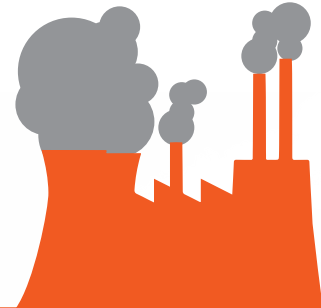


# THE UNPAID HEALTH BILL

## How coal power plants in **SERBIA** make us sick



This factsheet which is part of a report by the Health and Environment Alliance (HEAL) entitled “The Unpaid Health Bill – How coal power plants in the Western Balkans make us sick” provides an assessment of the **health impacts and costs** associated with **air pollution** from **coal and lignite combustion at existing power stations in Serbia**. It also estimates the costs for **planned** plants.

**Existing coal power plants create up to 4 EUR billion per year in annual health costs, of which 1.7 EUR billion fall on the population within the region**

Coal power plants emit thousands of tonnes of hazardous air pollutants each year making a significant contribution to air pollution in the Balkans region and beyond. **Existing coal plants in Serbia** create a total of between **600 and 1,756 EUR million per year in health costs to people and governments in the region**. **Due to long-distance travel of pollutants in the air**, plants in Serbia are creating a total of between **1.4 and 4 EUR billion health costs per year to Europe**. Plants in Serbia are generally operating on low environmental standards generating high levels of polluting emissions and high impacts on health.

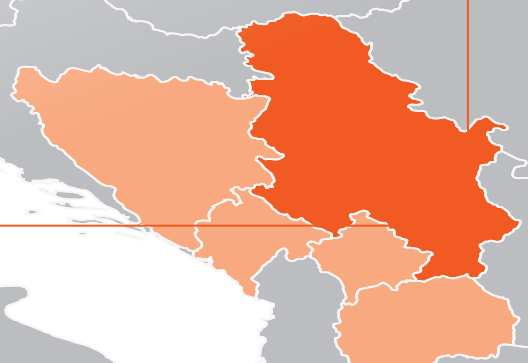
### **Continued reliance on coal?**

Currently home to six existing coal plants with an installed capacity of 4.3 gigawatt (GW), Serbia could see the installation of six new projects with a 2.2 GW capacity. With the change to new coal plants, some old polluting plants will be shut down though it is unclear which ones and how many will continue to operate. This building of new coal plants would mean that Serbia would continue to rely on the most polluting form of energy for many decades to come.

### **New coal plants could add health costs of up to 185 EUR million per year**

New coal plants would operate under much stricter air emission standards than today. However, new plants could create additional health costs for the population in the Western Balkan region of between 26 and 76 EUR million per year. In total, they could create additional costs of between 65 and 185 EUR million per year to Europe.

**HEAL recommends that:** National energy plans should be revised to reduce the reliance on coal and ultimately to phase it out, and to increase investment in renewables. This presents an important opportunity in health prevention in Serbia.



## What are the unpaid health costs?

This country factsheet provides a monetisation of the health impacts of air pollution from coal power plants in Serbia. We call these “unpaid costs” on human health because the health damage has to be borne by individuals, their families and society, and not by those responsible for the pollution.

The health burden from coal in Serbia is among the highest in the Western Balkan region. Currently, Serbia

is home to 17 units in six coal plants that are generating electricity with total capacity of 4.3 GW. By November 2015, there were plans for potentially six new installations generating an additional 2.2 GW. While some of the old installations will be replaced with new coal plants, hence not adding new capacity, some of the plans for new plants are intended to increase capacity. While many countries in the EU are moving away from coal and towards healthier sources of energy, such as solar and wind power, coal power still has a firm place in the energy future of Serbia.

## Calculation of the damage of coal power plants in Serbia

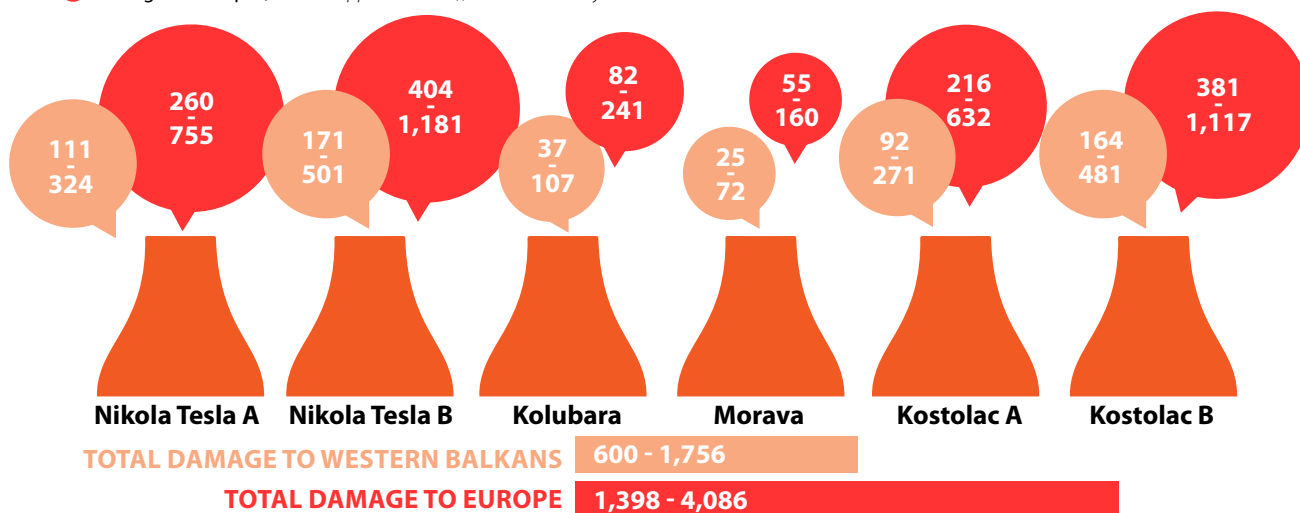
Research commissioned for this factsheet shows that coal plants in Serbia are producing costs of between 600 and 1,756 EUR million in damages to the health of citizens in the region. The most damaging to health are the Nikola Tesla B and Kostolac B plants. Together, they are causing the

Western Balkans an estimated 335 to 982 EUR million per year in health damage.

Damages to health by these coal plants are causing between 1.4 and 4 EUR billion per year to Europe. This is due to winds that carry coal fumes several hundred kilometres causing transboundary air pollution.

## The unpaid health bill from coal power plants in Serbia

- Damage to Western Balkans (lower to upper estimate), in EUR million/year
- Damage to Europe (lower to upper estimate), in EUR million/year



Note: Health costs given for the Western Balkans are part of the total health costs for Europe, and thus the amounts cannot be added up. In this context, Europe includes EU28 member states plus Albania, Belarus, Moldova, Norway, the Western regions of Russia, Switzerland, Ukraine, Bosnia and Herzegovina, Kosovo, Macedonia, Montenegro and Serbia.

**Figure 1. Estimated health costs from existing coal plants to the population in the Western Balkans and in Europe (upper and lower estimate), in EUR million/year.**

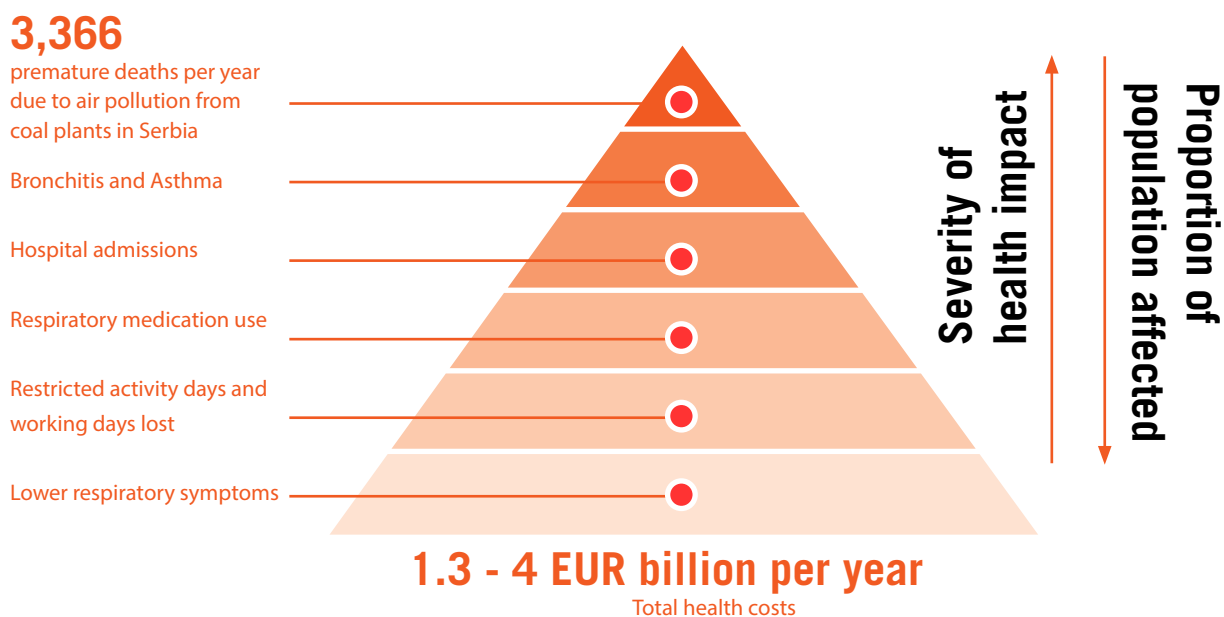
The lower figure in the health costs presented here is an estimate based on one approach to the valuation of mortality: value of the loss of a year’s life (VOLY), the higher figure is based on another approach: value of a

statistical life (VSL). These amounts are likely to be an underestimation because several health impacts as well as the full life cycle of coal are not factored in.

## What are the damages to health?

Figure 2 below shows the health damage from air pollution from coal power plants, with the most severe impact at the top (premature death) affecting a smaller number of the population and the least severe impact is at the bottom with a large number of people affected (cases of lower respiratory symptoms).

### Health impacts and costs from coal power generation in Serbia



**Figure 2. Factors contributing to total damages caused by coal power plants in Serbia**

## Air quality recognised as a public health threat in Serbia

According to figures from the World Health Organization (WHO), the South East Europe (SEE) region is losing the equivalent of 19 percent of its GDP to costs associated with premature deaths from air pollution. In Serbia, health costs associated with air pollution total 33.5 percent of GDP. These percentages are much higher than in the rest of the region.<sup>1</sup>

Serbia and Montenegro (grouped together) are estimated to have the second highest premature death rate associated with air pollution in Europe, with only Bulgaria having a higher rate. Romania and Poland take third and fourth positions respectively.<sup>2</sup>

Recently Serbia's health professionals recognised air quality as an urgent problem threatening public health. Public health professionals have signed a statement on

reducing chronic disease by reducing a dependency on fossil fuels. They join colleagues in other EU countries who are calling for cleaner energy for better health.



“Doctors are very concerned about air pollution and are calling on the government to take health into account when taking decisions on energy policy.”

Professor Dr. Marija Jevtić,  
Medical faculty University of Novi Sad, Institute of Public Health of Vojvodina

## Poor record on air quality

The WHO has carried out extensive reviews of the science on the health effects of air pollution. It has put forward recommendations for air quality concentrations that should be kept in order to protect health. For example, for the larger parts of particulate matter (PM), known as PM<sub>10</sub>, the WHO has set a guideline of 20 µg/m<sup>3</sup> annual average. The Serbian air quality standard is 40 µg/m<sup>3</sup>.

In Serbia in 2012 annual mean levels of PM<sub>10</sub> was 38.8 µg/m<sup>3</sup>. That is just under the limit values set by national law but considerably higher than WHO recommendations. The WHO also points out that there is no safe threshold for PM. Even the lowest level has effects on health.

Serbia allows for a maximum of 35 days a year in which the PM<sub>10</sub> daily concentrations can exceed 50 µg/m<sup>3</sup>. In 2012, Serbians experienced more than two months (65 days) of high levels of PM<sub>10</sub>.



“In big, urban areas like ours, air pollution has a considerable effect on the health of our citizens. People living in large industrial zones, where there is a dense, highly developed transport system, breathe in a large amount of harmful agents that are in the air. Particularly as the weather heats up, large amounts of ash, smoke and allergens are present in the air. What I conclude is that this is a period when we help a number of patients, primarily with respiratory diseases, asthma, chronic obstructive pulmonary disease (COPD), as well as those with acute respiratory diseases resulting from the harmful effects of pollutants in the atmosphere.”

Dr. Radmila Šehić,  
a doctor in the emergency department (ED) of a health care centre in  
Belgrade, Serbia's capital

## Coal power dependency and its contribution to air pollution in Serbia

Emissions from coal power plants make an important contribution to poor air quality<sup>3</sup>. Each year, one large coal power plant emits thousands of tonnes of hazardous air

pollutants including heavy metals. Pollutants such as sulphur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>) react in the atmosphere to form ozone and secondary PM. Ozone and PM are of greatest concern to health.

In Serbia, coal plants were responsible for more than 96 percent of national SO<sub>2</sub> emissions and the source of more than half of NO<sub>2</sub> emissions in 2013<sup>4</sup>.

Serbia has the largest electricity system in the region with some 66 percent of electricity generated from lignite, the most polluting form of coal<sup>5</sup>. Serbian plants have an average age of 41 years. The Kolubara plant is the oldest; some of its units have been in operation for the past 52 years.

All of the coal plants are situated in the central part of the country. By far the largest coal plant in the Western Balkans is located just 40 kilometres from the Serbian capital, Belgrade. The plant, named Nikola Tesla A, has six units with a total capacity of 1,690 megawatts electric (MW). The second biggest is the Nikola Tesla B plant with two units comprising of a 1,240 MW capacity.

“Reducing the level of pollutants in the air would produce very significant reductions in premature deaths, suffering from respiratory and heart problems, and health care costs in Serbia. Health protection must therefore be considered in energy choices. Long-term effects on population health in Serbia should be taken into account when developing energy policies.”

Professor Dr. Berislav Vekić,  
State Secretary for Health, Serbia



## Serbia – home to some of the most polluting coal plants in Europe

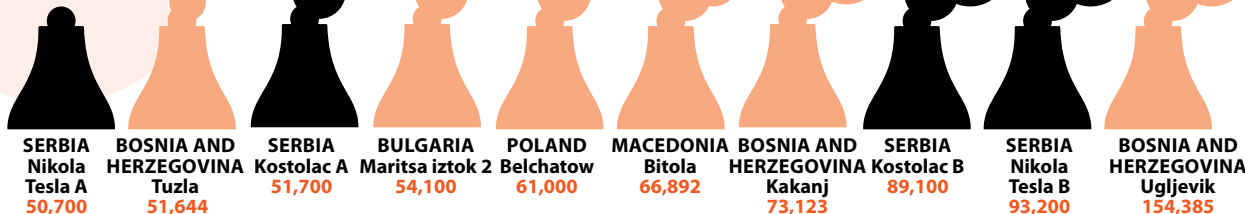
Three of the biggest emitters of PM<sub>2.5</sub> in Europe are in Serbia. Serbia is also host to four of the 10 biggest emitters of SO<sub>2</sub> and one of the top 10 emitters of NO<sub>x</sub> in the European region<sup>6</sup>.

### Meet the ten most polluting coal power plants in Europe

PM<sub>2.5</sub>



SO<sub>2</sub>



NO<sub>x</sub>



Figure 3. Coal-fired power plants in Serbia emitting the greatest quantities of PM<sub>2.5</sub>, SO<sub>2</sub>, and NO<sub>x</sub>

 EU and Western Balkans  Serbia

Of all pollutants emitted, the most damaging to health is PM<sub>2.5</sub>. Nikola Tesla A and Kostolac B are the biggest emitters in Serbia with a total of 3,600 tonnes of PM<sub>2.5</sub> per year. However, the Morava plant emits a relatively larger quantity of PM<sub>2.5</sub> given its smaller capacity. It emits 860 tonnes of PM<sub>2.5</sub> per MW capacity per year, which is almost three times higher than the average Serbian plant.

Nikola Tesla B and Kostolac B each emit around 90,000 tonnes of SO<sub>2</sub> per year. With this high level of emissions, they are second most polluting plants in the European region after Ugljvik in Bosnia and Herzegovina.

NO<sub>x</sub> is involved in a series of reactions that form secondary pollutants. NO<sub>x</sub> emissions from Serbian plants are very high. The biggest emissions of NO<sub>x</sub> in Serbia are produced by Nikola Tesla A and B. Together they emit into the air around 34,400 tonnes of NO<sub>x</sub> per year. All Serbian plants are emitting similar amounts of NO<sub>x</sub> (ranging from 8.5 to 11.5 tonnes per year per MW installed capacity). This may mean that the plants have very limited technology to reduce and control NO<sub>x</sub> emission or none at all.

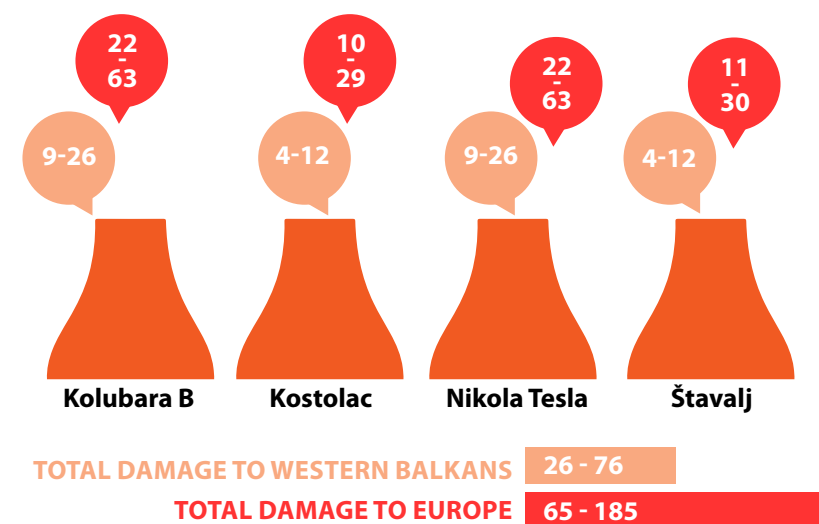
## New plants would only add to the health burden

Serbia has announced several new coal projects. The expansion could include six new installations with a capacity of 2.2 GW. However, only the Kostolac project has moved to a more advanced stage, the so called "pre-permit" stage.

If plans for future coal plants go ahead in full, additional health costs could total up to 185 EUR million per year. Of this amount, 26 - 66 EUR million in health costs would fall on the Western Balkans.

## The unpaid health bill for future coal plants in Serbia

- Damage to Western Balkans (lower to upper estimate), in EUR million/year
- Damage to Europe (lower to upper estimate), in EUR million/year



Note: Health costs given for the Western Balkans are part of the total health costs for Europe, and thus the amounts cannot be added up. In this context, Europe includes EU28 member states plus Albania, Belarus, Moldova, Norway, the Western regions of Russia, Switzerland, Ukraine, Bosnia and Herzegovina, Kosovo, Macedonia, Montenegro and Serbia.

**Figure 4. Estimated health costs from planned new plants in Serbia to the population in the Western Balkans and in Europe (upper and lower estimate), in EUR million/year**

Any expansion of capacity will add to health damage. However, due to anticipated higher standards of pollution control, the costs to health will be relatively less.

New coal plants need to be compliant with EU legislation. That is good news for health. It means they must use "best available technologies" to filter the pollution from the air thus emitting less pollution into the environment. Serbia's obligations to comply with strict air emission standards is a result of its membership of the Energy Community, an international organisation dealing with energy policy.

Serbia has binding national targets to achieve 27 percent of its energy through the use of renewables by 2027. This should involve the phase out of coal and opting for renewables, which is the healthy and sustainable way ahead.



"This report provides the first-ever estimate of the health impacts of coal power generation in Serbia. It shows the enormous burden of air pollution from coal power on people's health and the economy. It provides vital information on why Serbia should be phasing out coal and opting for renewables in its future energy policy. Some senior health professionals in Serbia are already aware and active on this issue. We hope these findings will help them advance their case."

Anne Stauffer,  
Deputy Director, Health and Environment Alliance (HEAL)

## The way forward: healthy energy choices



### **POLICY RECOMMENDATIONS TO SERBIAN DECISION-MAKERS THEY SHOULD >>>>>**

→ **Rapid phase out of coal: Close all old coal-fired plants and do not build new ones**

HEAL considers that a phase out of coal power generation for the EU is possible by 2040. Serbia should achieve the de-carbonisation of the power sector in about the same time frame.

→ **Take into account health protection in all energy decisions and opt for renewables and energy savings**

→ **Align national laws with WHO recommendations and fully implement existing air laws to take responsibility for providing clean air for the national population to breathe**

→ **Fulfil the obligations and fully implement standards agreed in international treaties, such as the Energy Community, Kyoto protocol and Paris Treaty**

## **HEALTH PROFESSIONALS SHOULD SPEAK ABOUT THE UNPAID COSTS OF COAL**

Health and medical professionals have a unique role to play in encouraging a transition from polluting to healthy forms of energy in Serbia. They should continue debates on the healthy energy options with the ministry of health, ministry of energy and other governmental institutions, as well with the public. Making widely known the true costs of coal power generation will help benefit public health.

## References

- <sup>1</sup> WHO Regional Office for Europe, OECD (2015). Economic cost of the health impact of air pollution in Europe: Clean air, health and wealth. Copenhagen: WHO Regional Office for Europe.
- <sup>2</sup> Data on premature deaths: Cost-benefit Analysis of Final Policy Scenarios for the EU Clean Air Package. October 2014, p. 48-49 <http://ec.europa.eu/environment/air/pdf/TSAP%20CBA.pdf>
- <sup>3</sup> Due to insufficient data it is not possible to determine the exact share from coal power generation to air pollution emissions and concentrations.
- <sup>4</sup> Data under the Convention on Long-range Transboundary Air Pollution (CLRTAP) for Serbia for 2013
- <sup>5</sup> [https://www.energy-community.org/portal/page/portal/ENC\\_HOME/MEMBERS/PARTIES](https://www.energy-community.org/portal/page/portal/ENC_HOME/MEMBERS/PARTIES)
- <sup>6</sup> Data on emissions for existing plants is from E-PRTR database year 2013.
- <sup>7</sup> [https://www.energy-community.org/portal/page/portal/ENC\\_HOME/AREAS\\_OF\\_WORK/Obligations/Renewable\\_Energy](https://www.energy-community.org/portal/page/portal/ENC_HOME/AREAS_OF_WORK/Obligations/Renewable_Energy)

## About HEAL

The Health and Environment Alliance (HEAL) is a leading European not-for-profit organisation addressing how the environment affects health in the European Union (EU). With the support of more than 70 member organisations, HEAL brings independent expertise and evidence from the health community to different decision-making processes. Our broad alliance represents health professionals, not-for-profit health insurers, doctors, nurses, cancer and asthma groups, citizens, women's groups, youth groups, environmental NGOs, scientists and public health research institutes. Members include international and Europe-wide organisations as well as national and local groups.



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