Transforming utility customer service: Helping decarbonize the residential sector





In the absence of federal mandates, many states throughout the country are beginning to set their own greenhouse gas (GHG) emission limits. Commercial & Industrial (C&I) customers may have their own self-motivated financial or reputational reasons to reduce emissions, but these motivational factors often do not exist for residential customers.

However, in order for states to meet their GHG reduction targets significant reductions from the residential sector are necessary. This series of articles explores issues surrounding residential GHG emissions and how to reduce them through the lens of the utility/customer relationship.

Greenhouse gas emissions from the residential sector are primarily generated by combusting fossil fuel for space and water heating purposes. These emissions can be a significant portion

of a state's overall emissions. In Massachusetts for example, residential combustion represents the second largest source of emissions, behind only transportation.

Fortunately, there are many new technologies, or old technologies used in new ways, that can help reduce emissions from homes. Heating electrification is one such strategy. To date, the electrification of heat has mainly taken the form of heat pumps. Advancements in cold climate heat pumps have allowed their expanded use in some northern climates.

Ground source heat pumps are also increasing in popularity, and in several Northeastern states there are pilots coupling utility operated geothermal distribution networks with ground source heat pumps. New technologies are also utilizing heat recovery of wastewater streams to pre-heat boilers, cutting down on the energy needed to heat water. Additionally, advancements in windows, refrigerators, clothes dryers, and insulation are all driving emissions reductions in the residential sector.

Advancements in technology are just one component necessary to reduce residential greenhouse gas emissions. It is critical to have corresponding policies and programs in place to ensure that utilities can help residential customers gravitate towards this low carbon future in an equitable manner. Utilities, regulatory commissions, and other key stakeholders need to address three core elements to help with this transition: rates; evaluation, measurement, and verification (EM&V) within energy efficiency programs; and equity. Rates are critical to send the appropriate price signals to encourage customers to adopt new technologies; the right EM&V regime is necessary to promote certain low carbon equipment within energy efficiency portfolios; and equity is critically important to ensure that no customers are unfairly burdened during the transition to a low carbon future.

Varying rate structures can be a useful tool to help drive certain customer behaviors. Utilities are starting to develop innovative rate structures to help drive electrification in heat and transportation. Time of Use (TOU) rates and incentive/rebate programs are being developed that provide customers with financial incentives to purchase electric vehicles, batteries or even thermal storage for heating purposes. When considering new rate structures, it is important to take into account any corresponding metering infrastructure, meter data management systems or billing system upgrades that may be necessary to implement the new rate.

As previously noted, one widely cited path towards residential emission reductions is through heating electrification and accelerating the deployment of heat pump technology by reducing upfront costs through energy efficiency incentives. However, the proper EM&V framework needs to be in place to encourage low carbon technologies through energy efficiency programs. Energy efficiency portfolios need to be cost effective, and a key consideration for moving from a fossil fuel system to an electric heat pump is determining the proper baseline to use in order to measure savings and thus determine cost effectiveness and appropriate incentive levels.

Another threshold question that impacts cost-effectiveness is how non-energy impacts (NEIs) associated with electrification are calculated. There are potentially health, comfort and

property value impacts of installing heat pumps, and the inclusion of those benefits in a cost effectiveness test can sometimes be the difference between whether or not a heat pump can be offered as part of an energy efficiency program.

Perhaps the most important consideration in the transition to a low carbon future in the residential sector is to ensure that it is done in an equitable way. There needs to be highly efficient appliances and other home upgrades that are affordable for low- and moderate-income customers and suitable energy efficiency programs for other hard to reach groups. Utilities, policy makers and community advocacy groups will have to work together to ensure that 1) customers who are least able to afford it aren't stuck paying a higher share of costs for decarbonization strategies and 2) communities that have historically borne a disproportionately high share of the impact from GHG emissions benefit from new reduction strategies.

Throughout this series of articles over the course of the year, we will explore many of these key issues that will determine the rate at which the residential sector accelerates towards decarbonization.

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