

# American Gas Association Energy Analysis Modeling the Economic Impacts of a Local Gas Moratorium in the Chicago Metropolitan Area

(Updated with 2022 Datasets)

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## Impacts to Residential and Commercial Energy Bills.

- In the Chicago MSA, between 2023 and 2042, the gas moratorium would affect approximately 1.5 million homes and 117,000 commercial facilities. Additionally, AGA modeled the average cost of installing high-voltage service paneling in around 662,000 older homes built before the early 1960s, which would need these upgrades to electrify.
- According to AGA, the 20-year cost of owning the average home with high-efficiency natural gas equipment would be \$21,573. The 20-year cost of owning an average home with electric equipment would be between \$45,874 and \$49,394, depending on whether the structure would require upgraded service paneling. Therefore, natural gas represents a savings of between 47% and 51% versus electricity for the energy needs of an average residential customer. Requiring electric equipment would increase customer costs between 89% and 103%.
- When equipment costs, installation costs, maintenance costs, and energy costs are annualized, the average home with natural gas would cost its customers an average of \$1,215 per year while the average electrified home would cost between \$2,294 and \$2,470 per year. Hence, natural gas customers would save between \$1,079 to \$1,255 per year.
- This analysis presumes electrification would proceed gradually as more homes and commercial structures come online and existing appliances and equipment reach the end of their service lives. In 2042, electrification would increase net costs for residential customers by \$1.45 billion and for commercial customers by \$880 million. From 2023 through 2042, residential customers' cumulative costs would increase by \$16.6 billion and commercial customers' cumulative costs would increase by \$9.6 billion for a regional total of \$26.2 billion.

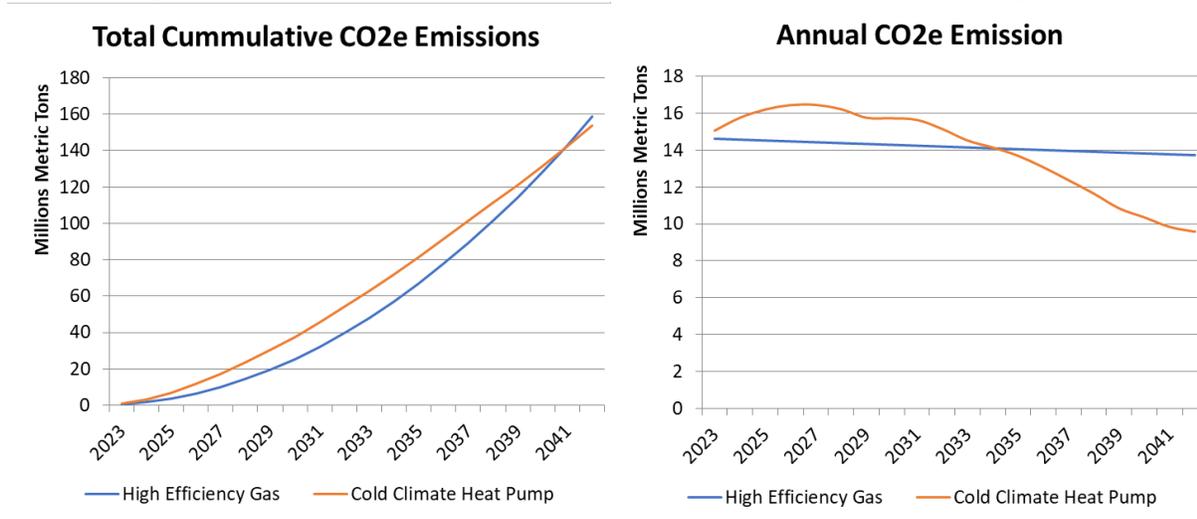
## Impact Policy Will Have on Net Emission Reductions

- A primary driver for costs to consumers is the likelihood of extreme winter weather. Based on the last 10 years of local weather data (2010-2019), Chicago experiences hourly temperatures at or below 35 degrees F 25.8% of the time, or the equivalent of over 94 full days yearly. This is a significant amount of time for customers to experience freezing temperatures outside.
- According to AGA calculations, the reduction in total equivalent carbon dioxide ("CO<sub>2</sub>") emissions from electrifying residential and commercial building stock in the Chicago region would be minimal and achieved only at costs exceeding all federal estimates of the social cost of carbon.
- The mandated electrification would decrease CO<sub>2</sub> emissions attributable to the Chicago region by a cumulative 4.8 million metric tons between 2023 and 2042. This result reflects reduced

direct use of natural gas and an increase in emissions from power generation, which would need to respond to additional load from electrification.

- Between 2023 and 2042, the continued use of natural gas while converting units to high efficiency gas appliances would emit a total of 158.6 million metric tons of CO<sub>2</sub>e compared to an all-electric pathway which would emit 153.7 million metric tons CO<sub>2</sub>e for a total savings of 3.0% over 20 years.
- AGA evaluated CO<sub>2</sub>e emissions using NREL’s ReEDS model’s long-term marginal rate and used the “Low Renewable Cost Scenario” to account for the accelerated use of renewable energy (2021 Cambium Database for the state of Illinois, located in the PJM Region). Natural gas emissions were assumed to equal 134 lbs. CO<sub>2</sub>e/MMBTU with no new decarbonization strategies throughout the 20 year period. Incorporating gas decarbonization strategies, such as integrating low-carbon fuels like renewable natural gas, would affect these results.
- Accounting for the emissions saved, the average cost per ton of CO<sub>2</sub>e saved would be \$5,417 per metric ton of CO<sub>2</sub>e.
- Figure 1 displays the impact between 2023 and 2042 for the baseline and electrified scenarios. Annual emissions from electrification don’t begin to show a net positive until the later part of the 2030s.

Figure 1 – Total emissions from modeled households and businesses through 2042

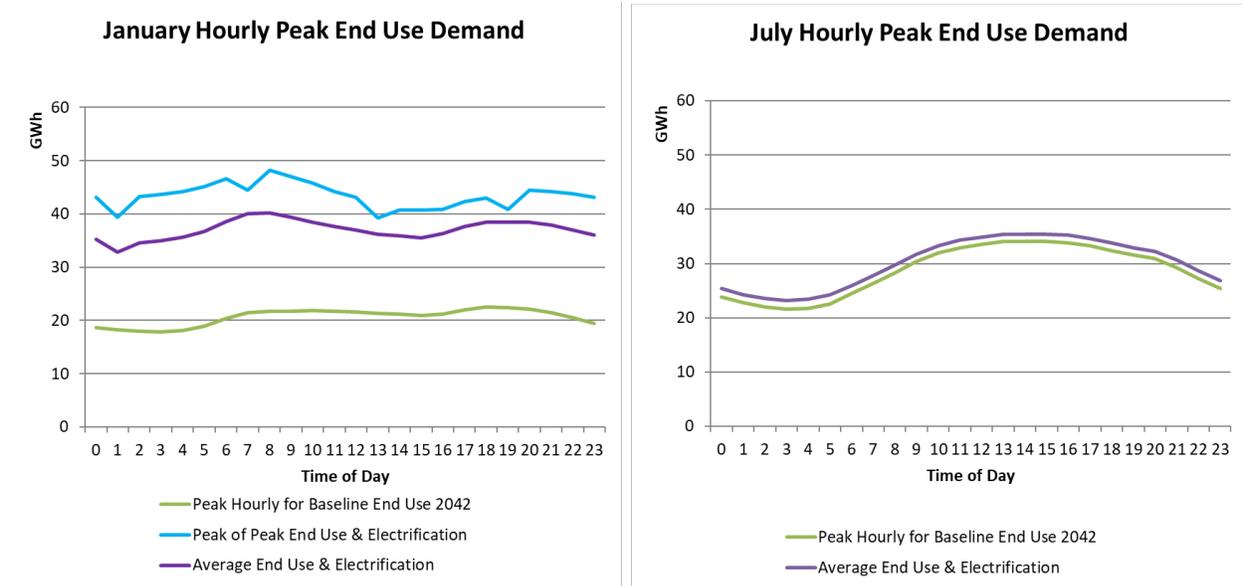


Source: AGA Modeling

**Policy Impact on Summer and Winter Demand in 2042**

- Figure 2 compares peak end-use demand in Illinois in the summer and the winter under the baseline and policy-mandated electrification scenarios in 2042. Both scenarios were built on the NREL’s cambium database forecast for 2042 electricity demand which only relies on 2012 weather data. Peak electricity demand increases more severely under a 10-year “peak of peak” event. The implications of this type of strain on energy systems may have an impact on overall energy system resilience. Nonetheless, additional margins, lower appliance efficiencies, and a 30-year horizon for weather events can be factored in to account for a broader range of possibilities.

Figure 2 – Peak of peak January demand for Illinois in 2042 after electrification policy



Source: AGA Modeling

This analysis is limited to the net costs and emissions impacts of mandated electrification for the Chicago region. It does not attempt to determine the total costs of the electrification policy for all regions. Additional costs would include: (1.) the electric generation, transmission, and distribution costs associated with increased load on the whole of the PJM Interconnection; (2.) the potential for gas utilities to raise rates on customers once the size of the customer base decreases; and (3.) and risks associated with changes in the reliability of the electrical grid and the overall resiliency of the Midwest and Mid-Atlantic energy system

**Notes on Updated Analysis (using 2022 data versus 2021)**

- The first-year price data from the Energy Information Administration was originally 2020 monthly electricity and natural gas prices. The 2022 Dataset includes the most recent EIA 2021 prices, which in all categories increased yearly. Residential and commercial electricity prices increased by 1.5% and 6.0%, and residential and commercial natural gas prices increased by 27.4% and 13.5%.
- Both models used the 2021 EIA AEO forecast for regional electricity and natural gas prices through 2042.
- NREL updated the ReEds model from 2020 to 2021 and now includes a CO2e output for the long-term marginal rate for state electricity usage. This change will result in higher emissions from new sources of electricity demand than before because more greenhouse gases are being accounted for in the model. Natural gas customers also represent an equivalent CO2e emissions estimate to match the one generated for electricity usage.
- In addition to increased emissions from other greenhouse gases, the annual long-term marginal rate for CO2-only emissions for Illinois from 2022 through 2042 increased by 57% between the NREL ReEds 2020 and the 2021 updated model. This increase suggests that the supply of lower carbon electricity will be harder to find on the margin for new demand than in the previous model