

# QUICK GUIDE: HOW TO CALCULATE THE HEALTH IMPACTS AND COSTS FROM COAL

## WHY SHOULD I READ THIS QUICK GUIDE?

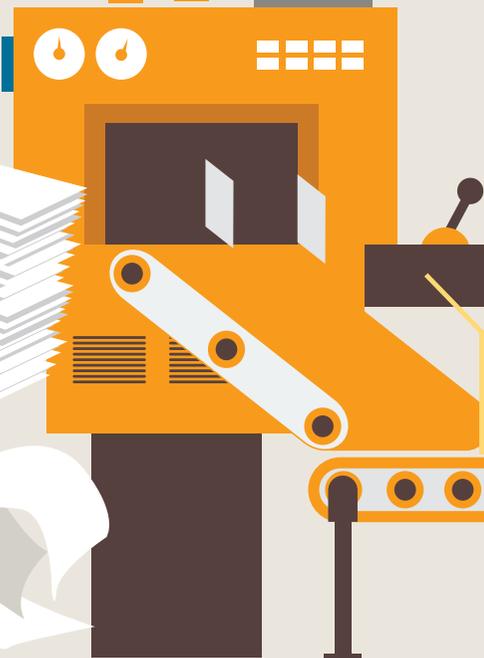
Air pollution harms everybody's health, but especially the most vulnerable groups in society including children, pregnant women and the elderly, mainly due to their age or medical condition. This quick guide illustrates how we know air pollution is affecting our health and how much this costs us.

## HOW DO I KNOW AIR POLLUTION IS BAD?

It is scientifically proven that air pollution leads to premature death, cardiovascular and respiratory diseases. The World Health Organisation (WHO) coordinated the reviews of thousands of studies to find clear evidence on the health impacts of air pollution.

## HOW ARE THE HEALTH IMPACTS OF AIR POLLUTION CALCULATED?

Analysis carried out by the Health and Environment Alliance (HEAL) quantifies the health impacts and economic costs of air pollutant emissions from coal power plants. This methodology follows the Impact Pathway Approach (IPA) developed in the ExternE Project ("Externalities of Energy" - damages to society that are not paid for by its main responsible actors). The IPA describes a logical pathway from the emission to exposure of the population to pollution to impact assessment and finally monetisation. The ExternE methodology is widely accepted by the scientists and is considered as the world reference in the field.



**ACTIVITY**  
(e.g. demand for electricity)



**INCIDENCE OF THE HEALTH EFFECT LINKED TO THE POLLUTANT UNDER INVESTIGATION**  
(e.g. hospital admissions)



**EXPOSURE OF THE GENERAL POPULATION**  
(people,  $\mu\text{g}\cdot\text{m}^3$ )



**MONETISATION OF HEALTH IMPACTS**  
(EUR)

## WHERE DOES THE DATA COME FROM?

The quantification of pollutant emissions is measured and reported by the coal power plant operator. Data is available in a publicly open database called The European Pollutant Release and Transfer Register (E-PRTR). This is a Europe-wide register that provides key environmental data from industrial facilities in EU member states as well as in Iceland, Liechtenstein, Norway, Serbia and Switzerland.

For facilities operating in other countries, data can often be obtained directly from the electricity operator, environmental protection agency or governmental bodies. Data obtained for HEAL's report "The Unpaid Health Bill – How coal power plants in the Western Balkans make us sick" comes from the below sources. This latest report is part of a series of reports on the unpaid health bill in Europe.

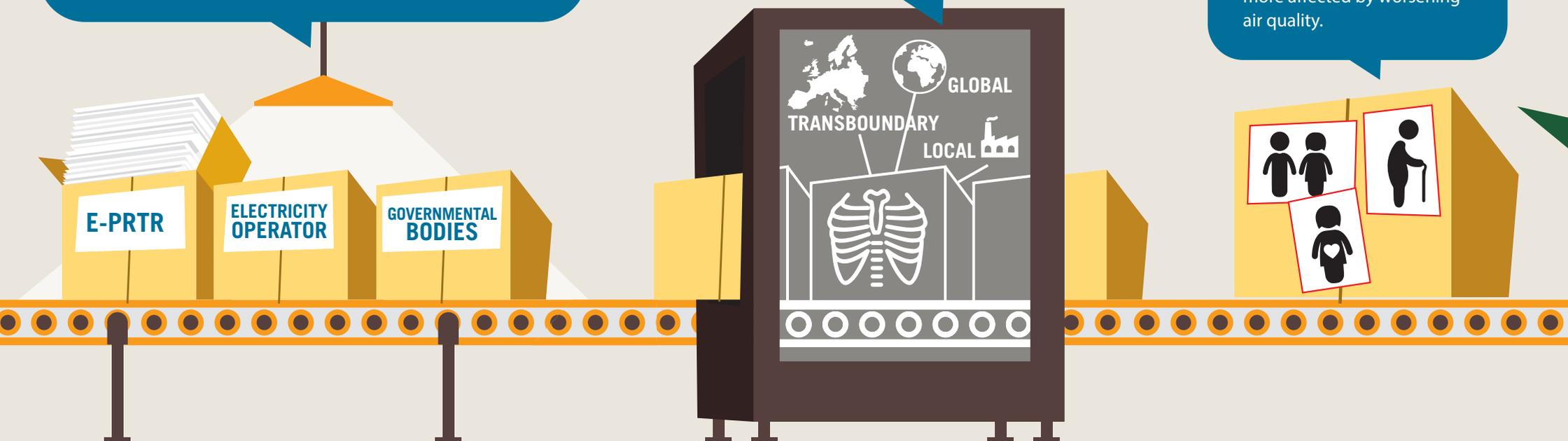
## WHAT DOES THE DATA SHOW?

Air pollutants can travel thousands of kilometres, and across borders, until pollutants deposit in ecosystems or in people's lungs. Thus, both local and regional effects are important. With specific models (dispersion and atmospheric chemistry models) we can calculate how concentrations of air pollution in one country is affected when dirty air is released by coal power plants.

Effects of releasing tonnes of a pollutant from one country on the pollution climate of Europe as a whole is described in the European Monitoring and Evaluation Programme (EMEP). EMEP is under the Convention on Long-range Transboundary Air Pollution (CLRTAP), which has the aim to solve transboundary air pollution problems.

## WHO IS AFFECTED?

Air pollution harms everybody's health, but especially the most vulnerable groups in society including children, pregnant women and the elderly mainly due to their age or medical condition. Changes in pollution levels are overlaid with a map of the European population to describe the exposure of the general population and exposure of the risk population who might be more affected by worsening air quality.



# WARNING

INCREASED RISK OF HEALTH IMPACTS FROM EXPOSURE TO PM

## WHAT ARE THE HEALTH IMPACTS INCLUDED IN THE CALCULATION?



### AIR POLLUTION CAN KILL

#### Premature deaths—how are people dying from air pollution?

Air pollution itself will not be indicated in medical charts as the cause of death. Rather, it will be stated that the person has suffered from a heart attack or stroke. Nevertheless, the term “premature death” means that a fraction of the total deaths in the population from natural causes should be actually attributed to air pollution. It implies that the death would have occurred later in life if air quality was improved. Clinical experiments have shown how air pollutants are involved in the development of severe health conditions, and how they can aggravate existing conditions in a person. The majority of deaths attributed to air pollution is thought to be from cardiovascular disease and strokes.

Air pollution is a risk factor, which means that it is more likely that a person will die or fall ill if (s)he is exposed to a certain level of air pollution. Large epidemiological studies showed that for every 10 microgram of particulate matter (PM), the increase in deaths is expected to be about 6%. It would also increase the incidence of bronchitis by 11%, prevalence of bronchitis in children by 8% and so forth. For example, in Serbia in 2012 the PM10 concentrations were 38.8 micrograms. This means if PM levels in the country are 38.8 microgram annually, 19% of deaths that year were due to PM air pollution.



#### LONG TERM

MORTALITY  
6.2%

INFANT MORTALITY  
4.0%

PREVALENCE OF BRONCHITIS IN CHILDREN  
8.0%

INCIDENCE OF CHRONIC BRONCHITIS IN ADULTS  
11.7%



#### SHORT TERM

HOSPITAL ADMISSIONS (RESPIRATORY)  
1.9%

HOSPITAL ADMISSIONS (CARDIOVASCULAR DISEASE)  
0.9%

RESTRICTED ACTIVITY DAYS  
4.7%

WORK LOSS DAYS  
4.6%

ASTHMA SYMPTOMS IN ASTHMATIC CHILDREN  
2.8%

DEATHS

HOSPITAL ADMISSIONS

STROKES

IMPAIRED LUNG FUNCTION

PRE-TERM DELIVERY

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

COSTS FROM MERCURY

LOST PRODUCTIVITY

REDUCED LIFE EXPECTANCY

LOW BIRTH WEIGHT

LUNG CANCER

HEALTH COSTS FROM CLIMATE CHANGE

COGNITIVE DEVELOPMENT IN CHILDREN

*Under-estimation of health effects: if all health conditions related to air pollution would be included health bill would be even higher*

IN CALCULATION

NOT IN CALCULATION

*The estimate does not include any health costs arising from the full life cycle of coal: mining, transport, waste disposal etc.*

## HOW DO I PUT A PRICE TAG ON THESE IMPACTS?

Monetisation is a jargon term, for putting 'a price tag' on the health impacts. The term refers to an estimation of the monetary worth of health or avoiding ill health and death. Valuation is performed by multiplying health impacts (such as respiratory hospital admissions) by an estimate of the cost of that impact. For example, values for the health impact assessment in CAFE (price year 2005) for premature deaths are 1.09 to 2.22 million EUR/death.

## HOW CAN I USE THIS INFORMATION?

Knowing how much poor air affects health and how much it costs society we: (1) see who is polluting the most, (2) how much we are paying in health for this pollution, (3) compare this to other health urgencies and prioritise, and (4) compare policy measures and actions aiming to reduce the concentrations of pollution in the air.

Information can be used to engage with the medical community, policy and decision makers as well as the general public.

The essence of this methodology is used to calculate the air pollution costs to health globally by the WHO, EU28 by the EU Commission, EU28 and Turkey and Western Balkans by HEAL.



MEDICAL  
COMMUNITY



DECISION  
MAKERS



GENERAL  
PUBLIC



**A QUICK  
GUIDE**  
BY THE HEALTH AND  
ENVIRONMENT  
ALLIANCE (HEAL)

MORE INFORMATION:  
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**HEAL**  
Promoting environmental policy  
that contributes to good health