

**From:** Louise Gorenflo

**Sent:** Thursday, January 12, 2023 8:11 AM

**To:** Louise Gorenflo

**Subject:** A literature review in support of the Ann Arbor proposed ban on new residential and commercial natural gas connections

Because of its commitment to achieve its climate action plan, the City of Ann Arbor moves toward ending the use of fossil gas within residential and commercial buildings.

Here is a [link to a literature review](#) I prepared in support of a natural gas ban for new connections and major rehab. This literature review is also attached.

Also, here is the [link to the Inflation Reductions Act rebates](#) for home electrification.

Please get back with me with questions you might have about the information presented or other questions not covered by the literature review.

May we work together to move through climate change in ways that benefit everyone, all life, and the Earth.

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# Literature Review of Research Supporting a Natural Gas Ban

## Climate

**Billimoria, Shirley**, et al. The economics of electrifying buildings. *Rocky Mountain Institute* (2018).  
<https://rmi.org/insight/the-economics-of-electrifying-buildings/>

Reaching the deep carbonization goals of 75% or greater in greenhouse gas emissions will require eliminating most or all of the CO<sub>2</sub> produced by furnaces and water heaters across the country, alongside other measures. Achieving this vision will require massive market transformation, including discontinuing the expansion of the gas distribution system, widespread adoption of new appliance in homes and businesses, and a hardened grid.

## Electrify Everything

**Roberts, David**. The key to tackling climate change: electrify everything. *Vox*. 10/27/17  
<https://www.vox.com/2016/9/19/12938086/electrify-everything>

Decarbonization requires electrification.

When connected to a grid, everything you use that runs on electricity is, in carbon/climate terms, as clean as that grid. That means that as long as we continue to reduce carbon on the grid, every single electrical device is getting cleaner throughout its life.

A natural gas furnace's rate of emission is basically fixed by its design. It will emit the same level of carbon emissions per unit of heat throughout its 20-year lifespan.

Electrical grids are giant levers that can move the environmental needle on hundreds of millions of distributed technologies at once. Every device that runs on electricity benefits from the grid's every incremental improvement. Improvement is continuous and far faster than tech running on fossil fuels.

## Indoor Air Pollution

### Breaking News:

**Lebel, Rebecca**. The gas stove regulation uproar, explained. *Vox* (January 11, 2023).  
<https://www.vox.com/energy-and-environment/2023/1/11/23549303/gas-stove-regulation-explained>

### Fossil gas leaks in homes / Air Quality

**Weller, Zachary**. Disparities in natural gas leak prevalence in US urban areas. *Environmental Science & Technology*, 2022.  
<https://www.sciencedaily.com/releases/2022/05/220512164115.htm>

The multi-city analysis revealed greater leak densities in communities where the majority of the population is non-white relative to predominantly white neighborhoods. Leak densities also increased with decreasing median incomes. The strength of these relationships varies among individual cities.

Methane gas leaks on local pipeline systems are carefully regulated for safety, but many leaks are allowed to continue unaddressed for years -- during which time they continue to emit climate pollution and could become hazardous.

**Iaconangelo, David**. *E&E News* (January 27, 2022).

<https://www.scientificamerican.com/article/gas-stoves-leak-more-methane-than-previously-thought/>

About three-quarters of the methane measured by the Stanford researchers was leaked when the stoves weren't being used. The age of the stoves didn't affect the outcomes, which were consistent across stoves ranging from three to 30 years old.

Once people used the stoves to cook, the associated indoor pollution—in the form of nitrogen dioxide—could quickly rise to unhealthy levels, they found. For kitchens with poor ventilation, the amount of NO<sub>2</sub> could exceed what EPA prescribes as the exposure limit for outdoor air quality, according to the study.

**Leber**, Rebecca. How the fossil fuel industry convinced Americans to love gas stoves. *Mother Jones* (June 20, 2021).

<https://www.motherjones.com/environment/2021/06/how-the-fossil-fuel-industry-convinced-americans-to-love-gas-stoves/>

Gas stoves emit particulate matter, formaldehyde, carbon monoxide and nitrogen oxides. Lawrence Berkeley National Lab Study: cooking with gas for one hour without ventilations adds up to 3000 ppb of carbon monoxide to the air – raising indoor concentrations by up to 30% in the average home. CO disrupts the blood's capacities to carry oxygen. CO monitors often fail to detect potentially dangerous levels.

Nitrogen oxides linked to increased risk of heart attack, asthma, and other respiratory diseases. Homes with gas stoves have 50-400% higher concentrations of NO<sub>x</sub>. Children most vulnerable. Children in homes with gas stoves are 42% more likely to have asthma than children whose families use electric.

Cooking with gas is the no. 1 way we are polluting our homes. Running a gas stove and oven for just an hour can produce unsafe pollutant levels thoroughly your house all day.

Natural gas industry cites a lack of regulation by the Consumer Product Safety Commission and the EPA as evidence of why the public shouldn't be concerned. The EPA has never said gas stoves are safe. It has linked short and long-term NO<sub>x</sub> exposure to respiratory problems.

Natural gas industry claims that proper ventilation can take care of any combustion fumes. Many homes cannot afford to install a sufficiently powerful hood vent. There are no regulations requiring it. Most stove fans do no more than move air about. Because of dated building codes and an unregulated market, low income Americans and renters have to put up with the invisible combustion byproducts in cramped living spaces.

Natural gas industry position: The science around the safe use of gas for cooking is clear: there are no documented risks to respiratory health from natural gas stoves from the regulatory and advisory agencies and organizations responsible for protecting residential consumer health and safety."

November 2020: California Air Resources board issued statement that gas stoves cause indoor air pollution. Calls for stricter ventilation standards for all household appliances. First time any major public agency has recommended policy changes to reflect the science of stoves and indoor pollution.

**Label**, Eric, et al. Methane and NO<sub>x</sub> emissions from natural gas stoves, cooktops, and ovens in residential homes. *Environmental Science and Technology* (January 7, 2022).

<https://pubs.acs.org/doi/10.1021/acs.est.1c04707>

Among all gas appliances, the stove is unique in that the byproducts of combustion are emitted directly into home air with no requirement for venting the exhaust outdoors. In fact, some kitchens have “ductless” hoods that recirculate fumes through activated charcoal filters, which are generally less effective at cleaning the air. Vented hoods have a range of effectiveness and function best when overhanging the stove. Because exhaust hoods are separate from the stove and must be operated manually, vented hoods in practice are used only 25–40% of the time.

NO<sub>2</sub> is a respiratory irritant and can lead to asthma, coughing, wheezing, and difficulty breathing, occasionally resulting in hospitalization.

Researchers found no evidence of a relationship between either the age of the stove or purchase price of the stove with methane emissions nor with NO<sub>x</sub> emissions normalized by burner energy. Median income from census tracts where the stove was located had no relationship with methane emissions.

## **Natural gas is being phased out in US cities & Europe**

**Huxley-Reicher, Bryn**, *Electric Buildings*. US PIRG (April 2021).

<https://publicinterestnetwork.org/wp-content/uploads/2021/04/RI-Electric-Buildings-Web.pdf>  
<https://publicinterestnetwork.org/wp-content/uploads/2021/04/RI-Electric-Buildings-Web.pdf>

In a 2019, the City of Berkeley, California was the first US city to ban natural gas hookups in new buildings. Now, a total of 42 cities in California have passed bans or severe restrictions, and the California Energy Commission, which is in the process of updating the state’s building codes, could easily pass a statewide gas ban for all new construction.

In the UK, the government has announced that by 2025, all new homes will be prohibited from installing gas and oil furnaces and boilers. Natural gas is being phased out in Canada beginning in 2023.

Leber, Rebecca. How the fossil fuel industry convinced Americans to love gas stoves. *Mother Jones* (June 20, 2021).

<https://www.motherjones.com/environment/2021/06/how-the-fossil-fuel-industry-convinced-americans-to-love-gas-stoves/>

42 municipalities have moved to phase out gas in new buildings.

Washington state lawmakers intend to end all use of natural gas by 2050.

## **Rising cost of fossil gas**

**McWhirter, Sheri**. Natural gas costs forecasted to skyrocket this winter *MLive* (Dec. 10, 2022).

<https://www.mlive.com/public-interest/2022/12/natural-gas-costs-forecasted-to-skyrocket-this-winter.html>

More than three-quarters of Michiganders stay warm in their homes through winter with natural gas, and that is going to hit their household budgets hard in coming months. Electric rates for residential customers in 2023 may rise by 7% for DTE and 14% for Consumers Energy.

Energy industry experts point to significantly growing demand for natural gas and unstable market conditions because of geopolitical conflicts as the dual problem. The outfall is a spike in cost for residential natural gas projected at 29% through this winter, largely because of jumps in commodity prices.

High price for natural gas won't only be a problem solely this winter but will extend throughout 2023. That's because utilities will recover the cost of this year's fuel by raising rates next year.

"It's not a Michigan specific thing. It's not even a U.S. specific thing. It's just the underlying price of gas as a commodity," said Dan Scripps, chairperson for the Michigan Public Service Commission. War on the other side of the globe isn't the only factor. More natural gas is being used here, too.

## Utility Pushback

**Leber, Rebecca.** *How the fossil fuel industry convinced Americans to love gas stoves.* Mother Jones (June 20, 2021).

<https://www.motherjones.com/environment/2021/06/how-the-fossil-fuel-industry-convinced-americans-to-love-gas-stoves/>

Natural gas bans are an existential threat to the gas utility business. With bans in new buildings, the gas companies are losing their growth and new market share. They will start to shrink and lose investor interest.

Utilities have launched local anti-electrification campaigns: Robotexts to consumers warning that ban would dramatically increase their bills. Bus ads – "Reliable. Affordable. Natural Gas. Here for you."

American Gas Association worked aggressively with legislatures in seven states to enact laws banning bans – at least 14 others states have bills that would prevent cities from passing cleaner building codes.

Surveys show the public has no preference for gas water heaters and furnaces over electric ones. Industry focuses on gas stoves. Promoted as a coveted symbol of class and sophistication, a selling point for builders and real estate agents.

All-out campaign to convince Americans that cooking with gas flame superior to using electric heat. No mention of indoor air pollution or what it means to combust a fossil fuel in our homes.

Residences make up 68% of the industry revenue. Prevalence of gas stoves in new single-family homes climbed from less than 30% in 1970s to over 50% in 2019.

## Contractor Barrier

### Heat Pumps

**Huxley-Reicher, Bryn,** *Electric Buildings.* US PIRG (April 2021).

<https://publicinterestnetwork.org/wp-content/uploads/2021/04/RI-Electric-Buildings-Web.pdf>

Knowledge gaps, high upfront costs, and lack of governmental support

Contractors unfamiliar with current technology and may believe heat pumps are more expensive, impractical, or unreliable.

Consumers unaware of improved technologies for electric heating and cooking.

**Billimoria, Shirley, et al.** *The economics of electrifying buildings.* Rocky Mountain Institute (2018).

<https://rmi.org/insight/the-economics-of-electrifying-buildings/>

The most efficient electric devices (heat pumps for space and water heating) have a small market share today. Many homes need additional electrical work to accommodate them, and consumer awareness of this heating technology option is low.

**Leber**, Rebecca. *The most annoying barrier to getting your home off fossil fuels* Vox (October 8, 2022).  
<https://www.vox.com/energy-and-environment/2022/10/8/23387530/home-electrification-heat-pumps-gas-furnace-contractors>

Heat pumps actually work like a two-way air conditioner, using electricity and a chemical refrigerant to transfer heat into and out of a building. Since heat pumps are up to 4.5 times more efficient than gas, environmentalists have rallied around them as the better alternative to combusting a fuel inside the home. The myth that the equipment won't work in cold places persists because as recently as about 20 years ago, it was true for most technology. It's one reason heating oil is much more common in New York and gas furnaces throughout the North. Today, with better refrigerants and compressor technology, these systems work just fine in subzero temperatures (indeed, heat pumps are already thriving in Maine and chilly northern Europe).

Most contractors have an understandable, if dated, bias against electric heat pumps. Their advice is simply based on what they've always done. They see an old or broken gas or oil furnace and swap it with another, even if the electric replacement could wind up saving the person far more money. In most cases, contractors are just unfamiliar with heat pumps, since only 10 percent of households used them as their main source of heating as of 2015, according to the Energy Department.

The Inflation Reduction Act includes \$200 million for states to set up new training programs for contractors, on top of \$20 million available through the bipartisan infrastructure law. These can be designed by states however they choose, but where experts said the training is most sorely needed is in understanding of the basic benefits of a heat pump, how much it can save consumers, and the climate benefits. There's an added incentive for contractors to get up to date on their HVAC technology because the law also offers a rebate for every electric HVAC system they install in middle- and lower-income households.

**Must view:** *Why heaters are the future of cooling: heat pumps*, VOX (YouTube)  
[https://www.youtube.com/watch?v=PIulbHyK0bc&feature=youtu.be&ab\\_channel=Vox](https://www.youtube.com/watch?v=PIulbHyK0bc&feature=youtu.be&ab_channel=Vox)

A simple and clear explanation of heat pumps and their value in the climate transformation.

## Incentives

**Fact Sheets:** Inflation Reduction Act's incentives for electrifying homes.  
<https://www.rewiringamerica.org/ira-fact-sheets>

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