Briefing

False fix: the hidden health impacts of Europe's fossil gas dependency

CREA Centre for Research on Energy and Clean Air

EMBER

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HEAL HEALTH AND ENVIRONMENT ALLIANCE

About

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Air pollution from burning fossil gas for power generation

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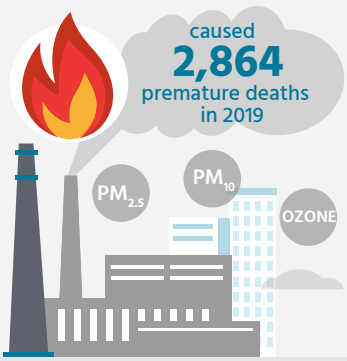
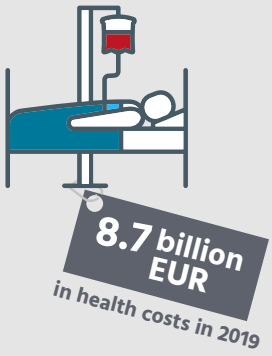


The price tag for the EU and UK's reliance on electricity generation from burning fossil gas



The largest health burden

With the war in Ukraine, energy considerations have risen to the top of the EU policy agenda. There is an increased understanding that all fossil fuels, not only those imported from Russia, are an economic, political, security, climate and health risk.

This briefing by health, environmental and climate NGOs quantifies for the first time the health impacts of burning fossil gas for power (and heat) generation, excluding private households. While coal combustion continues to be the most polluting, health-harming form of energy generation, the health impacts and cost from fossil gas have been grossly underestimated in public and policy discussions and cannot be neglected.

Burning fossil gas is not pollution free. The price tag for the EU's and UK's reliance on electricity generation from fossil gas is up to 8.7 billion EUR in health costs in 2019 alone, with the largest health burden in Italy, Germany, the UK, France, the Netherlands and Spain.

These costs stem from direct impacts on health from air pollution by gas combustion, including 2,864 premature deaths, over 15,000 cases of respiratory impacts in adults and children, over 4,100 hospital admissions and over 5 million days in lost productivity because of illness. All of these impacts are preventable.

This briefing underlines that the continued reliance on fossil gas is highly unhealthy. Given that gas power plants are located in areas of high population density, a large number of people are under threat from air pollution impacts.

As the EU Commission is set to present the REPowerEU package, health, environmental and climate NGOs and think tanks urge for the adoption of a timeline and an ambitious deadline for the phasing out of all fossil fuels, including fossil gas, and the avoidance of false solutions in the process. A continued reliance on fossil fuels undermines the EU's zero pollution commitment included in the Green Deal, and accelerates climate change, when alternatives exist.

All efforts, including financial ones, must now be concentrated on achieving a 100% renewable and energy efficient European Union as quickly as possible.

2.

Fossil fuels and health

The burning of fossil fuels - coal, oil and gas - is not only a major driver of the climate emergency through the release of CO_2 and methane. It also releases significant amounts of air pollutants, including particulate matter (PM), nitrogen dioxide (NO_2), and sulphur dioxide (SO_2).

Burning fossil fuels pollutes the air, which harms people's health

Air pollution is the top environmental threat to health in Europe and globally. Most air pollution originates from human activities, especially the burning of fossil fuels. The health burden from poor air quality in the EU is unacceptably high, with around 400,000 premature deaths and hundreds of billions of euros in health costs each year[1].

Air pollution is one of the five main risk factors for non communicable diseases. In the WHO European Region, air pollution is estimated to cause about 33% of new cases of childhood asthma, 17% of all lung cancer cases, 12% of all ischemic heart disease, 11% of all strokes, and 3% of all chronic obstructive pulmonary disease (COPD)[2]. Evidence on adverse effects of air pollution on diseases of the brain, including dementia and mental health, are rapidly emerging, and likely add to the increasing burden through air pollution.

Burning fossil fuels causes and accelerates climate change, which harms people's health

Climate change is a threat to planetary and human health, impacting the lives of everyone. The Lancet Countdown on Climate and Health has warned that "due to Europe's ageing populations, urbanisation, and high prevalence of chronic health diseases, European populations are globally the most vulnerable to heat"[3], and the impacts of the climate emergency became visible to everyone in the summer of 2021.

Climate change has direct and indirect impacts on human health. Direct impacts include those from extreme weather events, which are increasing in Europe, such as heatwaves, droughts, severe rain or flooding. Indirect impacts include the emergence of new allergens and longer allergy seasons, an increase in vector-borne diseases, or an increase in infectious diseases[4].

The International Energy Agency (IEA) recently highlighted that in order to keep to the Paris Agreement goals, no new fossil infrastructure must be built[5], and the World Health Organization (WHO) also recommends a phase out of fossil fuels in the energy sector[6].

Burning fossil gas releases health-harming air pollution

While there is general agreement that burning coal for energy or heat generation is the most polluting, it is often overlooked that burning fossil gas is not pollution-free.

In the burning of gas, a mixture of pollutants is released, which in the atmosphere can also react to form further (secondary) pollution (especially particulate matter, PM).

Of particular concern are the emissions of PM, nitrogen dioxide (NO_2) and sulphur dioxide (SO_2) (see also below).

Particulate matter or PM is a complex mixture of particles, formed either as primary or secondary by reactions of gases such as nitrogen oxides (NO_x) and SO_2 in the atmosphere.

In addition, both NO_2 and SO_2 (as well as ammonia (NH_3) and volatile organic compound (VOCs)) through chemical processes in the air contribute to the formation of particulate matter (PM), which is responsible for the largest health burden from air pollution. In addition, these pollutants also contribute to ozone (O_3) formation, which is of concern particularly during the summer months, and especially during heatwaves, which are increasing in Europe.

Following a thorough review of the science on how air pollution harms health, the World Health Organization (WHO) has underlined there is now considerably more evidence available demonstrating the short and long-term health harm of NO_2 exposure[7]. New evidence shows links to all-cause and respiratory mortality for long term exposure to high concentrations of NO_2 pollution. Short term exposure to NO_2 can trigger asthma attacks leading to hospital admissions and emergency room visits.

New research continues to highlight that PM is of particular concern for health, and the complexity of PM of different sizes causes damage to our bodies even at very low concentrations. Effects include hospital admissions due to cardiovascular and respiratory conditions, bronchitis in kids and adults, preterm births, low birth weight and even postneonatal mortality.

Achieving zero pollution in Europe

The EU's Green Deal recognises the threat from pollution to people's health and the environment, especially the loss of biodiversity[8]. The EU Commission has stated that the public health, environmental, moral and socio-economic case for the EU to lead the global fight against pollution is today stronger than ever.

Consequently, the EU Green Deal puts forward a zero pollution vision for a toxic-free environment by 2050, with major initiatives already foreseen by 2030.

This zero pollution commitment is supported by the latest science, which shows that air pollution can already have health impacts at very low levels[9]. Thus there's likely no safe level of pollution.

3.

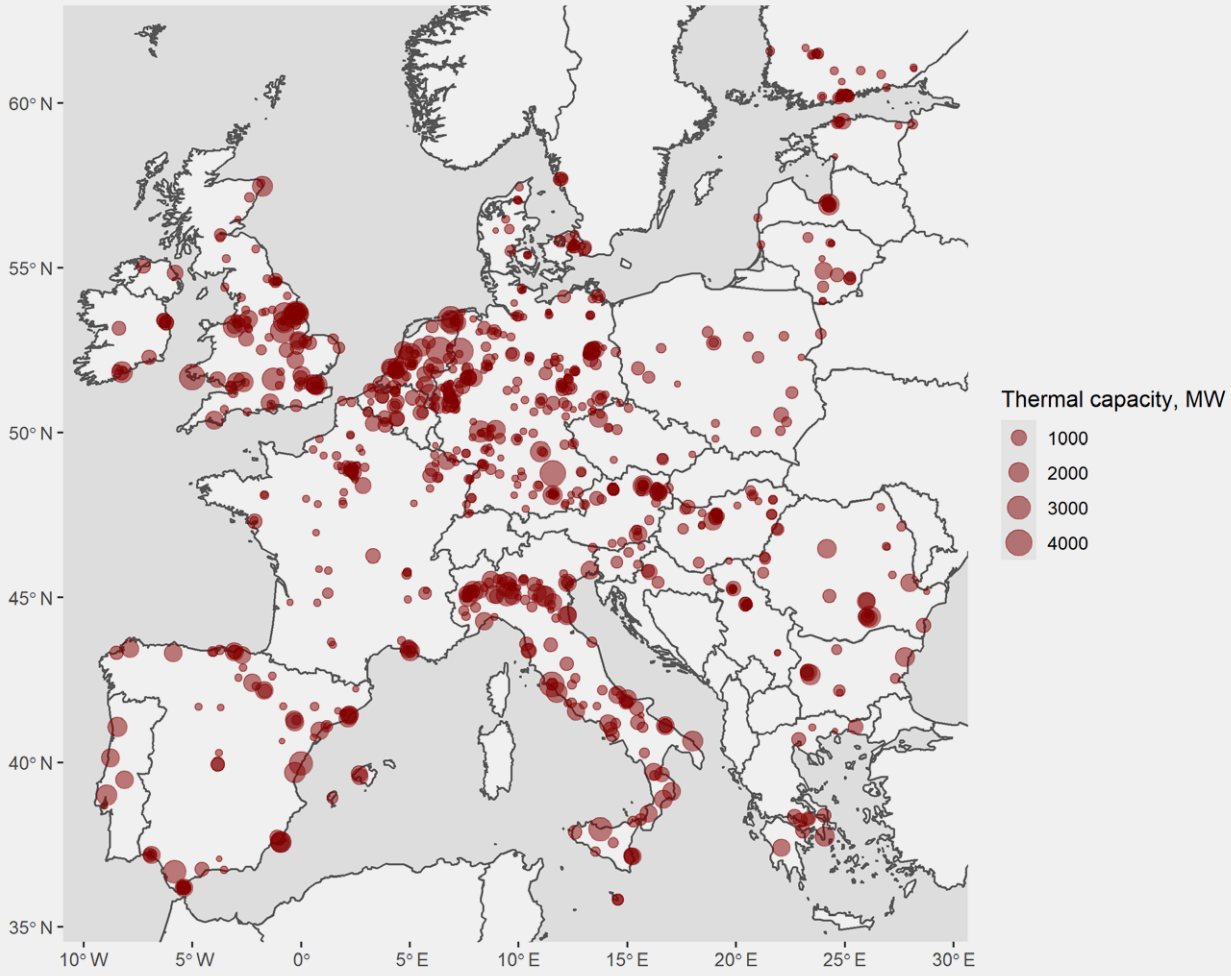
Pollution and health impacts from fossil gas in the power sector

Fossil gas emissions in the EU

Fossil gas accounted for 18% of the EU's electricity production in 2021, with some countries relying more on fossil gas for electricity and heat generation than others. In the EU-27, there are over 834 units that burn fossil gas for power (and heat) generation (and 88 units in the UK). Many of them are positioned in densely populated areas, meaning that many people are exposed to pollution.

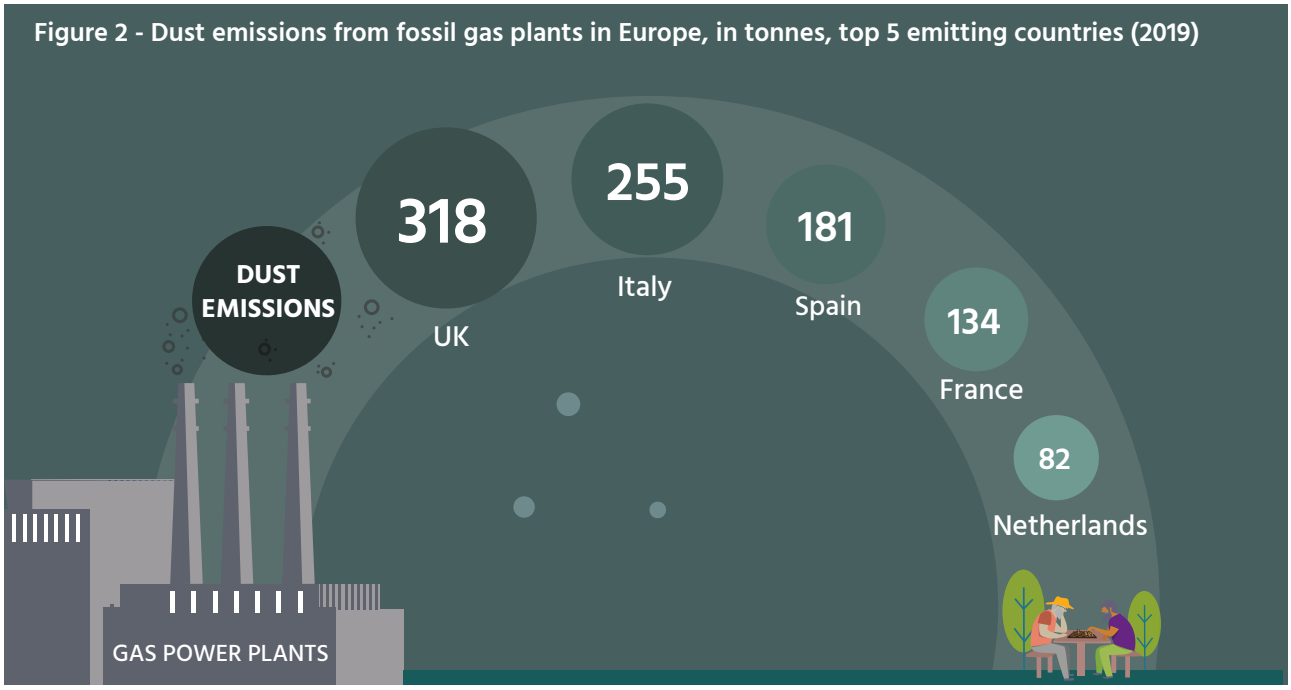
The five EU-27 countries with the largest number of fossil gas installations for power or combined power and heat are: Germany (247), Italy (111), France (93), Spain (68) and the Netherlands (42).

Figure 1 Fossil gas power plants in EU-27 and UK by size in megawatt (MW)



DUST EMISSIONS (PM)

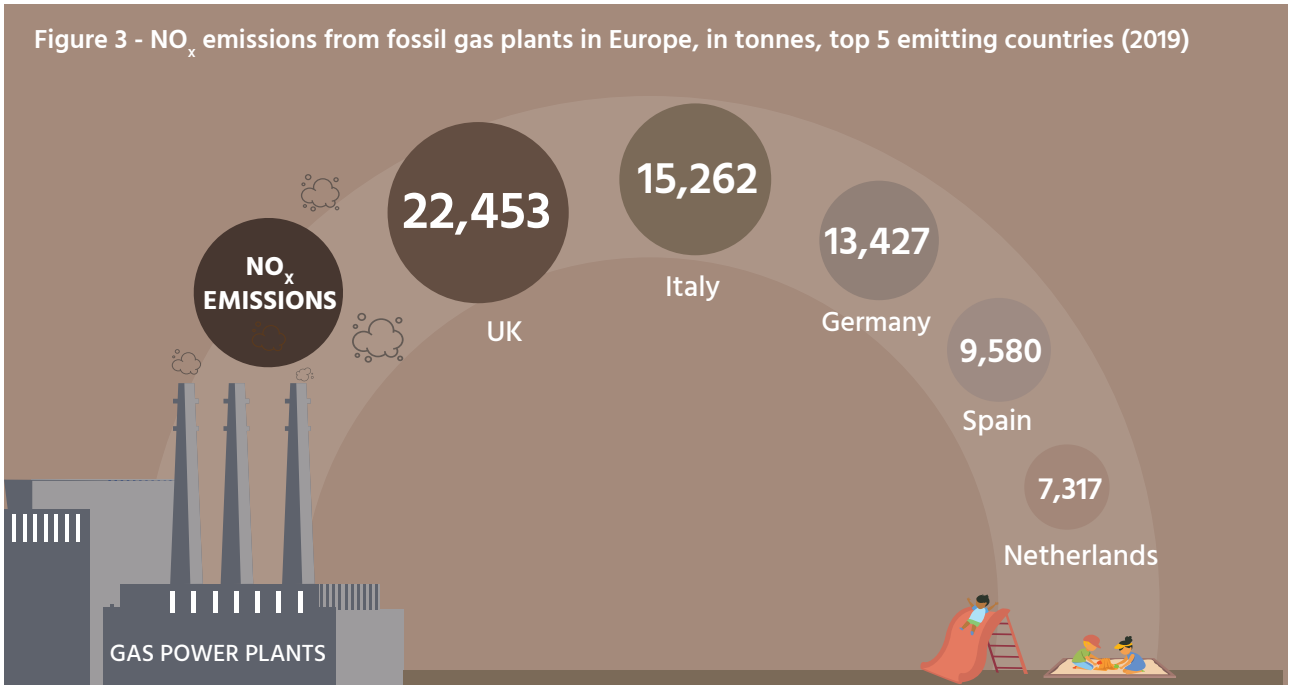
The biggest emitters of dust from fossil gas plants in the EU-27 are Italy, Spain, France, the Netherlands, and Germany. These top five EU-27 dust emitting countries and the UK are responsible for 75% of all dust emissions from burning fossil gas in Europe.



NO_x EMISSIONS

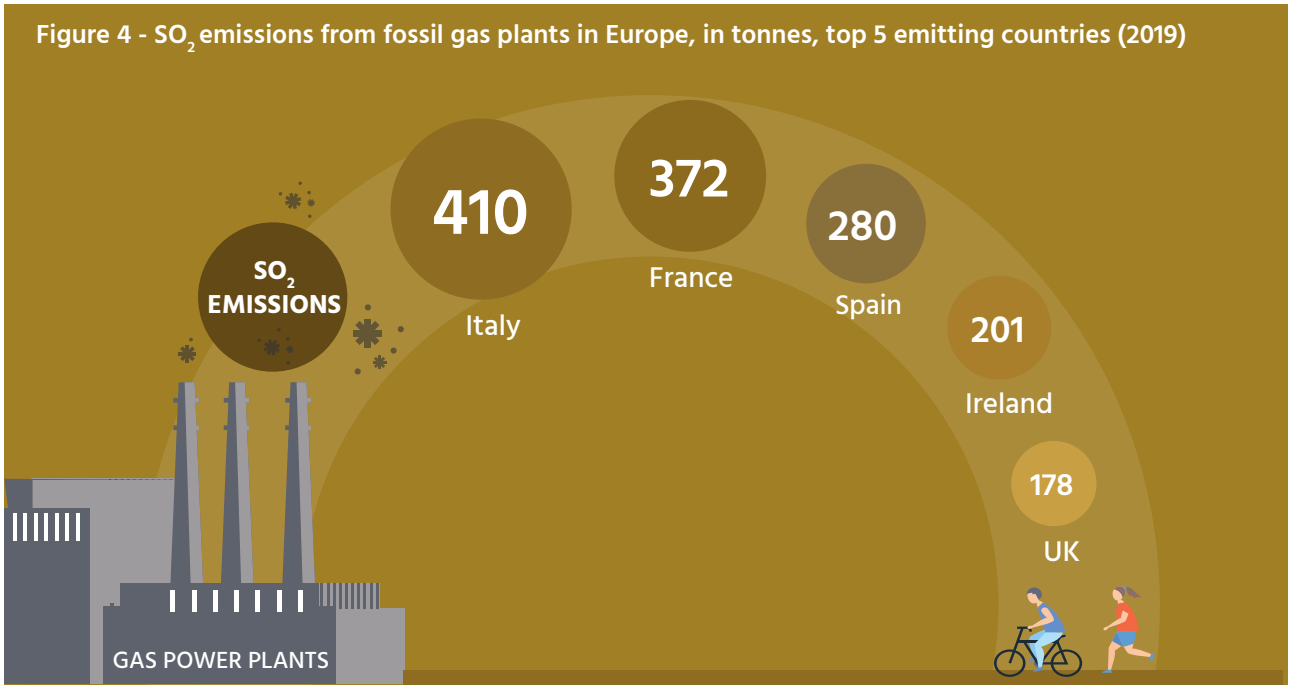
NO_x or nitrogen oxides refer to both nitrogen monoxide (NO) and nitrogen dioxide (NO_2). NO_x is emitted into the air during the combustion of fossil fuels.

The biggest European emitter of nitrogen oxide (NO_x) from fossil gas power plants is the UK, with 22,453 tonnes of NO_x in 2019. Italy, Germany, Spain, the Netherlands, and France are leading NO_x emitters in EU-27. Together, these five EU-27 countries and the UK are responsible for 78% of all NO_x emissions from fossil gas plants in Europe.

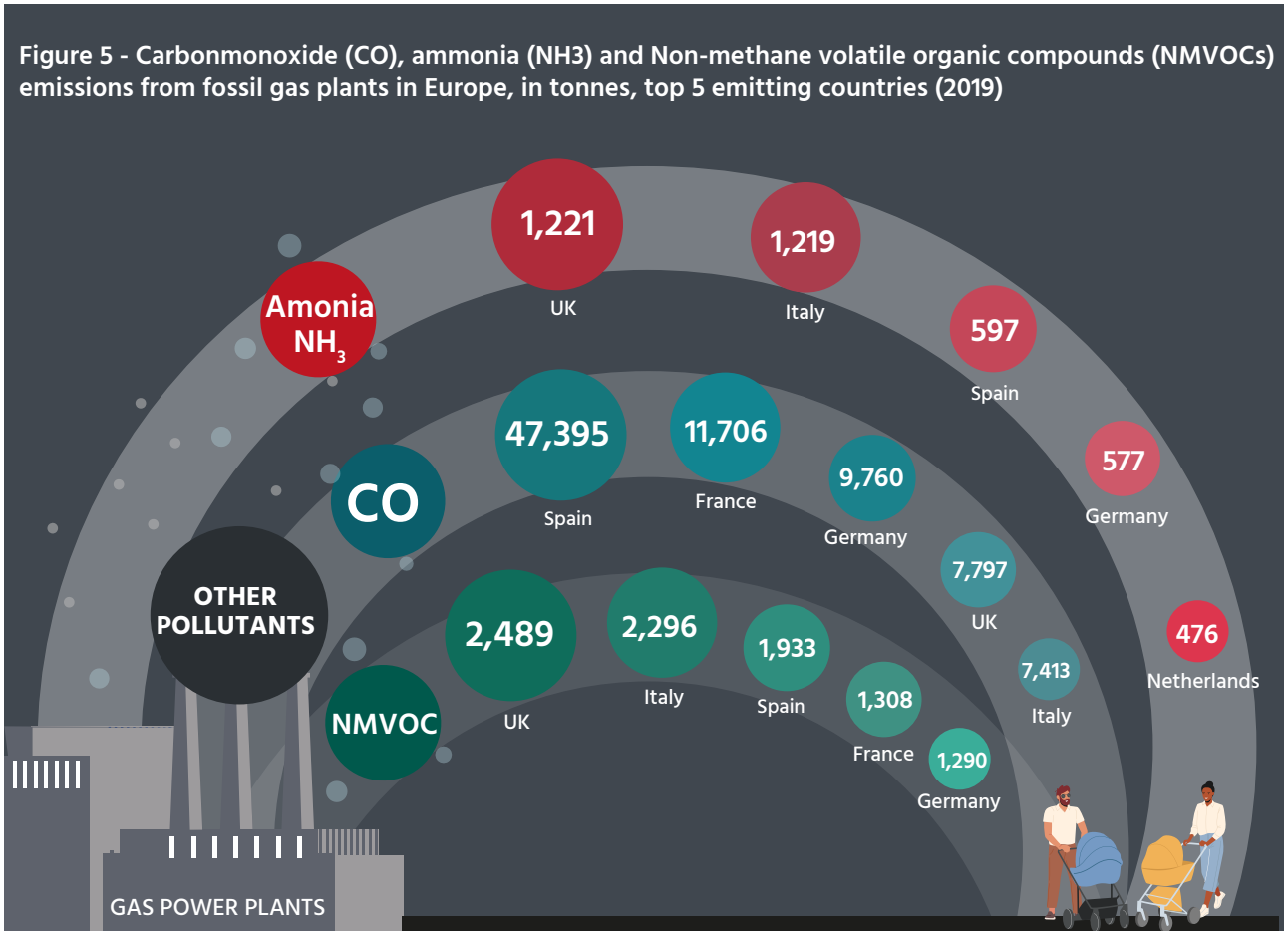


SO_2 EMISSIONS

The biggest emitters in the EU-27 of sulphur dioxide (SO_2) from fossil gas plants are Italy, France, Spain, Ireland, and Germany. Together, these five countries plus the UK are responsible for 75% of all SO_2 emissions from burning fossil gas in Europe.



GAS POWER PLANTS ALSO EMIT OTHER POLLUTANTS THAT DAMAGE OUR HEALTH AND THE CLIMATE



HEALTH IMPACTS FROM FOSSIL GAS BURNING

Air pollution from burning fossil gas caused numerous cases of premature death and diseases in 2019[10].

PREMATURE DEATHS

In 2019, air pollution from burning fossil gas for power generation caused 2,821 premature deaths from $PM_{2.5}$ pollution in the EU-27 and the UK[11], 5 postneonatal deaths due to PM_{10}. These premature deaths are linked to the long-term exposure to pollution[12] from gas power plants in those countries. 38 deaths were caused in addition, due to short-term exposure to ozone caused by gas plants.

Air pollution from burning fossil gas also contributes to the onset or the aggravation of a range of disease and ill-health.

Number of cases

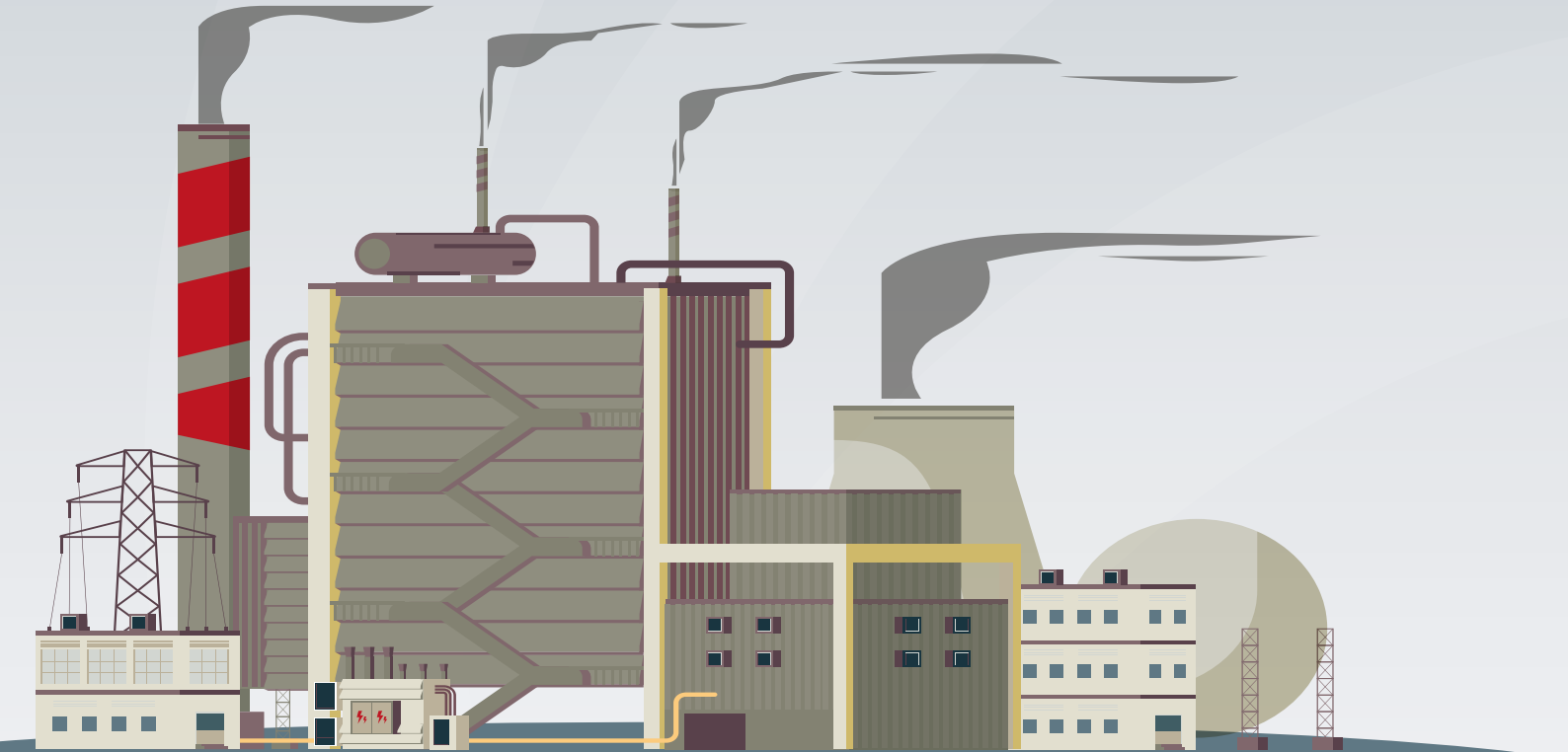
2,821	Premature deaths from $PM_{2.5}$ pollution	**38**	Premature deaths due short-term exposure to ozone	**5**	Postneonatal deaths due to PM_{10}	Total	**2,864**

RESPIRATORY IMPACTS

Respiratory effects linked to air pollution from gas power plants include days with bronchitis or asthma symptoms in asthmatic children (in 2019 alone 115,999 days for asthma symptoms), cases of bronchitis in non-asthmatic children (12,014), and impacts for adults in the form of new cases of chronic bronchitis. These effects are linked to the exposure to NO_2, $PM_{2.5}$ and PM_{10} pollution.

Number of cases

115,999	Asthma symptoms in asthmatic children, PM_{10}	**12,014**	Bronchitis in children, PM_{10}	**2,275**	Incidence of chronic bronchitis in adults, PM_{10}	**1,024**	Bronchitis symptoms in asthmatic children, NO_2



PRODUCTIVITY LOSSES

Air pollution from fossil gas burning in 2019 caused well over 3 million restricted activity days among the working population. Up to 908,457 working days were lost, a major economic impact.

Number of cases

3,806,551	Restricted activity days, $PM_{2.5}$	**908,457**	Work days lost, $PM_{2.5}$	**297,279**	Minor restricted activity days, Ozone

IMPACTS ON CHILDREN

Recent studies have shown that children are particularly at risk of harm from polluted air, given that their lungs, heart, brain, respiratory, immune and nervous systems are still developing[13]. Their health can be affected at early-life stages or even before birth, with lifelong consequences. The potential to prevent non-communicable and chronic diseases such as cardiovascular and cerebrovascular diseases, respiratory diseases lung cancer, diabetes, as well as for lower respiratory infections (LRIs), such as pneumonia, and neonatal deaths is huge from improving air quality. Air pollution can even lead to postneonatal mortality, low birth weight and preterm births[14].

Number of cases

115,999	Asthma symptoms in asthmatic children, PM_{10}	**12,014**	Bronchitis in children, PM_{10}	**1,024**	Bronchitis symptoms in asthmatic children, NO_2
470	Low birth weight, $PM_{2.5}$	**461**	Preterm births, $PM_{2.5}$	**5**	Postneonatal mortality, PM_{10}

HOSPITAL ADMISSIONS

Only the $PM_{2.5}$ pollution from fossil gas burning caused 1,407 hospital admissions due to cardiovascular health issues - this number doesn't even include the hospital admission due to respiratory problems from PM or other pollutants.

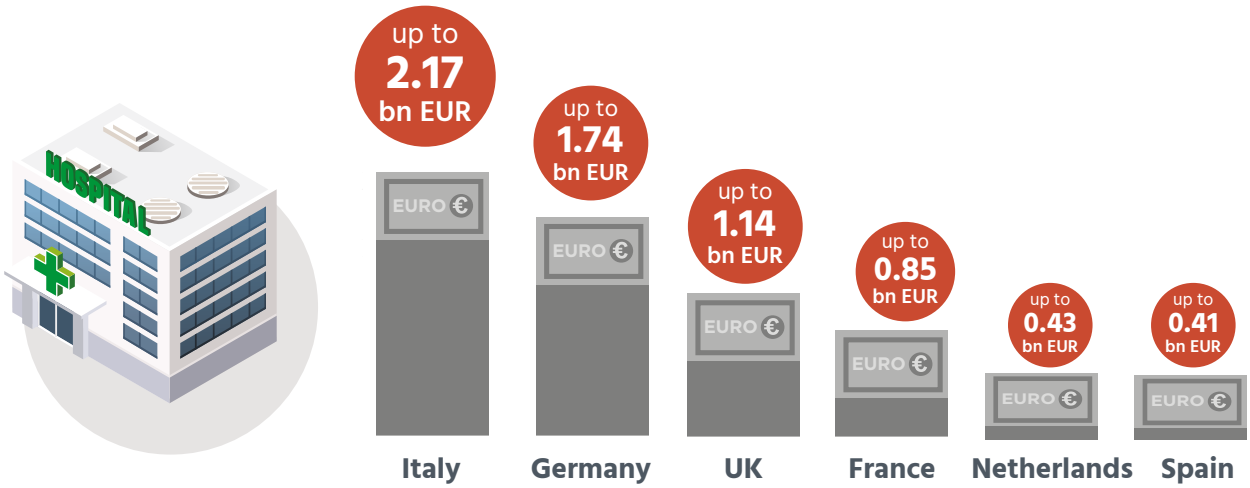
Number of cases

1,575	Respiratory hospital admissions, $PM_{2.5}$	**1,407**	Cardiovascular hospital admissions, $PM_{2.5}$
1,017	Respiratory hospital admissions, NO_2	**42**	Respiratory hospital admissions, Ozone

Health costs

In 2019 alone, air pollution from burning fossil gas for power generation in the EU-27 and UK led to up to 8.7 billion Euro in health costs.

The largest health cost burden occurs in Italy, Germany, UK, France, the Netherlands and Spain - the same countries where fossil gas plants generate the highest emissions.



An avoidable health burden piling up

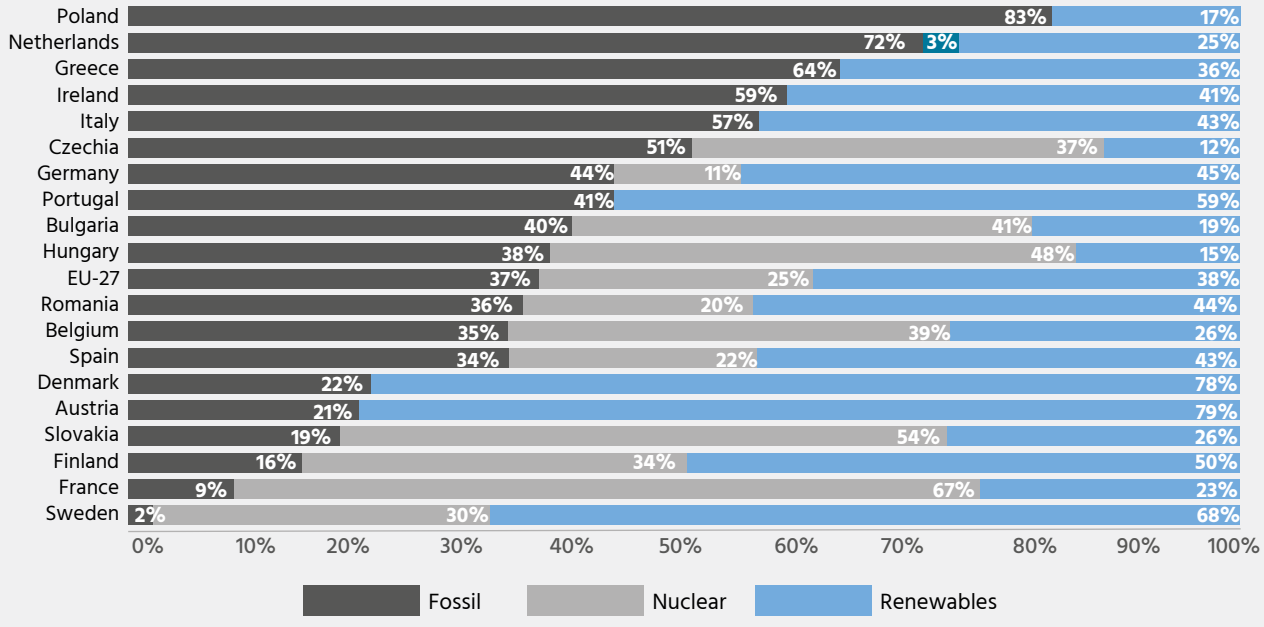
In the EU, fossil fuels still accounted for 37% of the electricity generation in 2021.

Coal power generation is still the most polluting, health-harming form of electricity generation, with a health cost of up to 35.5 billion EUR in 2016 (the last year for which data is available).

But this analysis demonstrates that the health costs from fossil gas power alone are also unacceptably high, with health costs of up to 8.7 billion EUR in 2019.

From a health perspective, there is no reason to replace one polluting fossil fuel source with another when healthier, cleaner and cheaper alternatives are available - homegrown renewables.

Figure 6 Fossil fuels vs. Renewables: Share of electricity generation



Source: Europe's Power Sector in 2020, publised by Ember and Agora Energiewende on 25th Januaru 2021.
The 19 countries displayed account for >97% of electricity consumption.

4.

Recommendations

1. **Uphold the EU's Green Deal zero pollution**, sustainability and climate commitments as the blueprint for energy decisions.

2. **Commit to phasing out all fossil fuels**, to protect health, the environment and to keep global heating to 1.5 degrees, and set up a swift implementation timeline. The power sector has to be fossil gas free by 2035 (and coal still has to be phased out by 2030). This means focusing on the rapid deployment of renewables and strengthening energy efficiency and savings. All efforts, including financial investment, need to be directed towards the goal of phasing out fossil fuels, in a socially just manner.

3. **Carry out an assessment of the health**, environmental and climate impacts and benefits of all energy measures under consideration, and consult with the non-governmental sector.

4. **Avoid false solutions** which would lock in pollution (e.g. wood burning, prolonged coal power use, investing in new fossil gas infrastructure or fossil based hydrogen) and are ecologically and environmentally harmful (e.g. cutting down forests and burning crops for energy).

False solutions include:

- The diversification of fossil gas supplies away from Russia through long-term contracts with other authoritarian regimes.
- The use of fossil fuels to generate hydrogen, and blending of biogas with "grey" hydrogen.
- Building new LNG import infrastructure is financially risky, unnecessary and will create stranded assets due to the inevitable fall in gas demand as more renewable energy sources come online.
- The increased reliance on partially fracked LNG from the US and other countries, which comes with a high health and environmental price tag (chemicals exposure, release of radioactive substances, high water consumption, methane emissions), or considering opening up Europe to fracking, an oil and gas extraction method linked to significant, multiple impacts on human health and air and water pollution.
- The subsidising and incentivising of highly polluting wood burning for energy or heat generation (wood burning causes serious health problems including stroke, heart diseases, lung cancer, pulmonary diseases, contributes to accelerated climate change, and counteracts environmental and biodiversity protection).
- The awarding of energy subsidies to everyone, instead of measures designed at energy poverty specifically.
- The burning of edible crops for energy generation.
- The delay in closing down coal power plants or prolonged increases in coal burning.

Further reading:

EMBER

The EU's €250 billion gas gamble
https://ember-climate.org/insights/research/the-eus-e250-billion-gas-gamble/

The EU can stop Russian gas imports by 2025
https://ember-climate.org/insights/research/eu-can-stop-russian-gas-imports-by-2025/

Europe Beyond Coal

Moving Beyond Coal - Power
https://beyond-coal.eu/moving-beyond-coal/power/

Friends of the Earth Europe and Food & Water Action Europe

10 reasons why liquified fossil gas is the wrong choice for Europe
https://www.foodandwatereurope.org/reports/lng-the-liquid-path-to-climate-chaos/

Green10

Letter on REPowerEU and phasing out of fossil fuels:
https://green10.org/wp-content/uploads/2022/04/20220408-G10-RePowerEU-Letter-to-Commission.pdf

5.

Sources

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2. WHO. Noncommunicable diseases and air pollution https://www.euro.who.int/__data/assets/pdf_file/0005/397787/Air-Pollution-and-NCDs.pdf
3. The Lancet: Tracking progress on health and climate change in Europe https://www.thelancet.com/pdfs/journals/lanpub/PIIS2468-2667(21)00207-3.pdf
4. European Climate and Health Observatory https://climate-adapt.eea.europa.eu/observatory
5. Pathway to critical and formidable goal of net-zero emissions by 2050 is narrow but brings huge benefits, according to IEA special report https://www.iea.org/news/pathway-to-critical-and-formidable-goal-of-net-zero-emissions-by-2050-is-narrow-but-brings-huge-benefits
6. The health sector has been increasingly vocal about the need for climate mitigation (and adaptation). Ahead of COP26, over 600 organisations representing over 46 million health workers, together with over 3,400 individuals from 102 different countries, signed an open letter with a #HealthyClimatePrescription to national leaders and country delegations, calling for real action to address the climate crisis by limiting global warming to 1.5°C, and to make human health and equity central to all climate change mitigation and adaptation actions. https://healthyclimateletter.net/
7. World Health Organization. Air Quality Guidelines - Update 2021. Copenhagen, Denmark: WHO Regional Office for Europe
8. EC. Zero pollution action plan. https://ec.europa.eu/environment/strategy/zero-pollution-action-plan_en
9. Effects of Low-Level Air Pollution: A Study in Europe http://www.elapseproject.eu/
10. Full methodology of calculating health impacts from emissions of pollutants from gas power plants can be found at the end of this briefing. https://docs.google.com/document/d/1qf4o0EqL7pDSMAHNhsyqKn43w844JROjjWcU1alQyKk/edit#
11. Numbers on the health impacts and costs in this briefing are high numbers from the range. Range includes, mean (low-high). Methodological technical annex of this briefing contains all the numbers in the range.
12. World Health Organization. Air Quality Guidelines - Update 2021. Copenhagen, Denmark: WHO Regional Office for Europe
13. WHO: Air pollution and children: https://www.who.int/publications/i/item/air-pollution-and-child-health#:~:text=More%20than%20one%20in%20every,of%205%20years%20in%202016.
14. Sapkota, A. et al. Exposure to particulate matter and adverse birth outcomes: A comprehensive review and meta-analysis. Air Quality, Atmosphere & Health. https://doi.org/10.1007/s11869-010-0106-3
15. See Europe Beyond Coal Database https://beyond-coal.eu/database/

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