

Propane Heating Market Characterization Executive Summary

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1.0 EXECUTIVE SUMMARY

The 2022 Illinois Climate and Equitable Jobs Act (CEJA) permitted utilities to promote fuel switching measures for cost effective electrification. Space heating offers significant opportunity for electrification energy savings, as over 90% of Commonwealth Edison Company (ComEd) homes use natural gas or propane for heating (Itron, 2020). Due to higher fuel prices, homes with propane offer a more economical fuel switching retrofit than homes with natural gas.

The goal of this research is to gather information on propane customers in ComEd's service territory, characterize propane rates faced by ComEd customers, estimate cost-effectiveness of the best heat pump opportunities and develop relationships with community partners in propane areas to help connect with customers. The team summarized findings from our modeling, analysis and interviews to inform key findings and recommendations for an air source heat pump (ASHP) program for customers currently using propane heat.

Propane Prices

The residential propane price estimates in ComEd territory are informed by public data from the U.S. Energy Information Administration (EIA), rate quotes from propane providers, documentation on fixed fees and an interview with a propane provider in Michigan. Table 1 shows this study's estimates of prices under three cost scenarios. Propane rates change throughout the year from macroeconomic conditions. Rates also vary between households based largely on the home's expected propane usage. This is reflected in our collected rate quotes that show high propane users will experience moderately lower propane rates, while low users are likely to experience relatively higher rates.

Propane customer fixed fees vary based on each provider's rate structures and customer preferences. Our fixed fee estimates include delivery fees for two propane tank refills per year and tank rental, which are issues likely faced by customers.

There are other costs that customers may face depending on their preferences or situation. For example, propane customers ending their propane service may experience costs associated with removing a leased tank or, potentially, breaching a contract if they end service before their contractual obligation ends with their provider. Also, each propane provider surveyed had "low usage fees" for customers with low propane usage. Low usage fees may impact customers that offset large portions of their propane use with an ASHP. Propane customers with a new service may experience added costs for a site survey and tank installation.

Table 1. Estimated Residential Propane Prices in ComEd Territory

Propane Rate Scenario	Volumetric Rate (\$ per gallon)	Annual Fixed Fee
High	\$2.63	\$106
Medium	\$2.21	\$82
Low	\$2.03	\$94

Propane Communities

ComEd customers with propane tend to live in older, single-family homes and are located in rural clusters outside of Chicago, Illinois. The team has identified three clusters for targeting propane furnaces to heat pump retrofits, as shown in Figure 1. An electrification program should leverage strong relationships with community organizations in these clusters to identify homes that are good candidates and a well-trained heating, ventilation and air-conditioning (HVAC) contractor network to sell heat pumps and conduct high-quality installations.

Of the roughly 101,250 ComEd customers using propane, 37,500 (37%) meet ComEd's income eligibility requirements. Income-eligible customers with propane could be good candidates for ComEd's Whole Home Electrification Program. These customers could be reached through relationships with community organizations or the Low-Income Home Energy Assistance Program (LIHEAP). In comparison to multifamily homes where customers can automatically qualify for income eligibility based on their census tract, customers in single-family homes are individually asked to verify their income as part of program requirements. Most propane customers live in single-family homes and programs will need to verify their income on an individual basis.

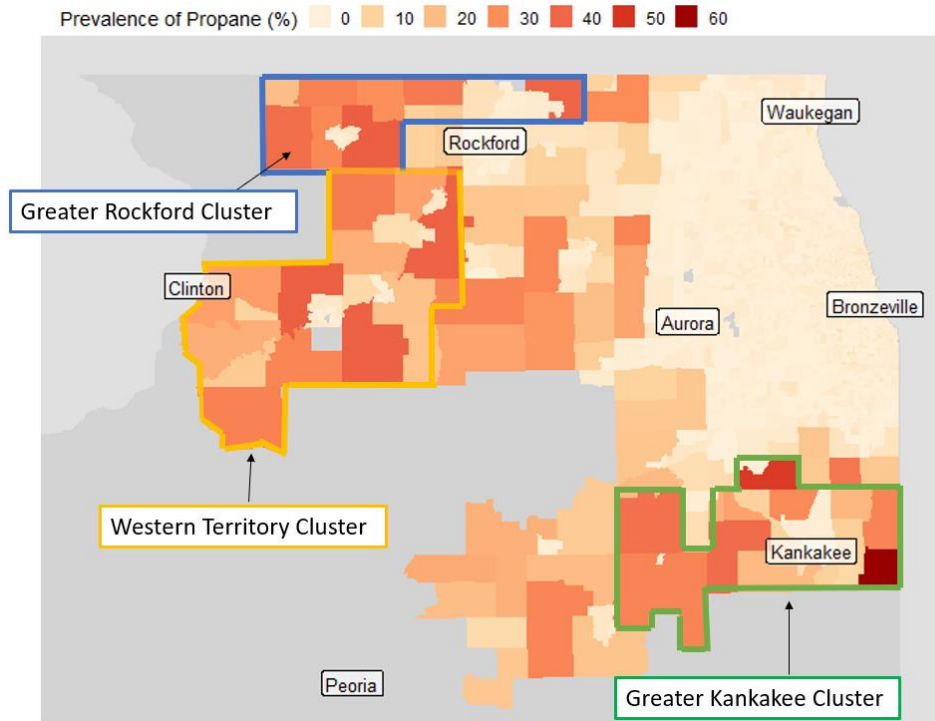


Figure 1. Propane clusters in ComEd territory

Archetype Modeling

The team modeled common propane-to-heat pump intervention archetypes to assess the simple payback that a customer may experience as well as program cost-effectiveness. The full electrification and new construction archetypes presented in Table 2 fully displace propane consumption because they use electric resistance for backup heat. The new dual fuel heat pump archetype describes a retrofit where the customer installs a new furnace with a new, variable speed heat pump that is sized to offset a large portion of the heating load. The high-end and single stage air conditioner replacements both integrate an ASHP with an existing furnace. The high-end option includes a variable speed heat pump sized for the heating load, while the single stage option is sized for the smaller cooling load.

The results in Table 2 show that all of the modeled archetypes will deliver a payback within the equipment’s useful lifetime according to the Illinois Technical Resource Manual Version 11 (IL-TRM V11). Importantly, most archetypes are likely to pay back within a product’s warranty period, which is typically between five and ten years. The single stage air conditioner replacement archetype is notably less cost-effective than the others. This may be driven by reduced energy savings from the smaller heat pump sized for cooling. However, we suspect the incremental costs of single stage heat pumps in the IL-TRM may be too high based on other research in ComEd territory.

Table 2. Archetype Cost-Effectiveness and Simple Payback¹

Archetype	Simple Payback (years)	100 Participant Cost-Effectiveness (\$/kWh saved)	500 Participant Cost-Effectiveness (\$/kWh saved)
Full Electrification	3.46	0.15	0.08
New Construction	3.33	0.16	0.08
New Dual Fuel Heat Pump	4.30	0.18	0.11
High-End Air Conditioner Replacement	4.30	0.18	0.10
Single Stage Air Conditioner Replacement	9.95	0.48	0.26

Program Design Considerations

The archetype modeling shows that heat pump interventions in propane homes can be cost effective for both customers and efficiency programs. The team recommends that ComEd’s program strives for full electrification retrofits, but still offers incentives for partial electrification retrofits where customers retain a fossil fuel backup. Both full and partial electrification are cost effective and feedback from interviews with Efficiency Maine, Mass Save® and Efficiency Vermont suggest that customers may not see the benefit in removing their propane tank.

Program outreach for propane customers should focus on clusters near high density propane areas. The program should seek to build enduring relationships in the community with community action agencies, weatherization providers and LIHEAP providers to promote the program and potentially provide referrals. Additionally, these communities will need a strong network of HVAC contractors that are comfortable with heat pump installations and equipped with sales pitches for customers who have propane space heating. In interviews with community organizations, they caution utility programs to be intentional about messaging to rural propane customers. Resiliency and economics-focused messaging may be more effective than themes of environmentalism for customers with propane. Promoting heat pumps with messaging that does not resonate with customers could lead to poor perceptions of the technology.

¹ These estimates include equipment, installation, operating, and energy costs. They do not include the costs of non-energy impacts or electrification upgrade costs. They also do not include a low usage charge, because homes may or may not experience those depending on retrofit and other site-specific characteristics.

Key Findings

Key findings from the team's propane market research include:

1. Although propane only accounts for three percent of residential home heating in ComEd territory, rural areas without access to natural gas have a higher density of homes heated by propane.
2. Propane is consistently more expensive than natural gas and homes heated with propane will be more economical candidates for fuel switching heat pump retrofits than homes with natural gas heating.
3. There are likely to be additional fixed costs for propane customers who either terminate their propane service due to full electrification or significantly reduce their usage due to partial electrification.
4. Variable speed heat pump retrofits in propane-heated homes are cost effective from a utility energy efficiency program perspective and are beneficial for customers as well. This should be considered when retrofitting full or partial electrification of a home's space heating.
5. Single stage heat pump retrofits are less cost effective but should still be promoted over central air conditioners (CACs).
6. Approximately 37% of propane customers are income eligible, which aligns with the percentage of income eligible customers across other fuel types.
7. The propane industry is actively advocating for expansion of propane through lobbying, programs and marketing campaigns. Some propane leaders see decarbonization as a threat to their business, while others see themselves as a part of the transition.
8. Although residential homes with propane may be an easy market to address through existing energy efficiency programs, propane is also used in commercial and industrial sectors for heating, cooling, transportation, manufacturing and agricultural processes.
9. Rural homes may be more receptive to messaging about energy resiliency or economics than environmental marketing messages for heat pump adoption. Promoting heat pumps with messaging that does not resonate with customers could lead to poor perceptions of the technology.
10. Community organizations are willing to work with ComEd to promote heat pumps. Building consistent, trusting relationships with these organizations will help with long-term heat pump market transformation.

Recommendations

Recommendations derived from the team's propane market research include:

1. Target residential homes or small commercial businesses using propane for any heat pump retrofit for full electrification and partial electrification.
2. Develop the HVAC contractor network in Rockford, Illinois by engaging with Union 23 and ComEd's Diverse Stakeholder program, both of which are interested in ASHP training. A similar approach can be applied to other propane clusters.
3. Identify income eligible propane customers to target through community organizations and LIHEAP providers for ComEd's Whole Home Electrification program.
4. Add ASHPs as the recommended technology for replacing propane heating systems in guidance documents for applicable energy efficiency programs.
5. Design outreach messaging for rural areas that aligns with other successful marketing campaigns for those customers.
6. Interview or survey ComEd customers who use propane to gather feedback on their experience with propane and collect data on their fixed costs, like low propane usage fees and tank removal costs.
7. Consider proposing adjustments to the IL-TRM to include scenarios for dual fuel heat pumps to account for the differences in energy savings and costs for partial displacement or heat pump compressor type.