

# The health harm of air pollution in TUZLA

## How coal power generation contributes to poor air quality and health risks



Air pollutants, gases and particles in the atmosphere strongly affect human health, the climate and the environment. The air in Western Balkan cities is usually dense with exhaust fumes, industry smoke or soot from coal power plants, especially during the fall and winter season. Air pollution is the single greatest environmental health risk and one of the main causes of death and disease globally and in the region. Poor air quality is also a leading risk factor for major chronic diseases in adults, including heart and lung disease as well as cancer. While each one of us is threatened by poor air quality, some groups in cities, including children, the elderly and those already suffering from disease, are particularly vulnerable.

Lowering air pollution levels, by following the World Health Organization recommendations, could prevent a significant number of chronic diseases and early deaths in cities each year. Decision-makers should be more ambitious in implementing long-standing commitments to improve the quality

of ambient air. This series of HEAL briefings aims to showcase the sources of air pollution in four cities in the Western Balkan region, and highlight why a phase out of coal power generation and end to using fossil fuels would be beneficial especially for city residents.

The Tuzla region has an area of 295,9 square kilometres, divided into 40 local communities. According to the 2013 data, 110,979 permanent residents live on the territory of Tuzla. The average age of residents is 41,08 years<sup>1</sup>.

Poor air quality is a consistent problem throughout the year. Air pollution affects Tuzla mostly during the autumn and winter seasons due to increased fossil fuel combustion, but the coal power plant Tuzla is an ongoing contributor. In 2020<sup>2</sup>, peak pollution saw NO<sub>2</sub> concentrations of 120,4µg/m<sup>3</sup>, PM<sub>2,5</sub> concentrations of 263,3µg/m<sup>3</sup>, and SO<sub>2</sub> levels of 4.196,6µg/m<sup>3</sup>.

<sup>1</sup>"Popis stanovništva, domaćinstava i stanova u Bosni i Hercegovini", 2013, Agency for Statistics of Bosnia and Herzegovina <https://popis.gov.ba/popis2013/knjigePregled.html?lang=hrv>

<sup>2</sup>"Godišnji izvještaj o kvalitetu zraka u Federaciji Bosne i Hercegovine za 2020. godinu", 2021. godine, <https://www.fhmzbih.gov.ba/PUBLIKACIJE/zrak/izvjestaj-2020.pdf>

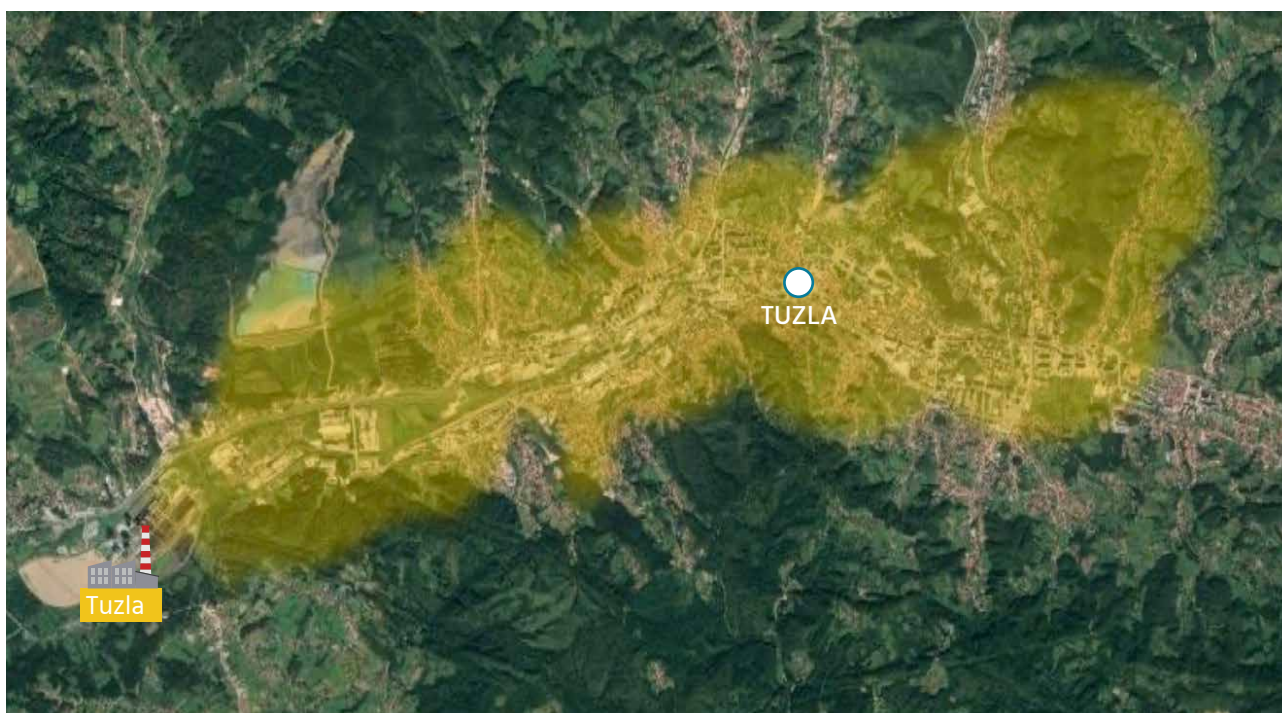
## How do coal plants contribute to poor air quality in Tuzla?

The sources of air pollution that impact air quality in this city include industrial activities, transport, energy production, energy and heat generation for households, agricultural activities and landfills. Tuzla city is among other 12 municipalities in Tuzla Canton, a home to the coal industry that has burdened public health, the economy and the environment for decades. Not only is it used to produce electricity but coal is also burned to power industries and to heat homes.

A particular concern for health protection in Tuzla are the emissions from the large coal power plant

called Tuzla, located nearby the city center. In 2020, emissions of the Tuzla coal power plant for sulphur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>) have gone up compared to 2019. The emissions for particulate matter have increased by 2,6%, sulphur dioxide by 12% and nitrogen oxides by 20,5%. The total coal consumption has increased in 2020 (3.261.798GWh) in comparison to 2019 (2.979.326GWh)<sup>3</sup> by 9,5%.

The high emissions of air pollutants significantly impact air quality in the city (see below).



**Table 1** Emissions of power plant Tuzla for selected pollutants (in tonnes)<sup>6</sup>

Power Plant	SO <sub>2</sub>	NO <sub>x</sub>	PM
Tuzla, 2020	45.209	4.320	534
Tuzla, 2019	40.342	3.584	548

<sup>3</sup>"Environmental protection report for 2020", JP Elektroprivreda BiH d.d. Sarajevo, 2021, [https://www.epbih.ba/upload/documents/GIZO\\_2020\\_engL.final\\_14.07.2021.pdf](https://www.epbih.ba/upload/documents/GIZO_2020_engL.final_14.07.2021.pdf)

# The health impacts of air pollution

The World Health Organization (WHO) says that no level of air pollution can be considered 'safe' and the link between air pollution and respiratory and cardiovascular diseases is well established. Particulate matter with a size of 10 micrometers ( $PM_{10}$ ) or 2.5 micrometers or less ( $PM_{2.5}$ ) leads to the greatest health burden. Annual mean PM concentrations in Tuzla<sup>4</sup> are significantly higher than what the World Health Organization (WHO) recommends<sup>5</sup>. In 2020, the annual mean for  $PM_{2.5}$  was 9 times higher compared to the WHO guidelines.

Breathing in particulate matter, even at low levels, can lead to physiological changes in the body that damage health. When inhaled, particles travel into the bloodstream and cause harm to our lungs and heart. They can cause strokes and lead to premature death. Studies also link particulate matter with harm to the healthy development of children, and diseases such as obesity. Poor air quality is also linked to chronic and acute respiratory diseases, which significantly degrades quality of life, such as bronchitis and the aggravation of asthma. Scientists continue to identify new ways that air pollution can harm our health, for example, there is increasing

evidence linking air pollution to dementia and new evidence has shown that particles of air pollution travel through the lungs of pregnant women and lodge in their placentas, harming babies before they are born.

Newest studies show that even the lowest levels of air pollution have significant damage to health. Based on that new scientific knowledge, WHO has very recently revised their air quality guidelines. New Air Quality guidelines<sup>6</sup> recommend lower values for several pollutants, most notably for particulate matter  $PM_{2.5}$ , which causes the greatest health burden, for which a new annual concentration of  $5\mu\text{g}/\text{m}^3$  is now recommended, for nitrogen dioxide ( $\text{NO}_2$ ), which has come under intense scrutiny in discussions on road transport and inner-city driving bans, a new annual concentration of  $10\mu\text{g}/\text{m}^3$  is now recommended (from previously  $40\mu\text{g}/\text{m}^3$ ).

The health toll of this persistent poor air quality is significant: In Bosnia and Herzegovina, poor air quality leads to 5,100<sup>7</sup> premature deaths per year, including 1,355<sup>8</sup> in Tuzla alone.

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<sup>4</sup> "Godišnji izvještaj o kvalitetu zraka u Federaciji Bosne i Hercegovine za 2020. godinu", 2021. godine, <https://www.fhmzbih.gov.ba/PUBLIKACIJE/zrak/izvjestaj-2020.pdf>

<sup>5</sup> WHO Global air quality guidelines, World Health Organization <https://www.who.int/news/item/22-09-2021-new-who-global-air-quality-guidelines-aim-to-save-millions-of-lives-from-air-pollution>

<sup>6</sup> WHO global air quality guidelines, World Health Organization <https://www.who.int/news/item/22-09-2021-new-who-global-air-quality-guidelines-aim-to-save-millions-of-lives-from-air-pollution>

<sup>7</sup> "Air Quality in Europe - 2020 report t European Environment Agency, 2020 <https://www.eea.europa.eu/publications/air-quality-in-europe-2020-report>

<sup>8</sup> "Premature Adult Mortality and Years of Life Lost Attributed to Long-Term Exposure to Ambient Particulate Matter Pollution and Potential for Mitigating Adverse Health Effects in Tuzla and Lukavac, Bosnia and Herzegovina", 2020, Health and Environment Alliance, Public Health Institute of Tuzla Canton - University of Tuzla, Faculty of Medicine, Institute of Public Health of Vojvodina - University of Novi Sad, School of Public Health, Research Center for Environmental Health and Occupational Health, Université Libre de Bruxelles, <https://www.mdpi.com/2073-4433/11/10/1107>

Figure 1

Annual mean of particulate matter concentrations in Tuzla in 2020, compared to WHO recommendation



## The health impacts of climate change

Climate change is expected to make matters worse: According to the annual climatological analysis for Tuzla, 2019 was one of the 5 warmest and the warmest year ever registered in Tuzla<sup>9</sup>. The vulnerability of the citizens to the effects of heat waves is estimated as high. It is well established that during heat waves air pollution goes up as well (e.g. the levels of ozone, which is another health harming pollutant).

The analysis also shows that Tuzla was affected by extreme temperature in November 2019, and the autumn of the same year was registered as an extremely warm season. Mean annual air temperatures in 2019 were significantly above the standard normal value (1961-1990) in the entire observed area of Bosnia and Herzegovina.

Compared to the standard normal value of 30 days of measurements from 1961-1990, in 2019 Tuzla saw 26 less frost days, 13 less cold days, 5 less ice days, but 37 more warm days and 29 more hot days.

The multiple risks of climate change threaten to reverse the progress of the environment and public health<sup>10</sup>. Tackling climate change requires decision-makers to provide a coordinated response to ensure a transition to a healthier future<sup>11</sup>. The burning of fossil fuels is responsible for more than a half of carbon pollution locked in cities worldwide. Coal is the biggest contributor to anthropogenic climate change. In 2020 the power generation of Tuzla had released a total of 2.466.817 tons of CO<sub>2</sub><sup>12</sup>, only 0,17% lower compared to the year 2019, which still goes against the Paris Agreement goal.

### Mayors active for healthy cities, clean air and a fossil fuel phase out

Being concerned about the effects of fossil fuels industry, mayors across the Globe in the C40 network have agreed to start “greening” the cities in order to expand uptake and access to clean, affordable electricity for millions of urban residents<sup>13</sup>. Increasing renewables leads to multiple benefits that result in mitigating the effects of climate change and will provide a healthier environment for all.

Tuzla is one of the cities that have joined the CARI initiative, which includes nine participating municipalities in the Western Balkans (Bosnia and Herzegovina: Banovići, Kakanj, Lukavac, Maglaj,

Tuzla; Serbia: Novi Sad, Niš; Montenegro: Pljevlja; North Macedonia: Bitola) They have committed to undertake voluntary measures aimed to reduce air pollution in their municipalities under the Clean Air Regions Initiative (CARI)<sup>14</sup>. Cities under the CARI initiative will strive to adopt and implement local air quality action plans with ambitious policies and measures, share their experiences and learn about progress and achievements in other regions. Tuzla has joined the initiative and has the opportunity to implement measures that clean up the air and protect health.

<sup>9</sup> Climatological analysis in 2019, Federalni Hidrometeorološki zavod Federacije Bosne i Hercegovine, 2020, <http://www.fhmzbih.gov.ba/latinica/KLIMA/analiza-godina.php>

<sup>10</sup> The 2021 report of the Lancet Countdown on health and climate change: code red for a healthy future, The Lancet [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(21\)01787-6/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)01787-6/fulltext)

<sup>11</sup> Climate change infographic, Health and Environment Alliance <https://www.env-health.org/wp-content/uploads/2019/11/Climate-Change-Health-Infographic-V3.pdf>

<sup>12</sup> “Environmental protection report for 2020”, JP Elektroprivreda BiH d.d. Sarajevo, 2021, [https://www.epbih.ba/upload/documents/GIZO\\_2020\\_engL.final\\_14.07.2021.pdf](https://www.epbih.ba/upload/documents/GIZO_2020_engL.final_14.07.2021.pdf)

<sup>13</sup> C40 Renewable Energy Declaration, C40 Cities [https://www.c40.org/press\\_releases/renewable-energy-declaration](https://www.c40.org/press_releases/renewable-energy-declaration)

<sup>14</sup> Declaration “Clean Air Regions Initiative (CARI)”, Energy Community <https://www.energy-community.org/news/Energy-Community-News/2021/07/1.html>

# Recommendations

## CITY AUTHORITIES



Set up a clean air for health action plan, including the path to reach WHO's air quality recommendations, and tackling the main pollution sources.



Make informed energy choices based on health and environment impact assessments and economic analyses to benefit the Tuzla city. Fossil fuel intensive cities are not environment friendly solutions for a healthier future.



Highlight the contribution of coal power plants to poor air quality in Tuzla and advocate for a coal phase out. This will lead to public health benefits as well as cost savings.



Establish a multi-agency task force so that all relevant parties can contribute to improving air quality by doing research on health and financial implications making sure that actions will lead to the best outcomes.



Increase air quality monitoring coverage and make data available 24/7 so that citizens can follow the recommendations to avoid health risks. City authorities need to implement air pollution risk management measures to keep citizens safe.



Initiate public campaigns to increase awareness among citizens about the health impacts of air pollution. City authorities should provide information on reducing exposure to air pollution.

## HEALTH COMMUNITY



Increase the participation of health experts in decision-making processes to ensure that the implementation of preventive measures is up-to-date. Decisions have to be made in a real-time manner. Timely actions will prevent chronic diseases and premature death.



Highlight the true costs of coal power generation in public health and clean air deliberations and decisions at city level, and advocate towards increasing the public understanding of how public health will benefit in reducing coal's unpaid health bill.



As a health community, provide input in the development of clean air actions, as well as energy and climate policies, and support the implementation of measures to reduce coal pollution.



Communicate to the patients and to the public the links between air pollution and health, and how improvements of air quality will result in better health.



Promote strong climate action in order to minimize the impacts of heat and extreme weather events.

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