

Toolkit Clean air

Implications of air pollution
for coal regions in transition

SUPPORT MATERIALS

Providing support materials to coal regions in transition

The Initiative for coal regions in transition developed the following support materials to assist practitioners in coal, peat and oil shale regions across Europe. Click below to download the toolkits.

- ↪ [Transition strategies](#)
- ↪ [Governance of transitions](#)
- ↪ [Sustainable employment and welfare support](#)
- ↪ [Environmental rehabilitation and repurposing](#)
- ↪ [Technology options](#)
- ↪ [Transition financing](#)



TABLE OF CONTENTS

Aims and scope	4
Who is this toolkit for?	4
Why do we need this guidance?	4
Key messages	5
Approach	6
Sources of air pollution in EU coal regions	7
The negative effects of air pollution	9
International and EU goals to reduce air pollution	12
How to reach air quality goals	13
Accompanying notes	20
Further reading	34
Bibliography	34

How to use this toolkit

Slides / Pages 4-19

This section features key ideas and concepts behind clean air strategies for EU coal regions.

It can also be used as a stand-alone presentation. For each slide, more detailed information can be found in the accompanying notes.

Accompanying notes / Pages 20-34

The accompanying notes follow the same structure as the slides and offer a more in-depth look at each section, including further resources, links, examples, and case studies.

AIMS AND SCOPE

This toolkit gives an overview of the impacts of air pollution for coal regions, current EU legislation, and possible measures and good practice examples to reach air quality goals.

WHO IS THIS TOOLKIT FOR?

- Regional and local authorities.
- SMEs.
- Civil society organisations.
- Relevant stakeholders engaged in clean air measures at the local and regional level.

WHY DO WE NEED THIS GUIDANCE?

Air pollution is considered to be the world's most serious environmental health concern, responsible for 8 million fatalities each year. It poses a major threat to health, the environment, climate and the economy.

To tackle air pollution, not only must the direct causes of pollution be addressed, but also indirect factors and interdependencies.

Accordingly, for many EU coal regions reaching better air quality remains a challenge.



KEY MESSAGES

- **Air pollution poses a major threat** to health, the environment, climate and the economy.
- Coal-fired power plants continue to be responsible for the **largest amounts of key pollutants released to air**.
- **Measures to improve air quality** range from technical solutions from educational programs, economic incentives, subsidies or bans to the implementation of local clean air strategies.
- Tackling air pollution in coal regions must also take into consideration **interrelated issues such as energy poverty and inefficient heating**.



APPROACH

Clean air for coal regions in transition

This toolkit structures around four main topics

SOURCES OF AIR POLLUTION IN EU COAL REGIONS

Coal combustion and mining
Coal burning for residential heating

INTERNATIONAL AND EU GOALS TO REDUCE AIR POLLUTION

Air quality standards
EU legislation and policies for air quality



THE NEGATIVE EFFECTS OF AIR POLLUTION

Health impacts
Environmental impacts
Economic and social impacts

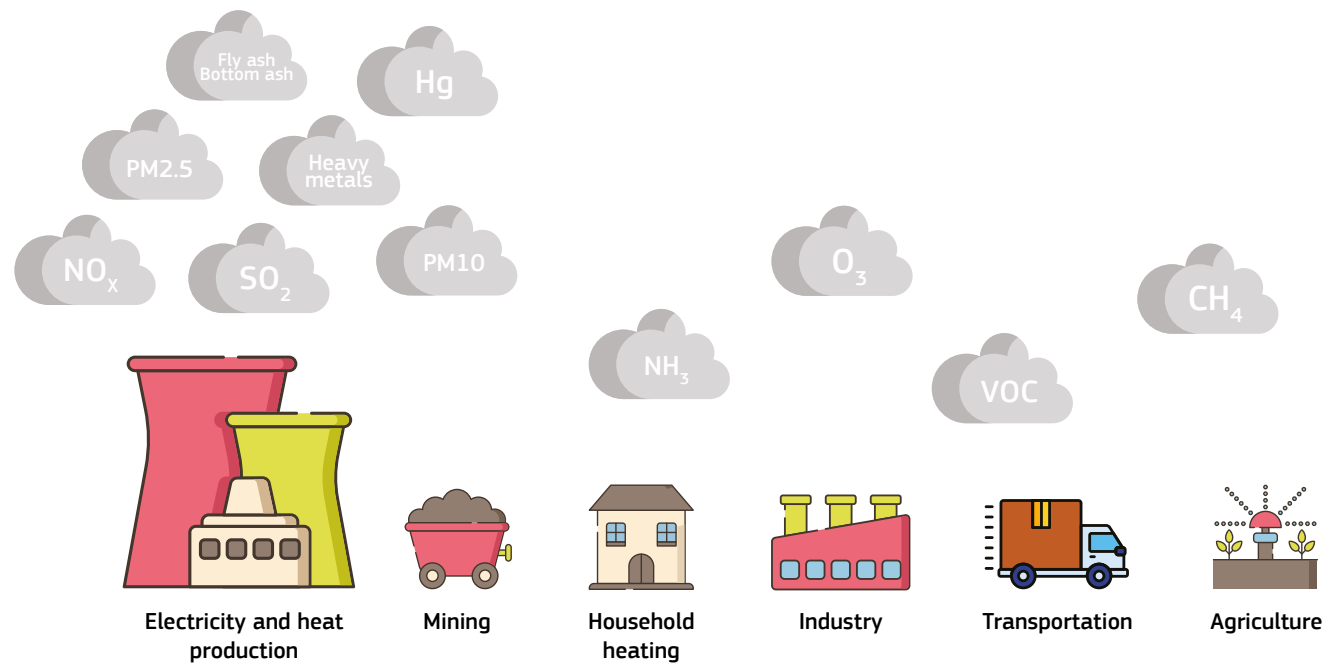
HOW TO REACH AIR QUALITY GOALS: POSSIBLE MEASURES AND PRACTICE EXAMPLES



Sources of air pollution in EU coal regions

Air pollutants

Air pollutants are both directly and/or indirectly emitted into the atmosphere. In coal regions, these are the main pollutants and their sources.





Sources of air pollution in EU coal regions

Coal combustion and mining

Coal mining and combustion for electricity are processes during which a **high number of pollutants** are released into the atmosphere.

Coal burning for heating

Residential heating is also a major source of ambient air pollution.

The **majority of Europe's most polluted cities are in coal regions** with power plants of low efficiency.

Measures against air pollution needs to address all types of coal utilization.

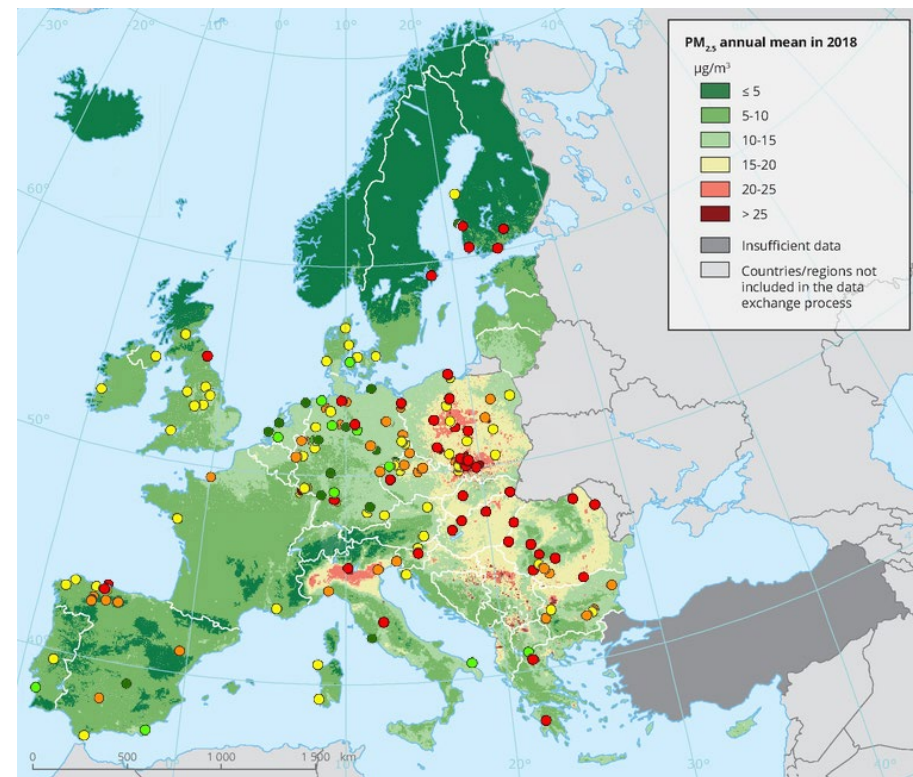


FIGURE 1: PM2.5 ANNUAL MEAN LEVELS AND EFFICIENCY RANGES OF COAL POWER PLANTS IN THE EU AND UK

Source: [EEA Europe](#) & [EU coal regions: opportunities and challenges ahead](#)



The negative effects of air pollution

Health impacts of air pollution

- Air pollution is the **largest environmental health risk in Europe**.
- Responsible for around **400 000 premature deaths** each year.
- Causes or aggravates asthma and other respiratory problems, heart disease, strokes, bronchitis, cancer, neurotoxic effects, IQ loss and other diseases.

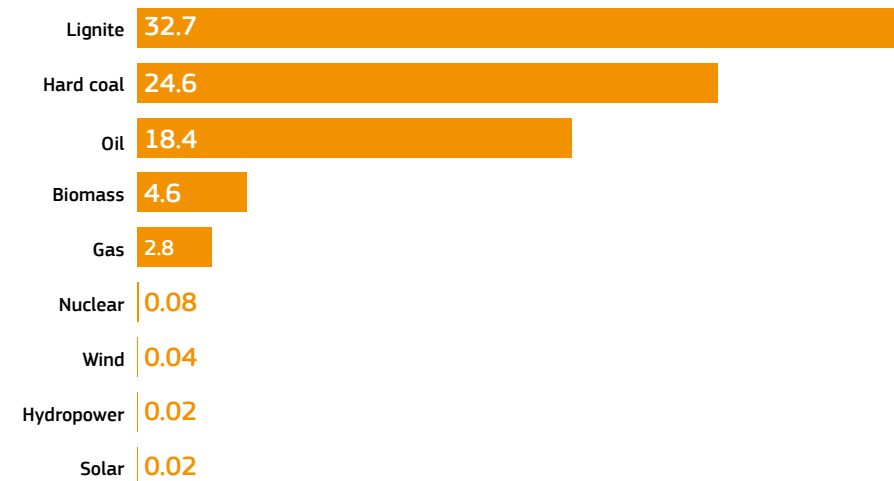


FIGURE 4: DEATH RATES FROM ELECTRICITY PRODUCTION PER TWH

Death rates are measured based on deaths from accidents and air pollution per terawatt-hour (TWh).
Source: [Sovacool et al. \(2016\)](#); and [Markandya, A., & Wilkinson, P. \(2007\)](#)



The negative effects of air pollution

Environmental impacts of air pollution

- Coal combustion **blocks sunlight, causes acid rain** harming natural ecosystems.
- NO_x, along with sulphur dioxide (SO₂), contributes to **acidification of soil, lakes and rivers**.
- Mercury emissions contribute to the **disbalancing of the chemical status of water bodies**.
- Ground-level ozone (O₃) reduces the **growth rates and yields of agricultural crops, forests, and plants**.



CLIMATE CHANGE AND AIR POLLUTION

Similar to CO₂ emissions, pollutants such as black carbon, methane, tropospheric ozone, and aerosols affect the amount of incoming sunlight. As a result, the Earth's temperature is increasing. This shows that the most important environmental issue of air pollution is climate change.



The negative effects of air pollution

Economic and social impacts of air pollution

- Crop yield losses.
- Workday losses due to sickness.
- Damage to buildings.

Industrial air pollution and GHG emission effects alone lead to estimated yearly costs of about [EUR 277 to 433 billion](#), equivalent to 2-3% of the EU GDP.



ENERGY POVERTY AND HEAT SUPPLY AS ANOTHER DRIVER OF AIR POLLUTION

In the EU, heating accounts to 65% of the total energy consumption of households. Combustion of coal and wood in low-efficiency ovens for domestic heating produces high shares of fine particles and other pollutants, which is particularly harmful for human health and is more prevalent in low and middle income regions and countries.

This stresses that air pollution is also closely interlinked to other challenges such as poverty, education and energy efficiency. As a result, measures to tackle air pollution must take those interdependencies into account.



International and EU goals to reduce air pollution

WHO air quality guidelines

A set of **evidence-based limit values** for specific **air pollutants** developed to assist countries in achieving **air quality safe** for people and the environment.

Clean Air Programme as the main strategy

- National Emissions reduction Commitments (NEC) Directive.
- EU Ambient Air Quality Directive for maximum concentrations.
- Source-specific emission standards, including BAT (best available technique) standards e.g. for large industrial installations.

	EU Air Quality Standards	WHO Guidelines 2021
Pollutant	Averaging period, objective and legal nature and concentration	Air Quality Guideline level
PM _{2.5}	Annual limit value: 25 µg/m ³	Annual limit value: 5 µg/m ³
PM ₁₀	Annual limit value: 40 µg/m ³	Annual limit value: 15 µg/m ³
SO ₂	Daily limit value: 125 µg/m ³	Daily limit value: 40 µg/m ³
NO ₂	Annual limit value: 40 µg/m ³	Annual limit value: 40 µg/m ³

EU AND WHO AIR QUALITY GUIDELINES FOR PM_{2.5}, PM₁₀, SO₂ AND NO₂



How to reach air quality goals

How to reach air quality goals

In order to support Member States in improving air quality and fulfilling national emission reduction commitments, the EU, governments, and other donors provide funding and support for projects aiming to improve air quality on a regional and local level.

Measures to reach air quality goals can be:

- technical standards;
- regional & local clean air strategies;
- communication & education;
- stakeholder engagement;
- incentives and subsidies;
- bans.

You can find practice examples of these measures in the following slides.





How to reach air quality goals

Technical standards

Best Available Technology (BAT)

BAT is the technology accepted by legislators or regulators for meeting output standards for a specific process, and in short, it prescribes the acquisition of the best available state-of-the-art technology. In the EU, BAT based policies are mostly used for large industrial installations. Although they have led to pollution reductions in the past, further investments may also [trigger lock in effects](#).



Photo by ŠJÚ. (CC BY-SA 3.0)

COAL-FIRED POWER STATION MĚLNÍK I

The coal-fired power station Mělník I in Czechia has been modernised to comply with EU standards for NO_x and SO_x emissions in 2016, which led to reduction of pollution levels of almost 50 percent. To comply with the newest BAT requirements, however, further investments would have been necessary. Instead, it was decided to phase out of coal combustion at Mělník I until 2030.

[Read more](#)



How to reach air quality goals

Regional & local clean air strategies

Implementation of an Air Quality Plan for the Małopolska Region

The Małopolska Air Quality Plan (MAQP) determines a broad range of targets and measures for local administrations, with a focus on household heating systems.

[➔ Read more](#)

Air quality Management Areas (AQMs) in the UK

In Municipalities in the UK, if the national AQ objectives are not met by the deadlines, an Air Quality Management Area is declared. The local government will then devise a plan to improve air quality (a Local Air Quality Action Plan).

[➔ Read more](#)





How to reach air quality goals

Communication & education

Clean Air education project

The main aim of the project is to raise awareness about the problem of air pollution, especially in the rural communities, as there public awareness to the problem is at a much lower scale.

[↪ Read more](#)

Heat wisely campaign in Hungary

The aim of the campaign is to raise awareness about the dangers of using solid fuels; to inform about the negative effects of waste-burning and also to provide all kinds of information on proper heating techniques.

[↪ Read more](#)





How to reach air quality goals

Stakeholder engagement

CuriousNoses - Science by and for citizens - Air quality at 20 000 measurement points in Flanders

Its goal is to collect large data sets on difficult environmental issues like air quality or heat and drought, which will aid in the mapping of these complex phenomena in great detail.

[↪ Read more](#)

Network Air Quality in Duisburg

With this citizen science project, the residents were encouraged to build their own monitors to measure particulate matter, which would give a rough picture of exposure to air pollution.

[↪ Read more](#)





How to reach air quality goals

Incentives and subsidies

Financial incentives Czech Republic - state subsidies - New Green Savings Programme

A programme focused on energy savings in family homes and apartment buildings. It aims to support the reduction of energy intensity of residential buildings, and construct houses with very low energy intensity and environmentally friendly sources of energy.

[↪ Read more](#)

Insulation of old or new family homes in Slovakia

A programme for contributing to the insulation of old houses or new houses with almost zero energy needs Slovakia, as part of the Act on Energy Efficiency of Buildings, in order to improve the energy efficiency of the family house.

[↪ Read more](#)





How to reach air quality goals

Bans

Banning the use of solid fuels in Krakow (Poland)

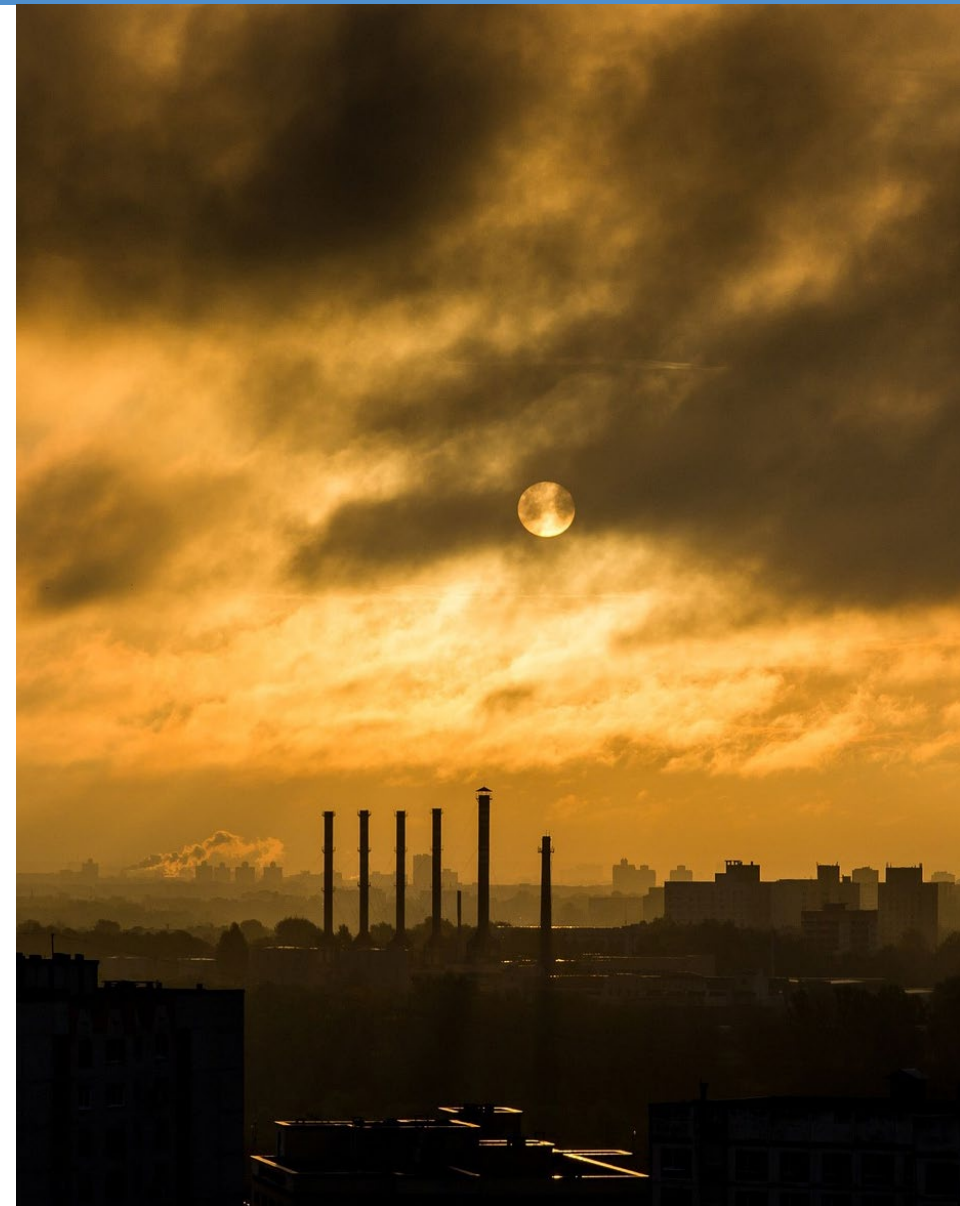
In 2016, The Malopolska Regional Parliament passed a resolution prohibiting the use of solid fuels in Krakow. Since September 2019, the city of Kraków has been prohibited from burning coal and wood in boilers, stoves, and fireplaces.

[↪ Read more](#)

The sale of smoky coal will be banned in Ireland before winter 2022

The Ministry of Environment in Ireland has announced that strict standards for all domestic solid fuels will be implemented across Ireland beginning in 2022, effectively eliminating the most polluting of home-heating fuels.

[↪ Read more](#)



Accompanying notes

Table of contents

Introduction PAGE 21

Why do we need this guidance? / Aims and scope

Sources of air pollution in the EU coal regions PAGE 22

Coal mining and combustion for electricity / Coal burning for residential heating

The negative effects of air pollution PAGE 24

Health impacts of air pollution / Environmental impacts of air pollution / Economic and social impacts of air pollution

International and EU goals to reduce air pollution PAGE 26

Air quality standards / The existing EU legislation and policies for air quality / The European Green Deal and current policy developments

How to reach air quality goals: Possible measures and practice examples PAGE 30

Technical standards / Regional and local clean air strategies / Communication & education / Stakeholder engagement / Incentives & subsidies / Bans

Further reading PAGE 34

Bibliography PAGE 34

Introduction

Why do we need this guidance?

Air pollution is considered to be the world's most serious environmental health concern, [responsible for 8 million fatalities each year](#). It poses a major threat to health, the environment, climate and the economy. Air pollution is also a profound issue in the EU. Most importantly, fine particulate matter has the biggest negative health impacts. [Data from the European Environment Agency](#) (EEA) shows that the levels of fine particulate matter known as PM 2.5 were exceeding the WHO recommended limits in as many as 196 of 323 cities in the EU in 2019 and 2020, causing more than 400 000 premature deaths a year. Air pollution also damages the environment in [many ways](#), directly and indirectly, which impacts the climate.

The EU and many international organisations have addressed air pollution with reduction targets, limitations, and standards. And in fact, emissions of many air pollutants have decreased in Europe [over the last three decades](#) as a result of different policies set by the EU. However, in many regions and cities air pollution continues to pose a major risk to the health of its population. Road transportation, industry, power plants, homes, and agricultural activities continue to emit significant amounts of air pollutants. Fuel combustion, be it household or industrial, [is regarded to be one of the main causes](#) of air pollution. Specifically the burning of coal is a key source of air pollution.

Reducing the use of coal is not only a necessity to reach the EU's climate and

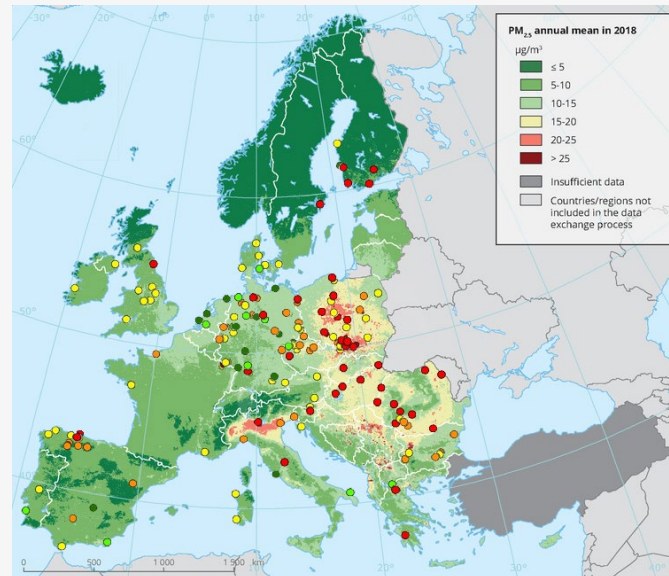


FIGURE 1: PM2.5 ANNUAL MEAN LEVELS AND EFFICIENCY RANGES OF COAL POWER PLANTS IN THE EU AND UK

Source: [EEA Europe](#) & [EU coal regions: opportunities and challenges ahead](#)

THE MAJORITY OF EUROPE'S MOST POLLUTED CITIES ARE IN COAL REGIONS

Coal regions are among the regions with the highest air pollution in Europe. There are also other sources of air pollution: road traffic, industry, agriculture. And consequently, air pollution is a concern in many urban areas or regions like northern Italy. Nevertheless, [the EEA data and rankings](#) clearly show that many of the most polluted cities are in regions characterised by the coal mining industry. Specifically Poland has the European Union's most polluted air. The concentration of both PM10 and PM2.5 was higher in Poland than in any other EU country in [2020](#). This is to a large degree due to the country's heavy reliance on coal - not only in power plants but also due to the burning of low-quality fuels for household heating. [80 percent of private homes using coal](#) in the EU are in Poland. More broadly, the figures below clearly show that especially in coal regions with old and less efficient power plants and in regions with high shares of coal use for household heating in Central and Eastern European countries, levels of air pollution are clearly above the EU's average.

zero-pollution targets, but also an opportunity for many coal regions to improve local air and water quality. This in effect reduces negative health and environmental impacts and increases the quality of life and consequently the attractiveness of regions for workers and companies, whilst complying with international commitments and EU environmental quality standards. Especially in southern and central-eastern Europe countries, where coal plants [are less efficient](#) and coal is more frequently used for household heating, local air pollution from coal is an important challenge.

Aims and scope

This toolkit aims to provide an accessible orientation on issues related to air pollution and clean air, relevant to coal regions in transition by informing about the scope of air pollution for public health, environment, climate and economy and especially by showcasing currently existing measures and good practice examples in EU countries that show pathways to support the transition towards zero air pollution.

This toolkit explicitly addresses air pollution caused by coal combustion, including coal mining, coal plant emissions as well as emissions from household use of coal for heating.

Coal-fired power plants continue to be responsible for [the largest amounts of key pollutants released to air](#). Coal combustion remains an important source of emissions, [contributing to poor air quality](#) across Europe. [It generates more pollutant and greenhouse gas \(GHG\) emissions](#) per energy unit than other fossil fuels. As such, this toolkit focuses on energy production and heating in the coal regions where air quality is the most affected.

Sources of air pollution in the EU coal regions

For centuries, coal has been a critical energy source and a mainstay in global and also the EU's energy supply. It is, however, [the most polluting energy source](#), both in terms of GHG emissions and of local air pollution per unit of energy produced. Its numerous negative environmental effects mining, preparation, combustion, waste storage, transportation and the use of coal for heating. These different processes impact the environment,

human health and climate in different ways. In this toolkit, focus will be given to the negative effects on air quality from coal mining and combustion for electricity production and coal burning for residential heating.

As PM 2.5 is the air pollutant with the highest impact on health in terms of premature death and disease, the [ranking of cities](#) in terms of air quality is done on the basis of average levels of this pollutant. [The largest share \(%\) of PM2.5 emissions](#) in the atmosphere by source in the EU is from commercial/household heating. [Another very important source of primary PM2.5](#) emissions is electricity and heat production. PM2.5 can

also be formed from the chemical reactions of other pollutant gases such as sulphur dioxide (SO₂) and nitrogen oxides (NO_x) which are called secondary particles. Electricity and heat production is also responsible for a large share of SO₂ and NO_x emissions and indirectly, of secondary particles.

In the EU, [almost 64% of energy consumption in households](#) is used for space heating. Especially in CE countries and specifically for poorer households, coal plays a very important role in the heating sector. According to [the data from EEA](#), electricity and heat production is responsible for 54% of SO₂ and 16% of NO_x emissions and additionally, higher coal generation in a country translates

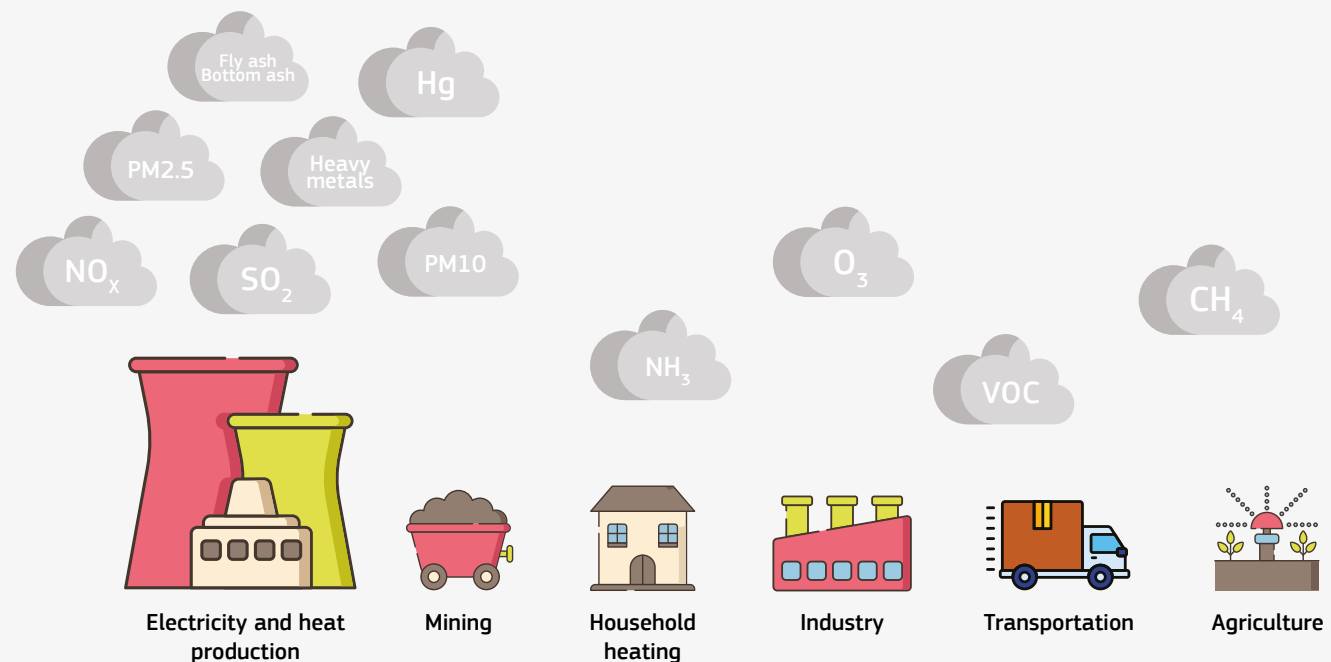


FIGURE 2: MAIN AIR POLLUTANTS AND SOURCES

Note: This is not an exhaustive list of all air pollutants and sources of air pollution. For a full list of air pollutants and sources, please visit: <https://www.eea.europa.eu/themes/air/air-pollution-sources-1>

into higher air pollutant emission share for its energy sector (figure 1). As a result, coal remains in the very centre of air pollution especially in the EU coal regions, and transition from coal to renewable energy should take place not only in the power sector, but also in the heating sector which will also play a major role in reducing air pollution.

Coal mining and electricity production

Coal utilisation goes through different processes, starting from mining, selection and washing, transportation, distribution and consumption. All of these air pollution sources and procedures have different effects in the environment. Regarding air pollution, two processes can be distinguished for their effect on air quality - coal mining, especially the operation of open-pit coal mines, which besides its effect on ground and surface water quality, is a process where a large amount of dust particles, such as PM2.5 is emitted which can affect the air quality not only locally, but over a large area; and power generation, where coal combustion releases a variety of air pollutants that are dangerous for human health, the environment and the climate. The main pollutants produced by [coal mining, combustion and burning for household are listed below](#):

- sulfur dioxide (SO₂), which contributes to acid rain and respiratory illnesses;
- nitrogen oxides (NOx), which contribute to smog and respiratory illnesses;
- particulates, which contribute to smog, haze, and respiratory illnesses and lung disease;

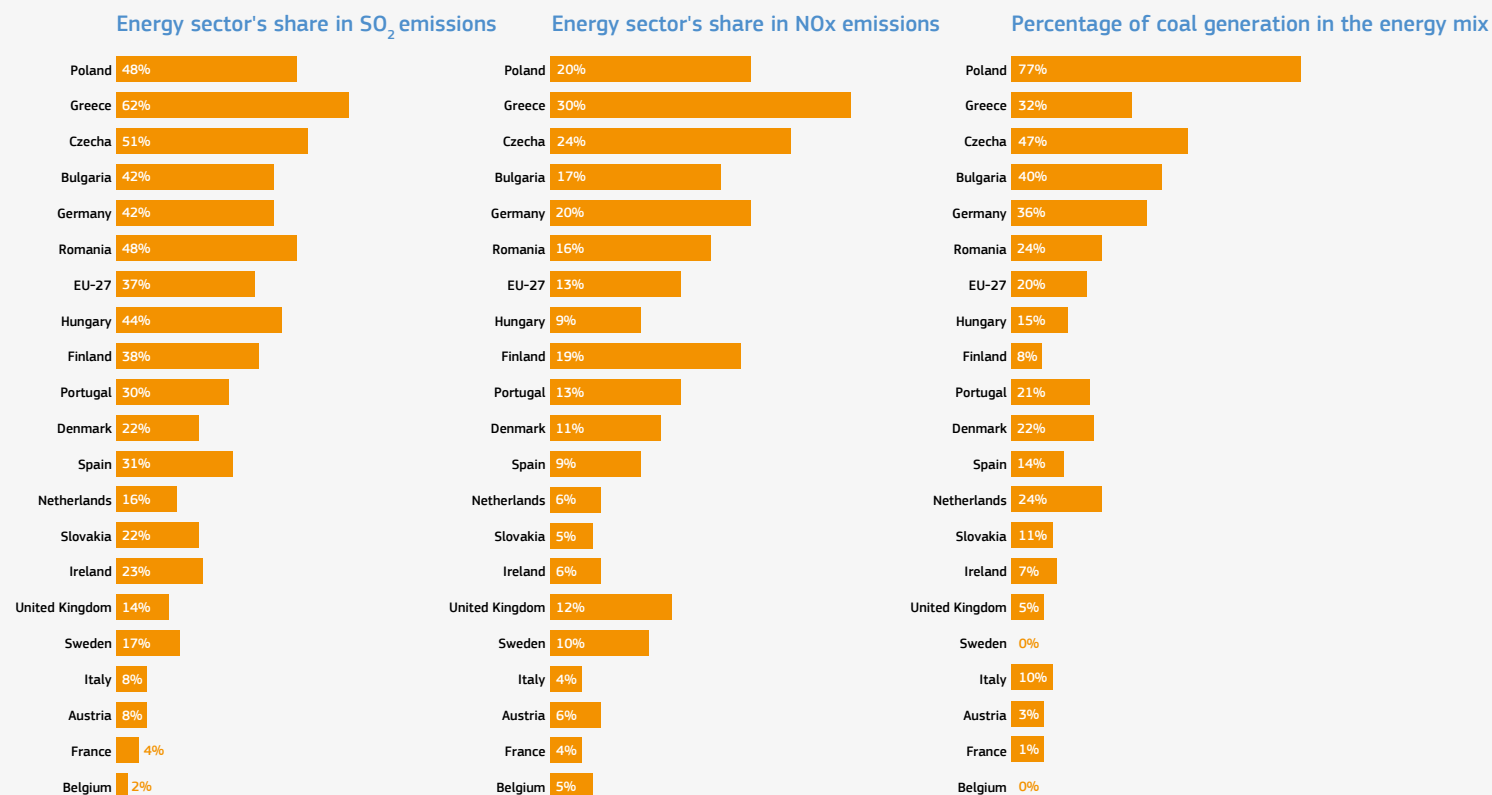


FIGURE 3: ENERGY SECTOR'S SHARE IN AIR POLLUTION AMONG EEA MEMBERS (2018)

Source: [Ember-climate.org](#)

- carbon dioxide (CO₂), which is the primary greenhouse gas produced from burning fossil fuels (coal, oil, and natural gas);
- mercury and other heavy metals, which have been linked to both neurological and developmental damage in humans and other animals;
- fly ash and bottom ash, which are residues created when power plants burn coal.

Coal burning for residential heating

Besides being utilized for electricity production, once it is extracted, coal can also be used for household heating. However, residential heating is a major source of ambient air pollution, and it can also cause significant indoor air pollution through direct exposure or infiltration from the outside. For example, 85% of all coal used for heating buildings in Europe is in Poland, and coal is the primary source of heat for many of the country's regions. Parallely, it is the country with the most polluted air in Europe, where concentrations of PM10 and PM2.5 were the highest in the EU in 2020. A significant proportion of this high level of pollution is due to the country's high reliance on coal - be it for electricity or heating. Because of this, when addressing problems with outdoor air pollution, it is very important to take into account coal burning for residential heating as well.

The negative effects of air pollution

In line with the EU's goal to become climate-neutral by 2050, clean air must be considered an important part for the overall transition strategy for the coal regions in the EU, as it is strongly [linked to climate change and other environmental concerns](#). Many air pollutants [come from the same sources](#) as GHGs, therefore, the efforts to mitigate climate change can improve air pollution. Thus, this toolkit provides an overall guidance to tackling air pollution in the coal regions while taking into account climate change and other environmental, social and economic issues.

There are numerous damaging environmental and health impacts of coal that occur when used as a source of energy or heat production. Coal mining, coal combustion for energy production and coal use for heating emit pollutants that affect human health, the environment and the economy in different ways. The main pollutants produced through these processes and their impacts are described in more details below.

Health impacts of air pollution

Air pollution is the [largest environmental health](#) risk in Europe, and is a major cause of premature death and disease. In many parts of Europe, PM concentrations continue to exceed EU limit values and WHO air quality guidelines. Studies show that the exposure to harmful pollutants causes or aggravates diseases in both short and long term. Typical effects are [asthma and](#)

[other respiratory problems](#), as [well as heart disease, strokes, bronchitis and cancer](#).

Exposure to air pollution [has also been linked](#) to type 2 diabetes, obesity, systemic inflammation, Alzheimer's, and dementia. Overall, the effects on citizen's health result in less working days and higher healthcare costs, with the most vulnerable groups being disproportionately affected.

Ultimately, air pollution causes over 400 000 premature deaths in the EU28 (attributed only to PM2.5 exposure), and the years of lives lost are estimated to be 4 381 000 (PM2.5 exposure).

Energy production and household heating are responsible for the largest amount of air pollution and coal specifically is the most polluting and dangerous energy source. Specifically, burning coal causes about 22 900 premature deaths a year in Europe. By setting and enforcing pollution limits in line with the best available techniques, [these numbers can be reduced to 2 600](#). Death rates per 1 TWh of energy produced are related mostly to coal and other fossil fuels (figure 4).

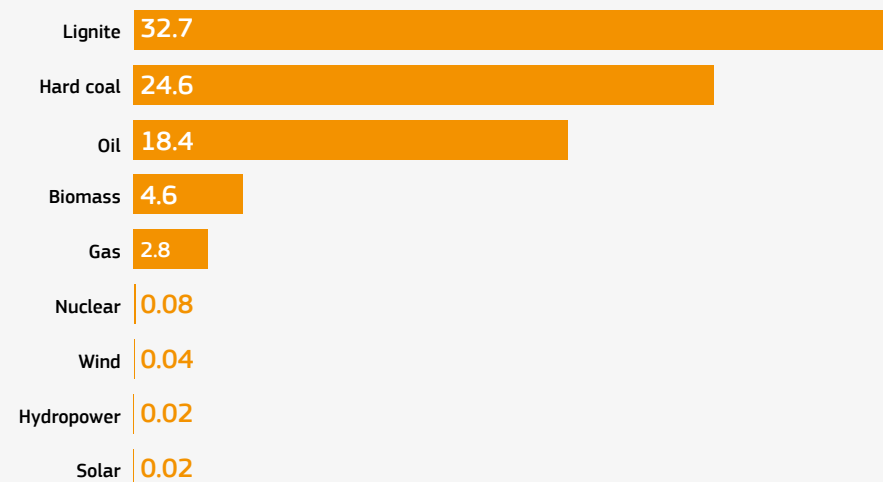


FIGURE 4: DEATH RATES FROM ENERGY PRODUCTION PER TWH

Death rates are measured based on deaths from accidents and air pollution per terawatt-hour (TWh).
Source: [Sovacool et al. \(2016\)](#); and [Markandya, A., & Wilkinson, P. \(2007\)](#)

Environmental impacts of air pollution

Air pollution [also impacts](#) the environment. It reduces air visibility which can block sunlight, cause acid rain and harm the natural ecosystem. Depending on the pollutant and its scale, the consequences to the environment vary. [NO_x, along with sulphur dioxide \(SO₂\)](#), contributes to acidification of soil, lakes, and rivers, resulting in biodiversity loss. [62% of the EU area](#) is exposed to eutrophication, and [110 000 km² in the EU area](#) is exposed to acidification. Mercury is also considered an important pollutant because of its effect on water bodies. Atmospheric deposition of mercury is the reason for failure of good chemical status in over [45 000 water bodies in the EU](#) and

coal is the most important source of mercury emissions in the air (15.6 tonnes of mercury to air in 2018, 61% of reported mercury emissions to air in the EU28). Short-lived climate forcers such as tropospheric O₃ and black carbon (BC), a constituent of PM, are examples of air pollutants that contribute directly to global warming. Ground-level ozone (O₃) reduces the growth rates and yields of agricultural crops, forests, and plants, affecting biodiversity and ecosystem services.

Economic and social impacts of air pollution

The health and environmental impacts of air pollution are also manifested as economic and social costs. Health expenditures for humans as well as crop yield losses, may result in reduced economic productivity, which according to an [OECD report](#), is projected to lead to a 1% decrease of annual global GDP by 2060. In the EU, direct economic costs of air pollution amount to around [EUR 23 billion](#). Specifically, crop yield loss amounts to [EUR 3 billion](#), workdays lost due to sickness a total of [15.8 billion](#), direct health amounts to [4 billion](#) euros and damage to buildings around [EUR 1 billion](#). Additionally, the increased mortality and morbidity due to

outdoor air pollution do also reflect as non-market costs, along with other factors. The EEA calculated that the industrial sector air pollution and greenhouse gases emitted from large industrial sites in the EU alone causes [costs of about EUR 280 to 430 billion](#). In fact, a limited number of facilities (1572) [make up for 90% of those damage costs](#), namely the energy sector (thermal power) and heavy industries, ferrous metals and chemical industry.

These and other potential economic impacts of air pollution are very significant and unequally distributed along different regions where vulnerable groups are always most affected.

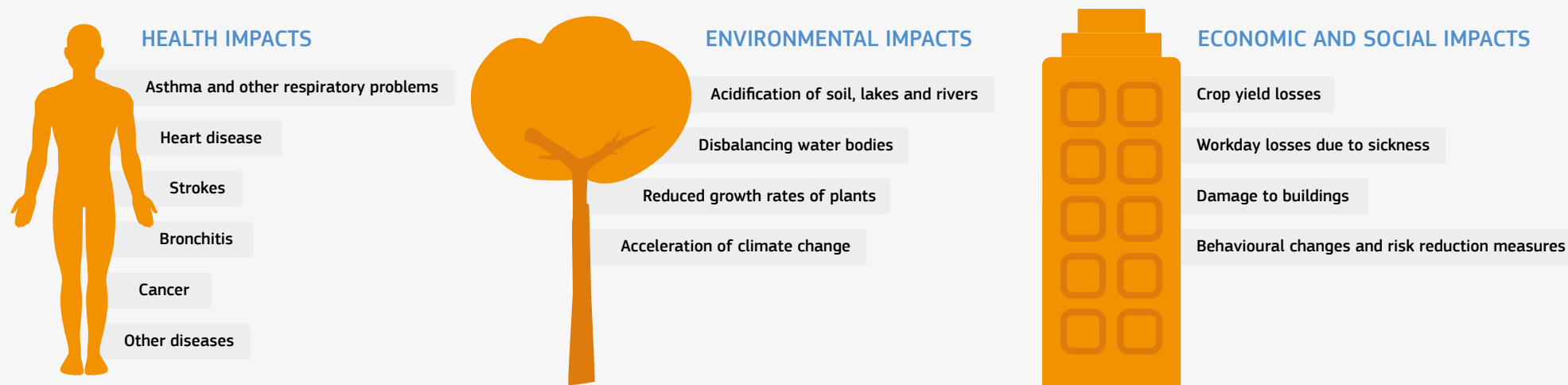


FIGURE 5: NEGATIVE EFFECTS OF AIR POLLUTION

International and EU goals to reduce air pollution

Air quality standards

There is growing concern about air quality issues among governments, international and national organizations, the media, and the general public, as well as increased public support for action. In response to the global threat to public health that air pollution poses, scientists have provided their contribution on determining the essential scientific evidence for the development of strategies for air quality management, which among other things, are intended to provide appropriate targets for a wide range of policy options for air quality management in various parts of the world.

The World Health Organization has been continuously developing air quality guidelines since 1987, with a last update in September 2021. Among health experts these guidelines are considered as a uniform scientific basis for understanding the effects of air pollution on human health. They are intended to act as a basis for setting air quality management standards at a local or national level. Currently, the WHO guideline offers guidance about the six classical air pollutants: particulate matter (PM 2.5 and PM10), ozone (O₃), nitrogen dioxide (NO₂), sulphur dioxide (SO₂) and carbon monoxide (CO). The 2005 guidelines were used as a starting point for the EU Ambient Air Quality Directive and are more stringent than the current EU air quality standards. The European Commission has

ENERGY POVERTY, HEAT SUPPLY AND AIR POLLUTION IN THE EU



FIGURE 6: THE INTERRELATION BETWEEN GDP PER CAPITA, EXPOSURE TO AIR POLLUTION AND PREMATURE DEATHS

Left: GDP per capita in euro, < 10,000 (2017, 2018) / Centre: Population-weighted concentrations of PM_{2.5}, >25 µg/m³ (2018) / Right: Premature deaths per 100 000 inhabitants attributed to exposure to PM_{2.5} > 150 (2018)

Energy poverty, heat supply and air pollution are all interlinked, because heating consumes 65 percent of total energy used by European households and residential burning is the largest source of fine particles and other air pollutants. As a result, measures to tackle air pollution must take into account the interdependence of these issues.

The EU has no official definition for energy poverty, but it is often described as “Inability to keep homes adequately warm”. Even though other energy uses apart from heating are also important (electricity, transportation etc.), in many countries heating is a key issue of energy poverty. Therefore, an important indicator for energy poverty is “the share of households’ expenditure covering their energy costs”. Thus, energy poverty is also closely linked to low income, poor building energy performance and rising energy prices, which may result in inefficient heating practices that cause high levels of air pollution, especially particulate matter. For example, the combustion of low-quality solid fuels, such as coal and wood, in low-efficiency ovens for domestic heating is more prevalent in low and middle income regions and countries. An interrelation between GDP per capita, higher exposure to pollution and premature deaths can be perceived in the maps shown above. These maps show an interrelation between low GDP, exposure to PM_{2.5}, and premature deaths, especially in eastern European countries. Because there are numerous interconnections between poor heating and air pollution in these countries, effective policies and best practices must be implemented on a national and local level in order to tackle these issues simultaneously. There are various examples of such good practices in section 5.

launched a [public consultation](#) on the revision of EU rules on air quality based on the latest WHO air quality guidelines update and [according to the Commission](#), it aims to align the EU air quality standards more closely with the new recommendations of the WHO. Thus, it can be expected that air quality standards in the EU will become stricter in the future.

The existing EU legislation and policies for air quality

The European Union acts in many ways to reduce air pollution alongside legislation: through environmental protection policies, strategies, programmes and plans, through cooperation with sectors most responsible for emissions; through national, regional authorities, non-governmental organisations and research. In order to increase efforts towards improving air quality, in 2013 the European Commission adopted a [Clean Air Policy Package](#), including a Clean Air Programme for Europe setting objectives for 2020 and 2030 and accompanying legislative measures.

The Clean Air Policy Package is the most comprehensive strategy for air pollution reduction in the EU, which contains objectives for reducing the health and environmental impact of air pollution, and legislative proposals for implementing stricter emission and air pollution standards. [Clean air Programme for Europe](#) is one of the elements of the Package, which - above all - addresses the reasons for widespread non-compliance of the air pollution limits and targets and it also suggests legislation to decrease harmful emissions that lead to

poor air quality and harm the environment in the long run. It contains legislative proposals for a revised NEC Directive (see table 2), and also non-regulatory support measures to enhance capacity and co-operation at all political levels, with priority areas in several dimensions of air policy.

The EU [Ambient Air Quality Directive](#) provides the current framework for the control of ambient concentrations of air pollution mainly through emission limits and target values for a range of pollutants. At the centre of the EU Ambient Air Quality Directive lie emission standards which set pollutant concentration limits that must not be exceeded in a given time period. Table 1 below summarizes selected EU standards as well as [World Health Organization \(WHO\) guidelines](#). Because the observed health effects associated with the various pollutants occur over different exposure times, these apply over different time periods. Only four air pollutants - PM_{2.5}, PM₁₀, SO₂ and NO₂ are presented in this table because they are the key pollutants released by coal-fired power plants. The EU standards are generally less strict than the WHO guidelines, which has been widely criticised by health experts and civil society groups.

These standards are part of an extensive body of legislation for air quality developed by the European Union. Other important EU legislation aims to reduce air pollution emissions from specific sources, such as: Paints and solvents, stationary sources/ industrial facilities and transportation. In table 2 are listed the relevant legislation for coal regions covering also emissions from combustion plants and industrial emissions.

On top of policies and legislation, the EU has introduced many economic tools for reducing (air) pollution, also known under

	EU Air Quality Standards	WHO Guidelines 2021
Pollutant	Averaging period, objective and legal nature and concentration	Averaging time and target (interim target 4)
PM _{2.5}	Annual limit value: 25 µg/m ³	Annual limit value: 10 µg/m ³
PM ₁₀	Annual limit value: 40 µg/m ³	Annual limit value: 20 µg/m ³
SO ₂	Daily limit value: 125 µg/m ³	Daily limit value: 50 µg/m ³
NO ₂	Annual limit value: 40 µg/m ³	Annual limit value: 40 µg/m ³

TABLE 1: EU AND WHO AIR QUALITY GUIDELINES FOR PM_{2.5}, PM₁₀, SO₂ AND NO₂

the term '[environmental economics](#)', which in one way or another, result in decreasing the pollution and improving the environment. Such tools can be market-based instruments such as environmental taxes, tradable permit systems, and targeted subsidies - which incentivize businesses and consumers to choose greener production or products; polluter-pays principle, which has a main purpose to internalize the social costs (externalities) borne by the environment, the general public, or government agencies as a result of pollution or inefficient natural resource use; green taxation such as an Environmental Tax Reform, which is the combination of an increased application of environmental taxes with the reduction of other, more distorting taxes, e.g. on labour, in order to improve the environment and to support growth and employment, within a context of budget neutrality; tradable permits such as EU ETS, etc.

EC Implementing Decision establishing best available techniques (BAT) conclusions, under the [Industrial Emissions Directive \(IED\)](#)

Another instrument to reduce air pollution on top of air quality standards and legislation, is the requirement for The Best Available Technology (BAT). BAT is the technology accepted by legislators or regulators for meeting output standards for a specific process, and in short, it prescribes the acquisition of the best state-of-the-art technology available. In the EU, BAT based policies are mostly used for large industrial installations, but although they could have led to overall pollution reductions in the past, further investments may also trigger [lock in effects into coal-fired power generation](#), which would be countereffective for clean air and climate efforts. According to an [EEA report](#), emissions of key pollutants from large combustion plants have decreased significantly during the recent years. During

Legislation	Description
Directive 2008/50/EC on ambient air quality and cleaner air for Europe	A replacement of the five acts regarding air pollutants by a single Directive in the interests of clarity, simplification and administrative efficiency Aims to reduce emissions of the main air pollutants, by setting rules for establishing a reciprocal and data from networks and individual stations measuring ambient air pollution within the Member States
National Emission reduction Commitments Directive (NEC Directive) -	Sets stricter limits on the five main pollutants in the EU Aims to reduce by almost 50% of the negative health impacts of air pollution by 2030 if fully implemented.
Directive 2010/75/EU on industrial emissions (integrated pollution prevention and control)	Regarded as the main EU instrument regulating pollutant emissions from industrial installations. Establish a general framework for the control of the main industrial activities with a priority to intervention at source.
Directive 2001/80/EC on the limitation of emissions of certain pollutants into the air from large combustion plants	Aims to reduce emissions of acidifying pollutants, particles, and ozone precursors. Aims to control the emissions from large combustion plants (with rated thermal input equal to or greater than 50 MW). The EC is currently undertaking an impact assessment to propose a revision in 2022.
Directive (EU) 2015/2193 on the limitation of emissions of certain pollutants into the air from medium combustion plants	Aims to reduce emissions of acidifying pollutants, particles, and ozone precursors by setting limitation of emissions of certain pollutants into the air from medium combustion plants Applies to combustion plants with a rated thermal input equal to or greater than 1 MW and less than 50 MW ('medium combustion plants'), irrespective of the type of fuel they use.
UNECE Convention on Long-Range Transboundary Air Pollution	Its " multi-pollutant " protocol has national emission ceilings for EU Member States that are either equal to or less ambitious than those in the EU NEC Directive.
2011/850/EU: Commission Implementing Decision as regards the reciprocal exchange of information and reporting on ambient air quality	Lays down target values relating to several air pollutants to be met by a certain date Determines common methods and criteria for the assessment of the listed pollutants Lays down the information that needs to be transmitted to the Commission Ensures that adequate information on concentration levels of those pollutants is made available to the public.
The Minamata Convention on Mercury	The Minamata Convention on Mercury is an international treaty aimed at safeguarding human health and the environment from anthropogenic mercury and mercury compound emissions and releases. It also addresses the phase-out and phase-down of mercury use in a variety of products and processes, emission control measures for air, land, and water.
Directive 2004/107/EC of the European Parliament and of the Council of 15 December 2004 relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air	Aims to minimise harmful effects on human health, paying particular attention to sensitive populations, and the environment as a whole, of airborne arsenic, cadmium and nickel and polycyclic aromatic hydrocarbons, target values should be set, to be attained as far as possible.

TABLE 2: OVERVIEW OF EU AND INTERNATIONAL LEGISLATION REGARDING AIR POLLUTION WITH RELEVANCE TO COAL REGIONS

the period 2004-2015, sulphur dioxide (SO₂) emissions decreased by 81%, nitrogen oxides (NOx) by 49% and dust by 77%.

However, there are clear limitations to the BAT approach. As many countries in the EU allow derogations, EU member states [are still far from achieving](#) the requirements of the Industrial Emissions Directive, which defines [Best Available Techniques for large combustion plants](#). In relation to coal/lignite combustion, [only one EU lignite plant](#) has more effective DeNOx controls (SCR) in place, but is not required to use it. As Member Countries have fallen short on applying the BAT-complying technologies, these were updated in 2017 with a deadline in 2021. One reason was the associated costs: Projections in 2016 showed that the combined update and modernisation costs for coal-fired power plants to meet the Industrial Emissions Directive amounts between [EUR 7.9 and 14.5 billion](#).

For instance, [a modern European lignite plant which is located in Slovenia](#) (Sostanj 6), is not using its NOx abatement tools in order to keep operational costs as low as possible. Even in this case, the Government supports the plant to continue operating regardless of not complying to the BATc. There are [many other similar cases](#) where permitting authorities and operators have gone for the highest legally permissible levels of pollution and have avoided enforcing the LCP BREF pollution standards because of costs. As such, with rising CO₂ prices and member states' commitments to lower their overall emissions, today, for many power plants closure would be economically more feasible than investing into BAT-complying technologies.

The European Green Deal and current policy developments

[The European Green Deal](#) is a set of policy initiatives by the European Commission with the overarching goal of achieving climate neutrality in Europe by 2050. One of the elements of the Deal is '*a zero pollution ambition for a toxic-free environment*' which underlines the EU needs for better monitoring, reporting, preventing and remedying pollution from air, water, soil and consumer products. In order to address these challenges, the Commission has adopted a [zero pollution action plan for air, water and soil](#).

As a first step toward climate neutrality, the EU has increased its 2030 climate ambition, committing to a 55 percent reduction in emissions by 2030. Under the so-called '[Fit for 55 package](#),' the EU is revising its climate, energy, and transportation-related legislation in order to align current laws with the 2030 and 2050 goals. The package also includes a number of new proposals to update the entire EU 2030 climate and energy framework, including legislation on effort sharing, land use and forestry, renewable energy, energy efficiency, new car and van emission standards, and the Energy Taxation Directive. The Commission proposes that the emissions trading system (ETS) be strengthened, that it be extended to the maritime sector, and that the free allowances allocated to airlines be reduced over time. Additionally, The Commission is seeking to propose aligning the EU air quality standards closer towards the WHO recommendations. Similar to the former, it will also review EU measures for large industrial installations.

How to reach air quality goals: Possible measures and practice examples

Even though there have been some improvements in many regions regarding to air pollution caused by coal combustion, working towards clean air remains a challenge, especially for the regions affected most, which are also often coal regions in the EU.

The following practice examples and measures are meant to target regional and local stakeholders and are complementary to EU and national legislation and policies. Regional strategies, awareness concepts, educational projects or direct regional legislation can already have an impact on air pollution levels.

However, it should be noted that these following examples are only aiming to reduce emissions, not fully abolish them. For example, improving boiler efficiency in coal-fired power plants will reduce air pollution - however, even strict compliance with state-of-the-art air pollution standards will lead to high residual pollution emissions (i.e. lock-in pollution transfer sinks such as mercury) as well as other negative impacts (i.e. water abstraction and upstream pollution due to mining). In consequence, a shift away from combustion, the substitution to cleaner fuels, specifically non-combustion based renewables, is an increasingly viable option both with respect to reaching the EU's climate and zero pollution ambition targets and increasing air quality in coal regions.

Technical standards

Best Available Techniq

In 2016, the six boilers of the Mělník I coal-fired power station in Czechia have been modernised to comply with EU standards for NO_x emissions, which at time set a new limit for pollution at 200mg/Nm³. Furthermore, desulphurisation lines for SO_x emission abatement were installed at the power station, which has production capacities of 1089MWt/h. The costs of these upgrades are indicated at about EUR 47 million. However, as the newest 2021 BAT maximum NO_x levels require the plant to emit maximum levels of 65-150mg/Nm³ as yearly average, further improvements were necessary. Facing these further requirements and at the same time the need to reduce Co₂ emissions, it was decided to phase out of coal combustion at Mělník I until 2030.

[🔗 Read more](#)

Regional and local clean air strategies

Implementation of Air Quality Plan for Małopolska Region

Southern Poland is one of the regions in the EU with the highest air pollution levels. The Malopolska Region suffers from extremely poor air quality, especially during the winter months. Particulate matter and benzo(a) pyrene concentrations are extremely high throughout the region. In response to this situation, [the Małopolska Air Quality Plan \(MAQP\)](#) determines different tasks for local governments in order to change the status quo of air quality in the region, with a focus on household heating systems. However, the level of implementation of the actions of the actions determined by the Plan prepared in 2013 was insufficient, as in 2013 – 2015, the achieved reduction of PM and benzo(a) pyrene emissions reached only 8% of the target for 2023. In order to accelerate and smooth the way for improving air quality in the Region, the [LIFE Integrated Project](#)

[“Implementation of Air Quality Plan for Małopolska Region – Małopolska in a healthy atmosphere”](#) assists in the effective use of available financial resources and legal tools. As one of the actions of the LIFE Integrated Project, a network of Eco-managers covering 62 beneficiary municipalities has been created. Eco-managers are responsible for the implementation of tasks arising from the Air Quality Plan at local level. In addition, at the regional level, the Excellence Centre was established within the Marshal's Office of the Małopolska Region to provide training and a knowledge base for all local authorities in order to assist municipalities in the implementation of their activities. The LIFE Integrated Project contributes to the implementation of local regulations introduced as a result of the Air Quality Plan for the Małopolska Region.

[According to the Ministry of Development in Poland](#), the actions taken in Kraków and Małopolska have brought positive effects not only in the form of local air quality improvement, but are also in the form of impact on other regions of the country. The model resolutions initiated in Krakow and



LIFE INTEGRATED PROJECT “IMPLEMENTATION OF AIR QUALITY PLAN FOR MAŁOPOLSKA REGION – MAŁOPOLSKA IN A HEALTHY ATMOSPHERE”

Malopolska have resulted in the creation and adaptation of similar anti-smog resolutions in 13 voivodships. The Ministry of Development has also positively evaluated the main directions and activities of the new AQP in the Malopolska Region which was adopted in 2020, especially for the support to people affected by energy poverty with the use of the Stop Smog Programme. Furthermore the Plan introduced a ban on public subsidies for coal-fired boilers from 2021. The results of the resolution and the Plan are visible especially in the heating period from October to March. The average concentration of PM10 dust between the winter season 2014-2015 and the last season 2019-2020 dropped by 30% in Małopolska, while in Krakow by as much as 45%. An important requirement of the Plan is an obligation to employ Eco-managers in all municipalities. It is planned to co-finance their employment within the funds of the Regional Operational Programme 2021-2027. The benefits of this are visible, as those municipalities where Eco-managers are employed have replaced more furnaces than others so far. Between 2016 and 2019, the municipalities have replaced as many as 32 289 boilers in the LIFE programme (55 municipalities), while the remaining ones (127) have replaced 16 165 old high-emission devices.

[↪ Read more](#)

Natural England's Shared Nitrogen Action Plan (SNAPs)

Trialing Site Nitrogen Action Plans (SNAPs) for affected sites in the UK is one of the main two aspects of the strategic approach in its Atmospheric Nitrogen Theme Plan (supported by European LIFE+ funding). Nitrogen oxide emissions [are linked to a number of](#)

[environmental issues](#), including increased ground-level ozone, acid rain, acidification of aquatic systems, forest damage, etc., which results in changing ecosystems, including sensitive habitats protected under the EU Habitats Directive, which offers a high degree of protection to Natura 2 000 sites. As such, SNAPs aim to achieve a decline in atmospheric nitrogen deposition on sensitive habitat through spatially targeted source and landscape-scale measures, while taking account of trends in background Nitrogen deposition at a site level, and ensure habitat restoration measures are in place.

According to the [Implementation Progress Report](#), the development and communication of Shared Nitrogen Action Plans (SNAPs), as recommended by the Nitrogen Deposition Theme Plan, has made significant progress. Six pilot SNAPs are in progress (Epping Forest, Birklands and Bilhaugh, Fenn's and Whixall, Breckland, Culm Grasslands and Tintagel-Marshland-Clovelly Coast) and two more are being scoped.

[↪ Read more](#)

Netherlands' National Air Quality Cooperation Programme (NSL)

The National Air Quality Cooperation Program (NSL) in the Netherlands outlines national, regional, and local actions that can be taken to meet the air quality standards. It takes into account desired and planned spatial changes. Within the NSL, the government, provinces, and municipalities collaborate. An annual update is performed to keep the NSL program up to date.

[↪ Read more](#)

Air quality Management Areas (AQMs) in the UK

Every local authority in the UK has been reviewing and assessing air quality in their area since the 1990s. This entails calculating air pollution levels and predicting how they will change over the next few years. The review's goal is to ensure that the UK's national air quality objectives are met by the deadlines. If a local government discovers a location where the goals are unlikely to be met, it must declare an Air Quality Management Area there. This area could be as small as one or two streets or much larger. The local government will then devise a plan to improve air quality, known as 'a Local Air Quality Action Plan'.

[↪ Read more](#)

Communication & education

Toolkit on communicating the health impacts of air pollution

This toolkit is developed by Clean Air Fund which aims to help organisations, institutions and other relevant users to communicate the health impacts of air pollution and to work on cleaning up our air. It is designed to reach people who are not already engaged in air pollution, but rather those who have vague or no information and knowledge on the issue. It provides the user with the most updated data on clean air and air pollution, and it also gives tips and means for communicating air quality and health to the audience. The toolkit also sheds light to the most prominent health issues of air pollution, that may provide the user with recommendations on focal



CLEAN AIR EDUCATION PROJECT

points at what people are most interested in regarding the matter, in order to increase the engagement of the reader. On top of all, it presents quantitative and qualitative health statements that may be used by the user, and it also offers some visuals that are tested and deemed to be critical in attracting public attention and engagement on air pollution.

[↪ Read more](#)

Clean Air education project

The Clean Air education project is funded by the European Commission and implemented by Krakowski Alarm Smogowy and other partners. The main aim of the project is to raise awareness about the problem of air pollution especially in the rural communities, as there public awareness to the problem is at a much lower scale. The Clean Air Project platform provides air pollution training to teachers in rural areas, as well as with educational materials to use in teaching their students and pupils about the problem. These educational materials can be found online at the Clean Air Project website.

[↪ Read more](#)

Promoting and educating interested and professional public through brochures, info gallery and centres in Zagreb

Continuous citizen engagement and consultation is carried out in Zagreb, Croatia, by promoting and educating interested and professional public through educational brochures, information galleries, and information centers. Every year, the City of Zagreb hosts the Zagreb Energy Week, which includes a series of international conferences, seminars, open doors, lectures,

and workshops at various locations and institutions throughout the city, all focusing on key issues of our time in the fields of energy and environmental protection in various sectors, with the goal of maximizing the use and protection of natural resources.

[↪ Read more](#)

Heat wisely campaign in Hungary

The “Heat Wisely” campaign, organised every year by the Ministry of Agriculture in Hungary, raises awareness about the dangers of using solid fuels; informs about the negative effects of waste-burning and also provides all kinds of information on proper heating techniques.

[↪ Read more](#)

hackAIR

hackAIR is an open technology platform for accessing, collecting, and improving air quality data in Europe. From January 2016 to December 2018, it was supported by the EU’s “Collective Awareness Platforms for Sustainability and Social Innovation” program aiming to raise collective awareness about the daily levels of human exposure to air pollution through air pollution monitoring mobile applications, air quality sensors etc.

[↪ Read more](#)

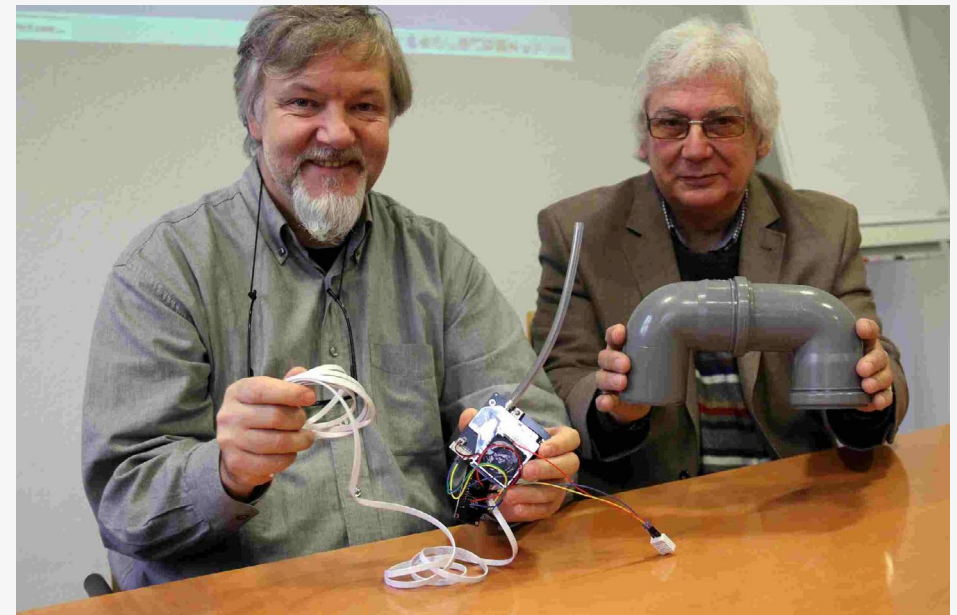
Stakeholder engagement

CuriousNoses - Science by and for citizens - Air quality at 20 000 measurement points in Flanders

CurieuzeNeuzen in de Tuin is the largest citizen research project in Flanders to date on heat, drought, and air quality. Its goal is to collect large data sets on on these difficult environmental issues environmental issues which will aid in the mapping of these complex phenomena in great detail. Thousands of citizens take part in the measurements, providing scientists with a new and unique data source. These massive data sets provide new scientific insights into

how we can improve air quality or better protect ourselves from the future effects of climate change. The CurieuzeNeuzen data, for example, will be used to improve government computer models that predict the health effects of air pollution or heat waves. In May 2018, 20 000 people received a measurement kit to measure the NO₂ concentration in their street, which resulted in a large and internationally renowned dataset. The information was used to calculate the population’s exposure and was compared to computer simulations of air quality in Flanders. It is the first time on a global scale that citizens have been actively involved in a scientific project on air quality.

[↪ Read more](#)



NETWORK AIR QUALITY IN DUISBURG

Network Air Quality in Duisburg

In 2017, the city of Duisburg in Germany launched its citizen science project - Network Air Quality. Until then, the city had 7 professional monitoring stations covering a total area of 233 km², all of which were run by the state agency for nature, environment, and consumer protection. With this citizen science project, the residents were encouraged to build their own monitors to measure particulate matter, which would give a rough picture of exposure to air pollution. The city hosted special workshops on how to put the air monitors together and the data and information acquired from the citizens was then added to a website.

[↪ Read more](#)

Establishing a 'Council of Inspiration' for discussions on air pollution prevention from agriculture in Nederweert

The municipality of Nederweert (The Netherlands) formed a "Council of Inspiration" (Raad van Inspiratie) to discuss how to avoid agricultural pollution in the air. A group of eleven people from the rural areas with various capacities (agricultural companies, recreation companies, residents) were involved in drafting a document called a "vision of the future", and a corresponding agenda for the area to address concerns about the health effects of increased farming activities. Platforms for solutions, opportunities, actions and initiatives related to the municipality were suggested to be established for the future, where all parties involved in rural areas can collaborate for similar issues.

[↪ Read more](#)

Incentives & subsidies

Financial incentives Czech Republic - state subsidies- New Green Savings Programme

The New Green Savings Programme of the Ministry of the Environment in Czech Republic is a programme focused on energy savings in family houses and apartment buildings, which is administered by the state Environmental Fund. It aims to support the reduction of energy intensity of residential buildings, construct houses with very low energy intensity and environmentally friendly sources of energy. It supports renovation of houses and buildings towards a more efficient and sustainable state, construction of houses and buildings in passive houses, solar, thermal and photovoltaic systems, green roofs, replacement of heat sources for heat pumps etc. Citizens can apply online for subsidies and depending on the real energy savings, up to 50% of the total eligible expenses may be saved.

[↪ Read more](#)

Insulation of old or new family homes in Slovakia

In 2016, the Ministry of Transport, Construction and Regional Development of the Slovak Republic has launched a programme for contributing to the insulation of old houses or new houses with almost zero energy needs Slovakia, as part of the Act on Energy Efficiency of Buildings, in order to improve the energy efficiency of the family houses. The contribution covers part of the costs incurred for the insulation of the family house. Citizens can apply online for a contribution whenever calls are open.

[↪ Read more](#)

Bans

Banning the use of solid fuels in Krakow (Poland)

[In 2016, The Malopolska Regional Parliament passed a resolution](#) prohibiting the use of solid fuels in Kraków, and since September 2019, the city of Kraków has been prohibited from burning coal and wood in boilers, stoves, and fireplaces. It is now only permitted to use gaseous fuels, oil, renewable energy sources, and district heating. Implementation of the resolutions is supported by the LIFE Integrated Project "Implementation of Air Quality Plan for Małopolska Region – Małopolska in a healthy atmosphere". This project continues to support the region's stakeholders in implementing the resolution, while providing them the tools, expertise, and the know-how for such endeavours. The second resolution was adopted in 2017 for the rest of Malopolska. According to its provisions, solid fuel boilers installed from July 1st 2017 must meet at least the Ecodesign requirements for emissions and seasonal energy efficiency. In addition, the resolution will lead to the replacement of existing high-emitting boilers and fireplaces by the end of 2026. Non-class boilers and fireplaces not meeting Ecodesign requirements may be operated no longer than until the end of 2022, and class 3 and 4 boilers no longer than until the end of 2026. In 7 municipalities additional regulations have been adopted to abandon the use of coal in newly installed heating devices from 2022 and all existing ones until 2030.

[↪ Read more](#)

The sale of smoky coal will be banned in Ireland before winter 2022

Due to poor air quality in Ireland and its impacts on public health, the country's Ministry of Environment has announced that strict standards for all domestic solid fuels will be implemented across Ireland beginning in 2022, effectively eliminating the most polluting of home-heating fuels. The move will, in effect, put in place a national smoky coal ban by extending restrictions beyond designated cities and towns. Consequently, from 2022, coal, coal-based products, any manufactured solid fuel or peat briquettes sold in the State will be required to emit less than 10 grams of smoke per hour, with the goal of reducing to 5 grams per hour by 2025.

[↪ Read more](#)

Further reading

- 🔗 European Environmental Bureau 2016. Lifting Europe's Dark Cloud: How cutting coal saves lives
- 🔗 ETC/ATNI 2020. Costs of air pollution from European industrial facilities 2008–2017.
- 🔗 European City Air Quality Viewer by EEA
- 🔗 Air quality in Europe - 2020 Report by EEA
- 🔗 What are the safest sources of energy - report (2020) by Our World in Data
- 🔗 WHO global air quality guidelines 2021 - World Health Organization
- 🔗 European Council - The clean air package: Improving Europe's air quality
- 🔗 European Commission - Cleaner Air for All

Bibliography

- 🔗 Alves Dias, P., et al. for European Commission 2018. EU coal regions: opportunities and challenges ahead
- 🔗 Clean Air Fund 2019. Communicating the health impacts of air pollution
- 🔗 ClientEarth, EEB, AirClim, HEAL and Transport & Environment 2018. The first ten years of the EU Ambient Air Quality Directive – an essential tool for protecting our health
- 🔗 EEB 2021. Four years of unnecessary pollution: EU governments fail to curb emissions from most toxic plants
- 🔗 Eurostat 2021. Energy consumption in households
- 🔗 Enova Energy Group 2017. Which Types of Energy Source Produces the Most Pollution?
- 🔗 European Court of Auditors 2018. Special Report - Air pollution: Our health still insufficiently protected
- 🔗 European Environment Agency 2015. Releases of pollutants to the environment from Europe's industrial sector
- 🔗 European Environment Agency 2020. Air pollution: how it affects our health
- 🔗 European Environment Organization 2019. Assessing the effectiveness of EU policy on large combustion plants in reducing air pollutant emissions - A Report
- 🔗 Eurostat 2021. Air pollutants by source sector (source: EEA)
- 🔗 Ioannis Manisalidis et al. 2020. Environmental and Health Impacts of Air Pollution: A Review
- 🔗 LIFE project 2020. Malopolska in a Healthy Atmosphere - LIFE Integrated Project "Implementation of Air Quality Plan for Małopolska Region – Małopolska in a healthy atmosphere"
- 🔗 Natural England 2018. Improvement Programme for England's Natura 2000 Sites (IPENS) Implementation progress report 2015-2018
- 🔗 OECD 2016. The Economic Consequences of Air Pollution
- 🔗 UNECE 2021. AIR
- 🔗 U.S. Energy Information Administration 2020. Coal explained - Coal and the environment
- 🔗 World Health Organization 2018. How Air Pollution is Destroying our Health

Authors

Timon Wehnert, Wuppertal Institute
Pranvera Selimi, Wuppertal Institute
Jannis Beutel, Wuppertal Institute

Reviewers

Alvin Mejia, Wuppertal Institute
Riccardo Nigro, European Environmental Bureau
Vlatka Matkovic, Health & Environmental Alliance (HEAL)
Christian Schaible, European Environmental Bureau
Justyna Mazurkiewicz, Marshall's Office of Małopolska Region
Aleksandra Pup, Marshall's Office of Małopolska Region

Initiative for coal regions in transition

Led by the European Commission, the Initiative for coal regions in transition assists EU countries and coal regions tackling challenges related to the transition to a low-carbon economy.

 ec.europa.eu/coal-regions-in-transition

 secretariat@coalregions.eu

 [@Energy4Europe](https://twitter.com/Energy4Europe)

© European Union, 2021

For any use or reproduction of photos or other material that is not under the EU copyright, permission must be sought directly from the copyright holders.

Reuse is authorised provided the source is acknowledged.

The reuse policy of European Commission documents is regulated by Decision 2011/833/EU (OJ L 330, 14.12.2011, p. 39).

Neither the European Commission nor any person acting on behalf of the Commission is responsible of the use that might be made of the information in this document.