



Policy recommendations & solution approaches to tackle energy poverty and air pollution

As 65% of the total energy used by European households is required for heating and as residential burning is the biggest source of fine particles and other air pollutants, heat supply is the main field of action when tackling the issue of energy poverty and air pollution. Policies and measures thus need to consider the inter-connection between the two issues.

What is the link between energy poverty and air pollution?

Energy poverty is a multi-dimensional challenge with substantial climate, social and health implications:

Climate and energy aspects

- Housing stock is often in a bad state with poor building efficiency, which leads to increased heat demand.
- Use of old, inefficient and poorly maintained heating systems.
- Use of low-quality fuel or even waste burning. State support is often granted for the direct purchase of low quality fuels.
- Residential burning leads to substantial emissions of climate pollutants.

Social and economic aspects

- Energy poverty mainly affects low-income households, which are often socially isolated.
- Energy poor people cannot afford to change heating systems and suffer from high energy prices.
- Households often do not know how to use energy and operate appliances in a sensible way. They are often not informed about pollution levels and related health impacts.
- Social welfare systems often do not provide enough support and social workers have no sufficient capacities to address the problem of energy poverty.
- Lack of trust towards energy suppliers (e.g. district heating).

Health aspects

- Energy poor people often live in poor conditions, including mold, moisture and dust. Thus, they tend to be subject to physical as well as mental health risks.
- Increased (premature) mortality and morbidity due to exposure to high indoor and outdoor concentrations of air pollutants. These effects are even more dramatic for vulnerable groups such as elderly or disabled people.

What is the environmental impact of residential burning?

Emissions

Small-scale combustion in fireplaces, wood and coal-fired stoves as well as boilers are significant contributors to air pollution. According to the European Environmental Agency (EEA), combustion in households is the biggest source of fine particulate matter (PM_{2.5}), black carbon (as part of PM_{2.5}) and polycyclic aromatic hydrocarbons (PAHs) such as benzo(a)pyrene (BaP). More than half of fine particles in the EU are caused by the residential sector.¹

¹ EEA (2018), *Air quality in Europe — 2018 report*, p. 24 (also including emissions from commercial and institutional sector, but households/residential sector is by far the biggest source).

Ambient air quality

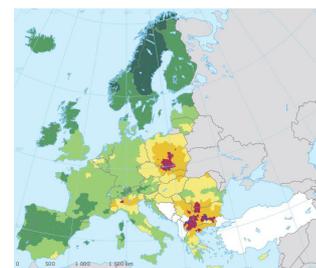
The European air quality standards are quite weak – they do not reflect the recommendations of the World Health Organization (WHO) for fine particles. Approximately 74% of the urban population in the EU were exposed to PM_{2.5} concentrations above the WHO guidelines. Thus, most European cities, towns and villages are still far from reaching the air quality recommended by the WHO². Many of them even breach the much weaker limit values set by the EU – especially in Eastern Europe. Due to the lack of air quality monitoring, actual air pollution is often not recognized in rural regions and residential areas.

Health impacts

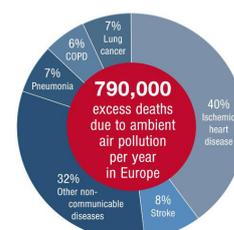
According to the EEA, more than 390,000 premature deaths are attributed to fine particles. A recent study indicates that this is rather a conservative estimate: New findings show that an annual number of 790,000 excess deaths are due to ambient air pollution in Europe (see chart)³. Almost 50 percent are estimated to be caused by cardiovascular diseases.

Climate impacts

Burning of coal and lignite emits substantial amounts of climate damaging CO₂. But wood burning is also harmful to the climate as black carbon (BC) and other short-lived climate pollutants are emitted. With regard to firewood stoves, a recent study concludes that “in the short term (i.e., 20-year period) CO₂-eq for all non-CO₂ forcers offset the CO₂ benefits of biomass use”⁴.



Exposure to PM_{2.5}; source: EEA



Source: European Heart Journal

Policy recommendations and best practices for better air quality

As there are numerous interconnections between poor heating and air pollution in eastern European countries, it is crucial to implement effective policies and best practices on national and local level.

Policy recommendations	Examples
<ul style="list-style-type: none"> Stricter national emission standards for stoves and boilers, including emission limits for old appliances and emission tests on site before putting appliances into operation. 	Emission limits for old stoves and boilers in Germany (1. BIm-SchV). Recurring measurements in Germany (for boilers, also 1. BImSchV) and Switzerland (boilers above 70kW).
<ul style="list-style-type: none"> Better monitoring of local air quality: more monitoring stations and PM measurements (indoor/outdoor) on site. Legal framework to regulate residential burning on regional/local level: in particular, temporary or permanent bans/restrictions for the operation of specific appliances or usage of fuels like lignite/coal. Concrete, obligatory measures with regard to energy planning and residential burning. 	Temporary ban for specific appliances in Stuttgart (Germany)/Graz (Austria); permanent bans in Krakow (Poland)/Berlin (Germany; only solid fuel boilers in new construction plans).
<ul style="list-style-type: none"> Tougher requirements for fuel sold or used (e.g. ban on coal/lignite burning; max. humidity for wood, content of ashes, sulfur and heavy metals). Standardization of fuels: Certification scheme and quality control for fuels. 	Max. of 25% of humidity for firewood used (Germany/1. BIm-SchV). Norms for pellets and woodchips in Germany (ENplus, Blue Angel).

² EEA (2018), *Air quality in Europe — 2018 report*, p. 7.

³ European Heart Journal (2019), *Cardiovascular disease burden from ambient air pollution in Europe reassessed using novel hazard ratio functions* (<https://academic.oup.com/eurheartj/advance-article/doi/10.1093/eurheartj/ehz135/5372326>).

⁴ Ozgen/Caserini (2018), *Methane emissions from small residential wood combustion appliances*, *Atmospheric Environment*, 189).

<ul style="list-style-type: none"> • Registration of combustion facilities, regular inspections as well as provisions for proper installation and better maintenance. • Affordable waste disposal systems and financial incentives to give residue wood or (garden) waste a value. • Effective controls and sanctions to avoid illegal (waste) burning and misuse of fuel/appliances: <ul style="list-style-type: none"> - Clear responsibilities and effective structures on local level - Ash testing to detect burning of forbidden materials - High fines in case of violations 	<p>Ash testing in Switzerland based on x-ray fluorescence (about 3 000 tests annually). Monitoring of illegal burning in Poland with measuring devices mounted on drones.</p>
<ul style="list-style-type: none"> • Subsidies/financial schemes for energy poor households based on holistic approach (i.a. building efficiency) and economic assessment of viable heating exchange options. • Stricter requirements for building efficiency/renovation. • Promotion of clean alternatives (in particular: heat pumps, solar heat, district heating based on renewables or excess heat from industry) and exchange of old appliances (with low-emission technology). 	<p>Market incentive program (MAP) in Germany with funding for solar/geo-thermal heat as well as specific biomass appliances. Extra funding for particle separators.</p>
<ul style="list-style-type: none"> • Awareness raising on the health/environmental impact and social costs of residential burning as well as burn right campaigns and education on energy efficiency measures. • Public information about exceedances of air quality limits. 	<p>'Heat wisely campaign of the Hungarian government'. Clean Heat campaign i.a. in Germany, Denmark and Hungary.</p>
<ul style="list-style-type: none"> • Effective structures for market surveillance. • Ambitious eco-labels for stoves and boilers to guide purchasing decision and to promote appliances with fewer emissions. 	<p>Minimum requirements for wood burning based on eco-labeling (France/Flamme verte and Lombardy region in Italy).</p>

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