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Warrantying Health Equity

Heather Payne & Jennifer D. Oliva

ABSTRACT

The United States is experiencing a significant rise in the prevalence of asthma and other debilitating respiratory and cardiovascular ailments that disproportionately burden low income and marginalized Americans. This is due in large measure to climate change, which is responsible for increasingly devastating air quality events—including wildfires and drought—that trigger these serious health conditions. As a result, it is imperative that we begin to explore potential legal and policy reforms that rein in sources of health-impairing air pollution.

The common law of property has long implied in residential leasing arrangements a warranty guaranteed by landlords to tenants that the premises are habitable. That implied warranty of habitability was adopted to stymie the squalid and unhealthful conditions prevalent in leased housing. While the implied warranty has traditionally been deployed to ensure access to running water and heat, or to abate rodent and other residential infestations, it has not been invoked to address poor indoor air quality that can significantly impact tenant health and well-being.

North Americans spend nearly 90 percent of their lives indoors and, due to the considerable air pollution generated by typical gas appliances, indoor air quality is often more harmful to health than polluted outdoor air. Yet, indoor air remains largely unregulated. To address the increasingly poor respiratory health of renters, this Article contends that the use of typical gas appliances in leased spaces violates the implied warranty of habitability and, thereby, the common law of property can be deployed to incentivize landlords to electrify.

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TABLE OF CONTENTS

INTRODUCTION.....	1032
I. THE HEALTH JUSTICE FRAMEWORK & HEALTH IMPACTS OF FOSSIL FUEL COMBUSTION.....	1040
A. The Health Justice Framework	1041
B. Health Impacts From Burning Fossil Fuels	1044
1. Carbon Monoxide.....	1044
2. Nitrous Oxides.....	1046
3. Sulfur Dioxide.....	1047
4. Fine Particulate Matter.....	1047
5. Formaldehyde.....	1049
6. Carbon Dioxide.....	1049
II. IMPLIED WARRANTY OF HABITABILITY	1051
A. Why did American Courts & Legislatures Adopt the Implied Warranty?	1052
B. What Conditions Does the Implied Warranty Typically Cover?	1056
III. HEALTH IMPACTS OF GAS APPLIANCES	1059
IV. IMPLIED WARRANTY UPDATE	1067
V. CHALLENGES & SOLUTIONS.....	1072
CONCLUSION.....	1081

INTRODUCTION

Ongoing exposure to air pollution has long been a source of significant health inequity in the United States. Individuals who reside in “fenceline communities”¹—neighborhoods proximate to chemical plants, ports, oil refineries, industrial facilities, and freeways²—are exposed to particulate matter, carcinogens, and criteria air pollutants at relatively high rates and suffer the health burdens attendant to such exposure.³ Lower income and racialized populations are disparately impacted by the health effects of such pollution because “a significantly greater proportion of [Black people], [Latinx people], and people at or near poverty levels tend to live in close proximity to the most hazardous facilities.”⁴ As a recent study concluded, “[r]acial-ethnic minorities in the United States are exposed to disproportionately high levels of ambient fine particulate air pollution (PM_{2.5}), the largest environmental cause of human mortality.”⁵

COVID-19 illuminated the concerning nexus between air pollution exposure and severe acute respiratory and cardiovascular illness. Populations exposed to

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1. Ronald White, *Life at the Fenceline: Understanding Cumulative Health Hazards in Environment Justice Communities*, ENV’T JUST. HEALTH ALL. FOR CHEM. POL’Y REFORM, COMING CLEAN, & THE CAMPAIGN FOR HEALTHIER SOLS. (Sept. 2018), <https://ej4all.org/assets/media/documents/Life%20at%20the%20Fenceline%20-%20English%20-%20Public.pdf> [<https://perma.cc/47Q5-3WAJ>].
 2. *See id.*; *see also* Nitrogen Dioxide, AM. LUNG ASS’N, <https://www.lung.org/clean-air/outdoors/what-makes-air-unhealthy/nitrogen-dioxide> [<https://perma.cc/7R9B-CQSS>] (noting increased levels of nitrogen dioxide near freeways and nitrogen dioxide’s myriad of harmful health effects).
 3. While this Article mainly focuses on ramifications for respiratory health, air pollution also contributes to several non-respiratory health issues. For example, pregnant people exposed to air pollution from oil and gas development are most likely to have children with congenital heart defects. *See Babies with Congenital Heart Disease More Likely Near Active Oil and Gas Sites*, THE ENERGY MIX (July 24, 2019), <https://theenergymix.com/2019/07/24/babies-with-congenital-heart-disease-more-likely-near-active-oil-and-gas-sites> [<https://perma.cc/J9DW-DFYJ>]. They are also more likely to experience premature births. *See* Julia Rosen, *Study Links Gas Flares to Preterm Births, With Hispanic Women at High Risk*, N.Y. TIMES (July 23, 2020), <https://www.nytimes.com/2020/07/22/climate/gas-flares-premature-babies.html> [<https://perma.cc/83TR-MQVA>].
 4. White, *supra* note 1, at 1.
 5. Christopher W. Tessum, David A. Paoella, Sarah E. Chambliss, Joshua S. Apte, Jason D. Hill & Julian D. Marshall, *PM_{2.5} Polluters Disproportionately and Systemically Affect People of Color in the United States*, SCI. ADVANCES (Apr. 28, 2021), <https://www.science.org/doi/10.1126/sciadv.abf4491> [<https://perma.cc/Q58J-A5LM>].

small particulate matter experienced increased mortality rates early in the pandemic.⁶ In fact, environmental science researchers determined that exposure to hazardous air pollutants was associated with “a 9 [percent] increase in COVID-19 mortality.”⁷ Additionally, the U.S. Centers for Disease Control and Pollution (CDC) issued a list of diseases that enhance the risk of severe COVID-19, which largely mirrors the categories of health conditions that are aggravated by long-term exposure to air pollution, including diabetes, heart disease, asthma, lung cancer, and chronic obstructive pulmonary disease.⁸ This has caused researchers to theorize that the disproportionately high COVID-19 morbidity and mortality rates suffered by inner-city racial minorities is due, at least in part, to their disparate exposure to air pollution.⁹

Climate change has further aggravated air pollution-related inequities.¹⁰ Wildfires are on the rise¹¹ and, where one finds fire, one finds heightened health harms attributable to smoke and higher ozone levels.¹² As a result, areas susceptible to wildfires that already suffer from poor air quality have become

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6. See *Air Pollution Linked With Higher COVID-19 Death Rates*, HARV. T.H. CHAN SCH. OF PUB. HEALTH (May 5, 2020), <https://www.hsph.harvard.edu/news/hsph-in-the-news/air-pollution-linked-with-higher-covid-19-death-rates/> [<https://perma.cc/7MQC-A4Y4>].
 7. Michael Petroni et al., *Hazardous Air Pollutant Exposure as a Contributing Factor to COVID-19 Mortality in the United States*, 15 ENV'T RES. LETTERS 1, 1 (Sept. 11, 2020), <https://iopscience.iop.org/article/10.1088/1748-9326/abaf86/meta> [<https://perma.cc/G7UQ-THKC>]; see also *id.* at 4 (concluding “[o]ur models suggest increased chronic multi-air pollutant exposure, even at levels below expected impact thresholds, are associated with higher COVID-19 mortality rates when controlling for known socioeconomic and behavioral health influences”).
 8. Erin B. Brandt, Andrew F. Beck & Tesfaye B. Mersha, *Air Pollution, Racial Disparities, and COVID-19 Mortality*, 146 J. ALLERGY CLINICAL IMMUNOLOGY 61, 61 (July 2020), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7204717> [<https://perma.cc/3Q9H-FR9C>].
 9. *Id.*
 10. See, e.g., Damian Carrington, *Global Heating Linked to Early Birth and Damage to Babies' Health, Scientists Find*, THE GUARDIAN (Jan. 15, 2022), <https://www.theguardian.com/environment/2022/jan/15/global-heating-linked-early-birth-damage-babies-health> [[https://perma.cc/QD\]6-2FXY](https://perma.cc/QD]6-2FXY)] (detailing how higher temperatures caused by climate change will increase risks of obesity, premature birth, hospital admissions of young children, severe birth defects from wildfire smoke exposure, and reduced fertility from exposure to air pollution).
 11. See Gabrielle Canon, *What the Numbers Tells Us About a Catastrophic Year of Wildfires*, THE GUARDIAN (Dec. 25, 2021), <https://www.theguardian.com/us-news/2021/dec/25/what-the-numbers-tells-us-about-a-catastrophic-year-of-wildfires> [<https://perma.cc/9YQZ-K2XY>].
 12. Henry Fountain, *Health Risks of Smoke and Ozone Rise in the West as Wildfires Worsen*, N.Y. TIMES (Jan. 5, 2022), https://www.nytimes.com/2022/01/05/climate/wildfires-ozone-smoke-california.html?utm_id=46538&sfmc_id=2600589 [<https://perma.cc/7NNG-VH3C>].

even more toxic.¹³ These polluted environments pose particularly significant implications for children's lifelong respiratory and immune health.¹⁴

Even in wildfire-free zones, climate change-driven higher temperatures increase ozone and cause a panoply of serious health issues. Stronger storms cause enhanced area flooding that triggers the release of toxic air pollutants.¹⁵ Drought can do the same.¹⁶ The compounding cascade of these climate change-instigated environmental hazards exponentially accelerates poor health outcomes.

Climate change is caused, in large part, by the burning of fossil fuels,¹⁷ including oil, coal, and fossil (natural) gas, to generate energy.¹⁸ The burning of fossil fuels releases carbon dioxide, sulfur oxides, nitrogen oxides, particulates of various sizes, carbon monoxide, (sometimes volatile) organic compounds,

13. See Somini Sengupta, *Wildfire Smoke Is Poisoning California's Kids. Some Pay a Higher Price*, N.Y. TIMES (Nov. 26, 2020), <https://www.nytimes.com/interactive/2020/11/26/climate/california-smoke-children-health.html> [https://perma.cc/GJH8-E7D5].

14. See *id.*

15. Sara Sneath, 'Ticking Time Bombs': Residents Kept in the Dark About Risks to LA's Chemical Plants During Storms, NEW ORLEANS PUB. RADIO (Dec. 7, 2010, 7:09 AM), <https://www.wno.org/coastal-desk/2020-12-07/ticking-time-bombs-residents-kept-in-the-dark-about-risks-to-la-s-chemical-plants-during-storms> [https://perma.cc/V3PQ-95ZQ].

16. See Christopher Flavelle, *As the Great Salt Lake Dries Up, Utah Faces an 'Environmental Nuclear Bomb'*, N.Y. TIMES (June 22, 2022), <https://www.nytimes.com/2022/06/07/climate/salt-lake-city-climate-disaster.html> [https://perma.cc/BL8Z-NQJ8]; Lizzy Rosenberg, *Here's How California's Largest Lake, the Salton Sea, Came to Be So Toxic*, GREEN MATTERS (July 26, 2021, 11:25 AM), <https://www.greenmatters.com/p/salton-sea> [https://perma.cc/V62D-9NLH]; Leia Larson, *As the Great Salt Lake Shrivels and Salt Lake Valley's Population Swells, State Regulators Reveal What Worries Them Most*, SALT LAKE TRIB. (Oct. 2, 2021, 7:15 AM), <https://www.sltrib.com/news/environment/2021/10/02/great-salt-lake-shrivels/#:~:text=Utah%20has%20made%20strides%20in,the%20form%20of%20blowing%20dust> [https://perma.cc/PCG4-LVRY].

17. *The Causes of Climate Change*, NASA, <https://climate.nasa.gov/causes> [https://perma.cc/G5JS-V3F7]. The leakage of unburned methane, also known as fossil gas, into the atmosphere is another potent warming agent, and the concentration of methane in the atmosphere has been increasing substantially. See Kate Ravilious, *Methane Much More Sensitive to Global Heating Than Previously Thought – Study*, THE GUARDIAN (July 5, 2022, 1:00 AM), <https://www.theguardian.com/environment/2022/jul/05/global-heating-causes-methane-growth-four-times-faster-than-thought-study> [https://perma.cc/TN8P-7VXJ]. This provides an extra incentive to reduce leaks and use of the natural gas system.

18. Melissa Denchak, *Fossil Fuels: The Dirty Facts*, NAT'L RES. DEF. COUNCIL (June 1, 2022), <https://www.nrdc.org/stories/fossil-fuels-dirty-facts> [https://perma.cc/W8R2-4FGM].

and other impurities into the air.¹⁹ Volatile organic compounds react with nitrogen oxides in the presence of sunlight and heat to form ground-level ozone.²⁰

The outdoor (ambient) airborne pollution generated by fossil fuel combustion is an “invisible killer” responsible for approximately one in five deaths worldwide.²¹ A 2015 study identified ambient air pollution as a “leading cause of the global disease burden, especially in low-income and middle-income countries.”²² Due to their considerable impacts on human health, the U.S. Environmental Protection Agency (EPA) regulates the outdoor pollutants generated by fossil fuel combustion under the Clean Air Act (CAA).²³

The CAA delegates to EPA the duty to prescribe National Ambient Air Quality Standards (NAAQS) that represent maximum outdoor exposure levels for ubiquitous air pollutants,²⁴ that is, “the maximum airborne concentration of [the] pollutant that the public health can tolerate.”²⁵ The agency is required to set those thresholds at levels “requisite to protect the public health” with “an adequate margin of safety” based on the available scientific evidence.²⁶ The CAA further demands that EPA conduct periodic reviews of the NAAQS and revise the standards where appropriate.²⁷

As the scientific community’s understanding of the dangers of ambient air pollution has evolved over time, EPA has downward adjusted various air quality exposure thresholds to be more health protective.²⁸ The agency also has adjusted the average duration of exposure criteria that it applies in calculating pollutant

19. CRAIG N. JOHNSTON, WILLIAM F. FUNK & VICTOR B. FLATT, *LEGAL PROTECTION OF THE ENVIRONMENT* 342–43 (4th ed. 2017).

20. *Ozone*, AM. LUNG ASS’N, <https://www.lung.org/clean-air/outdoors/what-makes-air-unhealthy/ozone> [<https://perma.cc/C95N-DB5P>].

21. Karn Vohra, Alina Vodonos, Joel Schwartz, Eloise A. Marais, Melissa P. Sulprizio & Loretta J. Mickley, *Global Mortality From Outdoor Fine Particle Pollution Generated by Fossil Fuel Combustion: Results From GEOS-Chem*, 195 ENV’T RES. 1, 4 (Apr. 2021), <https://www.sciencedirect.com/science/article/pii/S0013935121000487> [<https://perma.cc/R5T2-DKBB>].

22. *Id.* at 1.

23. 42 U.S.C. §§ 7401–7671.

24. *See* 42 U.S.C. §§ 7408–10.

25. *Whitman v. Am. Trucking Ass’n, Inc.*, 531 U.S. 457, 465 (2001); *see also* 42 U.S.C. § 7409(b); *Miss. Comm’n on Env’t Quality v. EPA*, 790 F.3d 138, 145 (2015) (noting that “ambient” means “outdoor”).

26. 42 U.S.C. § 7409(b)(1).

27. 42 U.S.C. § 7409(d).

28. *See, e.g., Timeline of Ozone National Ambient Air Quality Standards (NAAQS)*, U.S. ENV’T PROT. AGENCY (Nov. 3, 2022), <https://www.epa.gov/ground-level-ozone-pollution/timeline-ozone-national-ambient-air-quality-standards-naaqs> [<https://perma.cc/9BKZ-8EDM>].

threshold standards. For example, in 1997, EPA abandoned the one-hour average exposure criteria applicable to ozone (O₃) that it had established in 1979 and replaced it with an eight-hour exposure average.²⁹ The agency made that adjustment based on the theory that children rarely played outside for only an hour during long summer days and so the application of a one-hour average likely undercounted potential exposure to ground-level ozone.³⁰

Notwithstanding the NAAQS, certain areas of the country continue to struggle with poor ambient air quality³¹ and racial and socioeconomic inequity issues abound.³² For example, “Black communities . . . shoulder a disproportionate burden of the nation’s pollution—from foul water in Flint, [Michigan], to dangerous chemicals that have poisoned a corridor of Louisiana known as Cancer Alley—which scientists and policymakers have known for decades.”³³ Black, Latinx, Asian, and Indigenous Americans are exposed to far higher rates of fine

29. National Ambient Air Quality Standards for Ozone, 40 C.F.R. § 50 (1997).

30. See National Ambient Air Quality Standards for Ozone, 62 Fed. Reg. 38856 (July 18, 1997). The new standards were replaced and note how the previous standard was inadequate:

The current 1-hour primary standard is replaced by an 8-hour standard at a level of 0.08 parts per million (ppm) with a form based on the 3-year average of the annual fourth-highest daily maximum 8-hour average O₃ concentrations measured at each monitor within an area. The new primary standard will provide increased protection to the public, especially children and other at-risk populations, against a wide range of O₃-induced health effects, including decreased lung function, primarily in children active outdoors; increased respiratory symptoms, particularly in highly sensitive individuals; hospital admissions and emergency room visits for respiratory causes, among children and adults with pre-existing respiratory disease such as asthma; inflammation of the lung, and possible long-term damage to the lungs.

Id.

31. *Current Nonattainment Counties for All Criteria Pollutants*, U.S. ENV’T PROT. AGENCY: GREEN BOOK (Aug. 31, 2023), <https://www3.epa.gov/airquality/greenbook/anc1.html> [<https://perma.cc/62TP-M7L4>].

32. Maria Virginia Olano, *Chart: Black Americans Hit Hardest by Deadly Air Pollution*, CANARY MEDIA (Jan. 14, 2022), https://www.canarymedia.com/articles/climate-justice/chart-black-americans-hit-hardest-by-deadly-air-pollution?utm_campaign=chart-of-the-week&utm_source=twitter&utm_medium=social&utm_content=1642194124 [<https://perma.cc/BQ23-PM2T>] (discussing how “[p]eople of color in America—especially Black communities—suffer from air pollution and its harrowing health impacts at much higher rates than average. White Americans, on the other hand, are exposed to lower-than-average amounts of dangerous air pollution from many sectors.”).

33. Linda Villarosa, *Pollution Is Killing Black Americans. This Community Fought Back.*, N.Y. TIMES MAG. (July 28, 2020, 5:00 AM), <https://drrobertbullard.com/wp-content/uploads/2020/07/Untitled-attachment-01550.pdf> [<https://perma.cc/5CVX-2WZN>].

particulate matter air pollutants than their white counterparts across all income levels and regions in the United States.³⁴

While these concerning equity issues persist and warrant serious attention, there is no question that the CAA has had a net positive impact on outdoor air quality in the United States over the last several decades.³⁵ Between 1990 and 2020, national concentrations of air pollutants improved 73 percent for carbon monoxide, 86 percent for lead (from 2010), 61 percent for annual nitrogen dioxide, 25 percent for ozone, 26 percent for twenty-four-hour coarse particle concentrations, 41 percent for annual fine particles (from 2000), and 91 percent for sulfur dioxide.³⁶

It is well documented that the CAA has reduced morbidity and mortality associated with air pollutants while saving trillions of dollars.³⁷ Due to these successes, the CAA has been characterized as “the most powerful public health law enacted in the twentieth century of the United States.”³⁸

Indoor air quality, by contrast, remains largely unregulated.³⁹ This is particularly problematic given that, even before the onset of the COVID-19

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34. Tessum et al., *supra* note 5, at 1–2; Maggie Li et al., *Air Pollution in American Indian Versus Non-American Indian Communities, 2000–2018*, 112 AM. J. PUB. HEALTH 615, 617–20 (2022), <https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2021.306650?journalCode=ajph> [<https://perma.cc/F323-E6JX>]; Abdulrahman Jbaily, Xiaodan Zhou, Jie Liu, Ting-Hwan Lee, Leila Kamareddine, Stéphane Verguet & Francesca Dominici, *Air Pollution Exposure Disparities Across U.S. Population and Income Groups*, 601 NATURE 228 (2002), <https://www.nature.com/articles/s41586-021-04190-y> [<https://perma.cc/8E35-DUVA>].
 35. See *Progress Cleaning the Air and Improving People’s Health*, U.S. ENV’T PROT. AGENCY (May 1, 2023), <https://www.epa.gov/clean-air-act-overview/progress-cleaning-air-and-improving-peoples-health> [<https://perma.cc/W6XT-7TPT>].
 36. *Id.*; see generally Joseph E. Aldy, Maximilian Auffhammer, Maureen Cropper, Arthur Fraas & Richard Morgenstern, *Looking Back at 50 Years of the Clean Air Act*, 60 J. ECON. LITERATURE 179 (2022) (examining the Clean Air Act’s (CAA) contributions to air quality improvements since 1970).
 37. *Benefits and Costs of the Clean Air Act Amendments of 1990*, U.S. ENV’T PROT. AGENCY, <https://www.epa.gov/sites/default/files/2015-07/documents/factsheet.pdf> [<https://perma.cc/TNY2-EQDA>].
 38. Beth Gardiner, *This Landmark Law Saved Millions of Lives and Trillions of Dollars*, NAT’L GEOGRAPHIC (Dec. 29, 2020), <https://www.nationalgeographic.com/environment/article/clean-air-act-saved-millions-of-lives-trillions-of-dollars> [<https://perma.cc/7W48-L2Y6>].
 39. The Occupational Safety and Health Administration (OSHA) sets “permissible exposure limits” (PELs) for indoor toxins in covered occupational environments. See, e.g., 29 C.F.R. §§ 1910.1000–1910.1499; 29 C.F.R. §§ 1915.1000–1915.1501; 29 C.F.R. §§ 1926.50–1926.60; 29 C.F.R. §§ 1926.1100–1926.1153. U.S. Environmental Protection Agency (EPA) has never set indoor air pollutant exposure limits. See, e.g., *What Is the Average Level of Carbon Monoxide in Homes*, U.S. ENV’T PROT. AGENCY, <https://www.epa.gov/indoor-air-quality-iaq/what-average-level-carbon-monoxide-homes#:~:text=Average%20levels%20in%20>

pandemic, North Americans spent approximately 90 percent of their lives indoors⁴⁰ “where the concentrations of some pollutants are often [two] to [five] times higher than typical outdoor concentrations.”⁴¹ The lack of regulation of indoor air means that Americans now spend the overwhelming majority of their time in environments that are potentially much more threatening to their health than outdoor environments.⁴²

These dynamics disparately impact racialized and socioeconomically disadvantaged populations who live in highly polluted areas and lack access to air conditioning, high-efficiency filtration, and electronic appliances at home.⁴³ In addition, “poor indoor air quality can be harmful to vulnerable groups such as children, young adults, the elderly, or those suffering chronic respiratory and/or cardiovascular diseases.”⁴⁴ It cannot be overemphasized, however, that the imperative to improve residential indoor air quality is universal. Climate change-induced extreme weather and infectious disease endemicity portend a future where we are all likely to spend even more of our lives indoors—where the air is likely to be even more health-harming.

homes%20without,be%2030%20ppm%20or%20higher [https://perma.cc/XNY6-ERRD] (explaining that “[n]o standards for CO have been agreed upon for indoor air”).

40. See, e.g., Joseph G. Allen & John D. Macomber, *We Spend 90% of Our Time Inside—Why Don't We Care That Indoor Air Is So Polluted?*, FAST CO. (May 20, 2020), <https://www.fastcompany.com/90506856/we-spend-90-of-our-time-inside-why-dont-we-care-that-indoor-air-is-so-polluted> [https://perma.cc/CNR2-JJ44]; Alessandra Cincinelli & Tania Martellini, *Indoor Air Quality and Health*, 14 INT'L J. ENV'T RSCH. PUB. HEALTH 1, 1 (Oct. 25, 2017), <https://www.mdpi.com/1660-4601/14/11/1286> [https://perma.cc/BFX8-JKV6] (explaining that “[i]t has been estimated that people spend about 90 [percent] of their time in both private and public indoor environments, such as homes, gyms, schools, work places, transportation vehicles”).
41. *Indoor Air Quality: What Are the Trends in Indoor Air Quality and Their Effects on Human Health?*, U.S. ENV'T PROT. AGENCY (July 14, 2023), <https://www.epa.gov/report-environment/indoor-air-quality#:~:text=Americans%2C%20on%20average%2C%20spend%20approximately,higher%20than%20typical%20outdoor%20concentrations> [https://perma.cc/JWM4-7LGP].
42. Indeed, the health impacts of combustion in buildings cause more deaths and have a larger health impact than burning coal in many states. See Brady Seals & Leah Louis-Prescott, *Uncovering the Deadly Toll of Air Pollution From Buildings*, RMI (May 5, 2021), https://rmi.org/uncovering-the-deadly-toll-of-air-pollution-from-buildings/?__hstc=213470795.b5a78f861c78de9ce89bbd4f1f8a54be.1617923750983.1647309889275.1647556492898.131&__hssc=213470795.2.1647556492898&__hsfp=999181904 [https://perma.cc/Z6LZ-BAY3].
43. Fountain, *supra* note 12 (explaining that “the study also highlights how heat has to be taken into account when it comes to helping the public cope with air pollution, because the recommended public health measures for extreme heat and extreme air pollution can be completely opposite, especially for those who cannot afford air conditioning”).
44. Cincinelli & Martellini, *supra* note 40.

Although the CAA passed with near unanimous bipartisan support in 1970, it is highly unlikely that the current Congress will amend the statute to enhance EPA's ability to regulate indoor air quality. A recent expert report explains that:

Over the past fifty years, air pollution regulation has gradually become much more complex, and over the past twenty years, policy debates have become increasingly partisan and polarized, to the point that it has become impossible to amend the [Clean Air] Act or pass other legislation to address the new threat of climate change.⁴⁵

It is also highly improbable that any EPA regulatory action aimed at indoor air quality would survive a U.S. Supreme Court challenge.⁴⁶ We, therefore, have little choice but to rely on other legal mechanisms to instigate timely improvements in indoor air quality for the most disparately affected populations, including low-income and other marginalized renters.

This Article contends that tenants can potentially mitigate the largest controllable sources of indoor air pollution—fossil gas appliances—through the creative use of the implied warranty of habitability. Specifically, we argue that courts should interpret the warranty to encompass fossil gas appliances. While this Article proposes an admittedly novel expansion of the implied warranty, the negative health impacts generated by exposure to the air pollutants emitted by gas appliances are similar to the health harms caused by other leasehold habitability problems that courts have held fall within the implied warranty's scope.

To demonstrate the need to expand the implied warranty of habitability to encompass a tenant's right to be free from indoor air pollution generated by fossil gas appliances, Part I of this Article introduces the health justice framework and surveys the health impacts associated with fossil fuel combustion focusing on the adverse health impacts that low-income tenants and other marginalized groups face. Part II explores the history and purpose of the implied warranty of habitability and its traditional scope of coverage. Part III examines the specific health harms associated with the use of indoor gas appliances. Part IV of the

45. Richard Schmalensee & Robert Stavins, *Policy Evolution Under the Clean Air Act*, RESOURCES FOR THE FUTURE (Nov. 21, 2018), <https://www.rff.org/publications/working-papers/policy-evolution-under-the-clean-air-act> [<https://perma.cc/34QB-3EZ5>].

46. Any such rulemaking pursuant to EPA's enumerated powers under the CAA is likely to be struck down by the current U.S. Supreme Court under the major questions doctrine, pursuant to which the courts expect Congress to speak clearly if it wishes to assign decisions of vast economic and political significance to an agency. See *Utility Air Regul. Group v. Env't Prot. Agency*, 573 U.S. 302, 324 (2014); see also *West Virginia v. Env't Prot. Agency*, 597 U.S. ___ (2022) (striking down EPA's Clean Power Plan under the major questions doctrine); *Nat'l Fed. of Indep. Bus. v. Dep't of Labor, Occupational Safety & Health Admin.*, 595 U.S. ___ (2022) (striking down OSHA's COVID-19 occupational vaccine mandate under the major questions doctrine).

Article revisits the implied warranty and argues that courts ought to interpret the warranty to encompass gas appliances. Lastly, Part V acknowledges the serious challenges that this reform proposal raises for low-income tenants and discusses various solutions to mitigate those issues. The Article concludes by contending that the elimination of fossil fuel gas appliances as a source of indoor air pollution is necessary to protect population health.

I. THE HEALTH JUSTICE FRAMEWORK & HEALTH IMPACTS OF FOSSIL FUEL COMBUSTION

The significant adverse health outcomes associated with indoor air pollutants, and their disparate impact on the health and well-being of racialized and minoritized communities, are actionable public health crises that demand policymaker attention.⁴⁷ Whereas preventative and curative medical innovations typically focus on individual patient health, the field of public health focuses on the development, design, and implementation of health promotion and disease prevention strategies to improve health outcomes at the population level.⁴⁸ As public health law scholar Wendy Parmet explains:

[T]he protection of public health remains vital to ensuring that individuals and communities are healthy enough to participate in civil life and pursue their own life's goals.

Perhaps it is for this reason that the American polity has always presumed that public health protection is both an appropriate and an important goal, if not duty, of the government. Indeed, whenever a new threat to public health appears or gains public salience, be it toxic chemicals or pandemic influenza, mad cow disease or autism, the public has always demanded the government take some action, preferably sooner rather than later. More often than not, the action adopted relies on the law.⁴⁹

47. Jan Sundell, *On the History of Indoor Air Quality and Health*, 14 *INDOOR AIR* 51, 53 (2004) (taking the position nearly two decades ago that “there is mounting evidence of the importance of indoor air pollution . . . from a public health perspective”).

48. See, e.g., LAWRENCE O. GOSTIN & LINDSAY F. WILEY, *PUBLIC HEALTH LAW: POWER, DUTY, RESTRAINT* (3d ed. 2016); WENDY PARMET, *POPULATIONS, PUBLIC HEALTH, AND THE LAW* (2009); see also Dan E. Beauchamp, *Public Health as Social Justice*, 13 *INQUIRY* 3, 6 (1976) (explaining that “the historic dream of public health that preventable death and disability ought to be minimized is a dream of social justice”).

49. PARMET, *supra* note 48, at 1–2.

As explained below, an expansive interpretation of the implied warranty of habitability to include gas appliances to eliminate their disparate health impacts on low-income and racialized tenants is consistent with both the core principles of public health policy and the social equity framework of health justice.

A. The Health Justice Framework

Health justice is a “jurisprudential and legislative framework for the achievement and delivery of health equity and social justice.”⁵⁰ The health justice framework advances the argument that socioeconomic statuses and cultural biases represent fundamental root causes of population health outcomes.⁵¹ Consequently, it characterizes the widespread and health-harming socioeconomic conditions prevalent in low-income and racialized communities, including, but not limited to, poverty, residential environmental hazards, substandard housing, food insecurity, lack of access to occupational safety, and adverse childhood experiences as the *social determinants of health*.⁵² Legal scholars further contend that the lack of primary prevention laws, in addition to the enactment of laws and policies that perpetuate poor socioeconomic conditions in the United States, are determinants of poor health outcomes.⁵³

Modern theories about health justice—which center around the nexus between social and economic conditions and health outcomes—evolved from numerous sources, including the Rawlsian theory of justice,⁵⁴ the capabilities approach developed by Amartya Sen and Martha Nussbaum,⁵⁵ egalitarian and communitarian justice frameworks,⁵⁶ and the socioeconomic determinants work of Thomas McKeown.⁵⁷ Between the 1950s and his death in the late 1980s, McKeown published a series of books and papers investigating the underlying causes of population growth in the industrialized world from the 1700s until the

50. Emily Benfer, *Health Justice: A Framework (and Call to Action) for the Elimination of Health Inequity and Social Justice*, 65 AM. U. L. REV. 275, 276 (2015).

51. *Id.* at 335–38; see also Lindsay F. Wiley, *Health Law as Social Justice*, 24 CORNELL J. L. & PUB. POL’Y 47, 84–85 (2014).

52. Benfer, *supra* note 50, at 337.

53. *Id.* at 338.

54. Wiley, *supra* note 51, at 85 n.191.

55. *Id.* at 85–86 n.192; Benfer, *supra* note 50, at 337–38.

56. Wiley, *supra* note 51, at 86.

57. Colin Binns, Seung Wook Lee & Wah-Yun Low, *Thomas McKeown: A True Public Health Pioneer*, 24 ASIA-PAC. J. PUB. HEALTH 893 (2012).

mid-twentieth century.⁵⁸ Over this time, he developed what came to be known as the “McKeown Thesis,”⁵⁹ which contends that “the dramatic reductions in mortality over the past [two] centuries were due to improved socioeconomic conditions rather than to medical or public health interventions.”⁶⁰ McKeown elaborated:

An appraisal of influences on health in the past suggests that the contribution of modern medicine to the increase in life expectancy has been much smaller than most people believe. Health improved, not because of steps taken when we are ill, but because we become ill less often. We remain well, less because of specific measures such as vaccination and immunization than because we enjoy a higher standard of nutrition, we live in a healthier environment, and we have fewer children.⁶¹

McKeown’s claims were highly controversial during his lifetime and have been vigorously debated, lauded, and criticized by public health experts ever since due to their explicit minimization of the role of targeted curative medicine and public health innovations, like immunization, in disease prevention and treatment.⁶² McKeown’s core claim about the fundamental role that socioeconomic status plays in population health outcomes and the importance of preventative health strategies—the benefits of which are well documented in the epidemiological literature—nonetheless remain both influential and at the forefront of population health interventions that prioritize health equity.⁶³ McKeown critic John Coggon

58. See, e.g., Thomas McKeown & R.G. Brown, *Medical Evidence Related to English Population Changes During the Eighteenth Century*, 9 POP. STUD. 199 (1955); Thomas McKeown & R.G. Record, *Reasons for the Decline of Mortality in England and Wales During the Nineteenth Century*, 16 POP. STUDIES 94 (1962); Thomas McKeown & R.G. Record, *An Interpretation of the Modern Rise of Population in Europe*, 26 POP. STUD. 345 (1972); THOMAS MCKEOWN, *THE MODERN RISE OF POPULATION* (1976); THOMAS MCKEOWN, *THE ROLE OF MEDICINE: DREAM, MIRAGE, OR NEMESIS* (1976); THOMAS MCKEOWN, *THE ORIGINS OF HUMAN DISEASE* (1988).

59. See, e.g., Bill Bynum, *The McKeown Thesis*, 371 THE LANCET 644, 644–45 (2008), [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(08\)60292-5/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(08)60292-5/fulltext) [<https://perma.cc/38TP-FJ3T>].

60. Bruce G. Link & Jo C. Phelan, *McKeown and the Idea That Social Conditions Are Fundamental Causes of Disease*, 92 AM. J. PUB. HEALTH 730, 730 (2002).

61. Thomas McKeown, *Determinants of Health*, in UNDERSTANDING AND APPLYING MEDICAL ANTHROPOLOGY (Peter J. Brown & Ronald L. Barret eds., 2d ed. 2010).

62. *Id.* at 730–32; Binns et al., *supra* note 57, at 895; see also Emily Grundy, *Commentary: The McKeown Debate: Time for Burial*, 34 INT’L J. EPIDEMIOLOGY 529 (2004); James Colgrove, *The McKeown Thesis: A Historical Controversy and Its Enduring Influence*, 92 AM. J. PUB. HEALTH 725, 729 (2002).

63. Link & Phelan, *supra* note 60, at 732. Link and Phelan characterize the aspect of McKeown’s thesis that “alerts us that factors not typically conceptualized as relevant to health can have

articulates that, “it is [a] strong and consistent finding in the epidemiological research . . . that socio-economic status . . . is correlated with morbidity, mortality, and functioning.”⁶⁴

The health justice framework reflects these principles as well as several other important and well-accepted propositions about population health; specifically, that “public health measures can be effective,” “modern medicine does have some benefits,” “socio-economic development and organization . . . are associated with better health,” and “[f]actors such as income, workplace safety and stress, and the environment have major influences on people’s health.”⁶⁵ Health justice requires law and policy to facilitate these lessons through a social justice lens aimed at improving health outcomes at the community level.⁶⁶ Consequently, the health justice framework favors communitarian legal and policy reforms that acknowledge cultural biases and socioeconomic structural disadvantages that attend to low-income and minoritized populations over “individualistic, personal responsibility” approaches. It further seeks to expand and broaden the scope of “health law as concerned with all of the determinants of health rather than remaining narrowly focused on the law of health care delivery and financing.”⁶⁷

Health justice advocates for the development and implementation of laws and policies that prevent the development of health conditions that disproportionately impact low-income and minoritized communities.⁶⁸ While there are approximately fifty million Americans who are directly adversely affected by health-harming determinants, including the determinant of substandard housing, none of us are spared.⁶⁹ As health law scholar Emily Benfer explains, “[p]oor health in any population group affects everyone, leading to higher crime rates, negative economic impacts, decreased residential home values, increased health care costs, and other devastating consequences.”⁷⁰ It is, therefore, in our collective interest to devise legal and policy reforms that mitigate the adverse health impacts associated with particular social determinants of

tremendous impacts on health outcomes” as “eminently reasonable” and argue that “we need to be mindful of the potential health impacts of the entire array of social, political, and economic policy we humans develop, such as social security, child welfare, education, or the location of potentially polluting industries.” *Id.*

64. JOHN COGGON, WHAT MAKE HEALTH PUBLIC? A CRITICAL EVALUATION OF MORAL, LEGAL, AND POLITICAL CLAIMS IN PUBLIC HEALTH xv (2012).

65. Grundy, *supra* note 62, at 532.

66. Wiley, *Health Law as Social Justice*, *supra* note 51, at 84–85.

67. *Id.* at 87.

68. Benfer, *supra* note 50, at 338.

69. *Id.* at 335.

70. *Id.* at 275.

health. The following Subpart discusses the negative health outcomes associated with exposure to air pollutants generated by fossil fuels and their disparate health impacts on racialized and minoritized populations.

B. Health Impacts From Burning Fossil Fuels

The negative health impacts that result from our dependence on fossil fuel combustion are thoroughly documented. The chemical substances released during combustion include carbon monoxide, fine particulate matter, sulfur dioxide, nitrous oxides, and ozone. When properly combusted in the presence of oxygen, pure methane—the primary constituent of fossil (natural) gas—releases only water and carbon dioxide into the air. But that ideal situation rarely occurs outside of a tightly controlled laboratory setting.⁷¹ Real world fossil fuel combustion is typically incomplete and imperfect. As a result, fossil gas appliances contaminate indoor air spaces with myriad pollutants, including carbon monoxide, nitrous oxides, sulfur dioxide (where sulfur is a contaminant), and formaldehyde.⁷² The inhalation of airborne particulate matter, which is also released during fossil fuel combustion, can both cause and exacerbate a variety of health issues.⁷³ Exposure to carbon dioxide—the optimal end of the fossil fuel combustion process—also risks direct and indirect negative health impacts. The specific adverse health outcomes attendant to exposure to each of these dangerous air pollutants is discussed, in turn, below.

1. Carbon Monoxide

As noted above, the combustion of fossil fuels emits carbon monoxide (CO).⁷⁴ Indoor sources of carbon monoxide “include unvented or defective gas, coal, wood and fuel stoves, fire places, kerosene space heaters, water heaters,

71. Am. Chem. Soc’y, *Video: How Gas Stoves Pollute Your Home*, PHYS.ORG (June 6, 2022), <https://phys.org/news/2022-06-video-gas-stoves-pollute-home.html> [<https://perma.cc/PL3M-XCTF>].

72. Janna Clark, *Should You Stop Using Gas Appliances in Your Home?*, FOX 23 NEWS TULSA (Feb. 25, 2021), <https://www.fox23.com/news/fox23-investigates/should-you-stop-using-gas-appliances-your-home/SRFVKF3OJNE2DCBLPTKVAVBL2I> [<https://perma.cc/MPD6-6HVA>] (explaining that “[t]he combustion of natural gas emits gases like nitrogen dioxide, carbon monoxide, sulfur dioxide and formaldehyde”).

73. David Roberts, *Gas Stoves Can Generate Unsafe Levels of Indoor Air Pollution*, VOX (May 11, 2020), <https://www.vox.com/energy-and-environment/2020/5/7/21247602/gas-stove-cooking-indoor-air-pollution-health-risks> [<https://perma.cc/3KZJ-9WRW>].

74. Clark, *supra* note 72.

barbeques, car exhaust from attached garage, and cigarette smoke.”⁷⁵ Carbon monoxide, which is responsible for a “significant percentage of all poisoning deaths,”⁷⁶ “enters the bloodstream through the lungs and binds to hemoglobin, the substance in blood that carries oxygen to cells. Carbon monoxide inhalation reduces the amount of oxygen that reaches the body’s organs and tissues.”⁷⁷ Carbon monoxide toxicity results from tissue hypoxia—when cells have insufficient oxygen to maintain homeostasis—and cellular damage.⁷⁸

Even low-level exposure to carbon monoxide elevates the risk of adverse health outcomes in infants, children, and individuals with cardiovascular disease or compromised respiratory systems, among other vulnerable groups.⁷⁹ “Infants and children appear to be uniquely vulnerable to the neurotoxicity of air pollution due to the susceptibility of the brain during critical periods in development and the potential for exposure to such neurotoxins in both the fetal milieu and the postnatal environment.”⁸⁰ While the health impacts of indoor carbon monoxide exposure on children are difficult to quantify,

[i]t has been estimated that over 40,000 emergency department visits occurred annually for acute CO poisoning in the United States. Children are frequently poisoned in homes [but] little information exists regarding CO poisoning in infants and small children. Many of the early manifestations of CO poisoning, such as headache, nausea, and blurred vision are difficult or impossible to observe in an infant.⁸¹

Prenatal exposure to the pollutant is possible because “carbon monoxide can cross the placenta to gain access to the fetal circulation and the developing brain.”⁸² Such in utero exposure to carbon monoxide is associated with numerous adverse health outcomes ranging from neurodevelopment abnormalities and behavioral disorders to low birth weight and prematurity.⁸³ In addition,

75. JOHNSTON ET AL., *supra* note 19, at 361.

76. *Id.*

77. *Id.* at 355.

78. Perry Friedman, Xiaoyue M. Guo, Robert J. Stiller & Steven A. Laifer, *Carbon Monoxide Exposure During Pregnancy*, 70 OBSTETRICAL & GYNECOLOGICAL SURV. 705, 706 (2015).

79. JOHNSTON ET AL., *supra* note 19, at 355.

80. Richard J. Levy, *Carbon Monoxide Pollution and Neurodevelopment: A Public Health Concern*, 49 NEUROTOXICOLOGY TERATOLOGY 31, 32 (2015), <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4568061/pdf/nihms672024.pdf> [<https://perma.cc/7DSJ-7ZKY>].

81. JOHNSTON ET AL., *supra* note 19, at 361.

82. Levy, *supra* note 80, at 31.

83. *Id.* at 34; *see also* Friedman et al., *supra* note 78, at 709.

individuals exposed to carbon monoxide while pregnant are four times more likely to suffer miscarriage.⁸⁴

2. Nitrous Oxides

Nitrogen dioxide (NO₂) exposure impairs the respiratory system by reducing lung function and increasing inflammation of the airways.⁸⁵ Low level exposure to nitrogen dioxide may cause “decreased lung function in patients with chronic obstructive pulmonary disease” and “increased risk of respiratory infections, especially in young children.”⁸⁶ Meanwhile, the health issues associated with high levels of exposure to nitrogen dioxide are more serious and include “the development of acute or chronic bronchitis.”⁸⁷ Nitrogen dioxide’s adverse health impacts on children are pronounced:

Studies in asthmatic children have shown an airway hyperresponsiveness to NO₂ in a homelike environment. In children under 14 years of age, significant associations were demonstrated between daily personal exposure to NO₂ levels readily available in the domestic setting and chest tightness on the same day, breathlessness on exertion with a one-day lag, daytime and nighttime asthma attacks on the same day and with a one-day lag time.⁸⁸

Scientists and health professionals have recognized the impacts of nitrogen dioxide exposure on children’s health for a long time. The first meta-analysis on the topic was published in 1992. That analysis found “that for every [15 parts per billion (ppb)] increase in NO₂ levels—comparable to the increase resulting from exposure to a gas stove—the odds of respiratory illness in children go up by 20 [percent].”⁸⁹ A 2013 meta-analysis further concluded that “[c]hildren living in a

84. JOHNSTON ET AL., *supra* note 19, at 362.

85. *Nitrogen Dioxide*, AM. LUNG ASS’N, *supra* note 2.

86. *Nitrogen Dioxide’s Impact on Indoor Air Quality*, U.S. ENV’T PROT. AGENCY (Mar. 20, 2023), <https://www.epa.gov/indoor-air-quality-iaq/nitrogen-dioxides-impact-indoor-air-quality> [<https://perma.cc/6FA7-Q2MP>].

87. *Id.*

88. JOHNSTON ET AL., *supra* note 19, at 360.

89. Michael Thomas, *How Bad is My Gas Stove (Part Two)*, CARBON SWITCH NEWSLETTER, <https://carbonswitch.com/how-bad-is-my-gas-stove-part-two> [<https://perma.cc/2XQE-628Q>] (citing Vic Hasselblad, David M. Eddy & Dennis J. Kotchmar, *Synthesis of Environmental Evidence: Nitrogen Dioxide Epidemiology Studies*, 42 J. AIR & WASTE MGMT. 662 (1992)).

home with gas cooking have a 42 [percent] increased risk of having current asthma.”⁹⁰

3. Sulfur Dioxide

Even brief exposure to sulfur dioxide can cause asthma sufferers to experience “a narrowing of the airways,” which can provoke “wheezing, chest tightness, and shortness of breath. Symptoms increase as sulfur dioxide levels and/or breathing rates increase.”⁹¹ In fact, “[a]t very high levels [of exposure], sulfur dioxide may cause wheezing, chest tightness, and shortness of breath even in healthy people who do not have asthma.”⁹² Furthermore, “[l]ong-term exposure to sulfur dioxide can cause respiratory illness, alter the lung’s defense mechanisms, and aggravate existing cardiovascular disease. People with cardiovascular disease or chronic lung disease, as well as children and older adults” are most significantly impacted by SO₂ exposure.⁹³ The impacts on children, moreover, are particularly egregious as “[c]linical manifestations include acute respiratory symptoms, asthma, bronchitis, chronic cough, and chest illness. Particulates and SO₂ are implicated in acute morbidity and mortality.”⁹⁴

4. Fine Particulate Matter

Particulate matter air pollutants “can cause or aggravate a number of health problems and have been linked with illnesses and deaths from heart or lung diseases Particle pollution has also been associated with cardiac arrhythmias and heart attacks.”⁹⁵ Unlike larger particles which are impeded from entering the lungs by the defenses of the nasal passageway, fine particles “are able to travel deeply into the respiratory tract, reaching the lungs. Exposure to fine particles can cause short-term health effects such as eye, nose, throat and lung irritation, coughing, sneezing, runny nose, and shortness of breath.”⁹⁶

90. Weiwei Lin, Bert Brunekreef & Ulrike Gehring, *Meta-Analysis of the Effects of Indoor Nitrogen Dioxide and Gas Cooking on Asthma and Wheeze in Children*, 42 INT’L J. EPIDEMIOLOGY 1724, 1728 (2013).

91. JOHNSTON ET AL., *supra* note 19, at 355.

92. *Id.*

93. *Id.*

94. *Id.* at 359.

95. *Id.* at 354.

96. *Particle Pollution and Health*, N.Y. DEP’T OF HEALTH (July 2023), [https://www.health.ny.gov/environmental/indoors/air/pmq_a.htm#:~:text=Fine%20particulate%20matter%20\(PM2.5,hazy%20when%20levels%20are%20elevated](https://www.health.ny.gov/environmental/indoors/air/pmq_a.htm#:~:text=Fine%20particulate%20matter%20(PM2.5,hazy%20when%20levels%20are%20elevated) [<https://perma.cc/ZWR4-V6ZX>].

Children, the elderly, and those with heart or breathing problems are most susceptible to fine particulate pollution,⁹⁷ although others may also suffer:

When exposed to particles, people with existing lung disease may not be able to breathe as deeply or vigorously as they normally would. They may experience symptoms such as coughing and shortness of breath. Healthy people also may experience these effects Particle pollution also can increase susceptibility to respiratory infections and can aggravate existing respiratory diseases, such as asthma and chronic bronchitis, causing more use of medication and more doctor visits.⁹⁸

Exposure to fine particulate pollution is also associated with adverse health impacts to fetuses and young children. Such fine particle exposure “has been linked with significantly increased risk of autism spectrum disorder (ASD) in children, particularly if exposure occurs during the third trimester of pregnancy or during early childhood.”⁹⁹ One study noted that “exposure could affect vulnerable populations even at low levels, below [the] current [outdoor] regulat[ory]” thresholds.¹⁰⁰ Higher particulate pollution levels are also linked to increases in premature births.¹⁰¹

97. *Id.* New research shows that even low levels of particulates can be deadly for the elderly. Lisa Friedman, *Even Low Levels of Soot Can Be Deadly to Older People, Research Finds*, N.Y. TIMES (Jan. 26, 2022), <https://www.nytimes.com/2022/01/26/climate/air-pollution-study-epa.html?referringSource=articleShare> [<https://perma.cc/6NVX-MJU2>]. Researchers “found that if the federal rules for allowable levels of fine soot had been slightly lower, as many as 143,000 deaths could have been prevented” between 2006 and 2016. *Id.*

98. JOHNSTON ET AL., *supra* note 19, at 354–55.

99. *Air Pollution Linked With Increased Risk of Autism in Children*, HARV. T.H. CHAN SCH. OF PUB. HEALTH, <https://www.hsph.harvard.edu/news/hsph-in-the-news/air-pollution-linked-with-increased-risk-of-autism-inchildren/#:~:text=Exposure%20to%20fine%20particulate%20air,T.H.%20Chan%20School%20of%20Public> [<https://perma.cc/5S5A-KF9R>] (*citing* Cheng-Kuan Lin, Yuan-Ting Chang, Fu-Shiuan Lee, Szu-Ta Chen & David Christiani, *Association Between Exposure to Ambient Particulate Matters and Risks of Autism Spectrum Disorder in Children: A Systemic Review and Exposure-Response Meta-Analysis*, 16 ENV'T RSCH. LETTERS 063003 (2021)). “The new study found that the risk of [autism spectrum disorder] ASD increased by 64% with exposure to 10 micrograms of PM_{2.5} per cubic meter of air (mcg/m³) during early childhood and by 31% during prenatal periods.” *Id.*

100. *Id.*

101. *Children and Air Pollution*, AM. LUNG ASS'N (Apr. 17, 2023), <https://www.lung.org/clean-air/outdoors/who-is-at-risk/children-and-air-pollution> [<https://perma.cc/T86L-4N4D>].

5. Formaldehyde

Formaldehyde, a known carcinogen,¹⁰² “is quickly absorbed [in] the nose and the upper part of your lungs.”¹⁰³ Ingesting formaldehyde “[a]t low levels . . . can cause eye, nose, and throat irritation.”¹⁰⁴ Moreover, “[a]t higher levels, formaldehyde exposure can cause skin rashes, shortness of breath, wheezing and changes in lung function. Children, the elderly and people with asthma or other breathing problems may be more sensitive to the effects of formaldehyde.”¹⁰⁵ Unfortunately for those suffering from formaldehyde exposure, “air filters generally don’t help [to] lower levels of” the pollutant present in homes.¹⁰⁶ This is important because “[t]here is usually more formaldehyde present indoors than outdoors.”¹⁰⁷

6. Carbon Dioxide

Carbon dioxide (CO₂) exposure is associated with both direct and indirect adverse health outcomes. Since carbon dioxide is heavier than air, one of the direct effects of carbon dioxide exposure at highly concentrated levels is asphyxiation.¹⁰⁸ The inhalation of just one or two breaths of pure carbon dioxide can kill a human being because such inhalation replaces the oxygen in the lungs with oxygen-free gas.¹⁰⁹ To be sure, carbon dioxide exposure produces harmful effects at all concentration levels: “Exposure to a 1 [percent] to 5 [percent]

102. *Formaldehyde and Cancer Risk*, NAT’L CANCER INST. (June 10, 2011), [https://www.cancer.gov/about-cancer/causes-prevention/risk/substances/formaldehyde/formaldehyde-fact-sheet#:~:text=The%20International%20Agency%20for%20Research,Report%20on%20Carcinogens%20\(3\)\[https://perma.cc/97HB-ANQX\]](https://www.cancer.gov/about-cancer/causes-prevention/risk/substances/formaldehyde/formaldehyde-fact-sheet#:~:text=The%20International%20Agency%20for%20Research,Report%20on%20Carcinogens%20(3)[https://perma.cc/97HB-ANQX]).

103. U.S. DEP’T OF HEALTH & HUMAN SERVS. PUB. HEALTH SERV. AGENCY FOR TOXIC SUBSTANCES & DISEASE REGISTRY, TOXICOLOGY PROFILE FOR FORMALDEHYDE 23 (July 1999).

104. *Formaldehyde and Your Health*, U.S. DEP’T OF HEALTH & HUMAN SERVS. PUB. HEALTH SERV. AGENCY FOR TOXIC SUBSTANCES & DISEASE REGISTRY (Feb. 10, 2016), <https://www.atsdr.cdc.gov/formaldehyde> [https://perma.cc/66AR-ZHAL].

105. *Id.*

106. *Formaldehyde in Your Home: What You Need to Know*, U.S. DEP’T OF HEALTH & HUMAN SERVS. PUB. HEALTH SERV. AGENCY FOR TOXIC SUBSTANCES & DISEASE REGISTRY (Feb. 10, 2016), <https://www.atsdr.cdc.gov/formaldehyde/home> [https://perma.cc/TMH8-NWMF].

107. TOXICOLOGY PROFILE FOR FORMALDEHYDE, *supra* note 103, at 22.

108. Heather Payne, *Chasing Squirrels in the Energy Transition*, 52 ENV’T L. 237, 250 (2022). Methane (fossil gas), on the other hand, is lighter than air. See, e.g., Jan Broucek, *Production of Methane Emissions From Ruminant Husbandry: A Review*, 5 J. ENV’T PROT. 1482, 1484 (2014).

109. “Within five seconds of inhaling only a few breaths of oxygen-free gas, there can be mental failure and coma Death follows in two to four minutes.” Stanley M. Englund et al., *Process Safety*, in PERRY’S CHEMICAL ENGINEERS’ HANDBOOK 26–27 (Robert H. Perry, Don W. Green & James O. Maloney eds., 7th ed. 1997).

atmospheric CO₂ mixture can result in physical effects including increased breathing; loss of consciousness usually occurs from exposure to greater than 10 [percent] atmospheric CO₂; and most CO₂ concentrations above 30 [percent] are lethal.”¹¹⁰

The indirect effects of carbon dioxide exposure are well known and are nearly identical to the adverse health outcomes associated with climate change. Carbon dioxide emissions are a dominant source of global warming.¹¹¹ Therefore, even gas appliances that combust perfectly contribute to the warming of our planet and its attendant health concerns.

Adverse health outcomes associated with climate change “include increased respiratory and cardiovascular disease, injuries and premature deaths related to extreme weather events, changes in the prevalence and geographical distribution of food- and water-borne illnesses and other infectious diseases, and threats to mental health.”¹¹² As is the case with most public health threats, they likely will not be borne equitably across racial or socioeconomic groups.

The negative health outcomes linked to extreme heat exposure are illustrative of such inequities: “Older adults, young children, low-income populations, people who work outdoors, and people in poor health are the most vulnerable” to extreme heat.¹¹³ Additionally, “[u]rban areas already suffering from [higher temperatures relative to nearby outlying areas, which is known as the] heat island effect[,] will bear the brunt of these harsher heat events.”¹¹⁴ Notably, the most extreme heat island effects in urban areas occur in neighborhoods with fewer parks,¹¹⁵ which correlate to socioeconomic status and, often, race.¹¹⁶

110. Victor B. Flatt, *Paving the Legal Path for Carbon Sequestration From Coal*, 19 DUKE ENV'T. L. & POL'Y F. 211, 221 (2009).

111. *Causes of Climate Change*, U.S. ENV'T PROT. AGENCY (Apr. 25, 2023), <https://www.epa.gov/climatechange-science/causes-climate-change#:~:text=Greenhouse%20Gases,-Concentrations%20of%20the&text=Carbon%20dioxide%2C%20methane%2C%20and%20nitrous,in%20the%20last%20800%2C000%20years.&text=These%20greenhouse%20gas%20emissions%20have,earth's%20surface%20temperature%20to%20rise> [https://perma.cc/5QJ3-KHVS].

112. *Climate Effects on Health*, U.S. CTRS. FOR DISEASE CONTROL & PREVENTION (Apr. 25, 2022), <https://www.cdc.gov/climateandhealth/effects/default.htm> [https://perma.cc/4M8K-8L3D].

113. *Climate Change and Heat Islands*, U.S. ENV'T PROT. AGENCY (Feb. 15, 2022), <https://www.epa.gov/heatislands/climate-change-and-heat-islands> [https://perma.cc/CQP9-VDJK].

114. *Id.*

115. *Mapping Urban Heat Islands Leads NYC Council Data Team to Landsat*, U.S. GEOLOGICAL SURVEY (Mar. 1, 2021), <https://www.usgs.gov/news/mapping-urban-heat-islands-leads-nyc-council-data-team-landsat> [https://perma.cc/Z8WL-JXR6].

116. Ed Gerrish & Shannon Lea Watkins, *The Relationship Between Urban Forests and Income: A Meta-Analysis*, 170 LANDSCAPE URB. PLAN. 293 (2018) (explaining that “urban trees may be unequally distributed among poor and minority urban communities” and finding “evidence of income-based inequity in urban forest cover”).

For example, in New York City, warmer neighborhoods are “often more Black and Latin[x] and lower income” than healthier, cooler neighborhoods.¹¹⁷ These “observations line up with what the [CDC] has found in other cities, along with a racial/ethnic association with heat-related deaths.”¹¹⁸ Adverse health outcomes and their disparate impacts on racialized and underserved populations will expand as climate change worsens.

While higher temperatures can be mitigated in indoor environments through measures such as air conditioning,¹¹⁹ air conditioning requires electricity. Increased electricity use, in turn, further exacerbates residential energy burdens. In 2020, “34 million households (27 [percent] of all U.S. households) reported difficulty paying energy bills or reported that they had kept their home at an unsafe temperature because of energy cost concerns.”¹²⁰ States with high air conditioning demand due to weather have a “relatively high total energy burden.”¹²¹ Much like the heat island effect, energy burdens are borne inequitably: “low-income households experienced the highest median energy burden (7.2 [percent]), followed by [Black] households (5.4 [percent]), low-income households living in multifamily buildings (5.0 [percent]), Latin[x] households (4.1 [percent]), and renting households (4.0 [percent]).”¹²² Therefore, even where landlords provide air conditioning, the cost of energy may discourage tenants from using it in a manner sufficient to minimize the health risks of heat exposure.

II. IMPLIED WARRANTY OF HABITABILITY

The implied warranty of habitability reads into every residential leasing agreement a tenant’s right to a “habitable premises.”¹²³ “In the canon of modern

117. *Mapping Urban Heat Islands Leads NYC Council Data Team to Landsat*, *supra* note 115.

118. *Id.*

119. *Id.* (“Most of NYC’s heat-related deaths occur because of time spent indoors, not outdoors—inside homes with no air conditioning.”).

120. Ross Beall & Carolyn Hronis, *Today in Energy: In 2020, 27% of U.S. Households Had Difficulty Meeting Their Energy Needs*, U.S. ENERGY INFO. ADMIN. (Apr. 11, 2022), <https://www.eia.gov/todayinenergy/detail.php?id=51979&src=email> [<https://perma.cc/V663-2ZPH>].

121. U.S. DEP’T OF ENERGY OFF. OF ENERGY EFFICIENCY & RENEWABLE ENERGY, *LOW-INCOME HOUSEHOLD ENERGY BURDEN VARIES AMONG STATES – EFFICIENCY CAN HELP IN ALL OF THEM* (Dec. 2018).

122. AM. COUNCIL FOR AN ENERGY EFFICIENT ECONOMY, *LIFTING THE HIGH ENERGY BURDEN IN AMERICA’S LARGEST CITIES: HOW ENERGY EFFICIENCY CAN IMPROVE LOW INCOME AND UNDERSERVED COMMUNITIES* 4 (Apr. 2016).

123. *See generally* Peter J. Shedd, *The Implied Warranty of Habitability New Implications, New Applications*, 8 REAL EST. L.J. 291 (1980) (identifying and discussing the pace at which courts

landlord-tenant law, the implied warranty . . . is a staple in the arsenal of tenant-protective measures.”¹²⁴ The vast majority of states adopted the implied warranty over a twenty-year period beginning in the late 1950s as a result of case law and legislation¹²⁵ aimed at rectifying deplorable housing conditions. Although some would prefer the implied warranty to be waivable in an effort to create cheaper accommodations—a state Supreme Court justice opined that, “[i]f a group of male students prefer to spend their money on the purchase of beer, the playing of pool, and the chasing of women instead of paying rent for luxurious accommodations, they should be permitted to do so”¹²⁶—the implied warranty is not waivable and is in effect for the duration of any lease.¹²⁷ To be sure, the warranty does not demand luxurious accommodations; it simply ensures the bare minimum habitability conditions to meet essential living requirements.

The implied warranty has been characterized as “the most significant step forward for tenants in modern landlord-tenant law.”¹²⁸ This Part of the Article explains why state courts and legislators adopted the implied warranty and enumerates the residential conditions it typically covers.¹²⁹

A. Why did American Courts & Legislatures Adopt the Implied Warranty?

The early development of many property law doctrines under the English common law occurred in a predominantly feudal, agrarian environment.¹³⁰ In

adopted the warranty of habitability and the history of the doctrine in real estate transactions); see also Paula Franzese, Abbott Gorin & David J. Guzik, *The Implied Warranty of Habitability Lives: Making Real the Promise of Landlord-Tenant Reform*, 69 RUTGERS U. L. REV. 1 (2016) (discussing the history and development of the implied warranty of habitability in residential transactions).

124. *Id.* at 2.

125. Shedd, *supra* note 123, at 291; Serge Martinez, *Revitalizing the Implied Warranty of Habitability*, 34 N.D. J.L. ETHICS & PUB. POL’Y 239, 251 (2020) (stating that “[i]n 1972 the drafters of the new Uniform Residential Landlord Tenant Act (URLTA) incorporated the tenant protections of the implied warranty of habitability. Eventually, forty-nine states and the District of Columbia would adopt some version of the implied warranty of habitability.”).

126. *Teller v. McCoy*, 253 S.E.2d 114 (W.V. 1979) (Neely, J. concurring in part and dissenting in part).

127. Franzese et al., *supra* note 123, at 3. The Uniform Residential Landlord and Tenant Act § 2.104 I and (d) permit a tenant to waive the warranty in certain fact-specific situations, but this has not been adopted.

128. Martinez, *supra* note 125, at 240.

129. For a full history of the development of the implied warranty of habitability, see Francis S. L’Abbate, *Recovery Under the Implied Warranty of Habitability*, 10 FORDHAM URB. L.J. 285 (1982).

130. Donald E. Campbell, *Forty (Plus) Years After the Revolution: Observations on the Implied Warranty of Habitability*, 35 U. ARK. LITTLE ROCK L. REV. 793, 795 (2013).

that society, the physical land used for agricultural purposes was significantly more important than physical structures on the land and their attributes.¹³¹ As a result, the common law burdened landlords with the minimal duties of delivering possession of the land and warrantying its quiet enjoyment.¹³² It demanded nothing else.¹³³ Moreover, the common law severely limited the reasons that tenants could break a lease without payment liability. It required tenants, for example, to take possession even if the structures on the leased property were destroyed.¹³⁴

The common law also placed the responsibility for determining whether a particular location was suitable for the tenant's expected uses expressly on the tenant: "Courts applied the doctrine of caveat emptor (buyer beware), to the landlord-tenant relationship and interpreted lease instruments as reflecting the entire agreement of the parties because prospective tenants could examine the premises and exact express warranties."¹³⁵ The common landlord-tenant law, therefore, rested on three important assumptions: (1) that there was sufficient rental availability; (2) that every party to the agreement had equal bargaining power; and (3) that tenants were sufficiently knowledgeable and lease conditions were sufficiently clear for tenants to determine the likelihood of issues which could arise during the tenancy.¹³⁶

131. L'Abbate, *supra* note 129, at 286–87 (noting that "[l]andlord liability was not necessary because structures were of secondary importance, and tenants, for the most part, had the skill, time and financial resources to make necessary repairs"); *see also* Martinez, *supra* note 125, at 243. Martinez points out that:

[t]he law regarding rental housing conditions was built on traditional notions of the leasehold agreement—the landlord would rent the land to the tenant for agricultural purposes, and the tenant would pay the rent from the fruits of the land. Any dwelling on the property was assumed to be ancillary to the primary purpose of the leasehold, and neither landlord nor (it was presumed) tenant considered the condition of a dwelling to be important. Additionally, the tenant-farmer population was generally seen as perfectly qualified to identify and repair any conditions in a dwelling that needed fixing.

Id.

132. L'Abbate, *supra* note 129, at 286–87.

133. Campbell, *supra* note 130, at 797 (observing that that "the tenant's obligation to pay rent was for the right of continuing possession of the estate/land—it was not contingent or dependent upon the landlord doing anything").

134. *Id.* at 796 (explaining that "[t]here was no expectation that the landlord warranted that any structures on the property were in any particular condition. Tenants were expected to examine the property before renting it and thereafter took the property as they found it").

135. L'Abbate, *supra* note 129 at 287.

136. Martinez, *supra* note 125, at 242 (noting "[b]ad housing conditions for low-income tenants are a very stark physical manifestation of an enduring truth for low-income tenants: landlords have power and tenants have almost none").

Needless to say, those assumptions were questionable. It is well understood, for instance, that “many tenants [we]re uneducated and unaware of the necessity of obtaining express warranties from landlords.”¹³⁷ The common law doctrines that developed around leasehold repairs are illustrative. The doctrine of permissive waste, for example, placed the burden of making all necessary repairs on tenants, rather than landlords.¹³⁸ It also did not provide any recourse for tenants to hold landlords liable for poor conditions.¹³⁹

Even in situations where a lease agreement expressly placed the burden of repair on the landlord, the common law rendered such provisions illusory because a landlord’s failure to repair was no defense to an unlawful detainer action. In other words:

Even if for some reason the landlord actually did have an obligation to maintain a dwelling, the failure to do so did not affect the tenant’s obligation to pay rent. Owing to the incidental nature of the dwelling in traditional leaseholds, failure to maintain the residence was not considered relevant to the tenant’s obligation to pay rent.¹⁴⁰

Accordingly, a landlord’s breach of the lease agreement did not relieve the tenant from any rent obligation. Worse yet, the tenant often had insufficient resources to hire an attorney to take legal action to obtain repairs.¹⁴¹ Assuming a tenant was able to force the landlord to repair, the landlord was then legally entitled to evict in response and force the tenant to find new housing, a difficult task for tenants in tight housing markets and particularly so for a tenant who had just incurred the additional cost of moving.

While the common law eventually permitted tenants the right to raise a constructive eviction claim against landlords when their housing conditions were so horrific that the dwelling was “untenantable,”¹⁴² they had to vacate the premises

137. L’Abbate, *supra* note 129, at 289.

138. See, e.g., *Newbold v. Brown*, 44 N.J.L. 266, 267 (N.J. 1882).

139. *Id.*

140. Martinez, *supra* note 125, at 243.

141. *Intro to Tenant Right to Counsel*, FORDHAM NAT’L COAL. FOR A CIV. RIGHT TO COUNSEL, http://civilrighttocounsel.org/highlighted_work/organizing_around_right_to_counsel [<https://perma.cc/5ZE5-BR5L>] (noting that tenants have representation 3 percent of the time).

142. *Schulte Realty Co. v. Pulvino*, 179 N.Y.S. 371, 372 (N.Y. Sup. Ct. 1919). In another leading decision, the court observed:

The heating of the apartments, the supply of water, all sanitary arrangements, and many other things essential to the proper enjoyment of the apartments in the building by the tenants thereof, are regulated and controlled by the landlord, and he owes a duty to the tenant to see that all such matters and *appliances are kept in proper order*; and if he persistently neglects them, and by reason of such neglect the tenant is deprived of heat or water, or *his apartments are filled*

before they could avail themselves of the doctrine.¹⁴³ In a scenario where a tenant moved out and rented a new place, but the court determined that the tenant's previous leasehold conditions did not rise to the level of a constructive eviction, that tenant was on the hook to both their old and new landlords for rent—a financially untenable position for most renters. Constructive eviction claims, therefore, were unhelpful as a remedy unless the dwelling conditions were truly dire. Due to the common law's landlord-friendly arc, poor rental conditions and their attendant health impacts continued to persist.

The late 1950s marked a shift, however, and modern American courts and state legislatures started adopting the implied warranty of habitability¹⁴⁴ as the feudal rationales supporting the traditional common law landlord-tenant doctrines grew untenable.¹⁴⁵ The modern tenant who bargains for the use of the structure and not just the underlying land often lacks the skills to properly inspect the property or to make significant repairs and is consequently “in a poor position to bargain effectively” for a lease clause that shifts the repair burden to the landlord.¹⁴⁶ The adoption of the implied warranty was also “in harmony” with the enactment of housing and building codes, “which reflect a legislative desire to ensure decent housing” as well as consistent with “prevailing trends in consumer law, products liability law, and the law of torts.”¹⁴⁷

Modern landlord-tenant law extends to tenants multiple methods to remedy a breach of the implied warranty of habitability while remaining in possession of the property. Such options include withholding rent, repairing the issue and deducting the repair costs from rent, suing for damages, and terminating the

with gas or foul odors from the same, and the apartments become unfit for occupancy, the tenant is deprived of the beneficial enjoyment thereof, and the consideration for which he agrees to pay rent fails, and there is a constructive eviction.

Tallman v. Murphy, 24 N.E. 716, 718 (N.Y. 1890) (emphases added).

143. See, e.g., Upton v. Townsend, 17 C.B. 30 (1855).

144. David Super, *The Rise and Fall of the Implied Warranty of Habitability*, 99 CAL. L. REV. 389, 399 (noting that, “[i]n some states, the courts went first in announcing a warranty of habitability. In others, the legislature acted, sometimes by adopting the Uniform Residential Landlord and Tenant Act (URLTA) and sometimes by amending existing summary eviction statutes”).

145. See, e.g., Pugh v. Holmes, 405 A.2d 879, 900 (1979) (explaining that “the doctrine of Caveat emptor has outlived its usefulness and must be abolished, and that, in order to keep in step with the realities of modern day leasing, it is appropriate to adopt an implied warranty of habitability in residential leases”); Campbell, *supra* note 130, at 797 (observing that “[t]he historical foundations on which the caveat emptor and dependent covenants doctrines were based came under attack in the mid-1800s [because t]he presumptions no longer held”).

146. Wade v. Jobe, 818 P.2d 1006, 1010 (Utah 1991).

147. *Id.*

lease.¹⁴⁸ These flexible remedies are designed to permit a tenant to pursue what makes the most sense for that tenant under the circumstances. If the tenant wants to stay on the premises, for example, then withholding rent is a way to convince the landlord to fix the issue. If, on the other hand, the tenant wants to stay and it is relatively easy to find someone to fix the issue, then the tenant can elect to hire someone to repair the issue and simply deduct the cost of repair from rent. If the housing conditions are so deplorable that the tenant needs to vacate the premises but wants money back to secure a new lease in a tight housing market, then the tenant's preferred course of action may be to sue for damages. If the tenant needs to vacate the premises but the housing market has sufficient inventory, then the tenant may elect to simply terminate the lease.

In addition to creating flexible breach remedies for tenants, the implied warranty of habitability extinguished landlord immunity in tort. In the landmark case of *Sargent v. Ross*,¹⁴⁹ the court recognized that “the landlord-tenant relationship is governed by real property and tort principles.”¹⁵⁰ The court held that the state's abandonment of caveat emptor (buyer beware) and adoption of the implied warranty voided “the general rule of nonliability” for landlords in tort actions involving premises conditions.¹⁵¹ In other words, because the implied warranty of habitability requires landlords to maintain a habitable premises, tenants are entitled to sue in tort to vindicate harms suffered due to a landlord's breach of that duty. As already explained, landlords owed tenants no such duty prior to the adoption of the warranty and, consequently, tenants had no remedy in tort for injuries attributable to uninhabitable premises.

B. What Conditions Does the Implied Warranty Typically Cover?

While the exact contours of the implied warranty of habitability vary across jurisdictions in the United States, a common construction is that the warranty requires “a livable, safe and clean” premises.¹⁵² As a general rule, the warranty guarantees housing that is “suitable for human dwelling”¹⁵³ and

148. See, e.g., *Johnson v. Scandia Assoc., Inc.*, 717 N.E.2d 24, 31 (Ind. 1999) (listing remedies).

149. 113 N.H. 388 (1973).

150. L'Abbate, *supra* note 129, at 295–96.

151. *Id.* at 296 (citing *Sargent*, 113 N.H. at 395, 308).

152. *Landlord's Duties and Obligations*, N.Y.C. BAR (Aug. 2020), <https://www.nycbar.org/get-legal-help/article/landlord-tenant/landlords-duties-obligations> [<https://perma.cc/VWX5-P48H>].

153. Franzese, *supra* note 123, at 7.

protects tenants from “conditions that are dangerous, hazardous or detrimental to life, health or safety.”¹⁵⁴

Scholars have advanced numerous rationales to explain why courts and state legislatures extended the implied warranty to tenants. A popular theory is that policymakers believed that tenants could use the implied warranty to supplement housing code enforcement, which had proven incapable of addressing horrific and unsanitary dwelling conditions.¹⁵⁵ Additionally, as legal scholar David Super pointed out, policymakers had persuasive reasons to adopt the implied warranty “independent of any concern for the well-being of low income tenants,” particularly in urban settings, because “[d]eteriorating housing conditions have serious negative effects on surrounding communities: they depress property values and hence property tax revenues, contribute to the spread of insect and rodent infestations, give cities a negative image with visitors, and are correlated with crime.”¹⁵⁶

As legal scholars also have demonstrated over the years, the use of the implied warranty by tenants to address unsafe and unhealthy housing conditions has been stymied by various procedural and substantive roadblocks.¹⁵⁷ A recent study focused on tenant invocation of the implied warranty of habitability in Essex County, New Jersey is consistent with these criticisms; it concluded that tenants used the warranty sparingly (only 0.2 percent of the time) and predominantly defensively in response to landlord-initiated evictions.¹⁵⁸ Those few tenants nonetheless managed to invoke the warranty to address a wide range of residential ills, including “to remediate bug and rodent infestations, mold, lack of insulation, absences of heat and hot water, broken door locks, and defective appliances.”¹⁵⁹ It is also worth pointing out that such substandard housing conditions are distressingly common.¹⁶⁰

154. Port Chester Housing Auth. v. Mobley, 789 N.Y.S.2d 798, 800 (App. Ct. 2004).

155. Martinez, *supra* note 125, at 241 (explaining that “[h]ousing code enforcement requires that inspectors and a housing department are willing and able to enforce through effective tools. It did not take long to realize that public enforcement was going to be ineffective without more resources.”).

156. Super, *supra* note 144, at 402.

157. See, e.g., *id.* at 423–34; Martinez, *supra* note 125, at 255–67.

158. Franzese, *supra* note 123, at 5.

159. *Id.* The discussion of individual tenant stories in this Article is disheartening. It describes premises riddled with bedbugs, infested with rodents and roaches, and lacking heat, a working oven, and a working bathroom. The Article also details the callous disregard to these conditions by landlords raking in government subsidies despite the legitimate complaints and travails of their tenants.

160. Martinez, *supra* note 125, at 256 (stating, “[i]n its most recent report, the U.S. Department of Housing and Urban Development (HUD) identified 8.3 million households as ‘renters

Other recorded cases in which tenants successfully invoked the implied warranty involved a sewage flood in the basement¹⁶¹ and an inoperable stove.¹⁶² In the seminal implied warranty of habitability case, *Javins v. First National Realty Corp.*,¹⁶³ the court held that the warranty applied to “adequate heat, light and ventilation, serviceable plumbing facilities, secure windows and doors, proper sanitation, and proper maintenance.”¹⁶⁴ Some courts have even held that landlords breach the implied warranty by failing to keep their tenants safe from criminal acts, such as assault and burglary.¹⁶⁵ In sum, conditions that fail to satisfy the tenant’s implied right to suitable housing “are the sorts of infirmities deemed fundamentally incompatible with the implied promise that leased premises are fit for habitation.”¹⁶⁶

As such, the implied warranty does not cover trivial or aesthetic conditions, such as a dripping faucet or peeling paint.¹⁶⁷ It also only protects necessities and

with very low incomes—no more than 50 percent of the Area Median Income (AMI)—who do not receive government housing assistance and who pay more than one-half of their income for rent, live in severely inadequate conditions, or both”).

161. *Wade v. Jobe*, 818 P.2d 1006, 1008 (Utah 1991) (holding there to be a violation of the warranty of habitability when the apartment’s basement had sewage flooding that extinguished pilot lights and created unsanitary conditions); *Vanderschrier v. Aaron*, 140 N.E.2d 819, 820 (Ohio App. Ct. 1957) (holding there to be a violation of the warranty of habitability where the basement flooded with sewage, damaging furniture and carpet and making the house generally unsanitary).

162. *L’Abbate*, *supra* note 129, at 301.

163. 428 F.2d 1071 (D.C. Cir. 1970).

164. *Id.* at 1074–75.

165. *Highview Associates v. Kofler*, 477 N.Y.S.2d 585, 587 (Dist. Ct. 1984) (noting that “[d]espite many notices to the plaintiff of thefts and burglaries committed in the plaintiff’s garden apartment complex, the landlord . . . had not (and has not) taken any steps to protect its tenants . . . [and] thus breached the implied warranty of habitability” and concluding that the tenant “acted reasonably and properly when she fled the premises, since it became apparent to her that it was not safe to live in the apartment any longer”).

166. *Franzese*, *supra* note 123, at 8.

167. See *Landis & Landis Const., LLC v. Nation*, 286 P.3d 979 (Wash. App. 2012), *review denied*, 300 P.3d 415 (Wash. 2013); *Kolb v. DeVille I Properties, LLC*, 326 S.W.3d 896, 901 (Mo. Ct. App. 2010) (explaining that “[a] breach of implied warranty must be more than a de minimis violation or minor housing code violation”). This is not to say that the implied warranty should not be extended to cover other housing conditions except fossil fuel appliances; there is ample room for other viable extensions of the implied warranty to improve tenant living conditions and well-being. See, e.g., Liam Dillon, *Why Do So Many LA Apartments Come Without Refrigerators?*, L.A. TIMES (May 18, 2022 5:22 PM), <https://www.latimes.com/homeless-housing/story/2022-05-18/fridge-los-angeles-apartment-tenants> [https://perma.cc/9DF8-9VPZ] (describing how California classifies refrigerators as “amenities” that do not need to be provided by landlords to meet habitability standards). Most habitability codes, for example, do not require air conditioning. As temperatures rise, air conditioning will become critical to tenant health and well-being in various parts of the country and, thus, ought to be viewed in those areas as integral to habitability. See *B.C. Building Code Changes ‘Insufficient’ Against*

does not extend to amenities. Dishwashers, for example, are characterized as amenities not within the scope of the implied warranty. This is because it is possible to meet life requirements by washing dishes in hot water in a sink. In sum, “[t]he warranty was not intended to make the landlord a guarantor of every amenity customarily rendered in the landlord-tenant relationship, but only to provide protection against those conditions that materially affect the health and safety of the tenants or those deficiencies that in the eyes of a reasonable person deprive tenant of those essential functions which a residence is expected to provide.”¹⁶⁸

While courts often look to local housing or building codes to determine the scope of the implied warranty’s coverage, it is important to recognize that rental unit conditions can violate the implied warranty of habitability even when they are not included in building or housing codes.¹⁶⁹ As one court has explained, landlords have “a duty to keep the apartment in a state of repair sufficient to meet the standards of the local housing code *or* minimum standards of habitability.”¹⁷⁰ Building and housing codes simply do not, and likely cannot, cover every possible condition that may affect habitability.

III. HEALTH IMPACTS OF GAS APPLIANCES

As air pollution becomes more severe,¹⁷¹ it is critical to minimize pollutants that we can easily control. Reining in the global greenhouse gas emissions that are the primary instigators of climate change, for instance, is an exceptional task that demands multinational coordination. Replacing gas appliances with their electric

Deadly Hot Summers, THE ENERGY MIX (June 17, 2022), https://www.theenergymix.com/2022/06/17/b-c-building-code-changes-insufficient-against-deadly-hot-summersef%bf%bc/?utm_source=The+Energy+Mix&utm_campaign=df4c1edb0a-TEM_RSS_EMAIL_CAMPAIGN&utm_medium=email&utm_term=0_dc146fb5ca-df4c1edb0a-431644561 [https://perma.cc/ZGZ4-9WM9] (opining that building codes should be updated to require air conditioning).

168. Port Chester Housing Auth. v. Mobley, 789 N.Y.S.2d 798, 800 (App. Ct. 2004).

169. See, e.g., Miller v. Christian, 958 F.2d 1234, 1238 (3d Cir. 1992).

170. *Id.*

171. See, e.g., Kristoffer Tighe, *The “State of the Air” in America Is Unhealthy and Getting Worse, Especially for People of Color*, INSIDE CLIMATE NEWS (Apr. 21, 2022), <https://insideclimatenews.org/news/21042022/state-of-the-air-report> [https://perma.cc/84UW-ST9M]; David Carlin, *America’s Air Is Getting Worse: Here’s Why*, FORBES (May 24, 2020), <https://www.forbes.com/sites/davidcarlin/2020/05/24/americas-air-is-getting-worse-heres-why/?sh=7ef6b3e4d4f3> [https://perma.cc/4TPG-SHSX]; @sasan_saadat, TWITTER (Jan. 13, 2022 11:11 AM), https://twitter.com/sasan_saadat/status/1481705436751355904 [https://perma.cc/FZ7B-8VQQ].

counterparts in rental units, on the other hand, represents a relatively easy-to-implement policy reform that would improve indoor air quality and result in significant and positive population health outcomes.¹⁷²

As previously explained, the federal government does not regulate indoor air quality.¹⁷³ Yet, EPA “warns that ‘studies of human exposure to air pollutants indicate that indoor levels of pollutants may be two to five times—and occasionally more than one hundred times—higher than outdoor levels.’”¹⁷⁴ Indeed, “EPA’s own science shows that homes with gas stoves have around 50 percent, ranging up to over 400 percent, higher levels of [NO₂] than homes with electric stoves. Concentrations can often exceed US outdoor pollution standards.”¹⁷⁵

There is no EPA standard for indoor [NO₂], but the standard for long-term outdoor exposure is 53 ppb. However, effects have been documented at much lower exposures. A 2013 study of indoor NO₂ from stoves found that, among children with asthma, “every 5 ppb increase in NO₂ exposure above a threshold of 6 ppb” led to a measurable increase in wheezing and asthma severity.

A 2013 meta-analysis found that children’s risk of wheeze rose 15 percent for every 15 ppb rise in NO₂. In [one] 2006 study, “a 15 ppb increment in NO₂ exposure was found to be associated with a significant 50 [percent] increased annual risk of lower respiratory symptoms.” More recent EPA research also linked long-term NO₂ exposure to “cardiovascular effects, diabetes, poorer birth outcomes, premature mortality, and cancer.”

Finally, research has linked ongoing NO₂ exposure to reduced cognitive performance, especially in children. [A] 2009 study concluded that “early-life exposure to air pollution from indoor gas appliances may be negatively associated with neuropsychological development through

172. Thomas, *supra* note 89.

173. *What’s Up With Natural Gas in My Home*, FRESH ENERGY (Feb. 24, 2021), <https://fresh-energy.org/whats-up-with-natural-gas-in-my-home> [<https://perma.cc/R2LN-4YUT>]; see also Danielle Renwick, *Your Gas Stove Could Be Hurting Everyone Around You*, POPULAR SCI. (Jan. 28, 2022), <https://www.popsci.com/environment/gas-stoves-harmful> (noting the lack of EPA guidelines for indoor pollutants).

174. Roberts, *supra* note 73.

175. *Id.* (citing U.S. ENV’T PROT. AGENCY, INTEGRATED SCIENCE ASSESSMENT (ISA) FOR OXIDES OF NITROGEN – HEALTH CRITERIA (Jan. 18, 2016), <https://www.federalregister.gov/documents/2016/01/28/2016-01548/integrated-science-assessment-for-oxides-of-nitrogen-health-criteria> [<https://perma.cc/74LE-NGZ4>]).

the first 4 years of life, particularly among genetically susceptible children.”¹⁷⁶

Gas cooktops have recorded nitrogen dioxide levels up to 300 ppb while gas ovens can top out at 546 ppb.¹⁷⁷ According to one gas stove user who measured the nitrogen dioxide levels in his home to determine their potential impact, peak concentration was 291 ppb—nearly six times EPA’s standard of 53 ppb for long-term outdoor exposure.¹⁷⁸

In addition to their nitrogen dioxide emissions, gas stoves “may yield ongoing, low-level [carbon monoxide] exposure, putting the vulnerable at risk.”¹⁷⁹ In fact, the use of gas stoves “during pregnancy was found to be associated with decreased cognitive development in exposed children tested beyond 14 months of age . . . independent of social class, maternal education level, and other potential confounders.”¹⁸⁰ This is particularly true when gas appliances are either not maintained properly or located in poorly ventilated areas. A recent literature review found that “gas stoves may be exposing tens of millions of people to levels of air pollution in their homes that would be illegal outdoors under national air quality standards.”¹⁸¹ Moreover, “a meta-analysis looking at the association between gas stoves and childhood asthma found children in homes with gas stoves have a 42 percent increased risk of experiencing asthma symptoms (current asthma), a 24 percent increased risk of ever being diagnosed with asthma by a doctor (lifetime asthma), and an overall 32 percent increased risk of both current and lifetime asthma.”¹⁸²

176. *Id.* (quoting Kathleen Belanger, Theodore R. Holford, Janneane F. Gent, Melissa E. Hill, Julie M. Kezik & Brian P. Leaderer, *Household Levels of Nitrogen Dioxide and Pediatric Asthma Severity*, 24 EPIDEMIOLOGY 320, 320 (2013)); Ruifeng Li, Edie Weller, Douglas W. Dockery, Lucas M. Neas & Donna Spiegelman, *Association of Indoor Nitrogen Dioxide With Respiratory Symptoms in Children: Application of Measurement Error Correction Techniques to Utilize Data From Multiple Surrogates*, 16 J. EXPOSURE SCI. & ENV’T EPIDEMIOLOGY 342, 342 (2006); INTEGRATED SCIENCE ASSESSMENT (ISA) FOR OXIDES OF NITROGEN – HEALTH CRITERIA, *supra* note 175; Eva Morales, Jordi Julvez, Maties Torrent, Rafael de Cid, Monica Guxens, Mariona Bustamonte, Nino Kunzli & Jodi Sunyer, *Association of Early-life Exposure to Household Gas Appliances and Indoor Nitrogen Dioxide With Cognition and Attention Behavior in Preschoolers*, 169 AM. J. EPIDEMIOLOGY 1327, 1327 (2009).

177. *Id.*

178. Michael Thomas, @curious_founder, TWITTER (Jan. 13, 2022, 1:54 PM), https://twitter.com/curious_founder/status/1481746472370520067 [<https://perma.cc/RAV2-RWMG>].

179. Roberts, *supra* note 73.

180. Levy, *supra* note 80, at 34.

181. BRADY ANNE SEALS & ANDEE KRASNER, HEALTH EFFECTS FROM GAS STOVE POLLUTION 6 (2020).

182. *Id.* at 13.

A new study provides additional details regarding the health hazards associated with gas stoves. Researchers discovered twenty-one toxic air pollutants—including carcinogens, like benzene, to which there is no safe level of exposure—in the fossil gas piped into residential units to power appliances.¹⁸³ The study further found that the piped gas “contained inconsistent levels of odorants,”¹⁸⁴ indicating that residents may be entirely unable to perceive when a gas appliance or pipe is leaking.¹⁸⁵ Another study in which samples were collected from homes in California “found, in certain cases, benzene concentrations from leaky gas stoves were comparable to living with secondhand tobacco smoke.”¹⁸⁶

183. Elena Shao, *Gas Piped Into Homes Contains Benzene and Other Risky Chemicals, Study Finds*, N.Y. TIMES (June 28, 2022), https://www.nytimes.com/2022/06/28/climate/natural-gas-home-toxic-chemicals.html?campaign_id=54&emc=edit_clim_20220628&instance_id=65232&nl=climate-forward®i_id=95594363&segment_id=97015&te=1&user_id=f961f9c4b4fb056fcea4d24ca83cdc0e [https://perma.cc/JHE5-67CS]. Indeed, 95 percent of the samples had detectible levels of benzene. *Id.* There is no safe level of exposure to benzene. Sabrina Shankman, *Scientists Tested the Natural Gas Used in Kitchen Stoves Around Boston. They Found Dangerous Chemicals*, BOS. GLOBE (June 28, 2022), <https://www.boston-globe.com/2022/06/28/science/scientists-measured-pollutants-coming-gas-stoves-boston-they-found-dangerous-chemicals> [https://perma.cc/NZX9-KQ3X]. In addition to benzene, collected samples included toluene, ethylbenzene, xylene, and hexane. Drew R. Michanowicz et al., *Home is Where the Pipeline Ends: Characterization of Volatile Organic Compounds Present in Natural Gas at the Point of the Residential End User*, 56 ENV'T SCI. TECH. 10258, 10260 (June 28, 2022).

184. Shao, *supra* note 183.

185. The most concerning issue with a lack of awareness regarding leaks, of course, is explosions. Unfortunately, gas leaks can result in explosions and deaths even when individuals are aware of the leak by, for example, switching on a light switch. @duanotduha, TWITTER (June 7, 2022, 1:39 AM), <https://twitter.com/duanotduha/status/1534047425945640960> [https://perma.cc/GU7W-QWVF] (reporting death and house explosion from gas leak); see also Renwick, *supra* note 173 (noting that gas explosions in the United States in 2020 “result[ed] in 15 deaths and over \$300 million in damages”). Most people, however, do not know how to check for gas leaks by putting soapy water on pipe joints and are surprised when they find that leaks exist. The more bubbles, the larger the leak – and it is impossible to know how long the leak has existed. As one Twitter user noted with a video showing a methane leak, “[t]hose distribution system methane leaks are real yo”. @xiaowang1984, TWITTER (Sept. 26, 2022, 3:56 PM), <https://twitter.com/xiaowang1984/status/1574488204308365369> [https://perma.cc/ZSH6-2UPG].

186. Tony Briscoe, *Your Gas Stove May Be Polluting Your Home’s Air Even When It’s Turned Off, a New Study Finds*, L.A. TIMES (Oct. 27, 2022, 6:00 AM) <https://www.latimes.com/environment/newsletter/2022-10-27/boiling-point-gas-stoves-indoor-home-air-pollution-boiling-point> [https://perma.cc/H29W-LCTK]; see also Eric D. Lebel et al., *Composition, Emissions, and Air Quality Impacts of Hazardous Air Pollutants in Unburned Natural Gas From Residential Stoves in California*, 56 ENV'T SCI. TECH. 1528 (2022); Elena Shao, *Researchers Find Benzene and Other Dangers in Gas Piped to California Homes*, N.Y. TIMES (Oct. 20, 2022) <https://www.nytimes.com/2022/10/20/climate/gas-stove-benzene-california.html> [https://perma.cc/25S2-JXTH].

When considered alongside another study, which found that “the vast majority of methane emissions—76 percent—came from slow but steady leaks in stove piping and fittings when the stove was not in use,” this information suggests that residents are harmed not only by fossil fuel combustion byproducts in their homes, but also by long-term methane and carcinogen exposure even where they choose not to use their indoor gas appliances.¹⁸⁷ In addition, the use of range hoods that vent outdoors does little to mitigate the health harms associated with gas stoves because vents often “are insufficient to address exposure to nitrogen dioxide . . . levels emitted by gas burners.”¹⁸⁸

The evidence that residential gas appliances are health-harming has become so overwhelming that the Institute for Policy Integrity has urged the Consumer Product Safety Commission to address those harms, by, among other things, issuing performance standards for gas stoves and hoods and requiring warning labels for those products.¹⁸⁹ California has banned the sale of new fossil gas water heaters and furnaces by 2030 “to protect public health.”¹⁹⁰ Even more telling, the

187. Phil McKenna, *Gas Stoves in the US Emit Methane Equivalent of the Greenhouse Gas Emissions of Half a Million Cars*, INSIDE CLIMATE NEWS (Jan. 27, 2022), <https://insideclimatenews.org/news/27012022/gas-stoves-methane-emissions> [<https://perma.cc/68BJ-5HAJ>]. One important limitation of the study was that no low-income, multifamily stoves were tested. *Id.* This is important because “low-income families are more likely to have smaller kitchens with less well-maintained stoves and so are likely exceeding the NO_x [nitrogen oxides] threshold even quicker and with higher concentrations.” *Id.*; see also Eric D. Lebel, Colin J. Finnegan, Zutao Ouyang & Robert B. Jackson, *Methane and NO_x Emissions From Natural Gas Stoves, Cooktops, and Ovens in Residential Homes*, 56 ENV'T SCI. TECH. 2529 (2022) (finding that gas appliances that lacked hoods or ventilation can emit pollutants that surpass health limits within a few minutes, particularly in small kitchens).

188. Jamie Gold, *Latest Studies From Harvard, Et Al. Show Health Hazards of Gas Cooking*, FORBES (June 28, 2022), <https://www.forbes.com/sites/jamiegold/2022/06/28/latest-studies-from-harvard-et-al-show-health-hazards-of-gas-cooking> [<https://perma.cc/QVD7-8KFH>]. Even when they are available, individuals often fail to turn stove hoods on because “they don’t see the need, don’t see them working well enough, or dislike the noise.” *Id.* Moreover, stove hoods that simply recirculate the air do not ameliorate indoor air pollution and are merely designed to aid with grease collection and (sometimes) smell reduction; in at least one experiment, the recirculating hood seemed to even make things worse. Am. Chem. Soc’y, *Video: How Gas Stoves Pollute Your Home*, *supra* note 71.

189. LAURA FIGUEROA & JACK LIENKE, INST. FOR POL’Y INTEGRITY, *THE EMISSIONS IN THE KITCHEN: HOW THE CONSUMER PRODUCT SAFETY COMMISSION CAN ADDRESS THE RISKS OF INDOOR AIR POLLUTION FROM GAS STOVES* (2022), <https://policy.integrity.org/publications/detail/the-emissions-in-the-kitchen> [<https://perma.cc/73K7-2DMZ>].

190. Angel Adegbesan, *California Moves to Ban Natural Gas Furnaces and Heaters by 2030*, L.A. TIMES (Sept. 23, 2022), <https://www.latimes.com/business/story/2022-09-23/california-moves-to-ban-natural-gas-furnaces-and-heaters-by-2030> [<https://perma.cc/B5EN-SHDW>]; Jeff St. John, *California Could Ban New Gas Heaters After 2030. The Goal: Healthier Air*, CANARY MEDIA (Sept. 20, 2022), <https://www.canarymedia.com/articles/emissions-reduction/california-could-ban-new-gas-heaters-after-2030-the-goal-healthier-air> [<https://perma.cc/QGA9->

American Medical Association (AMA) House of Delegates recently adopted a resolution to “inform its members[,] . . . health care providers, the public, and relevant organizations that use of a gas stove increases household air pollution and the risk of childhood asthma and asthma severity.”¹⁹¹ The AMA further resolved to “advocate for innovative programs to assist with mitigation of cost to encourage the transition from gas stoves to electric stoves in an equitable manner.”¹⁹²

The 2022 AMA resolution merely acknowledges what medical professionals have known for at least a decade. As Johns Hopkins Medicine lung expert Nadia Hansel explained in 2008:

Doctors caring for children with asthma should always inquire about the home’s heating and cooking appliances and urge those using gas-based stoves and space heaters to switch to electric heating and cooking Inner-city preschoolers appear especially vulnerable because they spend most of their time indoors and in homes with high levels of nitrogen dioxide.¹⁹³

Gas appliances are typically used in residential settings in four applications: heating the space, heating water, cooking, and drying clothes. There are electric appliances on the market that can easily accomplish each of these services.¹⁹⁴ As a

NKU9] (discussing human health benefits). A new report found that gas appliances “generate about four times as much nitrogen oxide pollution as California’s electric utilities and approximately two-thirds as much as its light-duty passenger cars.” Maria Rachal, *California Could Phase Out Gas Heaters by 2030 to Cut Smog Amid Electrification Push*, UTILITY DIVE (Sept. 21, 2022), <https://www.utilitydive.com/news/california-smog-gas-heaters-air-pollution-carb> [https://perma.cc/U2Q6-QM59]. California has also recently become the first state to eliminate subsidies for gas line extensions. Kavya Balaraman, *California Becomes First State to Eliminate Subsidies for Gas Line Extensions Amid Electrification Push*, UTILITY DIVE (Sept. 16, 2022), <https://www.utilitydive.com/news/california-puc-gas-subsidies-electrification> [https://perma.cc/AZS3-JVJU].

191. AM. MED. ASS’N HOUSE OF DELEGATES, REPORT OF REFERENCE COMMITTEE D 16–17 (2022), <https://www.ama-assn.org/system/files/a22-refcmte-d-report-annotated.pdf> [https://perma.cc/LAL9-Y6ME] (adopting Resolution 439: “Informing Physicians, Health Care Providers, and the Public that Cooking with a Gas Stove Increases Household Air Pollution and the Risk of Childhood Asthma”).

192. *Id.* at 16.

193. Johns Hopkins Medicine, *Noxious Gas Stove Emissions Worsen Asthma Symptoms in Young Children*, SCIENCE DAILY (Oct. 14, 2008), <https://www.sciencedaily.com/releases/2008/10/081013131530.htm> [https://perma.cc/TF9J-9EE8].

194. Heather Payne, *The Natural Gas Paradox: Shutting Down a System Designed to Operate Forever*, 80 MD. L. REV. 693 (2021); see also Alexander Gard-Murray & Nate Adams, *A New Bill Could Speed Up American Electrification by 20 Years*, CANARY MEDIA (May 23, 2022), <https://www.canarymedia.com/articles/heat-pumps/a-new-bill-could-speed-up-american-electrification-by-20-years> [https://perma.cc/GFH4-U2SK] (noting that heat pumps are more efficient than traditional HVAC systems and therefore their installation, rather than air conditioning and furnaces, could save money in addition to reducing indoor air pollution).

result and for the additional reasons provided below, our proposed reform extends the implied warranty of habitability to all gas appliances (as opposed to just those used for cooking applications).

All cooking appliances create air pollution, but gas cooking appliances release far more pollutants than do their electric counterparts.¹⁹⁵ Moreover, the impact on indoor air quality from gas cooking emissions neither begins nor ends with cooking. In fact, it is common for tenants with inadequate heating to use residential cooking appliances as additional sources of heat. As a result, the indoor air pollution generated by gas stoves is likely far greater than estimated because they are frequently deployed for uses other than cooking.¹⁹⁶ Low-income households are also more likely to reside in smaller and more poorly ventilated spaces which enhances exposure to pollutants from the combustion of gas appliances.¹⁹⁷ Smaller spaces necessarily place occupants closer to the combustion, and the lack of ventilation causes the pollutants to linger in the space for longer time periods.¹⁹⁸

Building and housing codes often enumerate specific ventilation requirements for gas furnaces, hot water heaters, and dryers. They do not, however, mandate any testing to ensure that the standards they set actually eliminate combustion

and greenhouse gas emissions); Brian Kahn, *Everything You Need to Know About Heat Pumps*, PROTOCOL (June 24, 2022), <https://www.protocol.com/climate/heat-pumps-climate-explained>; @SimonMahan, TWITTER (Feb. 13, 2022 12:22 PM), <https://twitter.com/SimonMahan/status/1492912102817816578> [<https://perma.cc/JJ5C-LTV9>] (showing how much more efficient a heat pump is when powered by carbon-free electric power versus other types of energy).

195. Roberts, *supra* note 73.

196. Andrea Elliot, *The Art of Surviving When It's Cold Inside; Turning to Space Heaters and Ovens as Furnaces and Landlords Falter*, N.Y. TIMES (Jan. 11, 2014), <https://www.nytimes.com/2004/01/11/nyregion/art-surviving-when-it-s-cold-inside-turning-space-heaters-ovens-furnaces.html> [<https://perma.cc/7697-ER3L>]; *Deadly Dangers of Using the Stove for Heat*, METRO. TENANTS ORG. (Feb. 18, 2011), <https://www.tenants-rights.org/deadly-dangers-of-using-the-stove-for-heat/> [<https://perma.cc/EWW3-CM5X>].

197. Even in residential dwellings whose gas stoves are equipped with hoods, “only 35 percent of households use them.” Renwick, *supra* note 173 (explaining that “[m]ost people either don’t have hoods, don’t use their hoods, or their filters haven’t been cleaned and they’re ineffectual”).

198. McKenna, *supra* note 187 (articulating how “[r]unning gas ovens and stove top burners in small kitchens with poor ventilation resulted in emissions that within a few minutes surpassed [EPA’s] safety standards for outdoor air concentrations”); *see also* Paul H. Raymer, *Utilities Should Look Beyond Energy Efficiency to Improve Indoor Air Quality*, ICF (Apr. 13, 2022), <https://www.icf.com/insights/energy/beyond-energy-efficiency-indoor-air-quality> [<https://perma.cc/TFN8-LUEV>] (noting that “inadequate ventilation can actually increase indoor pollutant levels”).

byproducts from the indoor air.¹⁹⁹ This is particularly concerning because the nitrogen dioxide pollution from gas furnaces and water heaters often exceed suggested limits.²⁰⁰ The scientific evidence, therefore, leaves little room for doubt that gas appliances have significant detrimental effects on tenant health. The outstanding question, then, is whether tenants can force landlords to replace gas stoves, furnaces, and other appliances with their electric counterparts by invoking the implied warranty of habitability.

As previously explained, the implied warranty imposes on a landlord an unqualified duty “to provide facilities and services that are vital to the life, health, and safety of the tenant and to the use of the premises for residential purposes.”²⁰¹ The warranty, however, does not cover minor housing code violations or minimal habitability issues.²⁰² Instead, conditions of the premises that are at issue must “materially affect”²⁰³ habitability “in the eyes of a reasonable person”²⁰⁴ to constitute an actionable breach of the implied warranty. Courts weigh several factors to determine whether premises conditions materially affect habitability, including, among other things, “the nature of the deficiency or defect; its effect on the life, health, and safety of the tenant; the length of time it has persisted; and the age of the structure.”²⁰⁵

199. See Matt Risinger, *Make-Up Air for a Kitchen Exhaust – Most Homes Suck*, YOUTUBE (Jan. 11, 2022), <https://www.youtube.com/watch?v=rSIqKGsF2ZA> [<https://perma.cc/UF2Z-GLRB>]; see also FRESH ENERGY, *supra* note 173 (explaining that “levels of pollutants in homes are rarely tracked”).

200. Thomas, *supra* note 89 (describing how “[w]hen I spent more time looking at the data, I noticed something strange. In almost every 24 hour period, our NO₂ levels were the highest between about 2am and 7am. Unless my wife was sneaking out of bed for midnight snacks, something was amiss. I looked at the energy usage data from our Nest thermostat and discovered that those levels corresponded almost exactly with the times that our gas furnace was on”); see also Emily Pontecorvo & Zoya Teirstein, *Your Gas Stove is Warming the Climate – Even When It’s Turned Off*, GRIST (Jan. 27, 2022), <https://grist.org/buildings/your-gas-stove-is-warming-the-climate-even-when-its-turned-off> [<https://perma.cc/W7V9-DN6C>] (noting that “the team had previously investigated methane emissions from hot water heaters and was surprised to learn that the appliances leaked the most methane when they were shut off”).

201. Kolb v. DeVille I Props., LLC, 326 S.W.3d 896, 901 (Mo. Ct. App. 2010) (internal quotations omitted).

202. Park West Mgmt. Corp. v. Mitchell, 391 N.E.2d 1288, 1294–95 (N.Y. 1979).

203. *Id.*

204. Berzito v. Gambino, 308 A.2d 17, 22 (N.J. 1973).

205. Kolb, 326 S.W.3d at 901; see also Glasoe v. Trinkle, 479 N.E.2d 915, 920 (Ill. 1986) (explaining that, “[i]n determining whether there has been breach of the implied warranty, the courts have considered various factors, including the nature of the deficiency, its effect on habitability, the length of time for which it persisted, the age of the structure, the amount of the rent, the area in which the premises are located, whether the tenant waived the defects, and whether the defects resulted from abnormal or unusual use by the tenant”); Berzito, 308 A.2d at 22 (listing non-exhaustive factors).

Based on the above-described severe and life-altering health impacts associated with gas appliance emissions—including asthma, cardiovascular disease, diabetes, cancer, and neurological and developmental disabilities—it is unreasonable *not* to conclude that the mere presence of gas appliances in a rental unit can “materially affect” a tenant’s life, health, and safety. This is particularly true for marginalized and racialized tenants—and their young children—who might live in small, cramped spaces with poor ventilation. Moreover, and as explained in greater detail below, the extension of the implied warranty to gas appliances would advance health equity, mitigate climate change, and result in considerable economic benefits for taxpayers by preventing the development of costly, chronic health care conditions.

IV. IMPLIED WARRANTY UPDATE

As things currently stand, there is no concerted movement to persuade courts that the presence of gas appliances in residential rental buildings, generally, and in very small rental spaces, more specifically, implicates the implied warranty of habitability. Consequently, courts continue to apply the common law doctrine of caveat emptor to gas appliances. To understand why it is imperative that gas appliances fall within the scope of the implied warranty, it is important to revisit the three assumptions that the courts relied on when extending caveat emptor to landlord liability in the first instance, and then to apply those assumptions to the presence of gas appliances in residential rental buildings. Those assumptions are that: (1) there is sufficient rental availability; (2) all parties to the lease agreement (landlord and tenants) have equal bargaining power; and (3) tenants are sufficiently knowledgeable and the lease conditions are sufficiently clear to determine the likelihood of issues which could arise during the tenancy.

The abysmal lack of affordable housing in metropolitan areas like the New York City metro area and the San Francisco Bay Area is well documented.²⁰⁶ The

206. See, e.g., Mihir Zaveri & Dana Rubinstein, *Eric Adams Faces Pressure on New York’s Housing Crisis as Rents Rise*, N.Y. TIMES (May 24, 2022), <https://www.nytimes.com/2022/05/24/nyregion/nyc-housing-adams.html> [<https://perma.cc/SBA3-P3GJ>] (explaining that “[i]n New York City, roughly one-third of renters are ‘severely rent-burdened,’ meaning they spend more than 50 percent of their income on rent” and “more than 48,000 people slept in New York City shelters each night in March” 2022); Marissa Kendall, *How Can We Solve the Bay Area Housing Crisis? Build 160,000 Affordable Homes*, THE MERCURY NEWS (Mar. 19, 2021), <https://www.mercurynews.com/2021/03/18/how-can-we-solve-the-bay-area-housing-crisis-build-160000-affordable-homes> [<https://perma.cc/7XLS-DUYP>] (explaining that “[t]here are only 35 affordable units available for every 100 extremely low-income households in the combined area of San Francisco, Alameda, Contra Costa, San Mateo and Marin counties”).

lack of affordable rental housing beyond these two cities, however, and across the United States, is a national crisis of epic proportions.²⁰⁷ As a recent report from the National Low Income Housing Coalition details, “[n]o state has an adequate supply of affordable and available homes for extremely low-income renters.”²⁰⁸ The current relative supply ranges from “18 affordable and available homes for every 100 extremely low-income renter households in Nevada to 61 affordable and available homes for every 100 extremely low-income renter households in West Virginia.”²⁰⁹ Suffice it to say, therefore, that laws and policies premised on the availability of sufficient affordable rental housing for low- or moderate-income renters are suspect on their face.

The lack of affordable rental units for low- and moderate-income individuals and families also leads to significant disparities in bargaining power. Residential tenants are typically required to sign form leases with zero potential for modification. Even when potential residential tenants attempt to bargain for changes to their lease agreements, landlords rarely permit modifications.²¹⁰ Thus, there is no justification for relying on rules that assume equal bargaining power in the current landlord-tenant context.

Finally, charging residential tenants with sufficient knowledge to understand the myriad items to be on the lookout for when inspecting a potential rental unit and contending that the premises conditions that might cause tenancy issues would be readily apparent to the average American renter—including the

207. Katherine Schaeffer, *A Growing Share of Americans Say Affordable Housing Is a Major Problem Where They Live*, PEW RSCH. CTR. (Jan. 18, 2022), <https://www.pewresearch.org/fact-tank/2022/01/18/a-growing-share-of-americans-say-affordable-housing-is-a-major-problem-where-they-live> [https://perma.cc/A4KK-A6UB].

208. NAT’L LOW INCOME HOUSING COAL., *THE GAP: A SHORTAGE OF AFFORDABLE HOMES* 3 (2022), <https://nlihc.org/gap> [https://perma.cc/G442-HSW8].

209. *Id.*

210. See, e.g., Curtis J. Berger, *Hard Leases Make Bad Law*, 74 COLUM. L. REV. 791, 791 (1974) (explaining that “[l]andlords continue to proffer the lopsided forms that they have used for years, and tenants, without choice, continue to sign these forms”). See also Daniel E. Wenner, *Renting in Collegetown*, 84 CORNELL L. REV. 543, 568 (1999) (“A landlord usually offers a form lease on a take-it-or-leave-it basis without providing the potential tenant any chance to negotiate.”); *Street v. Davis*, 542 N.Y.S.2d 968, 969 (Civ. Ct. 1989) (explaining that tenants “are at risk when entering into contracts drawn up by others and presented to them on a take or leave basis”). Each year, one of the authors (Payne) asks her first-year Property law students whether they have attempted to modify their lease agreements and, if so, for what reasons. Each year, multiple students confess that they have attempted to modify their leases for various reasons (often to permit a future pet) and, as it turns out, their modification requests are uniformly rejected.

presence of colorless and odorless yet deadly air pollutants—is absurd.²¹¹ On these issues, it is landlords, not tenants, who are the experts about the premises conditions under the circumstances. And it is landlords, not tenants, who ought to be intimately familiar with the applicable housing codes and other housing conditions standards that apply to their property.

Let's assume that a rental unit suffers from a wiring problem disguised by drywall or other building material. A prospective tenant has no ability to discern such an issue, which could become catastrophic during the tenancy. It is the landlord that is required to ensure that the unit's hidden electrical wiring meets code requirements and is otherwise safe.²¹²

Let's examine another important tenant concern: whether the premises floods during storms. Once again, it is highly unlikely that most tenants have any feasible way to determine the likelihood that a particular unit routinely floods and could be dangerous during a storm.²¹³ The landlord, on the other hand, has ready access to such pertinent information including, but not limited to, whether the property is required by its mortgagee to carry flood insurance and whether the current or previous owner has filed flood insurance claims. The landlord also would have superior information to a prospective tenant regarding the storm-related experiences of previous tenants.

Landlords also have exclusive control over their building's systems. It is the landlord, not the tenant, who has the authority to decide which fuel source to use in the premises for space heating, hot water, clothes drying, and cooking. Tenants simply have no input regarding any of these decisions, which have huge impacts on health.²¹⁴ It is also unreasonable to expect a renter looking for an affordable

211. Courts have analogized landlords to merchants, recognizing that “a landlord is in a superior position to prevent defects, as is a merchant; second, the tenant, like the consumer, relies on the skill of the other party to the transaction; third, a landlord, like the products liability defendant, is in a position to spread his losses.” Roberts, *supra* note 73, at 303–04.

212. Sydney Temple, *10 Key Electrical Safety Tips for Landlords*, RENTABLE: BLOG (Apr. 29, 2020), <https://www.rentable.co/blog/electrical-safety-tips-for-landlords/> [<https://perma.cc/A7YW-YA86>].

213. See, e.g., Mihir Zaveri, Matthew Haag, Adam Playford & Nate Schweber, *How the Storm Turned Basement Apartments Into Death Traps*, N.Y. TIMES (Sept. 2, 2021), <https://www.nytimes.com/2021/09/02/nyregion/basement-apartment-floods-deaths.html> [<https://perma.cc/WNX7-GULM>]; Stephanie Lai, Vera Haller, Samira Sadeque & Marc Fisher, *Life and Death Underground: N.Y. Immigrants Perish in Flooded Basements*, WASH. POST (Sept. 4, 2021), https://www.washingtonpost.com/politics/hurricane-ida-new-york-floods/2021/09/04/b661e9da-0ce7-11ec-a6dd-296ba7fb2dce_story.html [<https://perma.cc/756X-N5LR>].

214. In some instances, when conditions are not meeting the basic needs of tenants—for example, insufficient heating in a residential unit—tenants may supplement their needs (which should be met with the building systems) with small appliances like space heaters. However, this

accommodation to keep up with the latest science and be aware that gas appliances can lead to respiratory distress, cardiovascular disease, developmental disabilities, or other complex, chronic health care conditions. As a result, the only common-sense and equitable conclusion that can be reached is that the common law of property should and must place responsibility for the potentially severe adverse health impacts that attend to using gas appliances on landlords.

A judicial extension of the implied warranty of habitability to gas appliances used to heat the premises, heat water, dry clothes, and cook is the most expeditious way to mitigate the prevalent health issues associated with these appliances for low- and moderate-income renters. Additionally, while the law often requires tenants to put landlords on notice about issues that impact habitability,²¹⁵ no such notice is required if the courts determine that the implied warranty of habitability encompasses gas appliances in leaseholds. Landlords are well aware of the fuel sources that power their properties, including those that power the four primary applications of gas appliances. It is often the practice of landlords to “do nothing and wait,” that is, to only make repairs if a tenant provides notice of the specific condition that needs to be remedied or abated.²¹⁶ But, where the issue is the presence of health-harming fossil gas appliances, the landlord is already on notice. As a result, the presence of fossil gas appliances in the premises would provide a reason for a tenant to request forgiveness for all arrearage rent; and, in fact, to seek damages due to the toxic exposure and health hazards associated with the rental unit.²¹⁷ At a minimum, such damages should include any rent paid

can also lead to catastrophic consequences. Brian Price, *19 Dead After Space Heater Sparks NYC's Worst Fire Disaster in 30+ Years*, NBC 4 N.Y. (Jan. 9, 2022), <https://www.nbcnewyork.com/news/local/31-people-seriously-injured-in-bronx-apartment-building-fire-fdny/3486866> [<https://perma.cc/ZAFD-AXPK>].

215. Martinez, *supra* note 125, at 257 (describing how “[m]odern property law generally holds that to claim the benefits of the implied warranty of habitability in the form of rent abatement, a tenant must first give the landlord written notice . . . With a notice requirement, a tenant is barred from claiming a violation of the implied warranty of habitability unless they have first notified the landlord and given them time to cure the violation”).

216. *Id.* at 266. Martinez explains that:
the elimination of the implied warranty of habitability in eviction defenses means that landlords have almost no incentive to maintain their properties. From the standpoint of a landlord who is disinclined to invest in housing maintenance, the easiest thing to do is nothing and wait. If a tenant notifies the landlord of an intention to abate, the landlord can act. Otherwise, there is no point—if the implied warranty of habitability will not be an impediment to evicting a nonpaying tenant, it may not make economic sense to maintain premises up to housing code.

Id.

217. While this is not currently how the implied warranty of habitability is interpreted by judges, there is at least one historical note that this is how the implied warranty should be applied.

(including rent paid by government agencies) and other pertinent incurred costs that can be substantiated, like missed work days and health care-related costs.

As with the initial adoption of the implied warranty of habitability, this proposed extension of the warranty is designed to update the law to meet society's needs in an ever-changing environment. While acknowledging that there are numerous improvements that warrant implementation in the application and judicial administration of the implied warranty of habitability,²¹⁸ an extension of the warranty to gas appliances would create a pathway for renters with limited options to either remove themselves (and their children) from dangerous and health damaging rental situations or require landlords to remove gas-burning appliances and replace them with heat pump, induction, or other electric alternatives. Judicial acknowledgment that gas appliances fall within the implied warranty of habitability will also enable public service agencies to eliminate health hazards related to fossil fuels currently imposed on residents in government-subsidized housing.

The expansion of the implied warranty to encompass gas appliances falls squarely within the health justice framework. Indeed, “[h]ousing is one of the best-researched social determinants of health, and selected housing interventions have been found to improve health outcomes and decrease health care costs.”²¹⁹ The implied warranty is just such a legal housing intervention. It has been invoked by low-income tenants to remedy myriad environmental conditions prevalent in substandard rental housing—including poor ventilation, lead paint, pest infestations, and water leaks—that are associated with adverse health outcomes and increased health care costs.²²⁰ The replacement of gas appliances with electric-

Id. at 273 (alleging that “[s]hould the petitioner be aware that conditions of the premises are violative of [the implied warranty of habitability], then this requirement prudently forewarns the owner to remedy the conditions prior to commencement of a non-payment proceeding, consistent with the law and public policy”).

218. See generally Franzese et al., *supra* note 123 (making suggestions for how the implementation of the implied warranty of habitability should be reformed to better aid tenants and fulfill its promise of leveling the playing field between landlords and tenants); see also Martinez, *supra* note 125, at 240 (proposing procedural reforms to make the implied warranty of habitability an automatic element of every eviction proceeding and arguing that “there is a vast chasm between what the law requires and what tenants actually experience”).

219. Lauren Taylor, *Housing and Health: An Overview of the Literature*, HEALTH AFFS. (June 7, 2018), <https://www.healthaffairs.org/doi/10.1377/hpb20180313.396577> [<https://perma.cc/UMM8-23JM>].

220. *Id.*; see also Benfer, *supra* note 50, at 293 (explaining that “the entire low-income population is at risk of developing serious health problems such as asthma, respiratory infections, lead poisoning, learning disabilities, behavioral and mental health problems, injuries, long-term brain damage, cancer, and other harmful conditions due to residential environmental hazards”).

powered devices will further minimize the disproportionate energy burden borne by socioeconomically marginalized and racialized tenants.

V. CHALLENGES & SOLUTIONS

As explained above, an extension of the implied warranty to gas appliances aligns with the implied warranty's objectives, purposes, and scope. The extension comports with the health justice framework and would benefit population health. If history is any guide, however, such a solution is fraught with practical challenges. Foremost, tenants lack knowledge about both the health harms associated with gas appliances and their legal rights under the implied warranty. Moreover, even when tenants are aware that indoor air pollutants emitted by gas appliances are negatively impacting their families' health and safety, the basic power dynamics that exist between landlords and tenants may incentivize inaction. As a recent public health article explains, "parents may . . . forgo opportunities to confront their landlord [to abate serious residential health risks to their children] for fear of retribution in the form of increased rent, penalties[,] or eviction."²²¹

In fact, the history of landlords shifting the costs of remedying substandard and health-harming housing conditions to low-income tenants and, thereby, creating rental affordability crises is a tale as old as the formal regulation of public health in the United States. The country's first municipal health and sanitation departments were created to mitigate the environmental and health impacts caused or exacerbated by substandard urban rental housing conditions during widespread infectious disease outbreaks.²²² In the mid-1860s, New York City was mired in a severe cholera outbreak concentrated in crowded, working class and poor urban neighborhoods that caused its relatively well-resourced denizens to "flee to the suburbs."²²³ In an attempt to control disease transmission and reestablish "public confidence" in urban living, New York City created the nation's very first municipal health department in 1866.²²⁴ The New York project was soon

221. Prathyusha Chenji, *Invisible Threats: Legal Methods to Address Asthma Triggers in Rental Homes*, 10 INT'L PUB. HEALTH J. 507, 507 (2018).

222. David E. Jacobs et. al., *A Systematic Review of Housing Interventions and Health: Introductions, Methods, and Summary Findings*, 16 J. PUB. HEALTH MGMT. & PRAC. S5, S5 (2010) (explaining that "[m]any housing and building codes trace their ancestry to the public health responses to epidemics that occurred with the rapid industrialization and urbanization in Western countries more than 100 years ago").

223. ARTHUR BUSHEL, CHRONOLOGY OF NEW YORK CITY DEPARTMENT OF HEALTH (1655–1966) 4 (1966), <https://www1.nyc.gov/assets/doh/downloads/pdf/history/chronology-1966centennial.pdf> [<https://perma.cc/75U9-9E36>].

224. *Id.*

replicated in the cities of Baltimore, Pittsburgh, St. Louis, and Chicago.²²⁵ The Chicago Department of Health's origin story is particularly instructive as it serves as both a lesson and a warning regarding the use of law—and law enforcement—as a tool to address squalid rental conditions to improve public health.

Chicago created its Department of Health in 1876 and appointed Oscar Coleman De Wolf as its first commissioner.²²⁶ De Wolf took his post with two primary aspirations: to (1) enhance sanitation and safety at slaughterhouses and (2) conduct regular tenement house inspections to control the spread of then-prevalent infectious diseases, including diphtheria, cholera, smallpox, and yellow fever.²²⁷ His first objective met significant pushback from the powerful meatpacking industry and, ultimately, failed.²²⁸ De Wolf's tenement regulation proposal, however, faced little initial public opposition.²²⁹ Consequently, the Chicago City Council authorized tenement inspection and regulation by ordinance.²³⁰

The 1880 Chicago housing ordinance not only granted the City Department of Health the right to regulate tenements, “[i]t required property owners to remove all stench-causing refuse and to provide tenement residents with containers for garbage.”²³¹ This latter use of the City's public health police power to regulate property owners faced predictable resistance: “[b]uilders and landlords, complaining of the additional costs, challenged the city government's right to regulate private property” and “urged the City Council to repeal the ordinance.”²³² When those efforts failed, landlords simply refused to comply with the law.²³³

Then, “under pressure from sanitary reformers, labor, and business leaders,” the State of Illinois enacted a law that authorized the Chicago Department of Health to regulate “the sanitation and construction of all tenements, workshops, and lodging houses.”²³⁴ Landlords responded to that measure by inserting clauses in their leases that shifted the burden of compliance with the tenement law from private property owners to tenants.²³⁵ This was problematic because the scope of the Department of Health's inspection power was extensive, inclusive of “heating,

225. Margaret Garb, *Health, Morality, and Housing: The “Tenement Problem” in Chicago*, 93 AM. J. PUB. HEALTH 1420, 1422 (2003).

226. *Id.* at 1420.

227. *Id.*

228. *Id.*

229. *Id.*

230. *Id.* at 1424.

231. *Id.*

232. *Id.*

233. *Id.*

234. *Id.*

235. *Id.*

lighting, ventilating, plumbing[,] and drainage arrangements.”²³⁶ The remedies the Department could demand for violations were likewise broad and often expensive, including “‘defective plumbing repair[s],’ the construction of new sewers and drains, ‘ventilation applied to waste and soil pipes,’ the cleaning of privy [wall] vaults, ‘rooms limewashed, leaky roof[] repair[s],’ uninhabitable basements cleared of inhabitants, [and the cleaning of] filthy yards.”²³⁷ The law placed the tenement law’s compliance costs on property owners, but the owners simply shifted those costs to tenants by either raising rents or requiring them to pay fee assessments, including property taxes, water taxes, and sewer connection fees.²³⁸ These tactics caused rental rates to increase “beyond the means of unskilled laborers.”²³⁹

The imposition of rental hikes in response to habitability regulations has been so historically popular with American landlords that such concerns were revisited by legal scholars in the wake of the widespread adoption of the implied warranty of habitability.²⁴⁰ Judge Richard Posner and other like-minded law and economics theorists, for example, explicitly argued that the imposition of rental housing regulations, including the enforcement of the implied warranty of habitability, would increase rents for low-income tenants and displace them from affordable housing.²⁴¹ A separate group of theorists, deemed the “dissenters” and led by legal scholar Bruce Ackerman, deployed varied theoretical approaches to conclude that low-income tenants would, on the whole, benefit from such regulation.²⁴² It is odd that Ackerman’s scholarship centered around the implied

236. *Id.*

237. *Id.*

238. *Id.* at 1425.

239. *Id.* (footnote omitted).

240. See generally Michael A. Brower, Comment, *The “Backlash” of the Implied Warranty of Habitability: Theory v. Analysis*, 60 DEPAUL L. REV. 849 (2011) (providing an overview of the scholarly debates and concluding that the empirical evidence supports the claim that adoption of the implied warranty both drives up rent and increases housing quality).

241. *Id.* at 850 n.11 (citing RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 259–63 (1972); Neil K. Komesar, *Return to Slumville: A Critique of the Ackerman Analysis of Housing Code Enforcement and the Poor*, 82 YALE L.J. 1175 (1973); Charles J. Meyers, *The Covenant of Habitability and the American Law Institute*, 27 STAN. L. REV. 879 (1975); Daniel P. Schwallie, Note, *The Implied Warranty of Habitability as a Mechanism for Redistributing Income: Good Goal, Bad Policy*, 40 CASE W. RES. L. REV. 525 (1989)).

242. Brower, *supra* note 240, at 850 n.13 (citing Bruce Ackerman, *More on Slum Housing and Redistribution Policy: A Reply to Professor Komesar*, 82 YALE L.J. 1194 (1973) [hereinafter Ackerman, *More on Slum Housing*]; Bruce Ackerman, *Regulating Slum Housing Markets on Behalf of the Poor: Of Housing Codes, Housing Subsidies and Income Redistribution Policy*, 80 YALE L.J. 1093 (1971) [hereinafter Ackerman, *Regulating Slum Housing*]; Richard Craswell, *Passing on the Costs of Legal Rules: Efficiency and Distribution in Buyer-Seller Relationships*, 43

warranty and its potential impacts on tenants was viewed as “dissenting” from the law and economics position. As it turns out, Ackerman conceded that adoption of the implied warranty could cause rents to increase but contended that such an outcome could be mitigated by the adoption of subsidy programs, tax incentive schemes, and other policies.²⁴³ The authors of this Article agree.

There are numerous ways in which government actors could offset or minimize any cost impacts that might inure to tenants due to an expansion of the implied warranty to gas appliances. The federal Medicare program and state Medicaid agencies ought to be particularly motivated to develop subsidy policies that bolster the ability of program-enrolled tenants to rent properties with electric appliances due to the extravagantly high health costs associated with medical management of chronic conditions that can be caused or exacerbated by gas stove-generated air pollutants.²⁴⁴

As this Article has explored, the indoor air pollutants produced by natural gas combustion can cause chronic asthma in children and adults. They can also trigger asthmatic episodes that require emergency or other health care interventions in individuals with pre-existing asthma. The elimination of gas stoves from small rental units can both prevent the onset of chronic asthma and eradicate a chronic

STAN. L. REV. 361 (1991); Duncan Kennedy, *The Effect of the Warranty of Habitability on Low Income Housing: “Milking” and Class Violence*, 15 FLA. ST. U. L. REV. 485 (1987); Richard S. Markovits, *The Distributive Impact, Allocative Efficiency, and Overall Desirability of Ideal Housing Codes: Some Theoretical Clarifications*, 89 HARV. L. REV. 1815 (1976).

243. Ackerman, *Regulating Slum Housing*, *supra* note 242, at 1112–34.

244. See, e.g., Jacob K. Quinton, O. Kenrik Duru, Nicholas Jackson, Arseniy Vasilyev, Dennis Ross-Degnan, Donna L. O’Shea & Carol M. Mangione, *High-Cost, High-Need Patients in Medicaid: Segmenting the Population Eligible for a National Complex Case Management Program*, BMC HEALTH SERV. RSCH. 1, 2 (2021) (explaining that “[r]ising costs in Medicaid are a key threat to balanced budget requirements in US states, enhancing pressure on Medicaid administrators to control costs, especially during periods of economic recession” and “[t]he majority of expenditure in any insured group concentrates in a few [high-need, chronically ill] patients, with 5 [percent] of individuals accounting for approximately 50 [percent] of expenditure year-to-year”); Susan L. Hayes, Claudia A. Salzberg, Douglas McCarthy, David C. Radley, Melinda K. Abrams, Tanya Shah & Gerard Anderson, *High-Need, High-Cost Patients: Who They Are and How Do They Use Health Care*, THE COMMONWEALTH FUND (Aug. 29, 2016), <https://www.commonwealthfund.org/publications/issue-briefs/2016/aug/high-need-high-cost-patients-who-are-they-and-how-do-they-use> [<https://perma.cc/9KDZ-HY9D>] (reporting that, “[f]or high-need adults, average annual per-person spending on health care services and prescription medicines topped \$21,000, nearly three times the average for adults with multiple chronic diseases only, and more than four times the average for all U.S. adults” and that “[h]igh-need adults spent more than twice as much, on average, on out-of-pocket expenses as adults in the total population (\$1669 vs. \$702) . . . , while their annual median household income was less than half that of the overall adult population (\$25,668 vs. \$52,685”).

asthma trigger. According to the CDC, “more than 26 million Americans suffer from asthma, . . . account[ing] for more than 439,000 hospitalizations, 1.7 million emergency department (ED) visits, and 13.8 million missed school days annually.”²⁴⁵ As a result, asthma imposes an approximately \$50 billion burden in health care costs alone each year in the United States.²⁴⁶ Worse yet, asthma kills approximately ten people every day in this country and “Black Americans are [two to three] times more likely to die from asthma than any other racial or ethnic group.”²⁴⁷ Needless to say, the implementation of an upstream asthma prevention strategy, such as the provision of a rent subsidy to government health program-enrolled tenants who rent electrified housing, is a cost-saving approach for public health care insurers.

Given the connection between indoor air pollutants and developmental and cognitive disabilities in young people, state and local education agencies may also be willing to invest in gas appliance abatement subsidies for low-income households that include pregnant people, infants, and children. Federal law requires states to provide all students with disabilities aged three to twenty-one with a “free appropriate public education” in exchange for federal funds.²⁴⁸ School districts are required to collaborate with parents and teachers to develop an “individualized education plan” (IEP) for each child eligible for special education services.²⁴⁹ Among other things, the IEP must enumerate the specific services the school district will provide to the child.²⁵⁰ The provision of those services, which can include one-on-one “specialized academic instruction, speech therapy, physical therapy, counseling, [and] behavioral intervention” are often resource-intensive and expensive.²⁵¹ For example, in 2017–2018 alone, the California public schools provided special education services to 12.5 percent of students at an average cost of \$26,000 per student, which is “almost triple [the cost of educating] a student without disabilities (\$9000).”²⁵²

245. CDC’s 6/18 Initiative: Accelerating Evidence into Action: Control Asthma, CTRS. FOR DISEASE CONTROL & PREVENTION (Mar. 9, 2022), <https://www.cdc.gov/sixteenteen/asthma/index.htm#:~:text=Each%20year%2C%20asthma%20accounts%20for,10%20people%20die%20of%20asthma> [https://perma.cc/H596-F7A4].

246. *Id.*

247. *Id.*

248. Individuals with Disabilities Education Act, 20 U.S.C. § 1400 et. seq.; § 1412(a)(1).

249. *Id.* § 1414(d).

250. *Id.*

251. GABRIEL PETEK, OVERVIEW OF SPECIAL EDUCATION IN CALIFORNIA, CAL. LEGIS. ANALYST’S OFF. (Nov. 6, 2019), <https://lao.ca.gov/reports/2019/4110/overview-spec-ed-110619.pdf> [https://perma.cc/3CUC-YZF7].

252. *Id.* at 1–2.

In lieu of providing direct subsidies to specific renter populations, state and local governments could simply transfer the funds they would have spent on expanding or updating their fossil gas systems to low-income rental unit electrification. Gas utilities spent \$21 billion on gas distribution systems in 2019 alone.²⁵³ Despite efforts to replace or repair leaky pipelines, municipal fossil gas distribution systems are leaking significantly more than previously forecast and more than six times higher in Boston, Massachusetts.²⁵⁴ The public monies spent on gas system repairs and improvements is being devoted to infrastructure that will need to be shut down before the end of its lifecycle to minimize climate change impacts. Those gas system repairs and improvements are also pursued inequitably: “minorities and people with low incomes are exposed to the dangers of gas leaks [outside the home] far more than white, richer people” as reported gas leaks in wealthy areas are prioritized, leading to disparate “exposure and wait times . . . along the lines of race and income.”²⁵⁵

Rather than continue to spend scarce resources on infrastructure that will become stranded,²⁵⁶ public utility commissions could reallocate those funds for

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253. Ashita Gona & Mike Hennen, *US Can't Meet Climate Goals While Spending Billions on Gas Infrastructure*, RMI (Aug. 2, 2021), <https://rmi.org/us-cant-meet-climate-goals-while-spending-billions-on-gas-infrastructure/#:~:text=America's%20gas%20utilities%20spent%20%2421,spent%20just%20a%20decade%20prior> [<https://perma.cc/U5WC-ZQ6N>].
 254. Deirdre Cummings & Brita Lundberg, *Gas Stoves Are a Risk to Your Health and Emitters of Dangerous Pollutants*, WICKEDLOCAL.COM (Feb. 25, 2022, 5:15 AM), <https://www.wickedlocal.com/story/transcript-bulletin/2022/02/25/gas-stoves-present-risks-health-and-environment/6817311001> [<https://perma.cc/G99W-B3MT>].
 255. Mike Soraghan, *Smell Gas? Getting It Fixed May Depend on Race and Income*, ENERGYWIRE (Apr. 25, 2022, 7:22 AM), https://www.eenews.net/articles/smell-gas-getting-it-fixed-may-depend-on-race-and-income/?utm_medium=email [<https://perma.cc/BCU3-G394>].
 256. It is also insufficient for a fossil gas distribution company to claim that they should be allowed to spend money on the distribution system in contemplation of renewable natural gas or hydrogen. First, the supply of renewable natural gas is insufficient to be anything but a niche product. See Heather Payne, *The Natural Gas Paradox: Shutting Down a System Designed to Operate Forever*, 80 MD. L. REV. 693 (2021). Second, the risks and costs of hydrogen power far outweigh any benefit, especially in buildings. Jeff St. John, *Experts Say Blending Hydrogen Into Gas Pipelines Won't Work*, CANARY MEDIA (Mar. 29, 2022), <https://www.canarymedia.com/articles/hydrogen/experts-say-blending-hydrogen-into-gas-pipelines-wont-work> [<https://perma.cc/AHF6-AM4S>]. Third, the use of hydrogen is up to fourteen times less efficient than direct electrification. Sarah DeWeerd, *In a Side-by-Side Comparison Hydrogen Fuels Required Up to 14x as Much Electricity as Direct Electrification*, ANTHROPOCENE (May 18, 2021), <https://www.anthropocenemagazine.org/2021/05/hydrogen-based-fuels-are-promising-but-they-cant-do-it-all> [<https://perma.cc/7G42-R5WE>]. Fourth, hydrogen cannot be put into the existing natural gas infrastructure, as hydrogen will make the pipes more brittle and leak prone, leading to additional safety concerns and lower efficiency. Hadley Tallackson, *High Risk, Small Reward: Regulators Should Tread Carefully When Reviewing Utility Hydrogen Proposals*, UTILITY DIVE (Apr. 5, 2022),

electrification by providing stipends for electric upgrades (as necessary) and electric appliances. States can also spend the money they currently devote to subsidize gas energy efficiency programs on residential electrification initiatives.²⁵⁷

It is also important to recognize that partial solutions which fail to mandate the complete removal of fossil gas appliances from housing units are unworkable and unacceptable. Such compromise reforms are too easily manipulated to facilitate the continued use of fossil gas appliances. If, for example, policymakers permit landlords to declare the presence of fossil gas appliances and obtain a tenant waiver to leave them in the unit (which is similar to the process adopted with lead paint), then the inequitable health impacts that attend to low-income renters will continue to persist due to the landlord-tenant power dynamics described above. Most tenants will simply execute the waiver. A similar outcome would result from a partial reform that permitted tenants to agree to the presence of fossil gas appliances in the rental unit in the lease agreement.

Furthermore, any solution that allows landlords to retain gas appliances so long as they admit “evidence” in court demonstrating that the gas appliance is in good working order is insufficient. Such a procedure is subject to abuse by

<https://www.utilitydive.com/news/high-risk-small-reward-regulators-should-tread-carefully-when-reviewing-u/621390> [<https://perma.cc/548F-YEUL>]. Finally, burning hydrogen releases nitrous oxides, which will continue to impact both indoor and outdoor air quality. Sammy Roth, *L.A. Needs Clean Energy. Hydrogen Could Be the Answer – Or Gas Industry Greenwashing*, L.A. TIMES (Mar. 21, 2022, 5:00 AM), https://www.latimes.com/business/story/2022-03-21/los-angeles-needs-clean-energy-hydrogen-could-be-the-answer?utm_id=51099&sfmc_id=2600589 [<https://perma.cc/V2V2-NSFB>]; Lew Milford, Seth Mullendore & Abbe Ramanan, *Hydrogen Hype in the Air*, CLEAN ENERGY GROUP (Dec. 14, 2020), <https://www.cleangroup.org/hydrogen-hype-in-the-air> [<https://perma.cc/L29F-PTDS>].

257. See Heather Payne, *Electrifying Efficiency*, 40 STAN. ENV'T L.J. 57 (2021) [hereinafter Payne, *Electrifying Efficiency*]; Heather Payne, *Pulling in Both Directions: How States Are Moving Toward Decarbonization While Continuing to Support Fossil Fuels*, 45 COLUM. J. ENV'T L. 285 (2020) [hereinafter Payne, *Pulling in Both Directions*]; see also Matt Vespa (@missionvespa), TWITTER (July 5, 2022, 3:23 PM), <https://twitter.com/missionvespa/status/1544401492072747008> [<https://perma.cc/4EZQ-CHKV>] (noting that 79 percent of California's food service efficiency program rebates go toward gas appliance purchases); Brandon Smithwood (@BSmithwood), TWITTER (June 16, 2022, 5:03 PM), <https://twitter.com/BSmithwood/status/1537541310630006790> [<https://perma.cc/6K2H-687A>] (showing a solicitation from his local utility for rebates up to \$2750 to install new gas appliances). Electrification also helps alleviate the concern that more affluent homeowners will convert to electric appliances while renters and those without access to capital will shoulder the cost of an increasingly unused gas distribution system, leading to even higher energy burdens. See Kavya Balaraman, *As California Confronts the Future of its Natural Gas System, Who Could Get Left Behind?*, UTILITY DIVE (May 16, 2022), <https://www.utilitydive.com/news/as-california-confronts-the-future-of-its-natural-gas-system-who-could-get/622576> [<https://perma.cc/23DY-KX5G>].

landlords and is likely to lead to adverse health outcomes for tenants.²⁵⁸ Given tenants' lack of power in these situations, proposed reforms that put the onus on tenants to demonstrate that a gas appliance is unsafe are untenable.

Indeed, the science makes clear that all gas appliances are unsafe—even when they are idle and go unused. American law currently fosters these sorts of shenanigans by, for example, allowing fossil gas fireplace manufacturers to sell fireplaces to the American public that “require” a window to be open for safe use. We should not extend the tactical use of these sort of unjustifiable workarounds to landlords in this context. Simply stated, landlords should not be permitted to impose unrealistic conditions on tenants (like mandating that they leave windows completely open in their homes all winter) to establish that fossil gas appliances can be used without serious health consequences. Equity, expediency, and administrative efficiency demand an immutable rule enforced through the implied warranty of habitability. Anything less than a complete ban on fossil gas appliances would amount to a policy failure.²⁵⁹

Cities and states are informed that the continued use of fossil gas in buildings is bad for their citizens and the planet.²⁶⁰ Some, in fact, have proactively addressed the issue by restricting the use of fossil gas in new construction.²⁶¹ Los Angeles, California and seventy-seven other cities and towns “have banned or discouraged new natural gas hookups” by “requiring new homes and buildings achieve zero-carbon emissions—effectively eliminating future natural gas lines.”²⁶² The Portland Public Schools are phasing out fossil gas in new buildings and

258. Josiah Kephart (@jlashk), TWITTER (Jan. 27, 2022, 11:34 AM), <https://twitter.com/jlashk/status/1486739453334986758> [<https://perma.cc/678T-JGJM>] (stating that “[a] common industry pushback is ‘well your specific stove must be low quality, a “properly functioning” stove wouldn’t pollute so much.’ This study contradicts that”).

259. Immutable rules supersede any contrary provisions in the lease and, as such, they cannot be contracted around.

260. See, e.g., *Fine, We’re Doing Gas Stoves*, VOLTS PODCAST (Jan 25, 2023), https://www.volts.wtf/p/fine-were-doing-gas-stoves?utm_source=direct&utm_campaign=post&utm_medium=web#details (explaining that the industry and its regulators have known for forty years that gas stoves were dangerous polluters).

261. See Payne, *supra* note 256 (listing cities and states that have taken steps to mitigate the health and environmental harms associated with fossil fuel appliances); see also Payne, *Pulling in Both Directions*, *supra* note 257 (discussing state and city actions regarding the use of fossil gas).

262. Elizabeth Weise, *Los Angeles Joins Movement to Ban New Natural Gas Hookups to Fight Climate Change*, USA TODAY (June 3, 2022, 5:02 AM), <https://www.usatoday.com/story/news/2022/06/03/los-angeles-bans-new-natural-gas-hookups-part-growing-movement/9969965002/?gnt-cfr=1> [<https://perma.cc/R84T-EYJM>].

transitioning the heating needs in all existing school buildings to electricity.²⁶³ California's first-in-the-nation Affordable Housing and Sustainable Communities program will "no longer fund projects that include natural gas."²⁶⁴ The New York City Housing Authority is piloting the installation of induction ranges.²⁶⁵ Menlo Park, California is going further with plans to electrify ten thousand buildings—95 percent of those in the town—by 2030, primarily through the use of heat pumps for HVAC and water heating and the installation of solar panels and batteries.²⁶⁶ And the California Bay Area Air Quality District intends to issue rule updates for nitrous oxide emissions from HVAC and water heaters, which contribute more nitrous oxide emissions to the area than passenger vehicles.²⁶⁷

To be sure, the fossil fuel industry has pushed back on these bans by lobbying against them in state legislatures and challenging them in the courts.²⁶⁸ Thus far, however, the industry has been unsuccessful. State courts have consistently held that fossil fuel bans fall well within the scope of state and municipal police powers that enable those governments to protect the health and safety of their citizens.²⁶⁹

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263. Julie Sabatier, *Portland Public Schools Considers Climate Crisis Response Policy*, OPB (Feb. 22, 2022, 7:25 PM), <https://www.opb.org/article/2022/02/22/portland-public-schools-considers-climate-crisis-response-policy> [<https://perma.cc/WHd6-QFKH>]; Bryant Clerkley, *Portland Public Schools Adopts New Climate Crisis Response Policy*, KGW8 (Mar. 3, 2022, 5:53 PM), <https://www.kgw.com/article/tech/science/climate-change/portland-public-schools-adopts-new-climate-crisis-policy/283-3d49e89a-1044-4d02-8103-4767ecc5d7c8> [<https://perma.cc/9VYN-APUN>].
 264. @missionvespa, TWITTER (Apr. 26, 2022, 4:33 PM), <https://twitter.com/missionvespa/status/1519052020438642688> [<https://perma.cc/Z3EW-GC4J>].
 265. Melissa Clark, *The Case for Induction Cooking, Versus Gas Stoves*, N.Y. TIMES (Mar. 11, 2022), <https://www.nytimes.com/2022/03/11/dining/induction-cooking.html?smid=tw-nytf&smtype=cur> [<https://perma.cc/DR8X-L8ZT>].
 266. Todd Woody, *Silicon Valley's Menlo Park Plans to Electrify 10,000 Buildings*, BLOOMBERG (June 17, 2022, 2:00 AM), <https://www.bloomberg.com/news/articles/2022-06-17/silicon-valley-s-menlo-park-plans-to-electrify-10-000-buildings> [<https://perma.cc/M59W-J5ED>].
 267. @AirDistrict, TWITTER (Jan. 27, 2022, 6:00 PM), <https://twitter.com/AirDistrict/status/1486836483533144068> [<https://perma.cc/DX7V-PJYS>].
 268. See Alex Brown, *Natural Gas Bans Are New Front in Effort to Curb Emissions*, PEW (Jan. 6, 2022), <https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2022/01/06/natural-gas-bans-are-new-front-in-effort-to-curb-emissions> [<https://perma.cc/Hc5E-DYRP>] (detailing twenty states where state legislatures have mandated that cities allow fossil gas service); Dan Gearino, *A Furious Industry Backlash Greets Moves by California Cities to Ban Natural Gas in New Construction*, INSIDE CLIMATE NEWS (Mar. 5, 2021), <https://insideclimatenews.org/news/05032021/gas-industry-fights-bans-in-homes-businesses> [<https://perma.cc/64MG-9KGD>].
 269. Timothy Oberleiton & Regina Hsu, *Got Lungs? Berkeley's Got Your Back (and the Gas Industry Doesn't)*, EARTHJUSTICE (May 10, 2022), <https://earthjustice.org/from-the-experts/2022-may/got-lungs-berkeleys-got-your-back-and-the-gas-industry-doesnt> [<https://perma.cc/CB2Q-BXM8>].

There is no doubt that banning the use of fossil gas and electrifying will dramatically improve indoor air quality. There also is little doubt that those gains will be inequitably distributed and enjoyed. All of the above-described electrifying policies adopted by various states and local governments permit buildings that currently use fossil gas to continue doing so going forward. This unfortunately means that low-income renters who are forced into the oldest and cheapest accommodations—that is, the units least likely to be required to update appliances—will continue to suffer the myriad health harms attendant to gas appliances long after relatively more wealthy citizens have transitioned to buildings that are fully electric. We continue to watch this very dynamic play out in the context of lead paint. While well-resourced Americans rarely inhabit rental properties with an abundance of egregiously health-harming lead-based paint, lower-income individuals and their families must resort to renting lead paint riddled premises and be subject to their devastating and debilitating health impacts.²⁷⁰ We should not allow fossil appliances to follow the same path as lead paint and thereby deprive our most vulnerable neighbors of a healthy indoor environment to call home.

CONCLUSION

As one commenter succinctly put it, “[w]e have an asthma epidemic in US. It costs us about \$70 [billion] annually. It hits Black[], Latin[x][] & American Indian/Alaska Natives populations the hardest. Health officials tell us gas stoves are the most common asthma trigger in our homes.”²⁷¹ Gas appliances are more likely

270. Nina Lakhani, “It Was Everywhere”: How Lead is Poisoning America’s Poorest Children, *THE GUARDIAN* (Feb. 26, 2020, 4:00 PM), <https://www.theguardian.com/environment/2020/feb/26/lead-poisoning-minorities-poor-americans> [https://perma.cc/RG9G-YLRN] (explaining that “as many as one in five children are poisoned in the city’s poorest neighborhoods where mostly [B]lack, Latinx and migrant families live” and “[a]bout two-thirds live in rental properties.”); Emily A. Benfer, *Contaminated Childhood: The Chronic Lead Poisoning of Low-Income Children and Communities of Color in the United States*, *HEALTH AFFS.* (Aug. 8, 2017), <https://www.healthaffairs.org/doi/10.1377/forefront.20170808.061398/full> [https://perma.cc/Z6SZ-Z4T7] (“The risk of lead poisoning falls disproportionately on minority children, as well, with [B]lack children nearly three times more likely than white children to have elevated blood-lead levels.”); Nick Farr & Cushing N. Dolbeare, *Childhood Lead Poisoning: Solving a Health and Housing Problem*, 2 *CITYSCAPE* 167, 168 (1996) (explaining that “because lead hazards are most severe in older, deteriorating housing, people of color and the inner-city poor are disproportionately affected. In many inner-city neighborhoods, more than one-half of the young children suffer from lead poisoning.”).

271. @brucenilles, *TWITTER* (Jan. 12, 2022, 9:00 AM), <https://twitter.com/brucenilles/status/1481310037016399872> [https://perma.cc/E33F-5C3L]. Another study estimated that reducing the air pollution associated with all fossil combustion in the contiguous United States could

to trigger adverse respiratory health problems, including severe asthma attacks, than pets, mold, mice, or smoking.²⁷² While the implied warranty of habitability could be a powerful tool, “[t]he reality is that the implied warranty of habitability is not used all that much at present, and it probably never has been. Multiple studies over the past forty-five years have reached the same conclusion.”²⁷³ Expanding the implied warranty to include fossil gas appliances has the potential—if implemented appropriately—to spare millions of Americans the adverse health outcomes that derive from inadequate indoor air quality. Even beyond the direct benefits that marginalized and racialized populations would enjoy from the proposed expansion of the warranty of habitability, including reduced morbidity and mortality, everyone would benefit from reduced greenhouse gas emissions and health care-related costs.²⁷⁴

prevent 53,200 premature deaths annually and provide \$608 billion in health benefits from the avoided small particulate-related illness and death alone. Nicholas A. Mailloux, David W. Abel, Tracey Holloway & Jonathan A. Patz, *Nationwide and Regional PM_{2.5}-Related Air Quality Health Benefits From the Removal of Energy-Related Emissions in the United States*, GEOHEALTH (May 16, 2022), <https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2022GH000603> [<https://perma.cc/AU4H-EAK9>]. Conservatively, “commercial and residential buildings are now responsible for approximately 18,300 early deaths and \$205 billion in health impacts – one-third of the health burden from stationary sources in the United States.” Brady Seals & Leah Louis-Prescott, *Uncovering the Deadly Toll of Air Pollution From Buildings*, RMI (May 5, 2021), https://rmi.org/uncovering-the-deadly-toll-of-air-pollution-from-buildings/?__hstc=213470795.b5a78f861c78de9ce89bbd4f1f8a54be.1617923750983.1647309889275.1647556492898.131&__hssc=213470795.2.1647556492898&__hsfp=999181904 [<https://perma.cc/4EB3-LY2P>].

272. MASS. DEP’T PUB. HEALTH, *ASTHMA AMONG CHILDREN IN MASSACHUSETTS* (Jan. 2017), <https://www.mass.gov/doc/pediatric-asthma-data-bulletin-0/download> [<https://perma.cc/NY98-UFQS>].

273. Martinez, *supra* note 125, at 254.

274. Nate Kinsey (@Negawatt_Nate), TWITTER (Jan. 14, 2022, 7:57 AM), https://twitter.com/Negawatt_Nate/status/1482019118639370245 [<https://perma.cc/Z43N-A8SZ>] (showing societal benefits of heating electrification).