

Matthew Pennycook MP Minister of State for Housing and Planning Ministry of Housing, Communities and Local Government 2 Marsham Street, London, SW1P 4DF

5 May 2025

Dear Minister,

We write to you on behalf of the <u>UK Health Alliance on Climate Change</u>, which represents 53 UK based health organisations including Royal Colleges, associations and societies. Collectively, our members represent more than one million health professionals working across all areas of healthcare.

We are writing to express our significant concern at the decision by the Ministry of Housing, Communities and Local Government to allow wood burning stoves to be permitted in new homes as a secondary heating source in the Future Homes and Buildings Standards.

Industry-sponsored publications promote wood burning stoves under the guise of environmental responsibility. This stance, supported by businesses whose vested interest lies in selling more stoves/wood, does not reflect independent scientific consensus and serves commercial aims, not public health.

Burning wood (1), produces a number of air pollutants known to have detrimental effects on health, most notably fine particulate matter, especially PM2.5, and the associated ultrafine particles (2). Domestic wood burning is the largest source of PM2.5 in the UK, accounting for 22% of emissions—more than is produced by road transport (3). UK Government figures (4) show that the use of wood as a fuel contributed 75% of both total PM2.5 and PM10 emissions from domestic combustion in 2022. Without curbs, these harmful emissions are likely to continue to grow: emissions of particulate matter from domestic wood burning increased by 56% between 2012 and 2022 (4), and wood stove sales in 2022 increased 60% over the preceding year (5).

PM2.5 particles are so small they can enter the blood stream and affect all major organs. Whilst most accept that lung infection (6, 7) and asthma (8) are linked to wood smoke PM 2.5 pollution, less well recognised is the effect such smoke has on cancer. The US Sister Study (9), a prospective study of wood burning and lung cancer incidence among US women, found that higher wood stove/fireplace usage was associated with 70% higher incidence of lung cancer. Associations were also elevated when analysis was restricted to 'never smokers' and the data suggested that even occasional indoor wood burning can contribute to lung cancer. A second study of the same cohort (10) showed that using an indoor wood-burning stove/fireplace at least once a week was associated with a higher risk of breast cancer. Equally less well recognised is its damaging effect on the heart (11), the brain, with stroke and longer exposure leading to dementia (7), and the permanent and devastating effect on children's growth and health (12, 13), including effects in pregnancy affecting the growing baby (14). Even short periods of exposure to woodsmoke, stiffens arteries, promotes blood clotting and alters the rhythm of the heart (15, 16), all of which increase the risk of cardiovascular diseases, which represent one of the biggest sources of early death in the UK. It also raises general mortality rates (17). Furthermore, ultrafine PM2.5 particles accumulate in tissue where there is already developing disease (18) making it worse.

It is not just the wood burner and their family whose health is damaged but that of their neighbours too. A study from Imperial College London (19) found "hotspots" of outdoor pollution where there were high concentrations of wood burning stoves, showing that particulate pollution from stoves can escape to pollute outside air, settling over a neighbourhood affecting a wide area. Thus the air pollutants could reach those with established disease who chose not to have wood burners, and who could then be forced to breathe the noxious air from their neighbours.

To put wood burning in perspective, it might be helpful to compare emissions from various heat sources (Table 1) (1). As can be seen a very large amount of PM2.5 is produced by wood smoke compared to other heating types.

	Energy ¹⁾	PM _{2.5}	вс	NO X	SO ₂	CH₄	со	PAHs ²⁾	NMVOC
Wood stove/boiler	Wood	375	22	90	14	140	3,440	0.08	465
Oil boiler	Fuel oil	6	0.25	65	8	0.9	4.5	0.0001	25
Gas boiler	Natural gas	< 0.1	< 0.1	22	0.5	1	22	< 0.0001	4
District heating (Plant < 50 MW)	Coal	6.5	0.15	125	584	1.2	13	< 0.0001	1.3
	Fuel oil	6.6	0.26	173	9	1.2	21	< 0.0001	1
	Natural gas	0.1	< 0.1	43	0.6	1.3	37	< 0.00 01	2.6
	Wood	13	0.44	120	15	14.5	320	< 0.0001	9.7
	Coal	2.3	< 0.1	28	11	1	11	< 0.0001	1
Electric heating (Plant > 50 MW)	Fuel oil	5.5	0.2	126	7.4	1	16.5	< 0.0001	0.9
	Natural gas	< 0.1	< 0.1	31	0.5	1.1	16.5	< 0.0001	2.2
	Wood	5.3	0.18	90	2	3.4	100	< 0.0001	5.6
Electric heating + direct solar heat	Wind, sun, and hydro					0			
Heat pumps ³⁾	One third of the emissions from electric heating depending on primary energy (see above)								

Table 1: Emissions of air pollution from heat sources (g pollutant/GJ house heating)

1) Primary energy: For electric heating the fuel used for producing the electricity.

2) Measured as Benzo[a]pyrene.

3) Small new heat pumps covering both air to air, air to water and soil to water all having average efficiencies around 3.

Comparative studies (Figure 1) have likened wood burning stoves to having a diesel truck in the sitting room, in terms of the toxic PM2.5 production (20). Focusing on stoves that were certified by the UK's Department for Environment, Food, and Rural Affairs (DEFRA), the daily average indoor PM concentrations when a stove was used were higher for PM2.5 by 196% and PM1 by 228% than those of the non-wood stove use control group (21). Second, hourly peak averages are higher for PM2.5 by 124% and for PM1 by 133% than daily averages, showing that PM is 'flooding' into indoor areas through normal use.

Fig 1 (Fig 2 from the referenced paper (1)): Particle emissions (PM2.5) from heat sources (g pollutant/GJ house heating). (ECO wood stoves here are wood stoves with the Nordic Swan eco-label indicating that even 'green' stoves generate high levels of particles)



Figure 2 shows that both the EU EcoDesign requirements and the more ambitious Nordic ecolabel fail —under optimal laboratory conditions— to reduce new stoves' particle emissions to acceptable low levels. Furthermore, it is clear that particle pollution from wood stoves and boilers is heavily under regulated in comparison to the regulation of trucks. A new EcoDesign stove in 2022 is allowed to emit 60 times as much particulate matter as an old truck from 2006 and 750 times as much as a newer truck from 2014 per GJ. A new EcoDesign stove in 2022 is allowed to emit 5 g fine particles per kg wood. Burning just one kg of wood will pollute 500,000 m³ of completely clean air to up the level of the current WHO air quality guideline for fine particulate matter (10 µg/m³).

In addition to the human cost, the cost to the NHS is substantial. Table 3 shows comparative costs of Year 1 health costs (22) for various scenarios. Even though wood burning produces only 6% of heat in the UK, it is associated with £0.9 billion in health-related damages (23).

Rank	Heating system/ pattern	Annual central damage cost (low damage costs; high damage costs)		
		Family of four	Older couple	
1 highest	Wood burner 80 %, gas boiler 20 % conventional stove	£4878.11 (£1913.1; 12841.35)	£4400.34 (£1725.77; 11583.44)	
2	Wood burner 80 %, gas boiler 20 % high-efficiency stove	£2484.86 (£962.72; £6544.07)	£2229.87 (£868.43; £5902.71)	
3	Wood burner 20 %, gas boiler 80 % conventional stove	£1085.47 (£421.34; £2882.61)	£1087.41 (£422.56; £2872.51)	
4	Wood burner 80 %, gas boiler 20 % eco stove	£665.49 (£249.98; £1811.13)	£600.17 (£225.47; £1633.16)	
5	Wood burner 20 %, gas boiler 80 % high-efficiency stove	£560.58 (£213.86; £1507.83)	£559.98 (£214.23; £1503.03)	
6	Wood burner 20 %, gas boiler 80 % eco stove	£166.18 (£58.26; £474.56)	£163.96 (£57.99; £465.53)	
7	Gas boiler 100 %	£26.73 (£4.71; £101.28)	£23.94 (£4.22; £90.71)	
8 Iowest	ASHP 100 %	0	0	

The 2024 Lancet Countdown on Health and Climate Change UK policy brief has called on the UK governments to "develop a framework to implement a just transition away from wood burning to clean fuels in urban and rural areas". However, we understand the concerns of the rural population and of those where grid supply is uncertain, thus a ban on wood burners with exemptions for rural areas would protect public health and reduce the inner-city health inequalities we see with air pollution related diseases.

Of further concern is that the endorsement of wood burning in homes by the UK Government appears to give tacit approval for this form of heating and will thus encourage its adoption in other older homes. This would significantly compound the ill effects linked to wood burning in the new builds (24).

Hence, we argue that wood burners are not a cost-effective, healthy or sustainable alternative (22) to other forms of heating, notably heat pumps, and should not play a critical role in the heat security of our future homes.

Further the Government's own Climate Change Committee has recommended the phasing out of wood-burning stoves in homes because of the carbon they emit, and concern regarding the dangerous PM2.5 particles responsible for these health problems as above, including heart and lung disease, as well as diabetes, cancer, brain function and premature births. They have stated clearly that wood burning stoves should be phased out and replaced with other forms of heating that are more efficient and cleaner, with lower emissions.

In light of the evidence set out above, we urge you to reconsider your decision to welcome the installation of new wood burning stoves in the Future Homes Standards and to use this opportunity to work collaboratively with the Department for Energy Security and Net Zero, the Department for Environment, Food and Rural Affairs and the Department of Health and Social Care to improve the health of the nation by supporting the urgent need to phase out of fossil fuels.

Yours sincerely,

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Jill Belch OBE, Professor of Vascular Medicine, Air Pollution advisor for the Royal College of Physicians of Edinburgh and trustee of the UK Health Alliance on Climate Change

References

- European Environmental Bureau. Where there's fire, there's smoke: Emissions from domestic heating with wood 2021 [Available from: <u>https://eeb.org/wp-content/uploads/2021/09/Where-theres-fire-theres-smoke_domestic-heating-st</u> <u>udy_2021.pdf</u>.
- Favez O, Cachier H, Sciare J, Sarda-Estève R, Martinon L. Evidence for a significant contribution of wood burning aerosols to PM2.5 during the winter season in Paris, France. Atmospheric Environment. 2009;43(22):3640-4.
- Romanello M, Walawender M, Hsu S-C, Moskeland A, Palmeiro-Silva Y, Scamman D, et al. The 2024 report of the Lancet Countdown on health and climate change: facing record-breaking threats from delayed action: Elsevier; 2024 [1847-96]. Available from: <u>https://doi.org/10.1016/S0140-6736(24)01822-1</u>.
- Department for Environment FRA. Emissions of air pollutants in the UK Particulate matter (PM10 and PM2.5) 2024 [Available from: <u>https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in -the-uk-particulate-matter-pm10-and-pm25</u>.
- 5. BBC News. Sales of wood burners rise as people battle increased energy bills 2022 [cited 2024 December]. Available from: <u>https://www.bbc.co.uk/news/uk-england-bristol-63241940</u>.
- Guercio V, Doutsi A, Exley KS. A systematic review on solid fuel combustion exposure and respiratory health in adults in Europe, USA, Canada, Australia and New Zealand 2022 [updated 2022/04/01/. 113926]. Available from: <u>https://www.sciencedirect.com/science/article/pii/S1438463922000098</u>.

- Anna Oudin DS, Rolf Adolfsson, Bertil Forsberg. Association between air pollution from residential wood burning and dementia incidence in a longitudinal study in Northern Sweden 2918 [Available from: <u>https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0198283</u>.
- Torres-Duque C, Maldonado D, Pérez-Padilla R, Ezzati M, Viegi G. Biomass Fuels and Respiratory Diseases 2008 [577-90]. Available from: <u>https://www.atsjournals.org/doi/abs/10.1513/pats.200707-100RP</u>.
- Mehta SS, Elizabeth Hodgson M, Lunn RM, Ashley CE, Arroyave WD, Sandler DP, et al. Indoor wood-burning from stoves and fireplaces and incident lung cancer among Sister Study participants 2023 [updated 2023/08/01/. 108128]. Available from: <u>https://www.sciencedirect.com/science/article/pii/S0160412023004014</u>.
- White AJ, Sandler DP. Indoor Wood-Burning Stove and Fireplace Use and Breast Cancer in a Prospective Cohort Study 2017 [077011]. Available from: <u>https://ehp.niehs.nih.gov/doi/abs/10.1289/EHP827</u>.
- Henning RJ. Particulate Matter Air Pollution is a Significant Risk Factor for Cardiovascular Disease 2024 [updated 2024/01/01/. 102094]. Available from: <u>https://www.sciencedirect.com/science/article/pii/S014628062300511X</u>.
- Noonan CW, Semmens EO, Ware D, Smith P, Boyer BB, Erdei E, et al. Wood stove interventions and child respiratory infections in rural communities: KidsAir rationale and methods 2020 [updated 2020/02/01/. 105909]. Available from: https://www.sciencedirect.com/science/article/pii/S1551714419306251.
- Guercio V, Pojum IC, Leonardi GS, Shrubsole C, Gowers AM, Dimitroulopoulou S, et al. Exposure to indoor and outdoor air pollution from solid fuel combustion and respiratory outcomes in children in developed countries: a systematic review and meta-analysis 2021 [updated 2021/02/10/. 142187]. Available from: https://www.sciencedirect.com/science/article/pii/S0048969720357168.
- Erlandsson L, Lindgren R, Nääv Å, Krais AM, Strandberg B, Lundh T, et al. Exposure to wood smoke particles leads to inflammation, disrupted proliferation and damage to cellular structures in a human first trimester trophoblast cell line 2020 [updated 2020/09/01/. 114790]. Available from: <u>https://www.sciencedirect.com/science/article/pii/S0269749120316055</u>.
- Unosson J, Blomberg A, Sandström T, Muala A, Boman C, Nyström R, et al. Exposure to wood smoke increases arterial stiffness and decreases heart rate variability in humans 2013 [updated Jun 6PMC3685524]. 20130606:[20]. Available from: <u>https://link.springer.com/article/10.1186/1743-8977-10-20</u>.
- Hunter AL, Unosson J, Bosson JA, Langrish JP, Pourazar J, Raftis JB, et al. Effect of wood smoke exposure on vascular function and thrombus formation in healthy fire fighters 2014 [updated Dec 9PMC4338635]. 20141209:[62]. Available from: https://link.springer.com/article/10.1186/s12989-014-0062-4.
- Piper R, Tremper A, Katsouyanni K, Fuller GW, Green D, Font A, et al. Associations between short-term exposure to airborne carbonaceous particles and mortality: A time-series study in London during 2010–2019 2024 [updated 2024/11/01/. 124720]. Available from: <u>https://www.sciencedirect.com/science/article/pii/S0269749124014349</u>.
- Miller MR, Raftis JB, Langrish JP, McLean SG, Samutrtai P, Connell SP, et al. Inhaled Nanoparticles Accumulate at Sites of Vascular Disease 2017 [updated May 23; cited The authors declare no competing financial interest. PMC5444047]. 20170426:[4542-52]. Available from: <u>https://pubs.acs.org/doi/epdf/10.1021/acsnano.6b08551?ref=article_openPDF</u>.
- 19. Casey j GA FGFd. Mapping hotspots of outdoor air pollution from solid fuel burning in Islington. 2021. 2021 [Available from: <u>https://www.islington.gov.uk/-/media/sharepoint-lists/public-records/environmentalprotection/information/adviceandinformation/20222023/mapping-solid-fuel-hotspots.pdf</u>.
- 20. Annual Danish Informative Inventory.Report to UNEP: Emission inventories from the base year of the protocols to year 2018. Scientific Report from DCE Danish Centre for Environment and Energy. 2020 [Available from: https://dce2.au.dk/pub/SR369.pdf.
- Chakraborty RH, J.; Mayfield, M.; Mihaylova, L. . Indoor Air Pollution from Residential Stoves: Examining the Flooding of Particulate Matter into Homes during Real-World Use 2020 [1326]. Available from: <u>https://doi.org/10.3390/atmos11121326</u>.
- Huebner GB, Donal;. Relight my fire or scatter the ashes? The economic and health costs of woodburning stoves 2024 [855-65]. Available from: <u>https://discovery.ucl.ac.uk/id/eprint/10199673/1/7-181-24_Huebner.pdf</u>.
- European Public Health Alliance. EPHA. Replacing fossil fuels and biomass with cleaner alternatives in residential heating and cooking can decrease the social health costs, say researchers 2024 [Available from: <u>https://epha.org/replacing-fossil-fuels-and-biomass-with-cleaner-alternatives-in-residential-heatin g-and</u>.
- 24. Heydon J. Between Ordinary Harm and Deviance: Evaluating the UK's Regulatory Regime For Controlling Air Pollution From Wood Burning Stoves 2023 [1504-22]. Available from: <u>https://doi.org/10.1093/bjc/azac102</u>.