CLEAN HEAT EUROPE

Clearing the Air

How clean heat can slash air pollution and reduce social costs

About Clean Heat Europe

Clean Heat Europe is a coalition which advocates for affordable, accessible, and climate friendly heat for households across Europe. The coalition calls for political action in support of affordable clean heating in Europe, and a competitive heating and cooling sector in Europe.

Clean Heat Europe is supported by a coalition consisting of the European Heat Pump Association, EuroHeat and Power, Solar Heat Europe, the European Climate Foundation, Solar Power Europe and the European Copper Association. The initiative also convenes an Industry Group consisting of 17 industrial leaders who manufacture clean heating and cooling solutions in Europe.

Lead Author: Joel Boehme, Campaign Manager (Clean Heat Europe)

Data analysis: Guillaume Uguen, Data Analyst (EHPA)

Editing and review: Sarah Azau, Communications and Events Director (EHPA); Carlos Jervis, Policy Advisor (Euroheat & Power), Esteban Gas, Junior Policy Officer (Solar Heat Europe)

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Executive Summary

1. The total cost of health-related social costs derived from outdoor air pollution due to domestic heating and cooling by households in the EU27+UK amounted to circa €29 billion (0.2% of the area's total GDP) in 2018.

2. When calculating annual health-related social costs from heating and cooling, both by household and by heating technology, the worst offenders are the same: wood, coal, oil and gas.

3. Clean heat solutions such as heat pumps, district heating and cooling, geothermal, solar thermal and direct electric heating all help eliminate social costs almost entirely.

4. Some of the key pollutants associated with residential heating and cooling-related emissions are PM2.5 particulate matter, nitrogen oxides (NOx) and carbon monoxide (CO).

Key policy actions to bring down heating-related health and social costs, and to reduce air pollution from heating and cooling include:

1. Households' total ownership costs for heating and cooling appliances must be lowered by improving affordability, addressing the electricity to gas price ratio, and coordinating effective subsidy schemes

2. Support large-scale investment schemes and facilitate the business case for clean heat facilities and the expansion and modernisation of heating networks to address the high upfront costs, while also rebalancing taxation on such facilities.

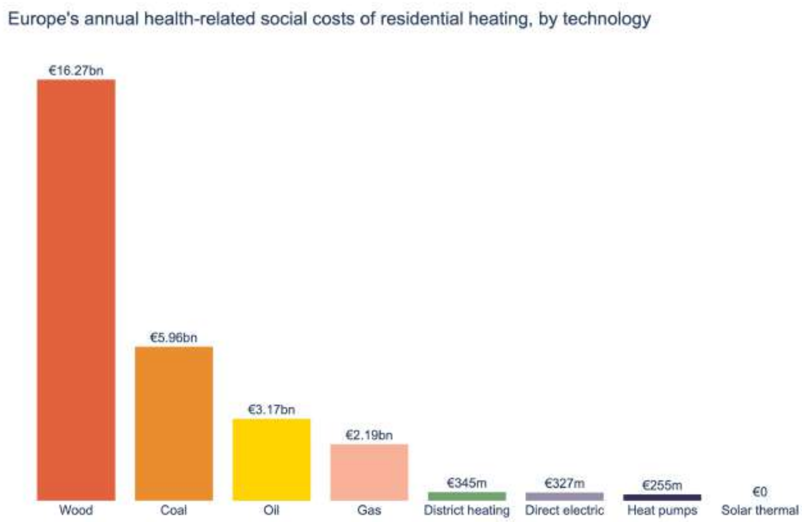
3. Ensure and support the full implementation of the EU Green Deal across all areas, including energy legislation as well as air quality policy, to ensure a clear long-term business case for clean heating and cooling

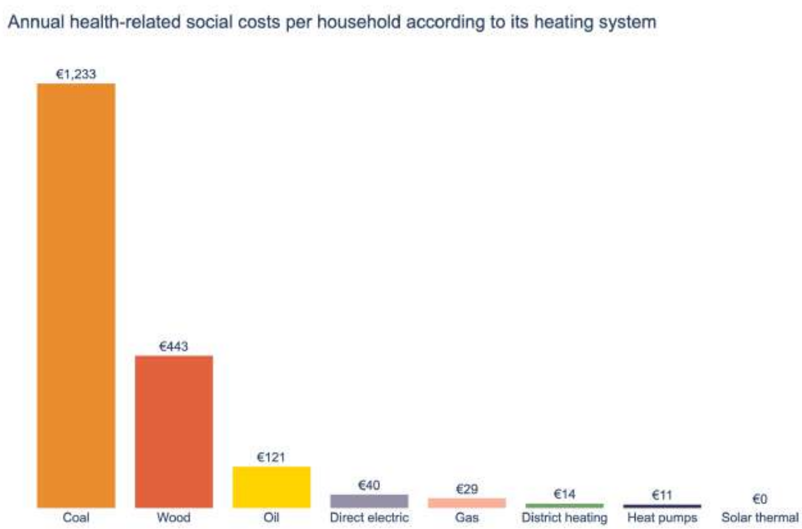
4. Include in the Heating and Cooling Strategy, support for Member States working to transpose the AAQD as well as progress towards meeting targets of the the NECD, with earmarked heating related funding available to support member states that implement sectorally-relevant targets and objectives for air pollution reduction sourced from heating and cooling.

Health-related Social Costs

According to a report by CE Delft, the total cost of health-related social costs derived from air pollution due to residential heating in the EU27+UK amounted to circa €29 billion (0.2% of the area's total GDP) in 2018, which translates to €130/year for an average European household. However, not all heat sources are equally costly for society. While the order of impact varies slightly depending on if the annual health-related costs of residential heating is calculated on a per-household basis, or tech-by-tech, a pattern emerge. According to research by EHPA, coal, wood, and oil are the worst offenders.

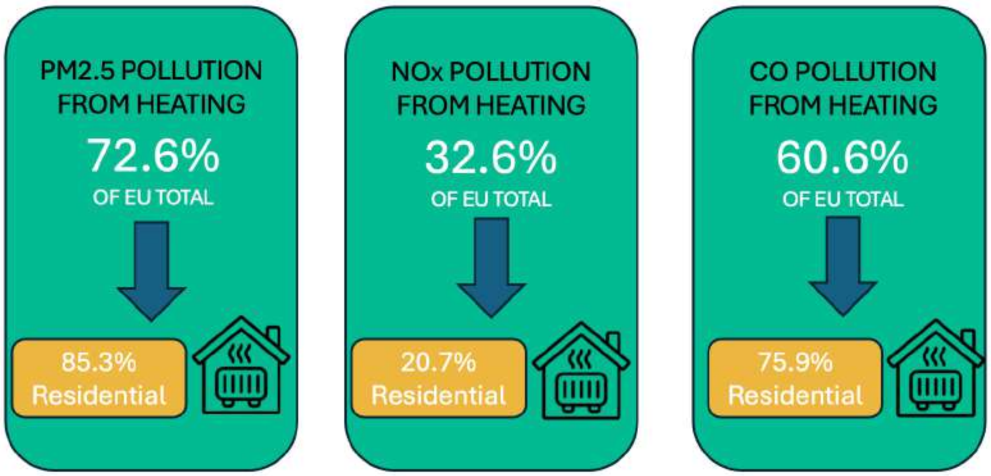
On a tech-by-tech basis, the most socially expensive fuel is wood. The total cost of Europeans burning wood to heat their homes is around €16.27 billion in health-related social costs.





Heat-related Air Pollution

The Joint Research Centre has studied a number of key pollutants, and outlined where their respective emissions can be traced back to in our economy. These include, among others, nitrogen oxides (NOx) which are known to exacerbate respiratory issues, tiny particles (PM2.5) which cause a number of diseases, and carbon monoxide (CO), which is fatal to inhale.



Furthermore, the JRC has demonstrated that out of five studied pollutants, PM2.5 and NOx are the two for which efforts so far have led to the least, counted against emission reduction commitments ahead of 2030:

- In the case of NOx, only six countries[1] have met their targets, and 18 countries have made only 30-50% of the required progress
- For PM2.5, only seven countries have met their targets[2], and 13 countries have made only 30-50% of the required progress.

As for carbon monoxide emissions - it's vital to note that while one mainly runs the risk of CO harm in case of acute, involuntary carbon monoxide poisoning – a different type of risk than the continuous harm being done by persistent PM2.5 and NOx inhalation – CO remains a notable cause of death, especially in Eastern Europe.

According to a study by the EEB, the Eastern European fatality rate from carbon monoxide stands at 19.8 - 23 deaths per 1,000,000 in 2021, with 5,180-6,080 deaths in total. That fatality rate is roughly similar to the fatality rate of motor vehicle accidents in Western Europe. As such, it's clear that reduced carbon monoxide poisonings – especially in Eastern Europe – is a key way to improve air quality, and this can be done by rolling out non-combustive clean heating.

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[1] Belgium, Estonia, Finland, Latvia, Poland, Slovakia

[2] Belgium, Finland, Ireland, Luxembourg, Sweden, Slovakia and the Netherlands

Impact of Clean Heat Rollout

Transitioning away from polluting heat sources can substantially reduce air pollution such as PM2.5, NOx, and CO. According to research published by EHPA:

- Replacing a gas boiler with a heat pump slashes the related NOx air pollution by 75%
- Switching a wood burning stove for a heat pump cuts PM2.5 by 99%

Naturally, the spirit of this argument holds true also when deploying clean heat solutions beyond heat pumps. Especially considering the similarly low health-related social costs associated with other clean heat solutions such as district heating, or the entirely social-cost free use of direct solar thermal panels.

Several countries have successfully improved air quality by encouraging households to connect to local district heating networks as they cut health-related costs by 99% compared to coal and wood stoves, and reduce the health burden of heating by more than sixfold compared to gas.

As for direct solar thermal heating, it emits no pollutant at all, and as such, replacing fossil or biomass heating with a solar thermal system would eliminate 100% of all pollution traceable to that given household's heating. Even when hybridising solar thermal with biomass boilers, the utilisation of solar heating collectors can reduce household's NOx emissions by around 34 kilos, and fine dust emissions by around six kilos, when such a hybrid system is used over a 30-year period

Policy context

The EU has enacted substantial air quality legislation in the past – most recently by updating the Ambient Air Quality Directive (AAQD) in 2024, and through the earlier National Emission Reduction Commitments Directive (NECD) from 2016.

Right now Member States are still within the two-year window during which they are expected to transpose the AAQD, which sets out binding air quality standards with a 2030 deadline, into national law. According to the European Commission's own impact assessment, this could prevent thousands of premature, pollution-related deaths, and save upwards €121 billion, primarily in health, economic and environmental benefits for less than €6 billion costs annually.

The European Commission should provide support and guidance to Member States looking to transpose this directive, and should explore options to provide or encourage ringfenced, sectoral support schemes to enable and amplify investments into for example clean heat solutions on the Member State level, to help national governments implement this key piece of air quality legislation.

Furthermore, the NECD, which was originally passed in 2016, is slated to be reviewed before the end of 2025. This review should raise ambition levels and set more ambitious targets. Similarly to the support levers proposed for the implementation of the AAQD, the European Commission should consider ways to channel funding to Member States or even to regional and local actors looking to make progress towards the fulfilment of NECD targets, for example by investing in clean heat solutions.

Policy recommendations

Key policy actions to bring down heating-related health and social costs, and to reduce air pollution from heating and cooling include:

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