Energy Savings and Modernization of Single-family Cooling Systems



Air source heat pumps (ASHPs) have been recently touted as a technology for significant energy savings, as well as a potential pathway to space heating decarbonization. However, in cold climates like Minnesota all-electric ASHP systems have higher ongoing energy costs compared to homes heated with natural gas furnaces.

Center for Energy and Environment (CEE) evaluated one solution to overcome this barrier, the dual fuel (or hybrid heat) ASHP, where the ASHP system replaces the central air conditioner (CAC) often paired with a natural gas furnace.

- This configuration allows the operation of either the gas furnace or ASHP for space heating, depending on the cost to operate.
- This product category can serve as a gateway application for ASHPs that familiarizes consumers and contractors with ASHP technology and enables most of the savings benefits of ASHP systems, while minimizing the barriers exclusive to all-electric ASHP installations.

There is huge market potential

- There is a large market opportunity in Minnesota for single-family homes to replace their current CAC with a variety of available ASHP products.
- Approximately 1.1 million out of 1.68 million single-family homes in Minnesota are heated by centrally ducted natural gas furnaces with CAC systems.

The market is ready for ASHPs to displace CAC equipment

The market is prime for transformational efforts to establish ASHPs as the new baseline technology and kick-start the massive statewide energy savings and greenhouse gas reductions promised by high efficiency electric space heating.

- Equipment is readily available at a variety of price points and efficiency levels.
- Customers are open to more efficient equipment that makes economic sense, but they need be given the option.
- Providing ASHP options to customers will accelerate ASHP adoption to up to 20% of the CAC replacement market.

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There are remaining market barriers to address

Lack of customer awareness is the main barrier to adoption; education efforts are necessary for contractors and consumers so they can make informed decisions during replacement cycles

- CAC replacements are often made under duress by customers who are unfamiliar with ASHP technology, often following the advice of contractors who are unfamiliar with or who downplay ASHP options.
- Fifty-six percent of customers surveyed are not familiar with ASHP technology, yet nearly half of all customers surveyed are willing to spend an additional $500–$1,000+ for comfort and $500–$1000+ for energy savings.
- The supply chain is interested in growing the ASHP market but needs more customer awareness and demand before more investment in technology and business models.
- Consequently, utilities and other stakeholders are justified in spending significant resources through all available channels to raise consumer awareness of ASHP applications.

Dual fuel ASHPs as CAC replacements offer most of the potential of all-electric ASHP systems

CEE's comprehensive performance and cost modeling over a range of variables have shown significant diversity in outcome, offering flexibility to match consumer goals.

- Despite their smaller size, single speed ASHP systems offer around 50% and variable speed ASHP systems offer over 80% of the emissions and energy savings benefits of all-electric ASHP solutions sized for heating.
- These savings, when paired with existing utility incentives or lower upfront costs realized at an increased market scale, meet customer cost expectations for higher performance and comfort.
- Single speed ASHPs systems provide cost-neutral operation with a low entry cost to ASHP technology.
- Entry level variable speed ASHPs, particularly paired with efficient furnace upgrades, provide an economic sweet spot that provide immediate cost-effective savings.
- Special dual fuel electric rates drive additional customer cost savings.

Utilities can move the market by displacing CAC rebates in favor of ASHP rebates that overcome first-cost barriers

We encourage an increased baseline in the CAC market shifting to entry level (SEER ≥ 15) ASHP. CAC rebates should be phased out to send a clear signal to the market that heat pumps are the preferred technology.

- Provide two tiers of heat pump rebates to incentivize as many heat pump installations as possible while continuing to encourage the highest efficiency products.
    - o **Tier 1:** Low-cost CAC replacement market; this tier will yield lower energy savings per install and therefore a lower rebate amount. The Tier 1 rebate will help promote a high volume of entry level variable speed heat pump sales for technology that is most accessible to many customers.
    - o **Tier 2:** Cold climate ASHPs; this tier will incentivize the most advanced products that meet the highest fraction of the heating load. This rebate is most applicable for customers who want all electric or mostly electric with natural gas as backup.
    - o Quality installation incentives can be used to provide higher rebate levels for contractors participating in a quality installation program.

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