

11,000 air pollution-related deaths avoided in Europe as coal, oil consumption plummet

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The measures to combat the coronavirus have led to an approximately 40% reduction in average level of nitrogen dioxide (NO₂) pollution and 10% reduction in average level of particulate matter pollution over the past 30 days, resulting in 11,000 avoided deaths from air pollution (95% confidence interval: 7,000 - 21,000). This effect comes as power generation from coal has fallen 37% and oil consumption by an [estimated](#) 1/3. Coal and oil burning are the main sources of NO₂ pollution and key sources of particulate matter pollution across Europe.

Other avoided health impacts include 1.3 million fewer days of work absence, 6,000 fewer new cases of asthma in children, 1,900 avoided emergency room visits due to asthma attacks and 600 fewer preterm births. Most of these health impacts are linked to chronic air pollution exposure and will be realized over coming months and years.

The health impact analysis also highlights how, regardless of improved air quality, air pollution is contributing to the load on the healthcare system at the time of the epidemic — because of air pollution there are more people suffering from pre-existing conditions that make them more vulnerable to the disease, and more people requiring treatment for everything from asthma to stroke and diabetes while the system is overburdened.

The countries with the largest reductions in NO₂ pollution levels are Portugal, Spain, Norway, Croatia, France, Italy and Finland. The largest reductions in particulate matter pollution took place in Portugal, Greece, Norway, Sweden, Poland, Finland and Spain.

The projected avoided health impacts are the largest in Germany, the United Kingdom, Italy, France, Spain, Poland and Portugal.

Coal power plants in the UK have been generating no power for more than two weeks, and Portugal has gone coal-free for more than a month; Austria and Sweden recently closed their last coal power plants.

The new analysis uses detailed air quality statistical modeling to isolate the effects of weather conditions and changes in emissions, showing larger reductions in particulate matter levels than reported previously, and attributing the changes more robustly to the interventions against the virus.

The COVID-19 crisis has brought about untold human suffering, and its side-effects should not be celebrated. The major public health benefits of reduced coal and oil burning, over just one month, are however a striking demonstration of the benefit to public health and quality of life if European decision-makers prioritize clean air, clean energy and clean transport in their plans to recover from the crisis, and reduce coal and oil consumption in a rapid and sustainable way.

Air pollution is the largest environmental health threat in Europe, with the average life expectancy in the European Union shortened by an estimated eight months due to pollution exposure. In 2016, 400,000 deaths in the European region were attributed to PM2.5, and 71,000 deaths to NO₂ ([EEA 2019](#)). An estimated 60% of the population in high-income European countries is exposed to levels of PM₁₀ or PM_{2.5} that exceed WHO guidelines, and 80% of the population in lower- or middle-income countries in Europe ([WHO 2018](#)).

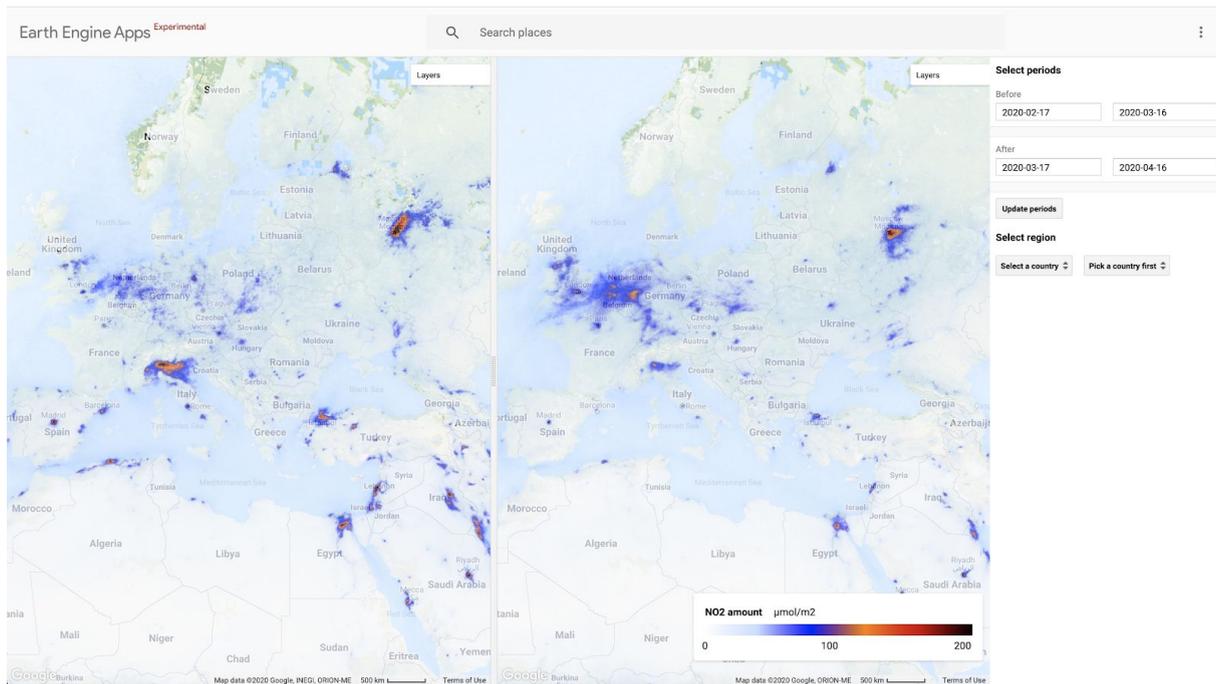
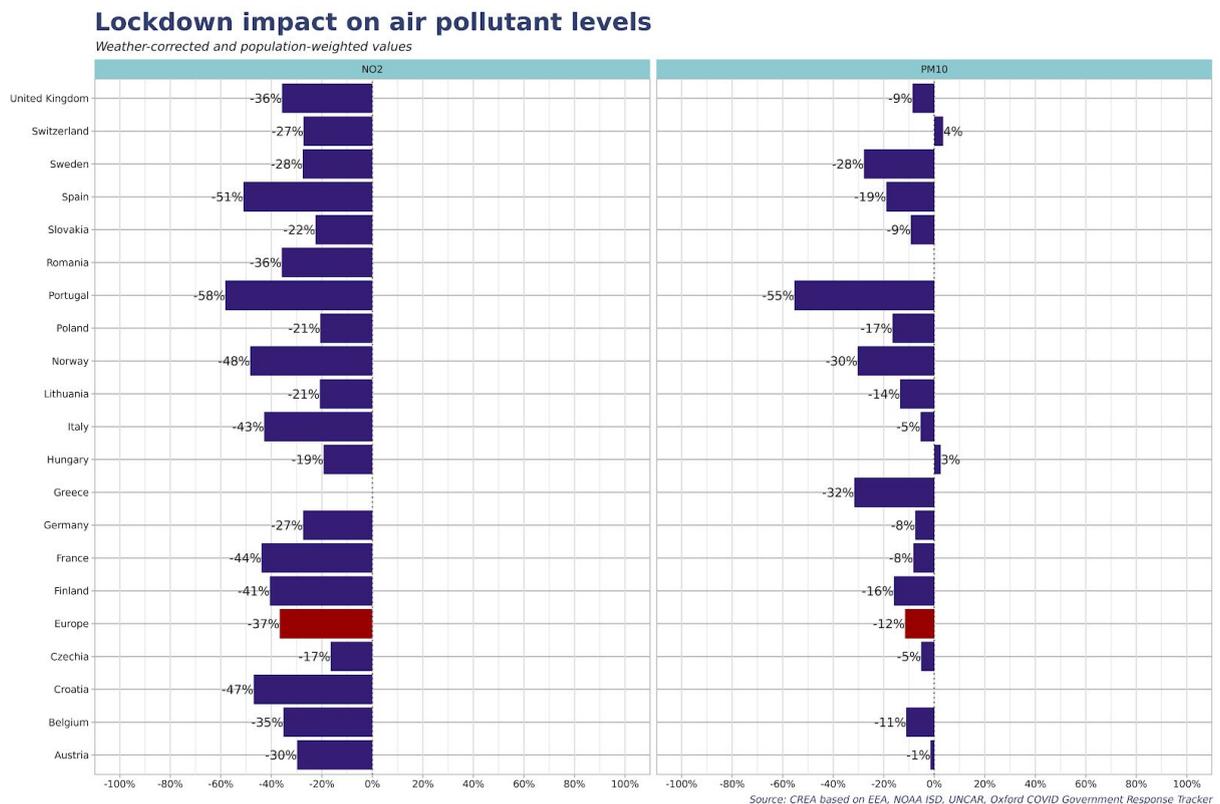


Image from [CREA's application](#) to visualize average levels before / after lockdowns in various countries. Left: Before 16 March 2020, Right: After 16 March 2020. Source: Sentinel-5P Tropospheric NO₂ data

Country-level results



Differences between measured air pollutant concentrations and levels predicted based on weather conditions and previous years' air quality data, showing the estimated impact of the lockdown measures. The analysis is done on the station-level, including all government monitoring stations, and population-weighted averages are calculated for each country.

Projected premature deaths avoided due to lower air pollutant exposure (low and high values correspond to 95% confidence interval)

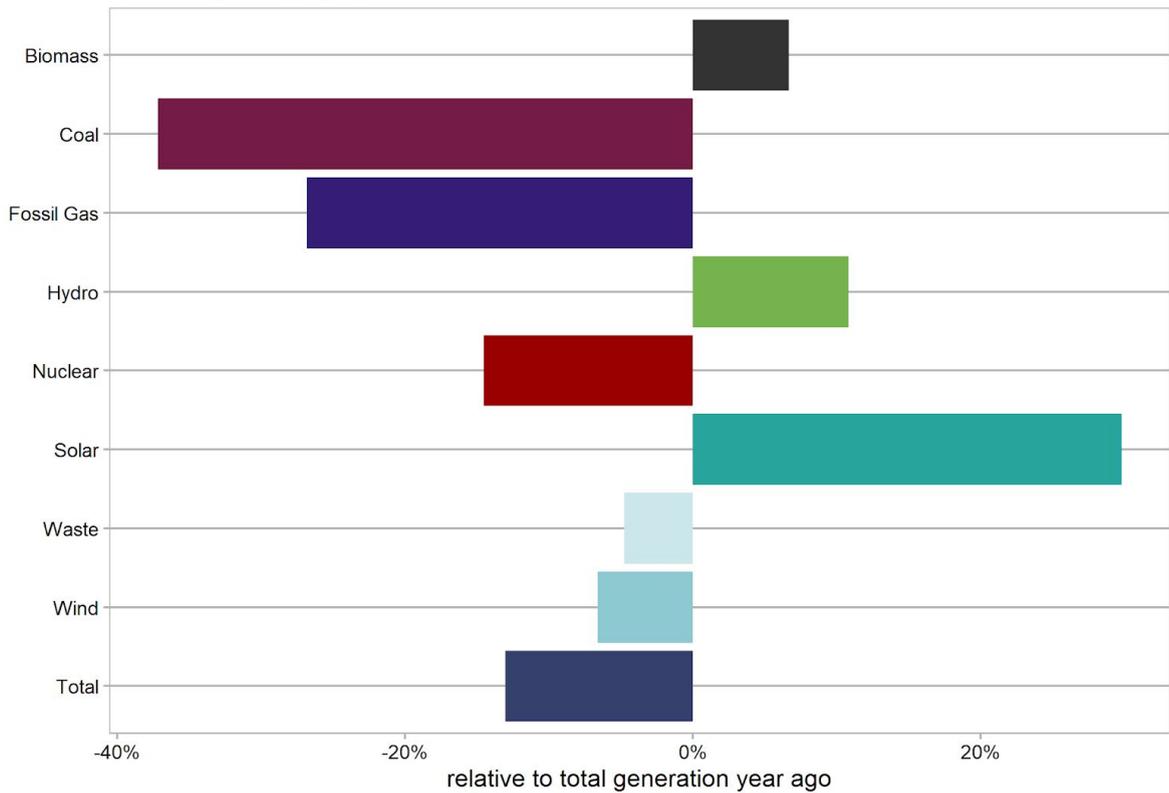
country	central	low	high
Germany	2083	1211	4213
United Kingdom	1752	1069	3425
Italy	1490	753	3360
France	1230	734	2431
Spain	1081	695	1944
Poland	771	558	1135
Portugal	609	440	887
Romania	383	252	665
Sweden	329	244	457
Norway	256	192	357
Belgium	248	151	486
Greece	236	182	294
Austria	129	74	268
Finland	115	88	150
Switzerland	112	55	263
Hungary	90	47	195
Serbia	78	-9	284
Lithuania	56	40	80
Latvia	53	36	84
Estonia	38	28	52
Ireland	25	18	35

Projected avoided health impacts due to lower air pollution exposure

Outcome	Pollutant	central	low	high
Sick leaves (days of work absence)	PM2.5	1,306,604	1,111,606	1,500,274
New cases of asthma in children	NO2	5,980	1,646	11,601
Emergency room visits due to asthma	PM2.5	1,865	1,678	2,048
Preterm births	PM2.5	575	278	611
Deaths	PM2.5	3,924	2,881	5,064
Deaths	NO2	7,389	4,032	16,388

Changes in power generation by source

April 1 - April 26 on year

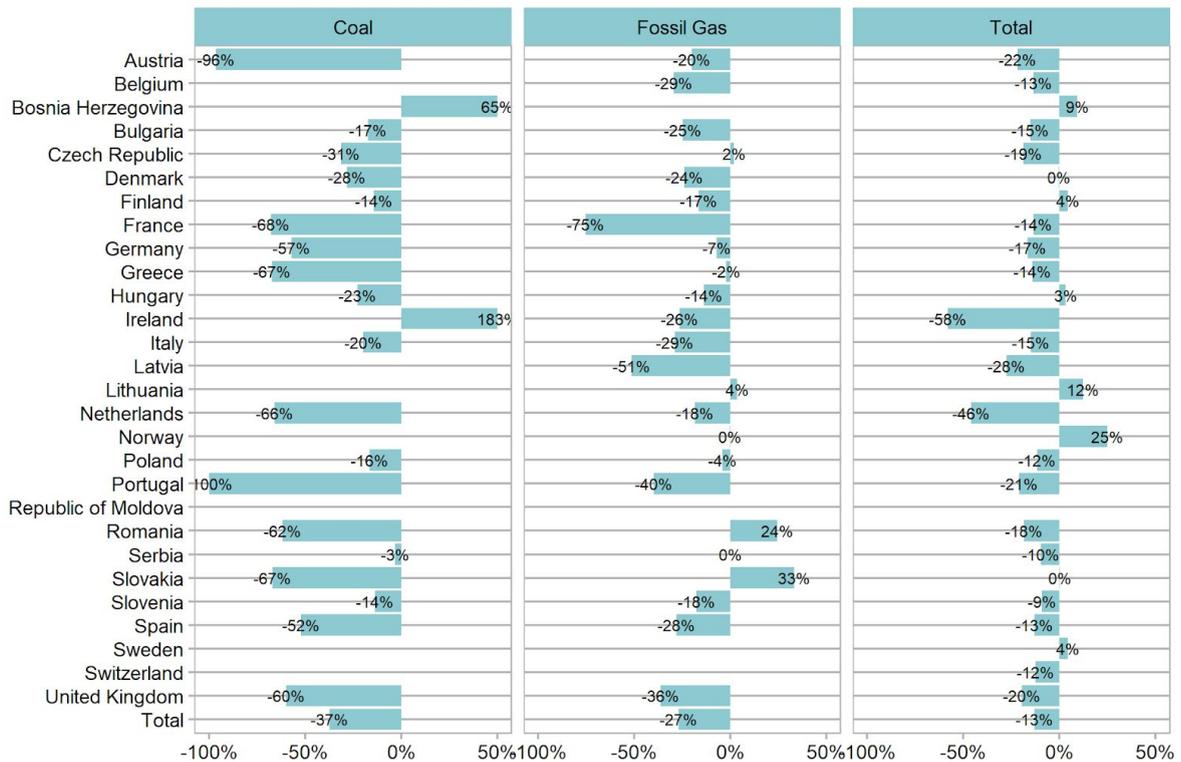


CREA analysis of ENSTO-E data

Coal-fired generation has fallen 37%, gas-fired generation by 27%, even as total generation has fallen 13%. This makes the COVID-19 crisis a “postcard from the future” as inflexible coal power plants are pushed out of the market.

Changes in power generation by country

April 1 - April 26 year-on-year



CREA analysis of ENSTO-E data

How air pollution contributes to the COVID-19 pandemic

CREA [assessment](#) of the links between COVID-19 and air pollution found that:

- High levels of air pollution affect the natural defenses of the body against airborne viruses, making people more likely to contract viral diseases, and this is likely to be true for SARS-CoV-2 as well. This means that it is likely that air pollution exposure is contributing to the spread of the disease.
- Air pollution exposure is a key risk factor for many of the chronic diseases that make people more likely to get severely ill, require intensive care and ventilation, and die from COVID-19. A strong body of existing scientific research shows that a significant part of the burden of diseases like chronic respiratory disease, heart disease, asthma and diabetes worldwide is attributable to air pollution. This means

that past air pollution exposure is now contributing to the death toll and the enormous pressure on healthcare systems from the disease.

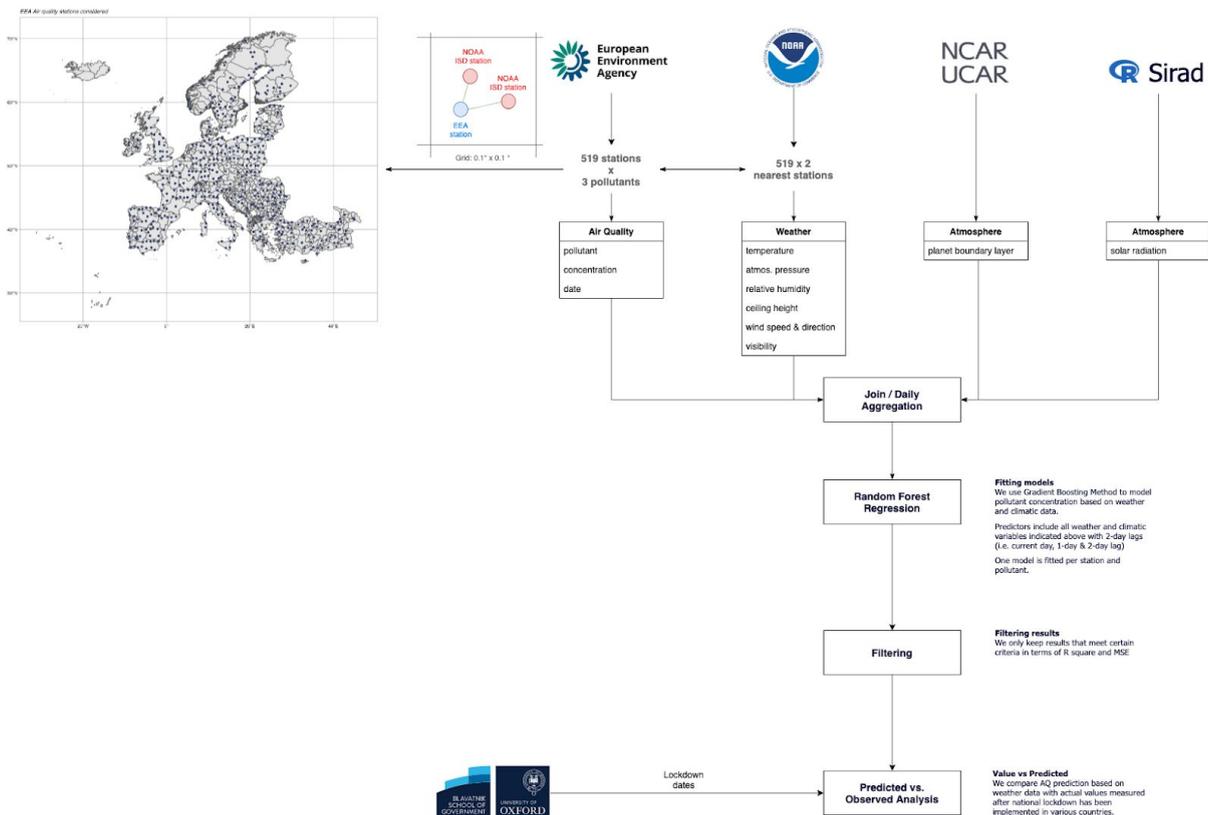
- For many respiratory infections, air pollution exposure on infected people can worsen their symptoms and increase the risk of hospitalization and death. This is likely to be true for COVID-19 patients as well but has not yet been confirmed with specific studies. This means that current air pollution levels, which remain dangerous in much of the world despite reductions caused by measures to control the virus, are likely contributing to the number of severe cases and deaths from COVID-19.
- Current air pollution levels are contributing to illness and need for health care services from other diseases, adding to the pressure on health care systems. Because of air pollution, there are more people requiring treatment for everything from asthma to stroke and diabetes while the system is overburdened.

Air pollution is a key risk factor for deaths from Lower Respiratory Infections. Globally, one death in six related to these infections is attributed to PM2.5 air pollution, amounting to approximately 400,000 deaths per year (GBD 2017).

Methodology

The analysis is based on hourly air quality data from 1285 official stations monitoring PM10 concentrations and 1953 stations monitoring NO2 concentrations. The effect of COVID-19 lockdowns was quantified using the meteorological normalization technique described in Grange & Carslaw ([2019](#)) and meteorological & atmospheric data from NOAA ISD and UNCAR. Percentage changes in pollution were interpolated from station-level data and used to scale the baseline concentrations of NO2 in Larkin et al ([2017](#)) and PM2.5 in van Donkelaar et al ([2019](#)) to model the change in annual pollution exposure. Since the monitoring data was for PM10, the changes in concentrations were converted to PM2.5 using country-specific annual average ratios calculated from European Environment Agency [statistics](#).

Health impacts of the reductions in pollution levels were assessed following the methodology of CREA report “[Quantifying the Economic Costs of Air Pollution from Fossil Fuels](#)”, which incorporates the latest risk models linking air pollution exposure to health impacts.



About CREA

Centre for Research on Energy and Clean Air (CREA) is a new independent research organisation focused on revealing the trends, causes, and health impacts, as well as the solutions to air pollution. CREA uses scientific data, research and evidence to support the efforts of governments, companies and campaigning organizations worldwide in their efforts to move towards clean energy and clean air, believing that effective research and communication are the key to successful policies, investment decisions and advocacy efforts. CREA was founded in December 2019 in Helsinki and has staff in several Asian and European countries.