

Fan Energy Index Market Development Executive Summary



Photo courtesy of Greenheck Fans

Release Date

September 29, 2023

Prepared For

Commonwealth Edison Company

Prepared By

Slipstream and Productive Energy Solutions

Acknowledgments

This project was developed as part of the Emerging Technologies initiative within the ComEd Energy Efficiency Program under internal project number P-0664. Slipstream produced this report for the Emerging Technologies team with overall guidance and management from Steven LaBarge. The team acknowledges the support of William Wilberg and Andrey Gribovich of DNV for their insights on midstream program implementation and support of fan distributor research. We express deep gratitude to the manufacturers who provided data for the market baseline analysis and the distributors who participated in interviews: Hatchell and MK Systems. For more information on this project, contact EmergingTech@ComEd.com.

Legal Notice

In support of its mission, ComEd engages in numerous research projects focused on improving energy efficiency opportunities for customers. This report describes one such project. It is posted only for general customer awareness. It is not technical guidance and cannot be copied in full or part or reused in any form or manner. It cannot be relied upon. We make no representation, nor by providing this example do we imply, that its content is correct, accurate, complete, or useful in any manner – including the particular purpose to which it relates.

The ComEd Energy Efficiency Program is funded in compliance with state law.

1.0 EXECUTIVE SUMMARY

This report provides market data to inform ComEd's on whether to develop midstream incentives for commercial and industrial standalone fans through the Instant Discounts program. This research builds on a technical energy savings potential estimate completed in 2021 and interviews with supply chain actors completed in 2022.

Standalone fans are responsible for around five percent of commercial building energy consumption. Some utility programs have been leveraging the new Fan Energy Index (FEI) developed by the Air Movement and Control Association International (AMCA) to launch incentives for standalone fans. All of these programs are administered through distributors and most of them employ a midstream incentive strategy. Given the small number of fan distributors serving a given market and the influence that distributors and sales reps have on the fan selection process, midstream programs represent a good pathway for promoting the optimal selection of standalone fans. The FEI rating applies to fans with motors larger than one horsepower (hp); fans with motors below this threshold are exempt from the FEI rating.

To inform ComEd's decision on whether to develop a midstream offering for standalone fans, we obtained sales data from two major manufacturers to determine the average FEI of fans being installed in ComEd territory today. These manufacturers represent around 60 percent of total fans sales nationwide. We found that average FEI varies widely by fan type. Centrifugal inline and axial inline fans represent a combined 75 percent of the national fan sales market and also have a lower average FEI rating than most of the other fan types. For the other fan types (centrifugal housed, etc.), our research revealed that a large portion of the fans sold have an FEI rating of 1.25 or above.

Unfortunately, the data we obtained indicates that the market for non-exempt standalone fans in ComEd territory is much smaller than was estimated in the 2021 technical achievable potential study. The current estimate of annual non-exempt fan sales in ComEd territory is 1,625 fans for the commercial sector and 533 fans for the industrial sector: 12 to 14 percent of the original market size estimate. Given the share of the market that is already at an FEI of 1.25 or above, there is also significant free ridership potential for fans between the code-required FEI of 1.0 and FEI of 1.25.

Under the conservative assumption that ComEd would not be able to claim program-influenced savings at FEI of 1.25 or below, we estimated the net energy savings of a program using an FEI rating threshold of 1.4, which could yield potential savings between 260,000 kWh and 1.03 million kWh per year. The lower end of the range assumes 5 percent market penetration for FEI incentives and the upper end of the range assumes 20 percent penetration. The distributors we interviewed for this phase of the research indicated that the program would likely be able to influence 10 to 20 percent of fan sales assuming that incentives were meaningful. This achievable energy savings potential estimate is likely lower than it would have been had we been able to

secure data from all the major fan manufacturers. The main reason is that the participating manufacturers produce a larger share of small fans that are exempt from FEI requirements. Some nonparticipating manufacturers produce a smaller percentage of exempt fans. When we scaled up the data from participating manufacturers to estimate the size of the total market, results were likely skewed downwards because of the high fraction of exempt fans produced by participating manufacturers.

Although these results do not indicate a “slam dunk” in terms of program opportunity, there are still good reasons to develop a FEI incentive offering. ComEd would be addressing a currently untapped source of energy savings. Fans are a long-lived measure, contributing to Cumulative Persisting Annual Savings (CPAS) goals. There is an opportunity to expand participation for at least one distributor currently participating in Instant Discounts (Hatchell) while building relationships with others. And higher FEI fans are better products, with quieter performance and lifetime cost savings that will benefit ComEd customers.

If ComEd elects to proceed with midstream incentives for standalone fans, we recommend the following program design elements:

- Establish incentive eligibility at FEI of 1.4 to reduce free ridership risk.
- Use a straightforward incentive strategy that is consistent across fan types such as \$/hp, so that the program is easy for reps to explain to their customers.
- Ensure that incentives are meaningful, particularly for larger fans, by covering at least 50 percent of the incremental material cost.
- Include a portion of the incentive designated to offset the administrative/marketing costs of participating distributors and sales reps (an existing practice of the Instant Discounts program, as well as part of one other utility programs we reviewed).

Key Outcomes and Lessons Learned

The market data available for this study was provided by two of the five largest fan manufacturers. We estimate that the data provided represents around 60 percent of fan sales in ComEd service area. If that estimate is accurate, then approximately 2,158 standalone fans are sold in the service area per year, totaling approximately 21,922 motor hp. This estimate is significantly lower than in our Phase 1 report due to differences in the data sources used and, in the Phase 1 report, a lack of data that would have enabled us to estimate the percentage of standalone fans that are not subject to the FEI energy code requirement (e.g., smaller than 1 hp). In Phase 1, we assumed 100 percent of the standalone fans sold to the ComEd service area would have a valid FEI metric, but the manufacturer provided data from Phase 2 shows that only around 20 percent of standalone fans sold are not exempt from the FEI requirement. Based on insights from AMCA, we believe this share of non-exempt fans is actually much higher

for manufacturers that did not participate in this study. Nevertheless, this difference greatly reduced the achievable energy savings potential by significantly lowering the number of fans that could be influenced by a utility incentive program. If nonparticipating manufacturers do have a larger share of non-exempt fans, then our achievable energy savings estimate is likely quite conservative.

Average FEI varies significantly by fan type, ranging from 0.96 for power roof ventilators to 1.44 for centrifugal unhooded fans. The manufacturers that provided data produce higher-end products, so it is possible that the average FEI results in our dataset are somewhat higher than they would be if we had been able to obtain data from all manufacturers.

- Power roof ventilator fans for commercial buildings have the biggest room for improvement, with most sizes of fans showing an average FEI below 1.0.
- Centrifugal inline fans in both the commercial and industrial sector also have significant opportunities for improvement, with most sizes of fans having an average FEI below 1.25.
- The majority of axial inline and centrifugal unhooded fans sold in the commercial sector, and centrifugal hooded fans sold in both sectors are already above 1.25 FEI, so a program targeting these fan types would ideally establish incentive eligibility at FEI of 1.40 or above.

Given the significant portion of the fan market that is already at FEI of 1.25 or higher, free ridership risk reduces the potential energy savings that could be captured from a standalone fan incentive offering. Under a 20 percent market penetration estimate, annual first-year savings are reduced from 1.4 million kWh per year in the gross savings estimate to 1.03 million kWh per year in the net savings estimate, a 27 percent reduction. Although the first-year energy savings from an FEI-based incentive strategy are low, fans are long-lived measures. Earlier interviews confirmed that fans are rarely replaced before the end of their useful life. Fan savings will persist for 15 to 20 years. The Illinois TRM measure for fans lists measures lifetimes ranging from 15 years for variable speed to 18 to 25 years for constant speed.

The distributors we interviewed are enthusiastic about participating in an Instant Discounts offer for standalone fans. They felt that a program would be able to influence around 10 to 20 percent of sales and is likely to grow over time. Though a program might initially start with a couple of distributors, it is likely that others would get on board once the program was in place. There are fewer than ten total fan distributors serving the ComEd market. A program would be most likely to influence the sales of larger fans that have a longer sales cycle and would have more influence on design-build projects than plan/spec.

The utility programs we reviewed mostly offer the same incentive regardless of fan type, except that two of the programs (Seattle City Light and DTE Energy) offer slightly lower incentives for power roof ventilators. Xcel and the Department of Energy do not

differentiate incentives by fan type. Distributors strongly prefer incentive offerings that are consistent across fan types.

Recommendations

The market for standalone fans subject to the FEI requirement is much smaller than originally estimated in our Phase 1 study, which is a key factor driving the determination of whether ComEd should pursue developing a midstream incentive offering for standalone fans. As discussed above, there are reasons to believe that the current estimate of achievable savings potential is conservative. There are a few reasons why a standalone fan incentive offering would be beneficial: (1) capture savings from a source that is not currently addressed in the ComEd portfolio; (2) ensure that savings are locked in over the long lifetime of installed fans (15 to 25 years is typical); and (3) educate distributors, mechanical engineering design firms, and customers about the benefits of higher-FEI fans. Higher FEI fans produce savings for ComEd in terms of energy savings. Participating distributors benefit because ComEd incentives make higher FEI products more attractive to customers and improve their net margins. ComEd customers benefit from purchasing a better product that uses less energy, operates more quietly, and performs better in the specified application.

ComEd must balance the cost of developing a new program offering for energy-efficient fans against these potential benefits. Rolling out midstream FEI incentives will involve forging relationships with distributors, reps, and manufacturers that are new to Instant Discounts. In addition, there is a continuing need to educate the market—particularly engineering design firms—so that FEI requirements are more regularly included in equipment specs. Because the FEI of a given fan varies depending on the application, the process of administering incentives is somewhat more complex than for other types of equipment, requiring several data inputs to determine incentive eligibility (airflow, pressure, speed, motor horsepower). Manufacturers' fan selection software makes the FEI determination straightforward for a given product and application.

If ComEd elects to proceed with midstream incentives for standalone fans, we recommend the following program design elements:

- Establish incentive eligibility at FEI of 1.4 to improve program impact and to reduce free ridership risk.
- Use a straightforward incentive strategy that is consistent across fan types such as \$/hp.
- Ensure that incentives are meaningful, particularly for larger fans, by covering at least 50 percent of the incremental material cost.
- Include a portion of the incentive designated to offset the administrative and marketing costs of participating distributors and sales reps (an existing practice of the Instant Discounts program and also part of the DTE Energy program).