



November 30, 2023

Dr. Umair A. Shah, MD, MPH
 Secretary of Health
 Office of the Secretary
 Washington State Department of Health
Secretary@doh.wa.gov

Lacy M. Fehrenbach, MPH
 Chief of Prevention
 Executive Office of Prevention, Safety and Health
 Washington State Department of Health
OPSH@doh.wa.gov

Dear Secretary Shah and Chief Fehrenbach,

The undersigned organizations write to respectfully request that the Department of Health **draft and disseminate a literature review on the growing body of evidence about the health impacts of burning gas in homes and businesses**, including the impacts on particularly vulnerable and disproportionately exposed communities. Gas combustion in building appliances is imperiling Washington residents' health and safety, both inside their homes and in the outdoor

environment. For this reason, the Washington State Medical Association has publicly recognized the health risks of burning gas for heating and cooking and called for policies to reduce its use in the home.¹

More than one-third of homes in Washington burn gas in building appliances like furnaces, water heaters, stoves, and dryers.² Pollutants emitted indoors from gas stoves and vented outdoors from gas furnaces, water heaters and dryers – which include fine particulate matter (PM_{2.5}) and nitrogen dioxide (NO₂) – directly contribute to health risks like asthma, respiratory infections, and COPD.^{3,4} Meanwhile, outdoor emissions of nitrogen oxides (NO_x) from gas combustion in buildings also contribute to ozone pollution and additional PM_{2.5} formation in the state, which are associated with respiratory, cardiovascular, cognitive, reproductive, and developmental harms; cancer; and early death.⁵

While the state is currently meeting federal air quality standards, health effects can occur even at pollution levels below those thresholds.⁶ Indeed, there is a linear relationship between exposure to fine particulates and increased mortality or morbidity, both daily and over time.^{7,8} And the increasingly regular seasonal burden of wildfire smoke – which brings acute PM_{2.5} exposures in Washington communities well above safe levels and will be difficult to moderate – calls for us to examine the serious sources of pollutant exposure under our control.

The undersigned organizations are asking the Department of Health to **educate Washington residents, elected officials, and policymakers about this critical issue by establishing and communicating the current state of the evidence on the impacts to health of burning gas in our homes and businesses.** Through the Department's trusted voice, it can help to elevate public awareness about these harms in the state and inform an inclusive and data-driven evaluation of effective policy responses.

Outdoor Impacts

Gas appliances like furnaces, water heaters, and dryers in the state's homes and businesses released more than 6,800 tons of NO_x pollution into the outdoor environment in 2020, equivalent to the emissions from all power plants in the state combined.⁹ The scale of this problem will only grow clearer as the remaining coal-burning plant in the state is shut down,¹⁰ because

¹ Washington State Medical Association (WSMA), "[Promotion of Building Electrification to Improve Human Health](#)" (2021). Adopted by the 2021 WSMA House of Delegates.

² United States Census Bureau, [American Community Survey](#) (2020).

³ American Lung Association, "[Particle Pollution](#)" (2023).

⁴ U.S. Environmental Protection Agency (EPA), "[Basic Information about NO₂](#)" (2023).

⁵ American Lung Association, "[Ozone](#)" (2023).

⁶ Di, Q., Wang, Y., Zanobetti, A., Wang, Y., Koutrakis, P., Choirat, C., Dominici, F., & Schwartz, J. D. "[Air Pollution and Mortality in the Medicare Population](#)" (2017). *New England Journal of Medicine*, 376, 2513-2522.

⁷ Vohra, K., Vodonos, A., Schwartz, J., Marais, E. A., Sulprizio, M. P., & Mickley, L. J. "[Global mortality from outdoor fine particle pollution generated by fossil fuel combustion: Results from GEOS-Chem](#)" (2021). *Environmental Research*, 195, 110754.

⁸ Di, Q., Dai, L., & Wang, Y. "[Association of Short-term Exposure to Air Pollution With Mortality in Older Adults](#)" (2017). *JAMA*, 318(24), 2446-2456.

⁹ EPA, [National Emissions Inventory](#) (2020). Appliance emission estimates include residential & commercial emissions for the gas category, with commercial emissions adjusted to exclude certain non-appliance sources like pipeline compressor stations.

¹⁰ TransAlta, "[Centralia](#)" (2023).

Washington's residential gas appliances alone emit more than five times as much NO_x as its gas-fired power plants, despite consuming less gas.¹¹

Gas appliance pollution contributes to approximately 50 premature deaths in Washington each year,¹² and analysis using EPA's Co-Benefits Risk Assessment tool indicates that this pollution is responsible for additional negative health and economic effects, with total health impacts valued at almost \$113 million annually.¹³ These outdoor health impacts are not borne equally but rather disproportionately impact low-income, Asian, and Black residents, Indigenous communities, and people of color, who are already more likely to be exposed to air pollutants than other communities.¹⁴

In addition to these direct impacts to health, gas appliances in the state's homes and businesses generate as much climate pollution as the state's industrial processes, waste management sector, and fossil fuel industry combined.^{15,16} The downstream health impacts from the climate disruption represented by these emissions are difficult to forecast but undoubtedly consequential as well. These significant carbon dioxide emissions led the state in September to commit to expand the use of pollution-free alternatives like efficient electric heat pumps, including by "explor(ing) the adoption of zero-emission standards for space and water heating equipment."¹⁷

Indoor Impacts

Gas appliances like stoves and ovens release harmful pollutants like carbon monoxide (CO), formaldehyde, and NO₂ directly into the indoor environments where Washington residents live and work. Gas stoves are associated with a 42% increased risk of current asthma symptoms in children and a 24% increased lifetime risk of an asthma diagnosis,¹⁸ and the EPA has found that older adults are at increased risk for NO₂-related health effects.¹⁹

A recent study from Harvard found that leaked gas in the Greater Boston area contained numerous hazardous air pollutants including benzene, a known cause of leukemia and

¹¹ U.S. Energy Information Administration (EIA), [Residential Sector Energy Consumption Estimates](#) (2021).

¹² RMI analysis using median estimates from the results of 3 reduced complexity models used in: Buonocore, J. J., Salimifard, P., Michanowicz, D. R., & Allen, J. G. "[A decade of the U.S. energy mix transitioning away from coal: historical reconstruction of the reductions in the public health burden of energy](#)" (2021). *Environmental Research Letters*, 16, 054030, as well as additional analysis from Jonathan Buonocore, Sc.D., the study's lead author.

¹³ EPA, [CO-Benefits Risk Assessment Health Impacts Screening and Mapping Tool](#) (2023). Health impacts estimates include emissions from the "commercial gas" and "residential other – natural gas" subsectors.

¹⁴ Tessum, C. W., Paoletta, D. A., Chambliss, S. E., Apte, J. S., Hill, J. D., & Marshall, J. D. "[PM_{2.5} pollutants disproportionately and systemically affect people of color in the United States](#)" (2021). *Science Advances*, 7(18), eabf4491, supplementary data file S2. People of color in Washington are exposed to 13% more PM_{2.5} from residential gas appliances than White residents, with Black and Asian Washingtonians exposed to 29% more and 64% more, respectively.

¹⁵ EIA, "[State Carbon Dioxide Emissions Data - Washington](#)" (July 12, 2023).

¹⁶ Washington State Department of Ecology, [Washington State Greenhouse Gas Emissions Inventory: 1990–2019](#) (December 2022).

¹⁷ United States Climate Alliance, "[U.S. Climate Alliance Announces New Commitments to Decarbonize Buildings Across America. Quadruple Heat Pump Installations by 2030](#)" (September 2023).

¹⁸ Lin, W., Brunekreef, B., & Gehring, U. "[Meta-analysis of the effects of indoor nitrogen dioxide and gas cooking on asthma and wheeze in children](#)" (2013). *International Journal of Epidemiology*, 42(6), 1724–1737.

¹⁹ EPA, "[Integrated Science Assessment for Oxides of Nitrogen – Health Criteria](#)" (2016).

lymphoma.²⁰ A second analysis done at Stanford confirmed these findings in California and also found that methane and benzene leak from gas stoves even when they are turned off.²¹ A third study done in homes in Colorado and California found that unhealthy concentrations of benzene were released when gas was burned in stoves, migrating through the home and “in some cases elevating bedroom benzene concentrations above chronic health benchmarks for hours.”²²

Gas stoves, furnaces, and water heaters have also been identified as “(c)ommon causes of accidental CO poisoning” in the home.²³ EPA lists fossil fuel furnaces, water heaters, and stoves among sources of indoor CO exposure,²⁴ which studies have confirmed through in-home inspections.^{25,26} Like NO₂, CO is odorless and colorless and is produced anytime the flame of a gas appliance is burning. Federal regulators have recognized that CO drives “an unreasonable risk of injury and death associated with residential gas fired central furnaces, boilers, wall furnaces, and floor furnaces” and are proposing rules to reduce exposure.²⁷

As with the outdoor impacts, the health impacts generated from these indoor emissions are not borne equally – pollution from gas combustion inequitably impacts low-income communities and people of color, infants and children, pregnant people, individuals with preexisting health conditions, and the elderly.^{28,29} Inequity in exposure to air pollution from gas appliances is reinforced by housing conditions that exacerbate exposure, such as smaller unit size; greater occupant density; old, unmaintained, and/or inadequate ventilation; and renters’ hesitation to ask landlords to change or repair appliances for fear of a rent increase or eviction.

Recently, eleven Attorneys General, including Washington State Attorney General Bob Ferguson, signed onto a letter calling for the U.S. Consumer Product Safety Commission to develop standards to reduce the health and safety impacts associated with gas stoves.³⁰

²⁰ Michanowicz, D. R., Dayalu, A., Nordgaard, C. L., Buonocore, J. J., Fairchild, M. W., Ackley, R., Schiff, J. E., Liu, A., Phillips, N. G., Schulman, A., Magavi, Z., & Spengler, J. D. “[Home is Where the Pipeline Ends: Characterization of Volatile Organic Compounds Present in Natural Gas at the Point of the Residential End User](#)” (2022). *Environmental Science & Technology*, 56(14), 10258–10268.

²¹ Lebel, E. D., Michanowicz, D. R., Bilsback, K. R., Hill, L. A. L., Goldman, J. S. W., Domen, J. K., Jaeger, J. M., Ruiz, A., & Shonkoff, S. B. C. “[Composition, Emissions, and Air Quality Impacts of Hazardous Air Pollutants in Unburned Natural Gas from Residential Stoves in California](#)” (2022). *Environmental Science & Technology*, 56(22), 15828–15838.

²² Kashtan, Y. S., Nicholson, M., Finnegan, C., Ouyang, Z., Lebel, E. D., Michanowicz, D. R., Shonkoff, S. B. C., & Jackson, R. B. “[Gas and Propane Combustion from Stoves Emits Benzene and Increases Indoor Air Pollution](#)” (2023). *Environmental Science & Technology*, 57(26), 9653–9663.

²³ Wright, J. “[Chronic and occult carbon monoxide poisoning: we don’t know what we’re missing](#)” (2002). *Emergency Medicine Journal*, 19(5), 386-390.

²⁴ EPA, “[Carbon Monoxide’s Impact on Indoor Air Quality](#)” (September 25, 2023).

²⁵ Jarman, H., Atkinson, R. W., Baramova, D., Gant, T. W., Marczylo, T., Myers, I., Price, S., & Quinn, T. “[Screening patients for unintentional carbon monoxide exposure in the Emergency Department: a cross-sectional multi-centre study](#)” (2023). *Journal of Public Health*, 45(3), 553-559.

²⁶ Blair, H., Kearney, N., Pricop, C., & Scholand, M. [Exposing the Hidden Health Impacts of Cooking with Gas](#) (January 2023).

²⁷ U.S. Consumer Product Safety Commission, “[Safety Standard for Residential Gas Furnaces and Boilers](#),” 88 Fed. Reg. 73272 (October 25, 2023) (to be codified at 16 C.F.R. pt. 1408).

²⁸ Rocky Mountain Institute (RMI), “[Gas Appliance Pollution Inequitably Impacts Health: Who Would Gain the Most from Electrification?](#)” (2022).

²⁹ Tessum et al. (2021), see note 13.

³⁰ Brian L. Schwab, James, L., Jennings, K., Brown, A. G., Joy Campbell, A., Hinds-Radix, S. O., Rosenblum, E. F., Neronha, P. F., Ferguson, R. W., Clark, C. R., & Ellison, K. [Comments of the Attorneys General of the District of Columbia, Delaware, Maryland, Massachusetts, Minnesota, New York, Rhode Island, Oregon, Vermont, Washington, and the City of New York](#), (May 8, 2023).

Health Expert Leadership

The people of Washington count on the Department of Health to communicate clearly about health hazards in our indoor and outdoor air, and a literature review of the current data on the health impacts of gas appliances would help inform the public and its representatives about this timely issue. The Health Department of Multnomah County, Oregon, has already conducted such an analysis focused on indoor air.³¹ This report is an example of potential work on this topic, though the Department should consider the significant health impacts from outdoor exposure in your examination as well.

Health and public health professionals and experts across the country have used their voices to raise the health impacts of gas appliance pollution with the public and policymakers. In 2021, the Washington State Medical Association adopted a resolution connecting home gas use with health and climate impacts and calling for a phaseout of gas infrastructure and end uses.³² In just the last few years, the American Medical Association,³³ the American Lung Association,³⁴ and the American Public Health Association³⁵ have also pointed to gas appliances as drivers of health impacts from indoor and/or outdoor pollution and called for policy changes, as have the Massachusetts Medical Society,^{36,37} the Pennsylvania Medical Society,³⁸ and the New York State American Academy of Pediatrics.³⁹

Air quality regulators like the California Air Resources Board have taken note of the damaging impacts of gas appliance pollution as well, both indoors⁴⁰ and outdoors,⁴¹ and are pursuing policies to phase it out.⁴²

Conclusion

Reducing exposure to NO₂ and PM_{2.5} emitted from gas appliances – and to the ozone and secondary PM_{2.5} generated from their NO_x emissions – will reduce illness and prevent death. Reducing ambient NO₂ levels through improving pollution controls on cars has been shown to

³¹ Multnomah County (Oregon), “[A Review of the Evidence - Public Health and Gas Stoves](#)” (November 2022).

³² WSMA (2021), see note 1.

³³ American Medical Association, “[Informing Physicians, Health Care Providers, and the Public that Cooking with a Gas Stove Increases Household Air Pollution and the Risk of Childhood Asthma D-135.964](#)” (2022).

³⁴ American Lung Association, [Literature Review on the Impacts of Residential Combustion](#) (July 2022).

³⁵ American Public Health Association, “[Gas Stove Emissions Are a Public Health Concern: Exposure to Indoor Nitrogen Dioxide Increases Risk of Illness in Children, Older Adults, and People with Underlying Health Conditions](#)” (November 8, 2022).

³⁶ Massachusetts Medical Society, “[Informing Physicians, Health Care Providers, and the Public That Cooking with a Gas Stove Increases Household Air Pollution and the Risk of Childhood Asthma](#)” (2019).

³⁷ Lundberg, B. (Massachusetts Medical Society), “[Connection Between Natural Gas Stoves and Pediatric Asthma](#)” (2020).

³⁸ Pennsylvania Medical Society, “[Informing Physicians, Health Care Providers, and the Public that Cooking with a Gas Stove Increases Household Air Pollution and the Risk of Childhood Asthma](#)” (2021).

³⁹ NYS American Academy of Pediatrics, “[Memorandum of Support - S.562-A \(Kavanagh\)/ A.920-A \(Gallagher\) - The All-Electric Building Act](#)” (March 29, 2023).

⁴⁰ California Air Resources Board (CARB), “[California Indoor Air Quality Program Update - Resolution 20-32](#)” (November 19, 2020).

⁴¹ CARB, [Proposed 2022 State Strategy for the State Implementation Plan](#) (August 12, 2022).

⁴² CARB, “[Zero-Emission Appliance Standards](#)” (2023).

decrease asthma rates in longitudinal data,⁴³ and reducing indoor NO₂ and outdoor NO_x concentrations from gas combustion in homes and businesses should have similar effects. The relationship between PM_{2.5} and adverse health outcomes is linear, without any known safe level of exposure,⁴⁴ and any reduction in primary and secondary particulate concentrations is expected to reduce the risk of respiratory ailments, cardiovascular disease, and death.

Despite increasing scientific consensus on the health impacts of burning gas in our homes and businesses, the gas industry has downplayed the risk to the public.⁴⁵ In light of this sizable and growing body of research, it is imperative that Washington residents, elected officials, and policymakers are educated on the significant health impacts of the continued use of gas in our buildings. To that end, the Department of Health should develop materials to help clarify the science and inform Washingtonians about this critical issue, including the impacts on those communities that are particularly vulnerable and/or disproportionately exposed.

Thank you for your consideration. We look forward to discussing this request with the Department at your earliest convenience.

Sincerely,

Dr. Mark Vossler, MD, Past President & Climate Program Co-Chair, **Washington Physicians for Social Responsibility**

Dr. Anna Janecek, MD, Member, **Washington Pediatricians for Climate Action**

Dr. Stefan Wheat, MD, Acting Instructor of Emergency Medicine, University of Washington (*for identification purposes only*)

Kelly Hall, Washington Director, **Climate Solutions**

Jed Holtzman, Senior Associate, **RMI**

Dylan Plummer, Senior Field Organizer, **Sierra Club**

Heidi Cody, Coalition Manager, **Alliance for Community Engagement SWWA (ACE)**

Michael Johnson, Technical Director, **Berkeley Air Monitoring Group**

Betty Carteret, Chapter Lead, **Skagit County Chapter, Citizens' Climate Lobby**

⁴³ Garcia, E., Berhane, K. T., Islam, T., McConnell, R., Urman, R., Chen, Z., & Gilliland, F. D. “[Association of Changes in Air Quality With Incident Asthma in Children in California, 1993-2014](#)” (2019). *JAMA*, 321(19), 1906–1915.

⁴⁴ Marks, G. B. “[Misuse of Pollution Reference Standards: No Safe Level of Air Pollution](#)” (2022). *American Journal of Respiratory & Critical Care Medicine*, 205(9), 984-985.

⁴⁵ See, e.g., NW Natural, “[Nov 2022 response to Multnomah County](#)” (updated January 31, 2023) & American Gas Association, “[AGA Files Comments In Response to CPSC RFI](#)” (May 8, 2023).

Grace Stahre, Operations Director, **Climate Action Families**

Heather Deese, Senior Director, Policy & Regulatory Affairs, **Dandelion Energy**

Eric Gonzalez Alfaro, Policy Advocate, **Earthjustice**

Rev. AC Churchill, Executive Director, **Earth Ministry/Washington Interfaith Power & Light**

Brian Stewart, Co-Founder, **Electrify Now**

Naghmana Sherazi, Climate Justice Program Director, **The Lands Council**

Colin Bovet, Head of Growth, **QuitCarbon**

Beth Brunton, Co-Chair, **South Seattle Climate Action Network**

Jess Wallach, Campaigns Co-Director, **350 Seattle**

Fawna Slavik, Co-Chair, **350 Spokane**

Gordon Wheat, MD, Board Member, **Thurston Climate Action Team (TCAT)**

Cc: Elizabeth Perez, MPH, Chief of Public Affairs and Equity
Lauren Jenks, MPH, Assistant Secretary, Environmental Public Health Division
Michele Roberts, MPH, Assistant Secretary, Prevention and Community Health Division

Anna Lising, MPP, Senior Policy Advisor for Energy, Office of the Governor
Amber Leaders, JD, Senior Policy Advisor for Behavioral Health, Aging and Disability,
Office of the Governor
Molly Voris, MPH, Senior Policy Advisor for Public Health and Health Care, Office of the
Governor
Samantha Pskowski, MPH, Policy Advisor for Public Health, Office of the Governor