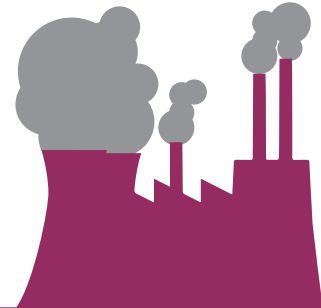


# THE UNPAID HEALTH BILL

## How coal power plants in BOSNIA AND HERZEGOVINA 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 Bosnia and Herzegovina**. It also estimates the costs for planned plants.

**Existing coal plants in Bosnia and Herzegovina create up to 3.1 EUR billion per year in health costs, of which up to 1.1 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 Balkan region and beyond. **Existing coal plants in Bosnia and Herzegovina** create a total of between **390 and 1,134 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 Bosnia and Herzegovina are creating a total of between **1.1 and 3.1 EUR billion health costs per year to Europe**. They are generally operating on low environmental standards generating high levels of polluting emissions and high impacts on health.

### **Plans to increase capacity and continued reliance on coal**

Currently home to four existing coal plants with an installed capacity of 1.7 gigawatt (GW), Bosnia and Herzegovina could see the installation of eight new plants with a 3.9 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 could in the end lead to an overall increase in capacity in Bosnia and Herzegovina and its reliance on the most polluting form of energy for many decades to come.

### **New coal plants could add health costs of up to 240 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 Balkans region of between 30 and 85 EUR million per year. These plants could create a total cost of between 85 and 240 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 Bosnia and Herzegovina.



## What are the unpaid health costs?

This country factsheet provides a monetisation of the health impacts of air pollution from coal power plants in Bosnia and Herzegovina. 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 Bosnia and Herzegovina is among the highest in the Western Balkans region. Currently, Bosnia and Herzegovina is home to nine units in four coal plants that are generating electricity

with a total capacity of 1.7 GW. By November 2015, there were plans for potentially 12 new installations generating an additional 3.9 GW. One of the planned installation, Stanari, started its operation in 2016. 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, like Stanari, 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 Bosnia and Herzegovina.

## Calculation of the damage of coal power plants in Bosnia and Herzegovina

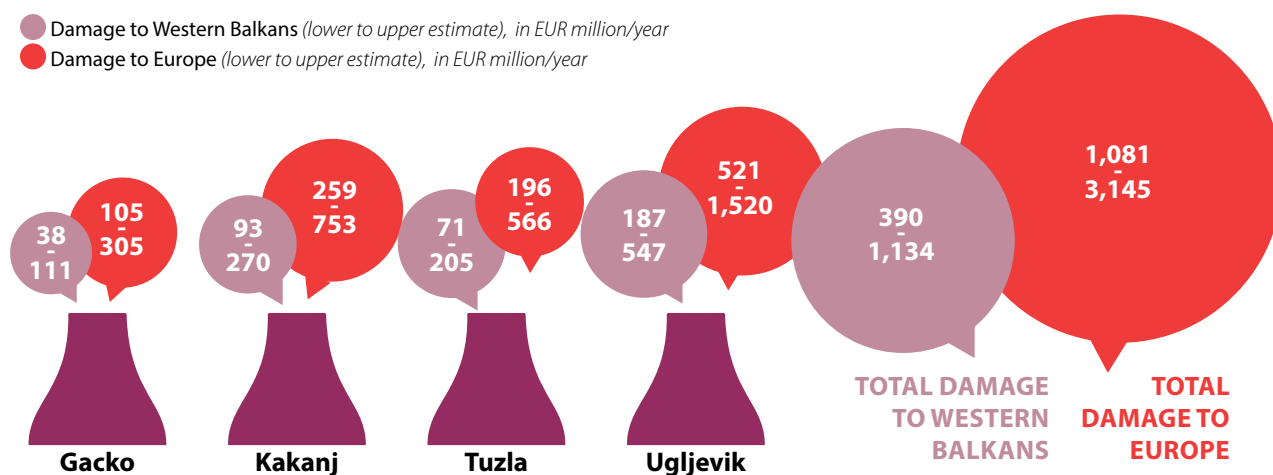
Research commissioned for this factsheet shows that coal plants in Bosnia and Herzegovina are producing costs of between 390 to 1,134 EUR million in damages to the health of citizens in the region. The most damaging to health is the Ugljevik coal plant. It is causing the Western

Balkans an estimated 187 to 547 EUR million per year in health damage.

Damages to health by these coal plants are causing between 1.1 and 3.1 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 for existing coal plants in Bosnia and Herzegovina

- 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 in Bosnia and Herzegovina 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 in Figure 1 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 Bosnia and Herzegovina

**2,564**

premature deaths per year due to air pollution from coal plants in Serbia

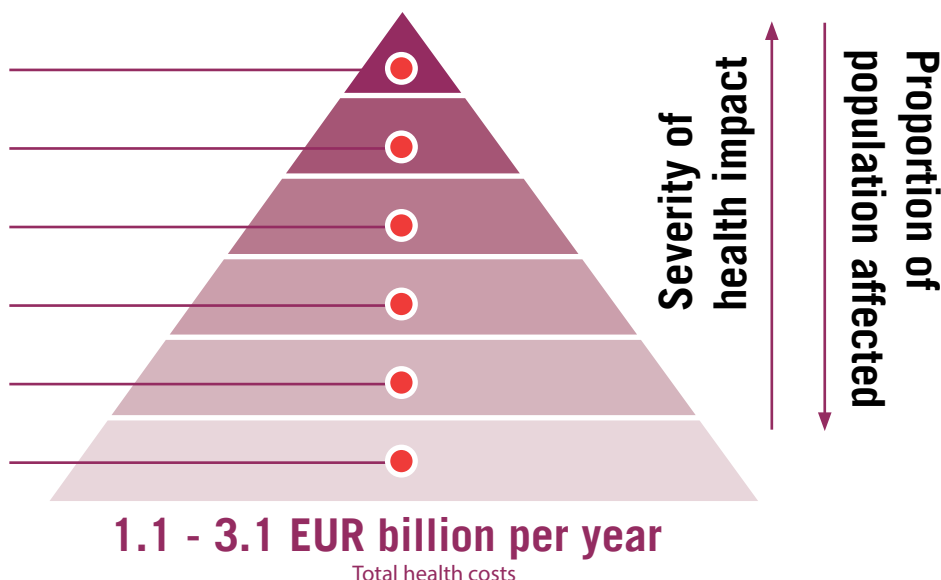
Bronchitis and Asthma

Hospital admissions

Respiratory medication use

Restricted activity days and working days lost

Lower respiratory symptoms



**Figure 2. Factors contributing to total damages caused by coal plants in Bosnia and Herzegovina**



“Visiting industrial areas in the Western Balkans where coal mines and coal-fired power stations are located close together is a worrying experience for a medical professional. The communities who live in these areas are likely to be particularly affected by respiratory problems, such as asthma, bronchitis and lung cancer. For example, each year particulate matter (PM<sub>2.5</sub>) concentrations in the vicinity of the Tuzla plant exceed limit values by three to five times. In the Tuzla region, health impacts due to continuous exposure to very high PM<sub>2.5</sub> concentration in 2012 were immense: including a loss of 2,875 life years; three cases of infant mortality deaths; 187 cases of chronic bronchitis in people aged over 27 years, 361 cases of bronchitis in children aged from 6 to 12 years; 113 cases of respiratory hospital admissions; 81 cases of cardiac hospital admissions; 272,914 restricted activity days; 5,355 asthma symptoms days among children aged from 5 to 9 years, and; 69,924 cases of lost working days.”

Professor Nurka Pranjić,  
Department of Occupational and Environmental Health, Medical Faculty University of Tuzla

# Air quality recognised as a public health threat in Bosnia and Herzegovina

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 Bosnia and

Herzegovina, health costs associated with air pollution total 21.5 percent of GDP. This percentage is one of the highest in the region and in Europe<sup>1</sup>.

## Poor record on air quality

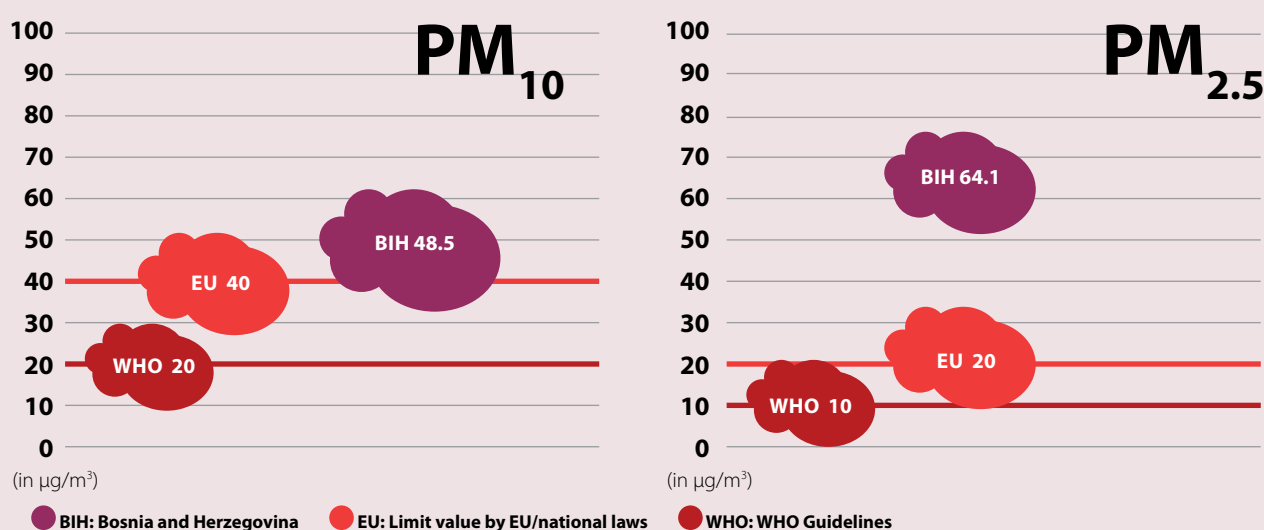
The WHO has carried out extensive reviews of the science on the health effects of air pollution. It has put forward recommendations for air quality concentrations that should be kept in order to protect health. For example, for the larger parts of PM, known as PM<sub>10</sub>, the WHO has set a guideline of 20 µg/m<sup>3</sup> annual average<sup>2</sup>. The air quality standard in Bosnia and Herzegovina is 40 µg/m<sup>3</sup>.

In 2010, the annual mean level of PM<sub>10</sub> was 48.5 µg/m<sup>3</sup> in Bosnia and Herzegovina<sup>3</sup>. That is 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.

Moreover, instead of having a maximum of 35 days where PM<sub>10</sub> limit values exceed air quality standards, Bosnia and Herzegovina experienced more than two months (82 days) of high levels of PM<sub>10</sub> in 2010. This means citizens in the country were breathing highly polluted air for almost three months, instead of one month, which is the limit set by the EU to protect public health.

In terms of the health damage, fine PM - PM<sub>2.5</sub> - is of most concern for health protection, given that these tiny particles can enter the bloodstream via the lung. Yet again Bosnia and Herzegovina exceed limits for PM<sub>2.5</sub> – by 2.5 times – or 64.1 µg/m<sup>3</sup>.

### Air quality in Bosnia and Herzegovina harms health



**Figure 3. Annual mean concentrations of PM<sub>10</sub> and PM<sub>2.5</sub> in Bosnia and Herzegovina and target values set by national law and WHO guidelines**

# Coal power dependency and its contribution to air pollution in Bosnia and Herzegovina

Emissions from coal power plants make an important contribution to poor air quality<sup>4</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, which are of greatest concern to health.

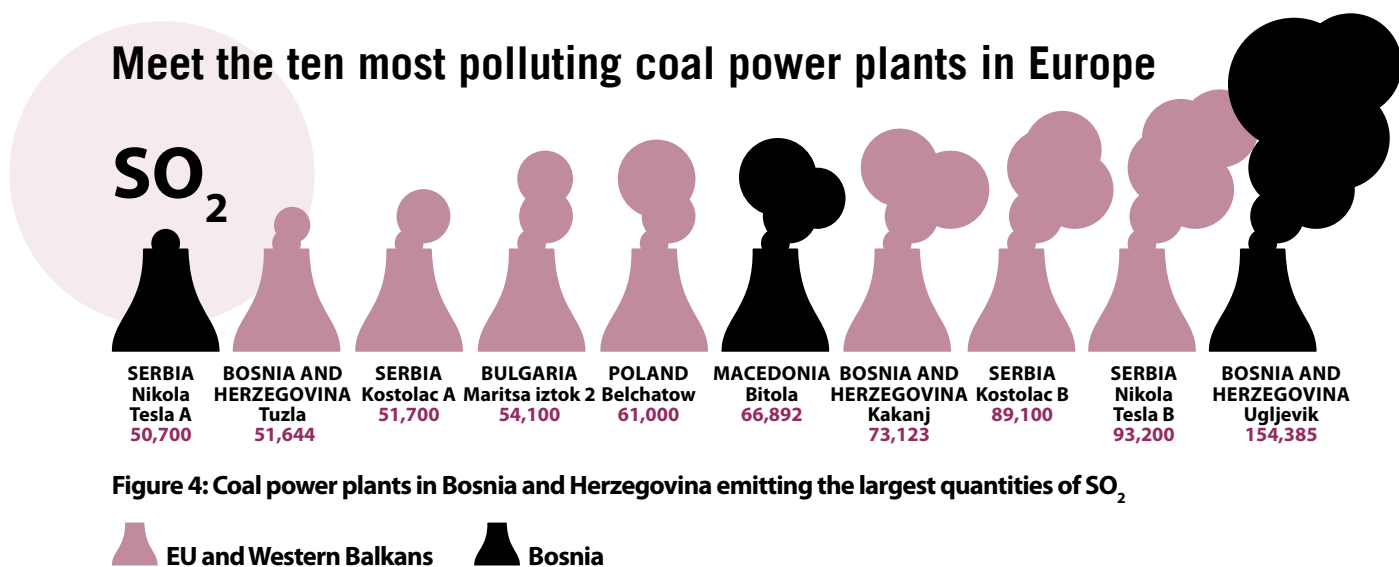
Bosnia and Herzegovina generates some 74 percent of electricity from lignite<sup>5</sup>, the most polluting form of coal. On average units are 39 years old, Tuzla being the oldest; some of its units have been in operation for the past 50 years.

There are four coal-fired units in Tuzla, three in Kakanj, one in Ugljevik and one in Gacko, with total installed power of 1,765 MW. In 2016, Stanari plant (300 MW) started its operation.

The biggest coal plant in Bosnia and Herzegovina is the Tuzla plant with a capacity of 715 MW. This plant is situated just next to Tuzla, the second biggest city in Bosnia and Herzegovina. The Kakanj plant follows the Tuzla plant in size with three units and a 450 MW capacity.

## Bosnia and Herzegovina – home to three of the biggest SO<sub>2</sub> emitting coal plants in Europe

Bosnia and Herzegovina hosts three of the 10 biggest emitters of sulphur dioxide (SO<sub>2</sub>)<sup>6</sup>.



Ugljevik is the dirtiest coal plant in Bosnia and Herzegovina with sky-high SO<sub>2</sub> emissions. This plant is Europe’s biggest SO<sub>2</sub> emitter with 154,385 tonnes per year. It produces five times more emissions than the average plant in Bosnia and Herzegovina. The Kakanj and Tuzla plants also sit on the top 10 list of the biggest European polluters, where together they emit 124,000 tonnes per year of SO<sub>2</sub>. These emissions are of concern for health, because they react in the atmosphere to form part of PM, which impacts health.

The biggest emitters of NO<sub>x</sub> are the Tuzla and Kakanj plants with a total of 17,700 tonnes emitted each year. The Tuzla plant is the top PM<sub>2.5</sub> emitter in Bosnia and Herzegovina with a total of 896 tonnes emitted each year. Its emissions are four times higher than that of the average coal plant in Bosnia.

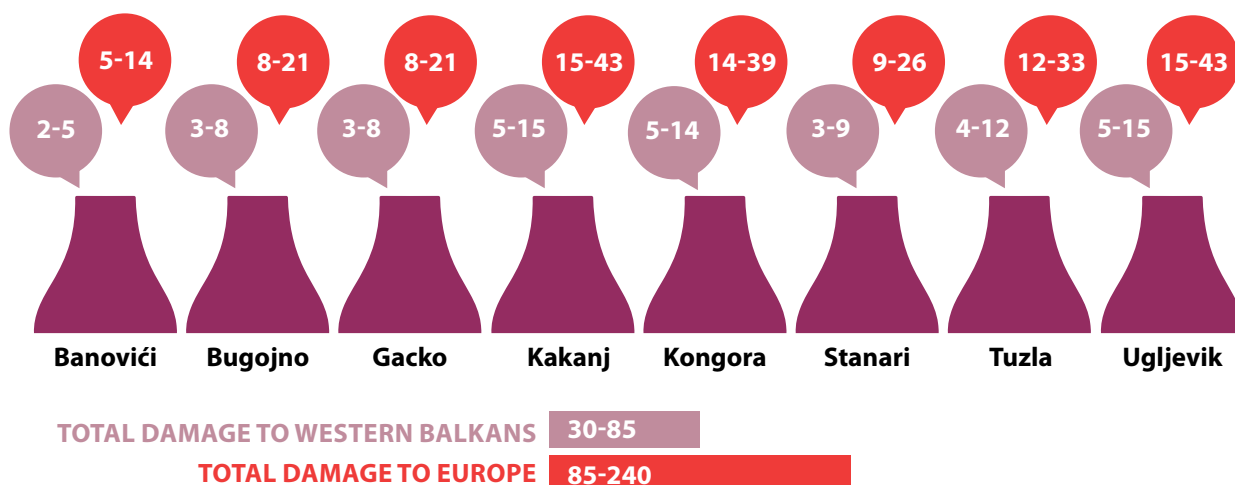
## New plants would only add to the health burden

Bosnia and Herzegovina has announced several new coal projects. The expansion could include 12 new units with a capacity of 3.9 GW. If plans for future coal plants go ahead in full, additional health costs could total up

to 240 EUR million per year. Part of total damage of between 85 and 240 EUR million per year falls to the Western Balkans region (30 and 85 EUR million per year in health costs).

### The unpaid health bill for future coal plants in Bosnia and Herzegovina

● 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. The Stanari plant begun its operation in 2016. However, we have kept this plant in the list of planned plants since it did not emit pollutants in the year the data was collected. We assumed it will comply with EU standards (Industrial Emissions Directive), but that remains to be seen.

**Figure 5. Estimated health costs from planned new plants in Bosnia and Herzegovina to the population in the Western Balkans and to 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. Bosnia and Herzegovina’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.

Bosnia and Herzegovina has binding national targets to achieve 40 percent of its energy through the use of renewables by 2020<sup>7</sup>. 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 Bosnia and Herzegovina. It shows the enormous burden of air pollution from coal power on people’s health and the economy. It provides vital information on why Bosnia and Herzegovina should be phasing out coal and opting for renewables in its future energy policy.”

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

## The way forward: healthy energy choices



### **POLICY RECOMMENDATIONS TO DECISION-MAKERS IN BOSNIA AND HERZEGOVINA**

#### **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. Bosnia and Herzegovina 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, and;**

→ **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 Bosnia and Herzegovina. They should start 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> Since 2012 new regulations on limit values and air quality standards are in place. For PM10, the target value of 40 µg/m<sup>3</sup> (EU standard) is to be reached by 2021. For PM2.5, the target value of 20 µg/m<sup>3</sup> (EU standard) is to be reached by 2024. Until then, the regulation allows higher limit values.
- <sup>3</sup> Data from EEA AirBase v8 for year 2010
- <sup>4</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>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 see Methodology at a glance in the main file of the report "The Unpaid Health Bill – How coal power plants in Western Balkans make us sick".
- <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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