The U.S. Residential Heat Pump Market, a Decade after “The Crisis”

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Current and Future Cooling Technologies

Agenda

• Objective
• U.S. Heat Pump Market Overview
• Impact of:
  – Housing Market (primary focus)
  – Economy
  – Fuel Prices
  – Regulatory Actions
  – Key Stakeholders
• Summary and Future Outlook
Objective

To evaluate impacts of various factors including population patterns, fuel prices, housing characteristics, consumer preferences, regulatory changes, and economic conditions on current U.S. heat pump (HP) trends and future outlooks.
US Heat Pump Market Overview

- After 15 years of fairly steady growth, HP and AC shipments fell from 8.6 million units in 2005 to 5.0 million units in 2010 following the housing market collapse which began in 2006.

- Market recovered to ~7.3 million units in 2016, with HPs increasing more rapidly from 2006 to 2016.

- HPs have gradually increased their share of U.S. market shipments, from approximately 14% in 1990 to 24% in 2016.
Impact of the Housing Market

- The housing market collapse and nationwide recession resulted in a 70% reduction in new housing completions from 2006-2011

- While overall HP shipments dipped during this time (as shown in previous slide), installation in new homes rose steadily to over 40% annually; primarily in warmer southern states
Impact of the Housing Market (cont’d)

- Nearly 40 years ago, space cooling began transitioning from a “luxury” item to a staple in many U.S. homes, which increased the market potential for HPs

- By 2015, 93% of single-family homes had some form of space cooling
Impact of the Housing Market (cont’d)

Target market segments for HPs are:

• New Home Builds:
  – Not constrained to existing infrastructure and fuel supply
  • Typically electric in rural areas
  – Highest viability in states with low electricity-to-NG cost ratios, moderate climates, and push for decarbonization and increase in renewables

• Replacements:
  – Homeowners tend to stick with existing infrastructure (e.g., fuel type, available space)
  – Highest viability in non-NG homes, where they can replace electric furnace or existing HP
  – Northern states could replace ACs with HPs for primary cooling and heating and rely on existing furnace/boiler for supplementary heat
Impact of the Economy

- Economic health positively impacts new building construction, R&D budgets, consumers’ willingness to pay, and A/C-related industry initiatives/incentives.

- Harvard University’s Leading Indicator of Remodeling Activity (LIRA), which tracks home improvement spending, is a strong indicator of economic health.

- From 2012 to present, there is a high coefficient of correlation (0.77) between HP shipments and LIRA. LIRA projections are indicating near-term growth for HPs.
Impact of Fuel Prices

• From 1990 to 2009, heat pump shipments correlated with the NG/electricity price ratio
  – HP shipments increased as gas prices increased
  – HP shipments decreased as natural gas prices decreased
  – Coefficient of correlation between NG/electricity price ratio and HP unit shipments is 0.7, indicating moderately strong relationship

• Recent increase in shipments, however, indicates a separate factor that is more influential than fuel price
Impact of Regulatory Actions

- Heat pumps are subject to federally-mandated minimum efficiency standards, both for SCOPc and SCOPh.

- Despite product efficiency improvements, shipments often suffer immediately following standards implementation due to offloading of non-compliant inventory in prior year and higher price tags.

- DOE has proposed important revisions to test procedures that will benefit northern climate dual- and variable-capacity units with improved heating performance.

Impact of Minimum Efficiency Standards on HP Shipments

Minimum SEER increased from 10 to 13 in 2005

Minimum SEER increased from 13 to 14 in select regions in 2014
Impact of Key Stakeholders

State and Utility Interest

• Widespread incentives show that utilities and state programs see higher cost-effectiveness with HPs, in many cases, over ACs
• Majority of HP incentives range from $250 to $500
• Ground-source, or geothermal, HPs also qualify for some incentives

Consumer Hesitations

• Natural resistance to change is observed in most consumers switching from traditional ACs and furnaces to HPs. Over time, homeowners are gaining confidence as they experience HP performance firsthand
• Contractors and HVAC companies are critical influencers in homeowner’s decision. However, they are hesitant to push HPs in colder climates
Summary and Future Outlook

- HPs gaining stronger traction as primary heating and cooling equipment in mild climates and secondary heating equipment in colder climates
- Monetary incentives, consumer loyalty, a recovering housing market, and steady/improving economy are keys to continued growth
- US southern region has shown most significant growth and is expected to mature in coming decades
- For HPs to become industry leader, aggressive penetration is needed in colder climates, where significant R&D is underway
Discussion

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