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Electric Upgrade Cost Avoidance (EUCA) Project

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This report summarizes the findings from a literature review and in-depth interviews performed as part of the Electric Upgrade Cost Avoidance study (EUCA) conducted by ILLUME Advising in Fall 2024. The goal of this research was to help Commonwealth Edison Company (ComEd) better understand options for avoiding electric panel upgrading that often accompanies electrification of residential properties. ILLUME interviewed both internal and external partners of ComEd who have knowledge of electrification issues, familiarity with cost avoidance strategies, and understanding of the needs of ComEd program teams.

EXECUTIVE SUMMARY

As ComEd continues to make strides toward meeting its electrification and decarbonization goals, there is growing interest in exploring what alternative strategies can be used to avoid the costly panel upgrades often seemingly necessitated by residential electrification efforts.[1] ILLUME combined in-depth interviews with a literature review to identify strategies that can help avoid panel upgrades, as well as outline where challenges exist with these alternative approaches.

This research identified several strategies that can be used independently or simultaneously, depending on the current and predicted future demand needs at a given site. Some of these strategies include installing (a) low-power equipment (LPE), (b) hard-wired devices, such as tandem breakers or circuit splitters that expand the number of available circuits, and (c) smart circuits, breakers, or panels that manage load. LPE helps to avoid panel upgrades because it reduces the demand put on the panel when the device is in use. Tandem breakers, circuit splitters, and smart circuits/panels can help to avoid panel upgrades by providing additional circuits and/or by managing the load on the panel to turn off one or more circuits while another is in use, thereby avoiding exceeding the panel's capacity. Other strategies involve different approaches to panel wiring and loading or take multiple approaches described in this report for whole panel management. Finally, one option is to use an alternative method for estimating the needed panel capacity based on actual historic energy demand rather than name plate ratings for on-site equipment.

[1] Discussion of electric panel upgrades in the context of this research often encompasses two components: panel upsizing and home service upgrades. Panel upsizing refers to replacing an electrical panel with one of higher ampacity (such as increasing from 100A to 200A) and is work completed by an electrician on the 'customer side of the meter'. Service upgrades refer to increasing the level of electrical service provided to the home and takes place on the 'utility side of the meter.' Unless otherwise specified, for the purposes of this report, we use 'electric panel upgrades' to refer to the combination of panel upsizing and service upgrading to a home.

Some barriers identified by this research are the lack of key market actors' familiarity with these strategies and the lack of data availability for implementing them at scale. At the conclusion of this study report, ILLUME provides recommendations on how ComEd can further understand and test these strategies in the context of existing program offerings and help inform the development of new offerings.

Key Findings

As exhibited throughout this report, there are a variety of strategies that can be implemented to avoid panel upsizing during residential electrification projects. However, these strategies are still relatively new and/or not commonly known or used by contractors and key market actors, such as electrical inspectors.

Additionally, internal partners expressed one reason nearly all homes in the Whole Home Electrification program are getting upgrades is because upgrades make the program simpler and more streamlined. For an alternative strategy to be viable, the strategy might need to be straightforward, apply broadly across homes, and avoid a per-home individualized assessment.

Recommendations

ComEd has multiple options to better understand and test the opportunities and cost-effectiveness of electric upgrade cost avoidance strategies. To what strategies are pursued and in the order and/or combination depends, in part, on current and near-term program design and implementation plans, and other ComEd objectives, notably around exploring a dual fuel offering. In this section, we provide recommendations on how ComEd may advance this effort. These efforts could be made separately or in conjunction, as we describe in the Program Integration section below.

Market Assessment

Market Characterization. One component to consider is the status of panel sizes in ComEd's service territory. To collect this information, ComEd can conduct research on the prevalence of various residential panel sizes located in its service territory. One way to collect this data would be to work with relevant program teams and implementation staff to collect this information in participant's homes. Another way to collect this data would be to create a representative sample of homes in ComEd's service territory and collect data on panel sizes in this sampling of homes. This dataset could be helpful in further research, such as approximating the need and cost for potential panel upgrades and thus, the cost-benefit analysis of pursuing alternative options. This data could also inform which alternative options are most ideal for homes in ComEd's territory, given the range and typical panel sizes in homes in this area.

To better understand the capacity of existing panels in ComEd's service territory, ComEd could also conduct research by monitoring home energy usage. This research could include equipping a representative sample of homes to allow for 15-minute interval Advanced Meter Infrastructure (AMI) data and collecting information on each home's existing panel size. This usage could next be compared to the panel size in the home to determine how much additional capacity the panel has and needs based on the usage data. Modeling could be done to determine how many of these homes could be electrified using alternative strategies like placing weatherization and installing a load-sharing device. This research would be useful to understand the best alternative strategies that could be used in homes in ComEd's service territory. In addition, this research may be beneficial in demonstrating to local electrical code inspectors that this method of determining panel capacity is just as useful as the typical methods currently performed to calculate panel size.

Awareness and Perception Research. A final research approach is ComEd can conduct research to develop an understanding of local market actors' (e.g., electricians and code officials) current approaches and practices on electrifying residential homes. This research can also provide insight into their awareness and perception of the alternative strategies discussed in the report. This work could inform what program design elements and interventions would be needed to create market momentum to scale these strategies, inform the design and development of contractor training, and understand the barriers and challenges that exist with local market actors' and how ComEd can work toward collaboration, education, and training on possible alternative strategies in the future.

Market Development

Training. A key component to developing awareness and understanding of recent technologies is training. ComEd can design and offer contractor training on how to select and implement various electric upgrade cost avoidance strategies. ComEd may also create a flow chart or easy-to-understand decision tree or decision-making aid that can allow a contractor to systematically determine the best strategy or combination of strategies to implement in a home toward electrification. We are aware of such tools being used and developed in California and Colorado. Both examples can provide ComEd with a good starting point which the utility can build upon and adapt for ComEd's needs.

Pilot. A pilot can also be considered to better understand how these alternative approaches work and function. ComEd can design and conduct a pilot designed to test the effectiveness and cost of implementing these strategies. This pilot could be done by implementing in an existing program offering model or by creating a new one in service, as described below. A pilot can help develop the market for scalability by service to further train contractors, establish a case study to convince and compel key market actors and potential participants and collect and assess customer satisfaction.

Program Integration

IE Whole Home Program – EUCA Opportunity Assessment

ComEd can work with the IE Whole Home program team to identify, test, and scale strategies to reduce and limit the need to upgrade electric panels and/or service in participant homes. This work could follow the following draft set of tasks:

Potential Tasks:

- Task 0 – Confirm interest and feasibility of conducting this effort with the program team.
- Task 1 – Detail the current practice of the implementation team, including market actors, decision-makers, decision trees, processes, etc.
- Task 2 – Characterize participant (and likely participant) homes, loads, and existing panels.
  Task 3 – Attempt to estimate the prevalence of various panel sizes across ComEd's IE customers.
- Task 4 – Select a set of strategies to test on a small scale. Determine if these strategies can be done as a part of the program or as an R&D project.
  - Consider testing multiple sets of strategies.
  - Could borrow from decision trees being developed in California and Colorado to help inform strategy design and implementation.
  - Review IL-TRM to understand any potential implications or opportunities
- Task 5 – Test, evaluate, and iterate.
- Task 6 – Outline program design recommendations for scaling.

Dual Fuel

ComEd can work with various internal stakeholders to create a roadmap ComEd can use to design, test, and lift a dual-fuel residential electrification offering. This work could follow the following draft set of tasks:

Potential Tasks:

- Task 1 – Review existing (relevant) dual-fuel offerings and characterize key program design components.
- Task 2 – Interview key ComEd stakeholders and staff to understand needs and potential barriers.
- Task 3 – Review the IL-TRM to understand program design implications.
- Task 4 – Construct a roadmap.

Market Scanning

ComEd should continue to monitor studies and developments underway designed to provide better and yet more alternatives to residential electric upgrades and draw from any useful findings to inform strategy development.