans be reverted?

Reverting infertility rates in the Western Balkans requires, apart from various health measures, urgent action to improve air quality. Pollution caused by particulate matter, sulfur oxides, and heavy metals must be reduced as soon as possible, so that fertility rates can gradually return to normal values. Phasing out coal in the production of electricity is the most important measure for air quality improvement. The replacement of household heating and cooking appliances with environmentally cleaner solutions, solar panels on the house and building rooftops, and projects aimed at improving energy efficiency can have an important role, too. Action must be taken sooner rather than later – namely, if we observe infertility through time prism, it is constantly growing and thus represents one of the major factors in the population decline of the Western Balkan countries.

Another measure to lessen air pollution's harmful impact is by reducing single-use plastic, especially non-recyclable packaging, as well as replacing synthetic fiber with natural fiber.

Countries in the region should support reproductive endocrinologists and gynecologists in promoting healthy pregnancy, by educating women to adopt a safe lifestyle during the pre-conception period. In order to reduce infertility rates, it is necessary to ensure highly efficient indoor air filtering systems, along with providing timely information for citizens on air pollution so as to avoid open-air activities during periods of poor air quality. This measure is particularly significant for special institutions for the treatment of sterility. This way, they would create optimal conditions for patients during the in the vitro fertilization process and reduce the negative effects of laboratory air pollution on the highly sensitive egg cells and embryos. Infertility treatment and in vitro fertilization must become much more available to all persons who want to have children. This type of treatment has become a privilege today, couples who want to have children must bear significant costs, and the process often involves traveling abroad for certain procedures.

Apart from instant short-term improvements, it is also necessary to advance the capacities of diagnostic centers; support the realization of joint studies which will use monitoring and measuring data from Western Balkan countries. The joint creationof interactive maps and mathematical models would summarize the short- and long-term exposure to harmful airborne pollutants, with a special emphasis on their effects on infertility, preterm births, onset of disease and stillbirth rates.

Finally, Western Balkan countries, instead of focusing only on birth rates, must get to work and provide people who wish to have children with support and conditions in which the children will be able to grow and breathe clean air.

NO ROOM FOR COAL-FIRED THERMAL POWER PLANTS AND POLLUTING INDUSTRY IN THE WESTERN BALKANS ANYMORE

Coal combustion is the biggest individual air pollution source in the Western Balkans, with thermal power plants leading the way. Companies that run them and the states in the region do not adhere to the laws on harmful gas emissions. The same applies to other large combustion plants – industrial plants with the largest energy consumption which, besides electricity production, are mainly responsible for pollution. Continued use of coal-fired thermal power plants will make it impossible to achieve carbon neutrality by 2050. In addition, the industry faces a financial collapse if it fails to quickly adopt cleaner technologies.

What is the path towards cleaner air in the Western Balkans? One of the major polluters is the electricity sector, more concretely coal-fired thermal power plants. If we only look at the industry, apart from electricity production, the biggest polluters include facilities whose operation requires high amounts of energy. These include steelworks, cement factories, refineries, and other pollution hot spots at the local level and beyond.

Coal is also used in heavy industry, and for heating – in heating stations, smaller boiler rooms, and households. Thus, a switch to cleaner fuels would eliminate the biggest individual cause of air pollution.

Coal-fired thermal power plants constituted 43% of electricity production capacities in the Western Balkans in 2019, however their overall share that year amounted to up to 61%1. There are no indications that these trends would decrease quickly.

Citizens are unwittingly paying billions of euros to the coal industry

Moreover, there are ongoing projects of coal-fired power plants' construction and reconstruction, as well as those pertaining to the expansion of existing coal mines. Even if the old production capacities were to be shut down once the new ones are operational, the extreme air pollution would still continue, which would prolong the dependency on coal for several decades. States in the region have paid a total of €72.7 million in direct subsidies for electricity production from coal in 2019. However, this amount is relatively small compared to government loan guarantees, amounting to up to €2.15 billion. This is money paid by all citizens, and these decisions are made without public participation.

The production of electricity from coal and other industrial activities release sulfur oxides (SOx), specifically sulfur dioxide(SO2), particulate matter (PM), also called suspended particulate matter, nitrogen oxides (NOx), non-methane volatile organic compounds (NMVOC), and heavy metals such as arsenic, cadmium, lead, and mercury. These are all harmful to health and the environment. For instance, sulfur emissions to the air cause increased soil acidification, thus jeopardizing agriculture. The share of air pollution produced by the transportation of materials is not registered as industry-caused air pollution.

Regulations and laws are not enforced

A substantial part of the European Union's environmental acquis has already been integrated in the national legislation of Albania, Bosnia and Herzegovina, Montenegro, Kosovo, Serbia and North Macedonia, respectively. However, due to a failure to accept accountability in the entire chain, from the authorities to the operators of industrial facilities, and the lack of regulation enforcement mechanisms, the permitted levels of air pollutants are still being exceeded. 2 Governments still view coal as a strategic resource. Violations and delays in introducing environmental protection measures by the companies in that sector, predominantly state-owned, are being tolerated. At the same time, private, mainly foreign investors in the energy-intensive industry are allowed to operate unobstructed despite violating pollution standards and regulations. According to 2018 data, many countries of the region have exceeded the maximum annual levels of SO 3 and particulate matter4 as specified by their national emission reduction plans (NERP). Pollution caused by coal-fired power plants in the Western Balkans has a cross-border impact, too. The majority (2,013) of the 3,906 premature deaths attributable to their influence in 2016 occurred in the European Union, while 1,239 occurred in the region itself, and the rest affected other countries.5 This contributes to the onset and escalation of international disputes. 6

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[10] Investments into the past: An analysis of Direct Subsidies to Coal and Lignite Electricity Production in the Energy Community Contracting Parties 2018–2019, Energy Community Secretariat, December 2020.

[11] Comply or Close, How Western Balkan coal plants breach air pollution laws and what governments must do about it, CEE Bankwatch Network, June 2020.

[12] WB6 Energy Transition Tracker, Energy Community Secretariat, February 2021.

[13] Chronic coal pollution - EU action on the Western Balkans will improve health and economies across Europe, HEAL, CAN Europe, Sandbag, CEE Bankwatch Network and Europe Beyond Coal, 2019.

[14] Secretariat concerned about the implementation of NERPs in four Contracting Parties: https://energy-community.org/news/Energy-Community-News/2021/02/05.html

[15] Council of the European Union, Council conclusions on Climate and Energy Diplomacy - Delivering on the external dimension of the European Green Deal, Brussels, 25 January 2021: https://www.consilium.europa.eu/media/48057/st05263-en21.pdf

Most of the countries have defined a deadline for phasing out coal, and thermal power plants which run on it are closing down at an accelerated pace. Besides the increasingly strict regulations, owners of fossil fuel-burning power plants are burdened with expenses for permits to release carbon dioxide. The prices of those certificates in the stock market has been hitting record highs for months.

Expensive filters for a futureless fuel

Moreover, the European Union is sending out the message that the oil and petrochemical sectors have no future, and that fossil gas will only serve as a transitional fuel. The EU also plans to quickly introduce a CO2 tax on imported goods and services, which would probably automatically shut down many export-oriented polluters in our region. One shouldn't exclude the possibility of those mechanisms becoming stricter, and that the bar with regard to mitigating global warming and its consequences will be raised.

Apart from the fact that reconstruction and installation of filters and desulfurization units in thermal power plants are being delayed in the western Balkans, thus perpetuating air pollution and jeopardizing public health, these expensive interventions will also raise the costs of their closure8, which increasingly seems inevitable. One should also note that all this environmental protection equipment runs on electricity, so it is logical to assume that it will be produced by the same coal-fired power plants, thus increasing the consumption of this fossil fuel.

Role of the citizens and the civil society

The most important prerequisite to reducing air pollution caused by the industry is a zero-tolerance policy towards environmental law and standards violations by the competent institutions. The civil society can make a contribution by strengthening its capacities for launching court cases, which will, in turn, improve judicial procedures.

Legal interventions should be followed by awareness-raising campaigns aimed at securing citizens' support. Citizens also have an important role in alarming the authorities and running media campaigns. According to the Aarhus Convention, they have the right to take part in decision-making during the analysis of the existing and planned industrial facilities' environmental impacts. With regard to this matter, they can use the assistance of international institutions and environmental organizations.

Local communities which suffer the consequences of pollution from the nearby industrial facilities are particularly important in triggering a reaction from the authorities. International financial institutions such as the European Bank for Reconstruction and Development and the World Bank, and even private creditors, can also represent a significant factor if they condition granting loans with adherence to environmental regulations.

Together we are stronger

An independent judicial body and financial penalties could be introduced within the Energy Community, an international organization that mediates in the matter of the EU energy market's expansion to countries that include the Western Balkans states. This requires support from the Brussels administration, as well as by civil society and the region's countries.

The entire Western Balkans is struggling with more or less the same challenges, which include industrial pollution. Therefore, joint action by activist groups addressing the European Union, the Energy Community and international organizations, is more effective than individual claims.

The fulfillment of obligations contained in the Green Agenda for the Western Balkans, accepted by the region's countries upon signing the Sofia Declaration in November 2020, would open the access to non-refundable grants and the EuropeanUnion's support to a just transition.

Even if we disregard all of the aforementioned, the majority of coal mines and thermal power plants could not survive in the market if they were not receiving said subsidies. These funds would have to be reallocated to social programs and workers' requalification, repairing and repurposing of facilities and mines, and the development of projects for generating energy from renewable sources. The electricity system would thus be transformed with a minimal impact on society, energy security and public finances.

Coal mines occupy huge areas and can be used for the installation of solar power plants which would compensate the electricity production capacities.

In any event, society is extremely jeopardized by air pollution and a substantial improvement is impossible without the implementation of the laws on environmental protection. Industrial production plants, both large and small, must turn to cleaner technologies, otherwise, they will not be able to survive.

ALL CARDS ON THE TABLE ABOUT AIR QUALITY

Whether the air we breathe is getting progressively worse, or we're merely more aware of it thanks to popular mobile apps and activist campaigns, public pressure remains a crucial factor in improving the monitoring system and fulfilling one's right to be informed about the pollution levels.

As recently as ten years ago, air pollution data was dealt with only by scientists and public health institutions. The rest of us were only guessing whether we are looking at ordinary fog or a cloud of smog and fine dust. The only people who complained about it were chronic lung disease patients and inhabitants of major industrial and mining centers. The latter could indeed often see and smell the pollution and notice the layers of soot on vehicles and garden plants.

The construction of pollution monitoring stations ensued in the meantime; however, data did not become publically available and understandable right away. Today, certain TV programs include an air quality index display, albeit only in the case of capitals and major cities. This rarely applies to public spaces.

The most sophisticated measuring stations in the Western Balkans are managed by the respective ministries of environment and other institutions under their auspices. In a simplified form, the overall pollution level is categorized by colors – there are five or six of them, depending on the methodology.

The category containing the overall indicator is determined by the most dominant pollutant. For instance, if the concentration of sulfur dioxide is a level purple health hazard, the aggregated indicator will reach the purple category even when all other substances are in the green.

In recent years, citizens have been increasingly purchasing personal, simple air pollution measurement devices. Household air purifiers are popular, as well. They usually also measure the levels of harmful matter.

Legal obligation

The government and local self-governments are legally obligated to monitor air pollution, inform the citizens of the results and create plans and implement improvement measures when the permitted ceilings are exceeded. Despite significant advancements that took place since the establishment of the air quality monitoring stations and the systems which keep the public informed in the region's states, the quality and amount of data have not reached satisfactory levels, and the official results need to be much more available and clear.

If it weren't for the popular websites and mobile applications that provide real-time data from the majority of stations in the world, the inhabitants of many cities would have to rely on local institution websites' information. Those are still often belated and the data is not presented in an easily understandable manner.

Furthermore, many areas including urban ones, are yet to be covered by monitoring stations or still lack measurements of all the relevant pollutants. The inhabitants of sparsely populated areas and people without access to the internet are mostly kept in the dark. If they received information on outdoor, i.e. ambient air pollution reaching dangerous levels, they could limit their outdoor activities and keep their windows closed until the situation improves, as is recommended in such situations.

Citizens have the right to be informed about the air pollution levels and be notified of any change that occurs. Local and state institutions must inform the citizens in a timely manner, similar to when the water quality drops in the supply system, or when the concentration of allergens in the air or the solar ultraviolet radiation increase.

We can draw another comparison, namely to warnings about extreme weather or power outages. Weather conditions also affect the concentrations of air pollutants, yet the competent institutions in the Western Balkans still fail to publish air quality forecasts.

System loopholes

According to findings by the European Commission [16], we have the least available data about the levels of particulate matter in the PM 2.5 category (diameters of 2.5 micrometers and smaller), given that many stations are either not measuring them at all or do so with interruptions.

This is one of the most dangerous pollutants - the finest, invisible dust penetrating the body, even through the skin. There lacks of chemical analyses which would determine the source and levels of airborne secondary particles.

Namely, monitoring stations cannot determine the origin of the particulate matter, and some types of PM do not reach the atmosphere directly from combustion but are the result of other pollutants' chemical reactions.

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[16] European Commission: "JRC Science for Policy Report: Status of air pollutants and greenhouse gases in the Western Balkans", 2020
https://publications.jrc.ec.europa.eu/repository/bitstream/JRC118679/air_qualityghg_western_balkans_online.pdf

Institutions in charge of monitoring lack sufficient financial and human resources, as is stated in the World Bank's reports on North Macedonia [17], Bosnia and Herzegovina [18] and Kosovo [19], respectively. Data validity, both in national reports and in those submitted to the European Environment Agency (EEA) varies in different locations and countries. Hourly measurement results are the main criteria. European standards require an annual 90% data availability; however, the registry also contains data from measuring stations that achieve only up to 75%. The European Commission states that the number of stations delivering data to the Agency is limited. Most of them are located in North Macedonia. Data quality requires regular maintenance of state network devices, which is expensive. The biggest funds are needed for the automatic measurement of PM levels, and slow procurement procedures have been causing month-long delays56. The majority of the region's countries do not have a precise registry of the sources and levels of pollutant emissions.[20]

Political will

Making decisions on measures to improve air quality requires detailed monitoring of the situation, along with official reports containing aggregate data. If there is no constant measuring, health care institutions are unable to monitor and study the effects of air pollution. The bulk of responsibility for the pollution monitoring and public information systems lies with the governments of the region's states. In order to overcome these challenges, there need to be major investments, but many of the problems can be resolved merely by displaying political will - the central authorities have the power and capacities to improve cooperation and coordination with lower administrative levels and enable the exchange of information. They are also in charge of improving the monitoring stations' maintenance process and including more of them in the European system. Whether it is a matter of pollution increasing in some areas or us having merely become more aware of it due to more data being available, it implies another important factor when it comes to political will.

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[17] The World Bank: “Western Balkans Regional AQM – Northern Macedonia”, 2019 http://documents1.worldbank.org/curated/en/116521576516981237/pdf/Air-Quality-Management-in-North-Macedonia.pdf

[18] The World Bank: “Western Balkans Reqional AQM – Bosnia and Herzegovina”, 2019 http://documents1.worldbank.org/curated/en/117281576515111584/pdf/Air-Quality-Management-in-Bosnia- and-Herzegovina.pdf

[19] The World Bank: “Western Balkans Regional AQM – Kosovo”, 2019 https://openknowledge.worldbank.org/bitstream/handle/10986/33041/Air-Pollution-Management-in-Kosovo.pdf?sequence=1&isAllowed=y#page=64&zoom=100,92,813

[20] Institut za javno zdravlje Srbije “Milan Jovanović Batut” (Institute of Public Health of Serbia): “Zagađenost urbanog vazduha na teritoriji Republike Srbije merena u mreži institucija javnog zdravlja u 2019. godini”, 2020 http://www.batut.org.rs/download/izvestaji/higijena/GodisnjiIzvestajVazduh%202019.pdf

Namely, pressure from the public. It is obvious that citizens and environmental protection organizations must demand the fulfillment of the right to information on the air we breathe.

The **power of association**

The pressure exerted on institutions has already been amplified by the popularity of air pollution monitoring websites and mobile applications that provide aggregate data and simple access to information about cities and states from the entire region. Their continued development, along with enabled access to historical data and its comparative analysis, would further mobilize the population and raise awareness with regard to this burning issue.

Lately, citizens have been linking the data from the applications with those gathered by their household air pollution measuring devices. These are not as precise as official stations – however, linked with meteorological data, they could be a helpful asset for pollution forecasting. Transferring information from personal devices to applications is also useful for people in areas that still lack official monitoring units. One of the main tasks is the creation of a catalog/inventory of sources, types, and amounts of pollutants, in order to register the share of individual human activities in causing air pollution. Local self-governments play a vital role in this matter. Namely, this information will be complete only if it includes household heating devices and the type of fuel that they use. Speaking of municipalities and cities, they can also contribute by placing digital displays of information on air pollution in public places. By signing the Sofia Declaration in November 2020, Albania, Bosnia and Herzegovina, Montenegro, Kosovo, North Macedonia, and Serbia have agreed to endorse the Green Agenda for the Western Balkans, which defines the WB6 states' obligations in improving monitoring and reporting efforts, and opens a path towards EU funds. Finally, being well-informed on this matter is possible only with the involvement of the media – public and private broadcasters, local outlets as well as those with national and regional coverage. When it comes to portals, radio, and TV stations, it shouldn't be that tall of a task to include an animated figure whose change in color will indicate the current quality of the air we are breathing.

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[21] Godišnji izvještaj o kvalitetu zraka u Federaciji Bosne i Hercegovine za 2019. godinu (2020) (Annual Report on Air Quality in the Federation of Bosnia and Herzegovina in 2019) http://www.fhmzbih.gov.ba/latinica/ZRAK/izvjestaji.php

[22] European Commission: "JRC Science for Policy Report: Status of air pollutants and greenhouse gases in the Western Balkans", 2020 https://publications.jrc.ec.europa.eu/repository/bitstream/JRC118679/air_qualityghg_western_balkans_online.pdf