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Alternative Form Factor Heat Pump Roadmap Executive Summary

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Prepared For
Commonwealth Edison Company

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1.0 Executive Summary

This report outlines a roadmap for the integration of Alternative Form Factor Heat Pumps (AFFHPs) into four ComEd energy efficiency programs: Home Heating & Cooling (HHC), Home Energy Products (or Retail Program and Retail Products Platform, RPP), Whole Home Electric (WHE), and Residential New Construction. The purpose of the roadmap is to deliver concrete, actionable recommendations to ComEd program and portfolio managers by detailing the applicable products for relevant programs, providing short- and long-term recommendations for integration, discussing barriers and other considerations, and estimating savings and cost-effectiveness for typical installations.

In June 2025, Slipstream and Elevate delivered a report to ComEd titled "Pushing the Envelope: Alternative Form Factor Heat Pump Market Assessment," which was Phase 1 of this work. This report provided information on the state of AFFHP technologies, broadly characterized the potential market, and commented on the barriers to deploying these systems. The report indicated that AFFHPs can significantly expand the range of viable electrification pathways in ComEd's territory, especially for multifamily fossil-fuel heated buildings. The report recommended that ComEd formally incorporate AFFHP technologies into its energy efficiency program portfolio, highlighting clear eligibility criteria and incentive structures for AFFHPs within relevant programs to increase both energy savings potential and customer benefits.

In this second phase of a more detailed investigation, the project team first interviewed AFFHP manufacturers to determine current and projected levels of market availability for the different technologies. The findings from these interviews provided information as to the level of confidence with which ComEd could integrate AFFHPs into future programs. The interview guide and summary of findings from the manufacturer interviews can be found in Appendix A and B, respectively.

Based on the Phase 1 Market Assessment and input from the ComEd Energy Efficiency Research & Development team, four programs were selected for the roadmap investigation detailed in this report. Those programs were: HHC, Home Energy Products, WHE, and Residential New Construction. The project team interviewed ComEd Program Managers (and implementation contractor staff) from the four programs to gain insights into adoption barriers and program opportunities that should influence AFFHP deployment strategies. Findings from the interviews helped identify best-fit AFFHP technologies for each program to shape program integration recommendations and modeled cost and energy savings. The interview guide and summary of findings from the ComEd staff interviews can be found in Appendix C and D, respectively.

The Phase 1 Market Assessment estimated aggregate savings at a high level across the entire ComEd multifamily building stock, which is useful for gauging the magnitude of the opportunity. Since savings vary by delivery channel and building stock, the project team modeled cost and energy savings for each of the four programs in this Phase 2. The installation scenarios for these models were identified based on Phase 1 results and Phase 2 interviews.

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The project team then facilitated a working session with ComEd Customer Innovation staff to reach a shared vision for each program within the roadmap. Insights from this working session are integrated throughout this report.

Key Findings

AFFHPs offer heat pump (HP) solutions that are well matched to space-constrained dwelling units like those in multifamily buildings, older residential buildings, and buildings lacking existing ductwork. These technologies include window heat pumps such as saddlebag and window box units, sleeve and two-port packaged terminal heat pumps (PTHP) that attach to an exterior wall, and vertical stack heat pumps designed to fit within existing utility closets.

Interview learnings reflect that across ComEd's residential programs, AFFHP adoption is constrained less by equipment performance than by how these technologies intersect with existing policy, program designs, and market infrastructure. Modest adjustments within ComEd's current program offerings could substantially expand AFFHP participation and extend program reach into underserved multifamily and renter-occupied segments. Updates to program eligibility requirements and integration of non-standard efficiency ratings in eligibility requirements would allow these technologies to fit more naturally within existing program offerings.

In addition, AFFHPs allow greater flexibility in equipment placement, discretionary usage, and backup heat control strategies (e.g., the potential for simultaneous backup heat and heat pump operation). This introduces operational complexities that influence system runtime and the interaction between heat pumps and backup heating. These complexities are not currently reflected in the Illinois Technical Reference Manual (IL TRM) ASHP measure (IL TRM v14 Measure 5.3.1). Targeted pilot programs designed to observe real-world system installation and operation could help inform future TRM refinements to better incorporate these nuances. However, as with most energy efficiency measures, uncertainty between modeled and realized savings will remain due to variation in installation practices and customer operation.

Modeling results highlight that the retrofit strategy for AFFHPs should be driven by baseline conditions rather than a single electrification objective. In buildings currently heated with natural gas, partial displacement scenarios generally offer broader applicability and more favorable customer cost outcomes than full replacement strategies. Conversely, in electric resistance heated buildings, full displacement with AFFHPs delivers the largest bill savings. Note that further research into contractor behavior and current installation practices is recommended to refine the partial displacement modeling assumptions used in this analysis. Modeling results should be interpreted with appropriate caveats until current practices are better understood.

Across all programs, successful integration will also depend on coordinated market education. Many contractors, retailers, distributors, designers, and building owners have limited exposure to AFFHP configurations, which can lead to risk-averse decisions such as inflated bids or dismissal of feasible projects. Leveraging existing program relationships to provide focused training, practical case studies, and guidance early in the design or purchasing process can reduce these soft barriers.

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Key findings are summarized below by program.

Whole Home Electric (WHE)

The WHE program is a highly targeted, income-eligible offering designed to electrify HVAC systems and appliances in single-family and multifamily buildings, often at little or no cost to the customer. To control costs and ensure bill savings, the program has historically restricted eligibility to buildings with in-unit ducted systems that can be readily retrofitted with unitary heat pumps, excluding many electrically heated or room-based configurations. There is potential for the integration of AFFHPs like saddlebag HPs, sleeve PTHPs, and vertical stack HPs if eligible building typologies were expanded. There is also a large, untapped potential for cost-effective partial and full electrification if ComEd can work with stakeholders to compensate for cost shifting under the Separate Metering requirements of the Illinois Administrative Code. Whole-building pilots could help to increase market awareness of and comfort with AFFHPs at the full-building scale.

Home Energy Products (Retail Program and Retail Products Platform, RPP)

The Home Energy Products program incentivizes the purchase of certified appliances through retail channels, offering instant discounts, coupons, and rebates. The Retail program operates through direct retailer partnerships and depends heavily on standardized product categories, retailer stocking decisions, and seasonal floor space constraints. The Retail program offers a scalable pathway for window-based heat pump products that align with existing retail stocking and purchasing behavior. Pilot usage data and TRM updates could support higher incentive levels and broader retailer participation. The RPP has limited flexibility due to nationally defined product lists, but window-based AFFHP products could be incorporated into ComEd's offering in the longer term.

Residential New Construction

Residential New Construction consists of two offerings for 2025: Affordable Housing New Construction (AHNC) and Electric Homes New Construction (EHNC). The AHNC program supports energy efficiency in new construction and major renovation projects serving income-eligible households through a consultative, performance-based incentive structure. Incentives are tied to whole-building outcomes rather than specific measures, allowing program staff to accommodate new technologies through custom calculations and performance adjustments relative to established standards. While this flexibility makes the program technically well suited to emerging HVAC solutions, adoption depends heavily on early-stage awareness and confidence among architects, developers, and builders. Integration efforts therefore emphasize engagement with design professionals, clearer inclusion of AFFHPs in program standards, and increased visibility of packaged heat pump options as compliant solutions rather than exceptions.

Home Heating & Cooling (HHC)

The HHC program provides incentives to residential customers delivered through midstream and downstream models that rely on distributors and a network of trained contractors.

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The program maintains a qualified product list and is structured to support standardized, contractor-installed solutions in single-family and small multifamily buildings, with most installations resulting in partial heating displacement. Its broad contractor reach enables wide market penetration, but the program's narrow scope and reliance on established distributor channels limit flexibility to accommodate non-traditional delivery models. AFFHP integration opportunities require aligning AFFHP products with existing qualification criteria and connecting distributor and contractor networks with AFFHP manufacturers.

Roadmap Recommendations

Based on learnings from interviews with manufacturers and program staff, the research team selected the best-fit AFFHP technologies for each program. These best-fit scenarios are the focus of the modeling and program integration recommendations.

Program, Product, and Pilot Priorities

Table 1 provides a prioritized list of programs and products for AFFHP integration along with brief recommendations for each program match.

Table 1: Prioritized list of program and product type

Rank	Program	Product	Reason for Rank
1	WHE- Multifamily	Saddlebag/ccWindow Box/2 Port PTHP	Viable partial displacement options, program experience can inform retail offerings
2	WHE- Multifamily	Sleeve PTHP	Clear implementation pathway as replacements for electric resistance in PTAC
3	Home Energy Products	3-season window box	Replacement for window ACs that may be the easiest fit for existing business model; some evaluation risk due to discretionary usage
4	Home Energy Products	ccWindow Box & Saddlebag	Promising long-term integration with wide reach of opportunity; however, need to modify business model
5	New Construction-AHNC	2 Port PTHP	Already can be included in program ad hoc; niche option but viable; education and awareness should be a focus
6	WHE- Multifamily	Vertical Stack HP	Possible use case, but overlaps with current offering for less cost savings
7	Home Energy Products	Portable HP	Unclear how these will be used by customers, which introduces an evaluation risk; however, a potential future low-cost study area

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Rank	Program	Product	Reason for Rank
8	HHC	2 Port PTHP	Higher difficulty to integrate new distributors or stock with existing distributors due to current program model

The top four combinations of program and technology items represent possible candidates for ComEd pilots in the near-term because both the market opportunity is high and gaps in understanding on performance, installation barriers, or user behaviors exist. Potential Phase 3 pilot programs are detailed in Section 5.0.

Summarized Roadmaps per Program and Product

WHE and Sleeve PTHPs:

- As a first step, expand WHE eligibility to include PTHPs.
- Once eligibility requirements are relaxed, modify the initial project screening process to locate buildings with existing wall sleeves or those suitable for through-wall penetrations.
- Medium-term, consider a whole-building pilot.
- Keep an eye on the market as new products are developed.

WHE and Saddlebag HPs:

- As a first step, expand WHE eligibility to include saddlebag units.
- Once eligibility requirements are relaxed, modify the initial project screening process to locate program candidates.
- Medium-term, work to increase contractor awareness of and comfort with saddlebag HPs.
- Long-term, work with stakeholders to address shifting of direct heating costs, separate metering, and requirements for IE electrification cost savings.

Home Energy Products Retail Program and Window Box HPs:

- As a first step, work with retailers to stock and offer incentives for three-season and cold climate window box HPs.
- Near-term, work with retailers to bring additional window box HP manufacturers into the retail space as needed.
- Medium-term, distribute window box HP educational material.
- Additionally, consider a pilot to understand the real-world savings potential of window box HPs.

Home Energy Products RPP and Window Box HPs:

- Near-term, there is little opportunity to adjust the RPP offering.
- Medium-term, window box HPs could be more fully integrated into ComEd's RPP offering.

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Residential New Construction AHNC and Two-Port PTHPs:

- Near-term, work to leverage two-port PTHPs in building types where they are the most valuable.
- Medium-term, increase architect and developer awareness of two-port PTHPs.
- Long-term, consider modifying the AHNC program structure to better integrate AFFHPs.

WHE and Vertical Stack HPs:

- As a first step, expand WHE eligibility to include Vertical Stack HPs.
- Once eligibility requirements are relaxed, modify the initial project screening process.
- Medium-term, consider a whole-building pilot.

Home Energy Products Retail Program and Saddlebag HPs:

- Medium-term, consider a saddlebag HP pilot.

HHC and Two-Port PTHPs:

- As a first step, adjust qualified ratings to include top-tier two-port PTHPs.
- Medium-term, connect two-port PTHP manufacturers with distributors.
- Long-term, integrate two-port PTHPs into educational materials and trainings.

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