

Home Infrastructure Upgrades to Enable Residential Electrification Executive Summary

Release Date

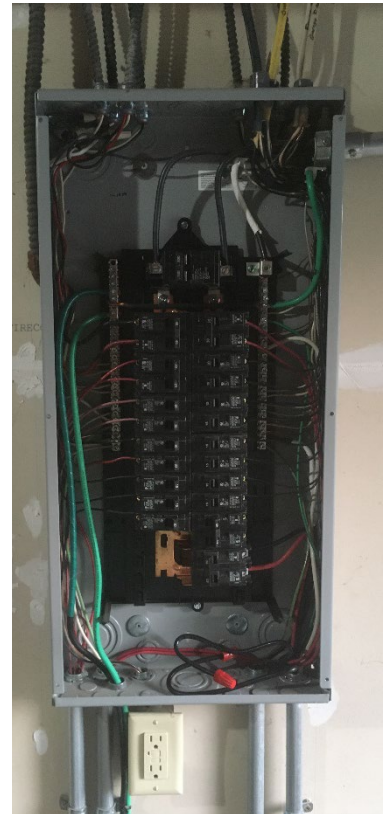
October 21, 2022

Prepared For

Commonwealth Edison Company

Prepared By

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Acknowledgements

This project was developed as part of the Emerging Technologies initiative within the ComEd Energy Efficiency Program under internal project number P-0674. Slipstream produced this report for the Emerging Technologies Team with overall guidance and management from Rick Tonielli and Pauravi Shah. The team acknowledges the support of Kevin Gries, Diba Malekpour, Sam Simonetta, Lee Shaver and Andrew Kotila from Slipstream, and Louise Sharrow from Elevate. For more information on this project or to request the full report, contact EmergingTech@ComEd.com.

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1.0 EXECUTIVE SUMMARY

ComEd is developing programs to promote residential electrification. Fuel switching end uses from gas to electricity adds electrical load to homes. Almost all electrification projects will require some level of electrical infrastructure work to enable the new electric appliances. This research characterizes the existing residential building stock, inventories loads and minimum amperage service sizes, investigates electrical infrastructure costs and hurdles that need to be overcome to enable electrification in this market and examines potential solutions.

Characterizing Existing Equipment

About 85% of ComEd residential customers use natural gas to heat their homes. About 3% use propane. The values are slightly smaller for domestic water heating. Propane users are primarily located in rural areas outside of the Chicago metropolitan area and are good targets for electrification in the near term since efficient electric options are more cost competitive against propane than against low-cost natural gas. Roughly two-thirds of ComEd residential customers (about 2.2 million units) have 100A or smaller electrical service.

Load Inventory and Electrical Panel Sizing

Most homes with 100A service can add some new loads with no major upgrades. So, most homes in ComEd territory can *partially* electrify now. But to *fully* electrify all homes, a huge investment in both home and utility electrical infrastructure will be necessary.

Typical electrification measures include water heating, space heating, cooking, clothes drying, and EV charging. A home pursuing electrification may choose to install any combination of these appliances and may install them all at once or over time, in any order.

Most existing homes with 100A service can support electrification of two of the three most common gas-fueled appliances (kitchen range, dryer and water heater). But doing all three would likely require upgrading to 200A service. The fully electrified home will almost certainly require 200A service. But 200A should be enough for most all-electric homes, even with an electric vehicle. Appliance efficiency and building weatherization are important factors affecting whether electrification can be accomplished on a given amperage service level.

Electrical Service Upgrades

Preparing a home's electrical infrastructure to enable electrification can be a complicated and time-consuming process. Response time from ComEd is usually faster than that stated on the utility website. Several electricians stated that current wait time for a ComEd disconnect/reconnect is around four weeks for overhead service and only slightly longer for underground service. Nonetheless, electrical upgrades need to be factored into the timeline of electrification projects.

Electrical Upgrade Costs

No two home electrical infrastructure projects are the same and costs vary widely. There are so many project-specific variables that the standard deviation of project costs is large, and choosing a single typical value is challenging.

Electrical infrastructure projects to enable electrification can be grouped into three main buckets:

- 1) Amperage service upgrade: typical cost \$4,000 - \$6,000
- 2) Replacement panel or subpanel without amperage service upgrade: typical cost \$1,000
- 3) New dedicated circuits: typical cost \$400

Electrical service upgrades are routine projects and are not a barrier to electrification *if* the lead time and financial costs are considered.

Solutions for Avoiding Service Upgrades

Several technologies and solutions can help residential customers avoid amperage service upgrades by managing and prioritizing loads. The options range from relatively simple circuit-sharing plugs that can safely split the demands of major electrical loads, to fully digital smart panels and circuit breakers that offer Wi-Fi connectivity and active control over major added loads such as EV chargers and solar batteries. End-use equipment such as dual-fuel heat pumps and 120V heat pump water heaters can reduce loads as well. Several of these items are still in the early adopter phase of development.

Recommendations

- Start with partial electrification now
- Start with homes on propane
- Offer cash incentives for service and panel upgrades
- Coordinate incentives with the Inflation Reduction Act and financing
- Plan for electrification in advance
- Target older gas-fired equipment
- Study offering loaner equipment for emergency replacements
- Encourage variable-speed heat pumps
- Continue researching 120V heat pump water heaters
- Include health and safety messaging when promoting electrification
- Partner with income-qualified weatherization programs
- Compile ComEd information on existing service
- Increase minimum allowed amperage service
- Research smart panel devices