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January 23, 2024

Committee on Energy, Utilities, and Technology
c/o Office of Fiscal and Program Review
5 State House Station
Augusta, ME 04333

**RE: Support of LD 2077, An Act Regarding Customer Costs and the Environmental and Health Effects of Natural Gas**

Dear Senator Lawrence, Representative Ziegler, and other members of the committee,

My name is Paul Arbaje, Energy Analyst with the Union of Concerned Scientists. UCS is the nation's leading science-based non-profit organization with more than a half a million supporters, including more than 2,500 in Maine. I offer this testimony in support of LD 2077.

LD 2077 is a significant and necessary step by Maine toward addressing the wide array of harms caused by fossil fuel use in buildings, particularly gas and petroleum products. The continued use of and reliance on these fossil fuels is not only incompatible with Maine's climate and clean energy commitments, but also directly harms the public health of communities through outdoor and indoor emissions of toxic air pollutants. These fossil fuel products have also led to significant economic harms in the form of higher energy burdens, as was most recently experienced during the sharp commodity price spikes of 2022.

This bill includes concrete measures designed to protect the climate, public health, and Maine ratepayers. It also wisely requires further scientific study of outstanding questions within all three of the aforementioned categories, answers to which will be critical in ensuring that the state's clean energy transition progresses justly and equitably.

Here are three reasons why LD 2077 is so important:

1.) ***Sharp reductions in carbon dioxide and methane emissions from buildings are key to meeting Maine's climate commitments.*** More than 70% of Maine households use petroleum products as their main energy source for heating,[1] which are the highest carbon-emitting fuel sources for homes and businesses aside from coal.[2] The state's residential and commercial sectors also account for about a quarter of the state's gas consumption, and research is increasingly showing methane leaks along the entire gas delivery chain to be higher than previously thought, including

[1] Maine - Profile Analysis. U.S. Energy Information Administration. (2023, October 19). https://www.eia.gov/state/analysis.php?sid=ME
[2] Carbon Dioxide Emissions Coefficients. U.S. Energy Information Administration. (2023a, September 7). https://www.eia.gov/environment/emissions/co2_vol_mass.php

from distribution systems and end users such as building equipment and appliances.[3,4] Rapid cuts of these emissions will be a necessary piece of meeting Maine's target of achieving net-zero emissions by 2045.

UCS's own analyses have shown that in a scenario where the United States achieves net-zero economywide emissions by 2050, virtually all of the building energy demand for gas and petroleum shifts to demand for electricity (see Exhibit A), more than 90% of which would be renewable electricity.[5] While economic incentives for building electrification and efficiency from the federally-passed Inflation Reduction Act (IRA) and from Efficiency Maine will help drive this transition, further policy action will be needed to achieve Maine's net-zero commitment by 2045 (five years earlier than what we analyzed).

LD 2077 is one such policy action that will help accelerate this transition away from fossil fuel use in buildings, and it accomplishes this push in multiple ways. First, it narrows the avenues gas utilities can use for expanding costly gas infrastructure at ratepayers' expense, thereby halting the widespread increase in gas-related emissions from homes, businesses, and associated upstream infrastructure. Second, it requires further study of the total methane leakage from indoor fossil fuel appliances in the state, rigorous accounting of which is necessary for accurately identifying decarbonization priorities and the full benefit of decarbonization alternatives. Finally, the bill requires the state to investigate geothermal heating districts, which could serve as clean alternatives to electrified building heat.

In addition to investigating geothermal solutions, LD 2077 directs the state to further study "alternative thermal technologies." Members of the committee should amend LD 2077 to explicitly disallow blends of hydrogen or biomethane (sometimes called "renewable natural gas") in gas distribution systems as one of these alternative technologies aimed at reducing building emissions. Both of these resources perpetuate public health harms, both of these resources perpetuate investments in likely future-stranded gas infrastructure, and both of these resources introduce serious questions around actual contributions to decarbonization—with each at significant risk of *increasing* emissions as opposed to decreasing them in the absence of rigorous safeguards.

- **Hydrogen.** Hydrogen use in buildings poses safety issues due to its high explosiveness and propensity for leakage, as well as public health risks from nitrogen oxides (NOx) formation during combustion. Further, it yields negligible climate benefits even if cleanly produced; blending restrictions limit emissions reductions to about 6% before requiring

[3] Sargent, M. R., Wofsy, S., McKain, K., & Floerchinger, C. (2021, October 25). Majority of US urban natural gas emissions unaccounted for inventories. Earth, Atmospheric, and Planetary Sciences. https://doi.org/10.1073/pnas.2105804118

[4] Inman, M. (2020, December 15). The Gas Index. Global Energy Monitor. https://globalenergymonitor.org/wp-content/uploads/2021/01/Gas-Index-report-2020.pdf

[5] Clemmer, S., Cleetus, R., Martin, J., Moura, M. C. P., Arbaje, P., Chavez, M., & Sattler, S. (2023, November 16). Accelerating clean energy ambition. Union of Concerned Scientists. https://doi.org/10.47923/2023.15253

expensive retrofits, since hydrogen is harsher on pipes and appliances than gas.[6] Direct electrification via renewables is a vastly more efficient and cost-effective use of renewable resources than converting those renewables into hydrogen and then combusting that hydrogen for use in buildings.

- **Biomethane.** The potential decarbonization contributions from biomethane are also very limited due to methane leakage at the point of production and throughout its distribution.[7] Moreover, extremely limited feedstock potential[8] means ratepayers could be forced to subsidize a "solution" that is soon diverted to sectors without decarbonization alternatives, returning the gas grid to its fully polluting state. Biomethane blending also perpetuates the public health harms associated with indoor fossil fuel appliances.

2.) ***Addressing the public health impacts from indoor fossil fuel pollution is long overdue.*** For decades, scientists have been studying the health effects of burning fossil fuels such as gas and petroleum products. The resulting large body of research has linked exposure to pollutants associated with these fuels to a host of negative health outcomes including cancer, asthma attacks, and birth defects, among others.[9] LD 2077 will require further study of the health impacts specific to *indoor* air pollution, adding to the body of research that is specific to the context of Maine, which is in need of actionable scientific findings in this area.

For example, Maine has the highest share in the country of homes that use fuel oil and other petroleum products for space heating.[10] Burning fuel oil emits many harmful pollutants, including sulfur dioxide ($SO_2$). Fuel oil accounts for *more than half* of all residential $SO_2$ emissions nationally,[11] despite petroleum products accounting for less than 1% of total US residential energy consumption.[12] $SO_2$ emissions can directly harm the respiratory systems of people with asthma, particularly children.[13] They also lead to the formation of particulate matter, which is

[6] Andee, K., & Barbara, G. (2022, October 26). Hydrogen Pipe dreams: Why burning hydrogen in buildings is bad for climate and Health. Physicians for Social Responsibility. https://psr.org/resources/hydrogen-pipe-dreams-why-burning-hydrogen-in-buildings-is-bad-for-climate-and-health/

[7] Grubert, E. (2020, August 11). At scale, renewable natural gas systems could be climate intensive: the influence of methane feedstock and leakage rates. Environmental Research Letters. https://doi.org/10.1088/1748-9326/ab9335

[8] Saadat, S., Vespa, M., & Kresowik, M. (2020, July 14). Report: The myth of "Renewable natural gas" for building decarbonization. Earthjustice. https://earthjustice.org/feature/report-building-decarbonization

[9] Hartley, S., Belova, A., Dagli, R., Economu, N., Holder, C., Hubbard, H., Justice, M. A., Lettes, S., Raymer, P., & Silva, R. (2022, July 1). Literature Review on the Impacts of Residential Combustion - American Lung Association. American Lung Association. https://www.lung.org/getmedia/2786f983-d971-43ad-962b-8370c950cbd6/icf_impacts-of-residential-combustion_final_071022.pdf

[10] See footnote 1

[11] See footnote 8

[12] Use of energy in homes. U.S. Energy Information Administration (EIA). (2023, September 1). https://www.eia.gov/energyexplained/use-of-energy/homes.php

[13] Sulfur Dioxide Basics. Environmental Protection Agency. (2023, February 16). https://www.epa.gov/so2-pollution/sulfur-dioxide-basics

known to be linked with decreased lung function, irregular heartbeat, and premature death in people with heart or lung disease.[14]

Gas use in buildings also leads to negative health outcomes and should be addressed in Maine communities. A 2022 study analyzed gas use in Boston area homes and found the presence of 21 different hazardous air pollutants, including the known carcinogen benzene.[15] Another recent study found that 12.7% of childhood asthma cases in the United States are attributable to pollution from gas stoves.[16]

The further scientific study required by this bill will help Maine address the health burden communities are currently bearing from ongoing indoor fossil fuel pollution. It is past time to quantify this burden and, critically, follow up with further action to mitigate that burden by prompting large shifts to cleaner forms of cooking, space heating, and water heating.

3.) ***The bill helps provide much needed ratepayer protections.*** Despite meaningful progress that has been made in recent years to help Maine ratepayers lower costs through investments in energy efficiency[17] and renewable energy,[18] those in the state with the lowest incomes still have very high energy burdens, spending an average of 14% of their incomes on energy costs.[19] Overreliance on price-volatile fossil fuels, such as gas—including imported gas—and heating oil, puts ratepayers at a repeated risk of harm arising from commodity price spikes similar to what New England experienced in 2022.[20,21] By prohibiting utilities from recovering the costs of new gas service lines, LD 2077 helps prevent further lock-in of expensive fossil fuel infrastructure that forces ratepayers to foot the bill for ill-advised investment decisions and inevitable future price spikes.

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[14] Health and Environmental Effects of Particulate Matter (PM). Environmental Protection Agency. (2023a, August 23). https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm

[15] Michanowicz, D. R., Dayalu, A., Nordgaard, C. L., Buonocore, J. J., Fairchild, M. W., Ackley, R., Schiff, J. E., Liu, A., Phillips, N. G., Schulman, A., Magavi, Z., & Spengler, J. D. (2022, June 28). Home is Where the Pipeline Ends: Characterization of Volatile Organic Compounds Present in Natural Gas at the Point of the Residential End User. Environmental Science & Technology. https://pubs.acs.org/doi/10.1021/acs.est.1c08298

[16] Gruenwald, T., Seals, B. A., Knibbs, L. D., & Hosgood, H. D. (2022, December 21). Population attributable fraction of gas stoves and childhood asthma in the United States. International Journal of Environmental Research and Public Health. https://doi.org/10.3390/ijerph20010075

[17] Scorecard: States cutting costs with efficiency, more progress needed. ACEEE. (2022, December 6). https://www.aceee.org/press-release/2022/12/scorecard-leading-states-cutting-costs-residents-energy-efficiency-more

[18] Commission Approves Delivery Rate Decreases For Central Maine Power (CMP) And Versant Power Effective July 1. Maine Public Utilities Commission. (2022, June 14). https://www.maine.gov/tools/whatsnew/index.php?topic=puc-pressreleases&id=8025065&v=article088

[19] Rubin, K., Freed, M., & Aggarwal, A. (2023, December 18). 1 in 7 families live in energy poverty. states can ease that burden. RMI. https://rmi.org/1-in-7-families-live-in-energy-poverty-states-can-ease-that-burden/

[20] Bartow, A. (2022, November 17). Get ready to pay more for power in Maine. WMTW. https://www.wmtw.com/article/get-ready-pay-more-power-maine/41983953

[21] Barndollar, H. (2022, October 17). Thick curtains, energy efficiency audits: How to penny-pinch on heat costs this winter. The Providence Journal. https://www.providencejournal.com/story/news/2022/10/14/utility-bills-more-expensive-how-save-heating-costs-new-england-winter-energy-ma-ri-ct-nh-vt-me/8235246001/

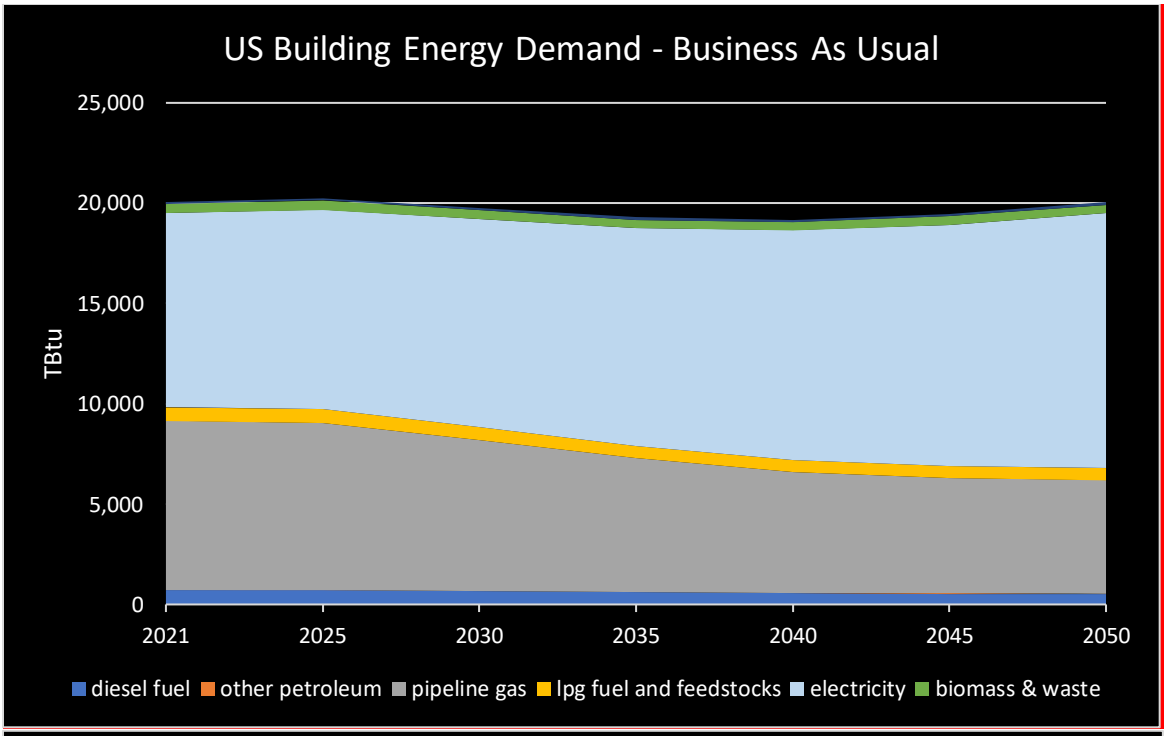
The bill also requires further investigation of the future of gas in Maine, which will aim to answer key questions surrounding stranded gas assets and the implications of a shrinking gas utility customer base, among others. As more and more homes and businesses transition from gas to cleaner sources, the amount of customers that utilities use to spread their fixed costs will shrink, causing per-household costs to rise. This is a concern for all households over the period of transition, but presents a particular concern for low-income households, which researchers have highlighted is a significant risk if those households are the last ones to transition off the gas system.[22] This inquiry can help equip Maine to proactively address these inequitable burdens.

Gas utilities must be held accountable in planning properly for the clean energy transition to which Maine is already committed, and LD 2077 takes the crucial step of reviewing utilities' plans for a shrinking customer base in the coming decades. It also requires the state to investigate the future demographic composition of these diminished customer bases, with a critically important focus on the potential impacts to low-income customers.

LD 2077 is a significant step in Maine's clean energy transition and includes key measures to make the transition more equitable. It will help the state fulfill its climate commitments, improve public health outcomes, and protect ratepayers from costly and inefficient fossil fuels. Thank you for the opportunity to testify in support of LD 2077.

[22] Davis, L. W., & Hausman, C. (2021, June 28). Who will pay for legacy utility costs?. NBER. https://www.nber.org/papers/w28955

**Exhibit A**


US Building Energy Demand - Business As Usual
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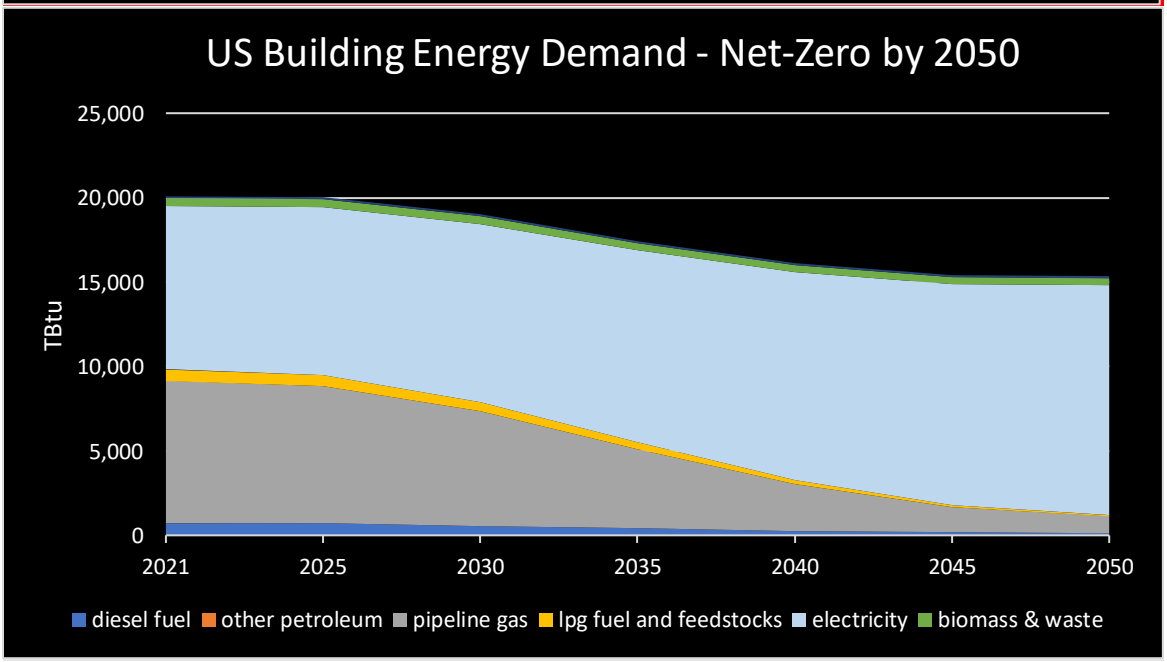
electricity
biomass & waste


US Building Energy Demand - Net-Zero by 2050
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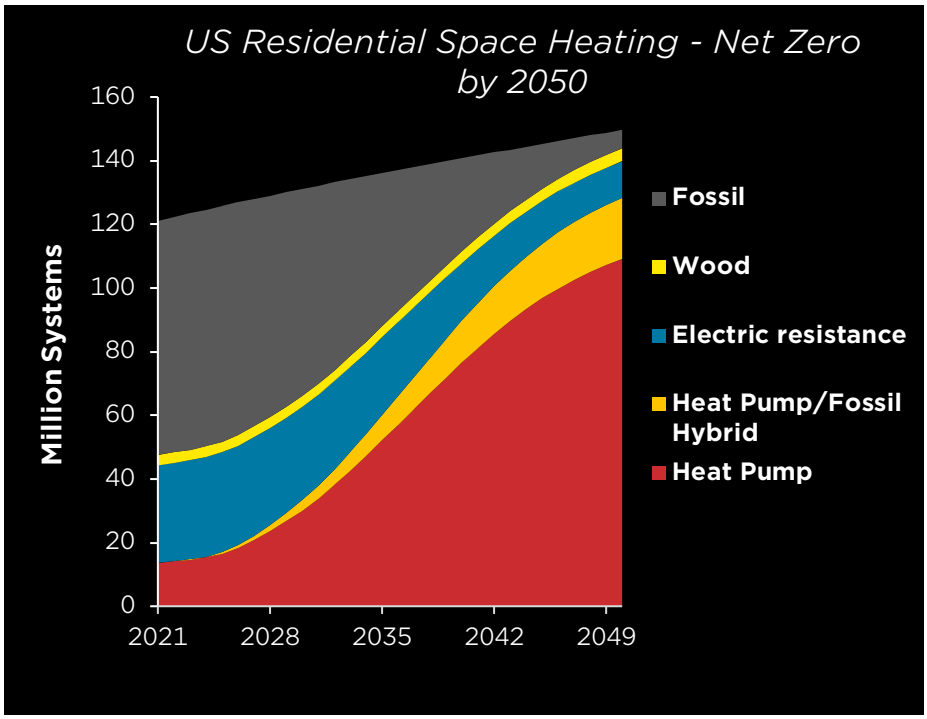
lpg fuel and feedstocks
electricity
biomass & waste




*Total building demand for gas and petroleum products gets very low in a scenario where the United States achieves net-zero economywide emissions by 2050 (middle graph). Most space heating needs are met by electric heat pumps in this scenario (bottom graph). This is in contrast to a business-as-usual scenario (top graph), where gas and petroleum demand remains more significant in the coming decades. The business-as-usual scenario accounts for the effects of current federal policies including the Inflation Reduction Act and the Infrastructure Investment and Jobs Act. || Source: Follow-up analysis of data from the Union of Concerned Scientists' Accelerating Clean Energy Ambition report.*