

Behind the Meter:

A Research-Backed Guide
to Electrification and
Customer Participation

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The Opportunity Beneath the Surface

The Opportunity Beneath the Surface

In the United States, residential buildings account for roughly [25% of total building energy consumption](#), with space and water heating alone responsible for [over half of residential energy consumption](#). These systems, many of which rely on natural gas, fuel, oil, or propane, represent one of the largest and most immediate opportunities to reduce emissions at scale.

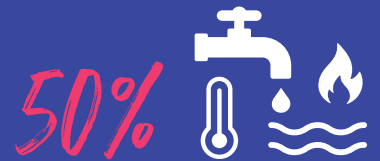
For utilities and homeowners alike, electrification offers far more than emissions reduction. When paired with demand response and load management strategies, it enables a more flexible, responsive energy system—one that improves comfort, enhances resilience during outages, optimizes energy use, and helps stabilize costs over time.

Increasingly, this flexibility is also the foundation for a new model of grid management: virtual power plants (VPPs). By connecting and coordinating distributed energy resources such as smart thermostats, heat pump water heaters, electric vehicles, and battery storage systems, utilities can shift, store, and dispatch energy in ways that reduce system strain while delivering value directly to customers. As electrification expands, these connected devices become not just individual upgrades, but part of a larger dynamic energy ecosystem.

But realizing these benefits depends on participation; that's where the challenge begins.



25%
of energy used in the
U.S. is used in residential
applications.



50%
of the energy used
in homes is used to
heat air and water.



The Opportunity Beneath the Surface

Encouraging homeowners to adopt technologies like air source heat pumps, heat pump water heaters, induction cooking, battery storage systems, and electric vehicles—and enroll in coordinating load management programs— isn't simply a matter of offering incentives or sharing information. It's a behavioral challenge rooted in perception, timing, trust, and perceived value. While utilities are advancing integrated electrification initiatives, homeowners are navigating a different reality—one shaped by competing priorities, budget constraints, home improvement needs, and varying levels of awareness.

To better understand this dynamic, [Franklin Energy](#) conducted a nationally representative study of U.S. homeowners to uncover what truly drives electrification adoption—and what stands in the way. The findings point to a critical insight: **electrification success isn't just about deploying better technology. It's about aligning solutions, programs, messaging, and incentives with how people actually think about their homes, their comfort, and their daily lives.**



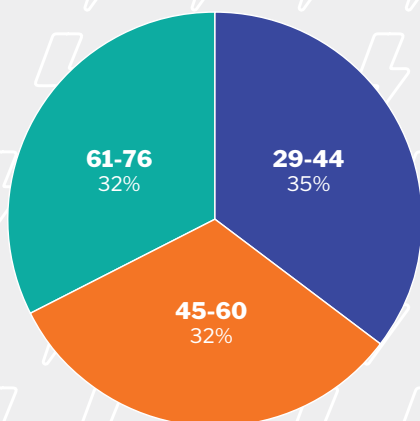
Who We Heard From—and Why It Matters

Our study surveyed 350 U.S. homeowners, ages 29–76, with household incomes above \$30,000. The sample was geographically and demographically representative, with balanced gender distribution and strong alignment to U.S. population trends.

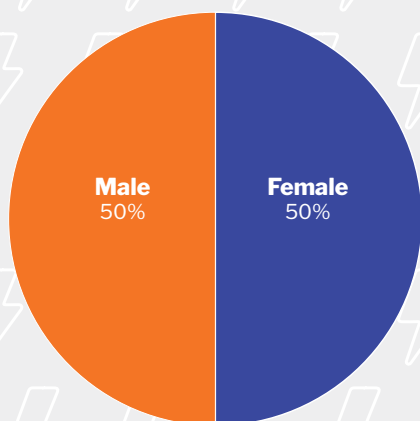
Representation was a key priority in the study design:

- Gender distribution was evenly split.
- Age was balanced across three primary cohorts.
- Geographic representation aligned with U.S. population distribution, with participation from every state and no regional over-sampling.
- Race and ethnicity closely reflected national demographics, with an intentional oversample of Indigenous respondents to ensure broader inclusion of perspectives often underrepresented.

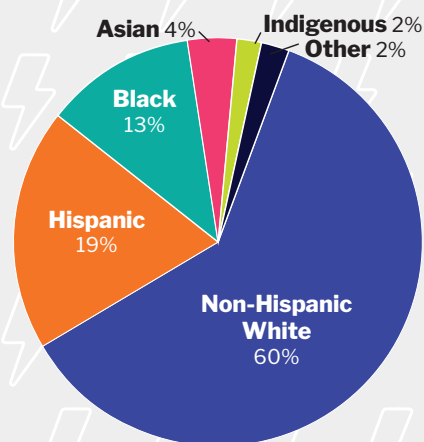
Age



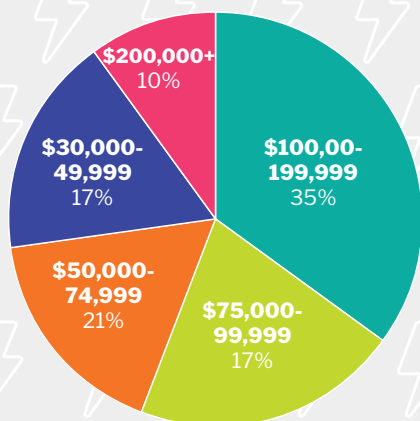
Gender



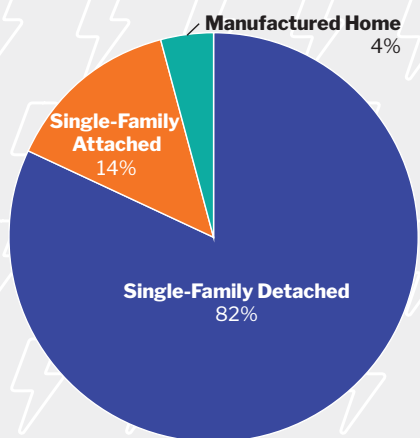
Race/Ethnicity



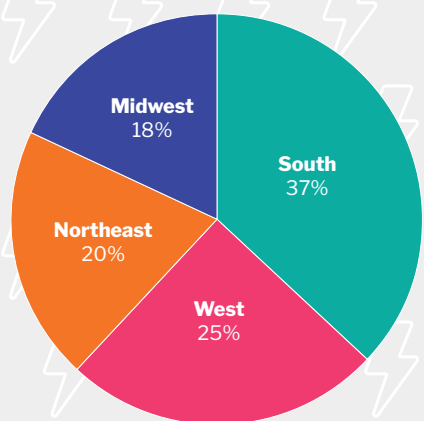
Household Income



Building Type



Region



Margin of Error: +/- 5% Confidence Level: 95%

Who We Heard From—and Why It Matters

Participants spanned a wide range of life stages and housing conditions—from newer suburban homes to aging rural properties. Across this diversity, **a consistent pattern emerged: homeowners approach energy decisions through the lens of their immediate needs, priorities, and lived experiences.**

This is what makes the study especially powerful.

It not only profiles owners and likely buyers of advanced electric equipment but also evaluates adoption likelihood and identifies the key motivators and barriers shaping customer decisions.

The study also examines how homeowners respond to different program designs, incentive structures, and messaging strategies, while also quantifying interest in demand response, managed charging, and battery control—key components of emerging load management approaches and VPP models.

What the data revealed is critical for utilities: participation decisions are rarely driven by energy goals alone. They are shaped by competing priorities, perceived value, and confidence in the outcome.

Let's dive into the questions we asked, the answers we received, and what each data point means for utilities.





More Than Aesthetics

More Than Aesthetics

Study Findings

It's important to understand that energy upgrades are not at the front of the line when it comes to home improvement needs and desires. While nearly 40% of homeowners in our study reported no major issues when asked to identify repair or improvement needs, approximately 30% of respondents cited insufficient insulation and over 40% reported structural, mold, or electrical issues—all of which can limit electrification readiness.

Reliability concerns also emerged, with many participants reporting some type of power outage issue. Specifically:

- **16% reported occasional or frequent long outages due to weather or grid failure**
- **14% experience short outages**
- **6% reported frequent breaker trips, indicating electrical system constraints**

Yet despite identifying these structural and energy-related challenges, most homeowners overwhelmingly prioritized aesthetic projects like kitchen or bath renovations or flooring upgrades when asked what they'd do if given \$20,000 for home improvements.



29%

Insufficient Insulation



17%

Structural Damage



11%

Faulty Electrical



9%

Insufficient Hot Water

Franklin Energy Insight

Homeowners prioritize improvements they can see (and show off), but energy reliability and efficiency issues are often hiding in the attic, basement, and behind the walls. Outages, breaker trips, and aging electrical systems point to a growing mismatch between home infrastructure and modern energy demands. As electrification expands, these limitations will become more pronounced, and insulation, air sealing, and remediation repairs must be addressed before electrification can occur.

Addressing these gaps does more than enable electrification; it improves reliability, enhances resilience, and prepares homes for participation in demand response and VPP programs.

More Than Aesthetics

Implications for Utilities



Make Electrification Readiness Foundational

Include panel upgrades, wiring improvements, and load assessments as core program components.



Bundle with Home Improvements

Integrate “behind-the-walls” upgrades into renovation-focused programs to align with homeowner priorities.



Lead with Reliability and Resilience

Position upgrades as solutions to outages, instability, and performance issues, not just an efficiency boost.



Manage Load Growth Proactively

Promote smart circuit breakers, panels, managed EV charging, and load flexibility tools to safely support electrification.



Build the Foundation for Flexibility

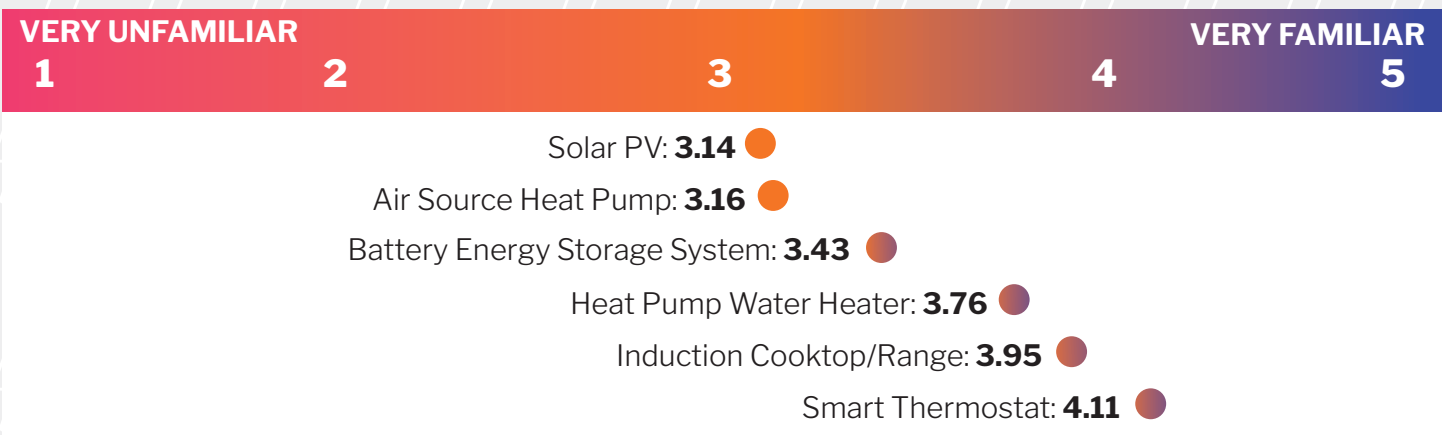
Integrate electrification upgrades with programs that ensure homes are prepared to support connected devices that enable demand response and VPP participation.



Cutting Through the Confusion

Study Findings

Most homeowners reported only moderate familiarity with advanced electric technologies. On a scale of 1 to 5, where 1 = very unfamiliar and 5 = very familiar, most technologies scored in the middle:



More notably, perceived ownership often did not align with actual market penetration, particularly for heat pump water heaters, battery storage systems, and induction cooking.

In our study, 25% of respondents reported owning a heat pump water heater, yet industry data suggests actual adoption is closer to 2%, [according to AWHI](#). A similar pattern emerges with battery storage: while 14% of respondents indicated they have a battery energy storage system, [SEIA estimates](#) that fewer than 1% of U.S. homes have installed residential battery capacity.

Induction cooking follows the same trend. While 21% of respondents reported owning an induction cooktop or range, national estimates from [Rewiring America](#) place actual adoption closer to 4%.

Even electric vehicles show a gap—though in the opposite direction—with only 2% of respondents reporting EV ownership compared to an estimated 5% national market share.

Together, these discrepancies point to a broader issue: **many homeowners may not fully understand the technologies they have or are being asked to adopt.** Terminology confusion—such as interpreting “battery storage” as batteries for charging small electronics—likely contributes to this gap, highlighting the need for clearer, more accessible education.

Cutting Through the Confusion

Franklin Energy Insight

The challenge is not simply lack of awareness; it's misunderstanding. When homeowners believe they already understand technology, they are less likely to seek additional information or engage with programs. This creates a barrier not just to adoption, but to participation in connected programs like demand response or managed charging.

Clarity is critical. Without it, even well-designed electrification and VPP programs will struggle to gain traction.

Implications for Utilities



Simplify the Message

Use clear, plain-language descriptions that explain what each technology is, how it works, and why it matters. Standardize messaging across channels (web, contractors, call centers) to ensure consistency and reduce confusion.



Launch “Electrification 101” Campaigns

Develop short-form, easy-to-digest educational content such as videos, animations, and infographics that explain technologies and correct common misconceptions. Focus on what it is, how it works, and the benefits. Distribute via multiple touchpoints like social media, program landing pages, outreach campaigns, and email journeys.



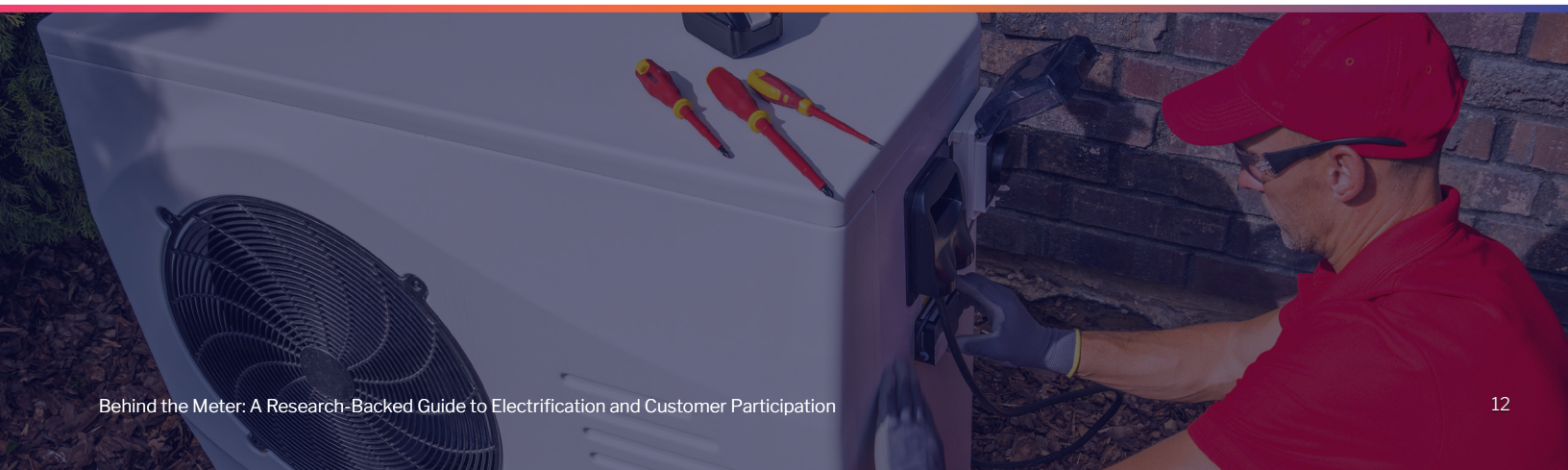
Show Real-World Applications

Move beyond explanations and demonstrate how technologies perform in everyday life. Use before-and-after scenarios, homeowner testimonials, and in-home visuals to show improvements in comfort, reliability, and resilience.



Train Contractors as Educators

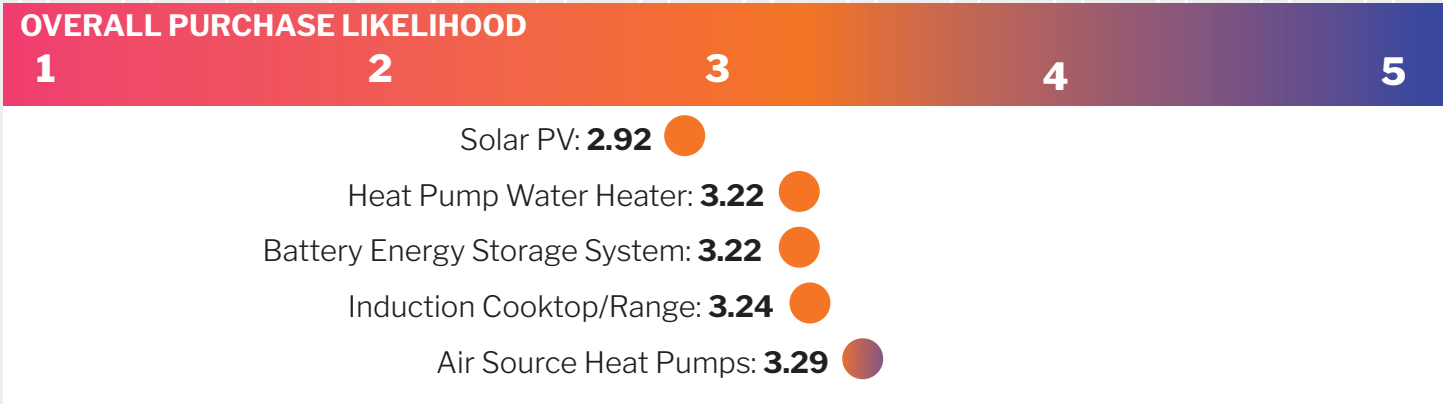
Equip contractors and trade allies with simple talking points, visual aids, and comparison tools so they can clearly explain technologies at the point of decision. Provide training on both product benefits and load management capabilities, including how devices can participate in demand response or VPP programs.



What Drives (and Stops) Adoption

Study Findings

Homeowner interest in electrification is strong but does not translate into action. Across technologies, 45%+ of respondents expressed interest in adopting air source heat pumps, heat pump water heaters, induction cooking, and battery storage. However, overall purchase likelihood remains moderate, with average scores between 3.09 and 3.29 on a 5-point scale, indicating hesitation rather than intent.



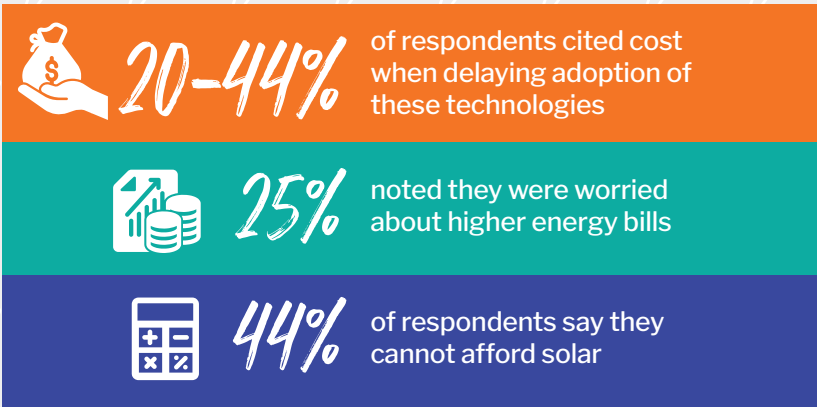
Barriers to adoption are both practical and behavioral. Nearly half of respondents say they don't need new equipment. At the same time, affordability remains a major constraint, with 20-44% of respondents citing cost concerns, even with rebates, and over a quarter worried about higher energy bills.

Financial concerns are most pronounced for solar, where 44% say they cannot afford it, and 40% are uncertain about payback.

Many homeowners require substantial incentives to act. For example, 62% of price-sensitive respondents indicate at least half of an air-source heat pump project's costs must be covered, underscoring the scale of support needed to move from interest to action.

Finally, we saw a pragmatic unwillingness to switch one product from gas to electric while still using gas for other appliances, with many noting, "I use gas for (space heating, water heating, or cooking), so I would still need natural gas/propane." This indicates that whole-home electrification programs, offering an attractive package of incentives for multiple fuel-switch upgrades, will likely be more successful at converting the market than one-off rebates.

Affordability Concerns of Respondents



What Drives (and Stops) Adoption

Franklin Energy Insight

The biggest barrier isn't technology; it's timing and perceived value. Homeowners are highly resistant to replacing equipment that is still functioning. Electrification becomes far more compelling when it aligns with natural decision points, such as equipment failure or planned renovations.

Importantly, the same customers expressing interest in electrification are also more open to participating in demand response and load management programs, making them prime candidates for integrated program offerings that can reduce initial and ongoing costs even more.



Implications for Utilities



Target Replacement Moments

Focus on equipment failure, renovations, and other natural decision points rather than early replacement. Utilities should work closely with contractors and retailers to influence decisions at the point of sale while using data like equipment age, permits, and outage history to identify and engage customers at the right time.



Offer Bundled, High-Value Incentives

Standalone incentives are often insufficient and are unlikely to encourage whole-home fuel switching. Bundle upgrades such as air-source heat pumps, heat pump water heaters, induction stoves, and electrical improvements into a single, compelling offer. Incentives should be deep enough to reduce upfront cost barriers and layered with all available funding sources and tax credits to spur conversion.



Link Adoption to Ongoing Value

Position electrification as more than a one-time upgrade. Pair incentives with demand response, managed charging, or VPP participation to create ongoing value through bill credits and incentives.



Address Cost and Bill Concerns Directly

Affordability and bill anxiety are major barriers. Provide clear, personalized bill impact estimates and pair electrification with rate optimization strategies like time-of-use plans and demand response. Emphasize cost control and predictability, not just savings.

An aerial view of a man in a dark suit and light blue shirt plugging a red charging cable into the rear of a white car. The car is parked on a grassy area next to a paved driveway. In the background, a large array of solar panels is mounted on a roof. The text "Unlocking Flexibility" is overlaid in red on the left side of the image.

Unlocking Flexibility

Unlocking Flexibility

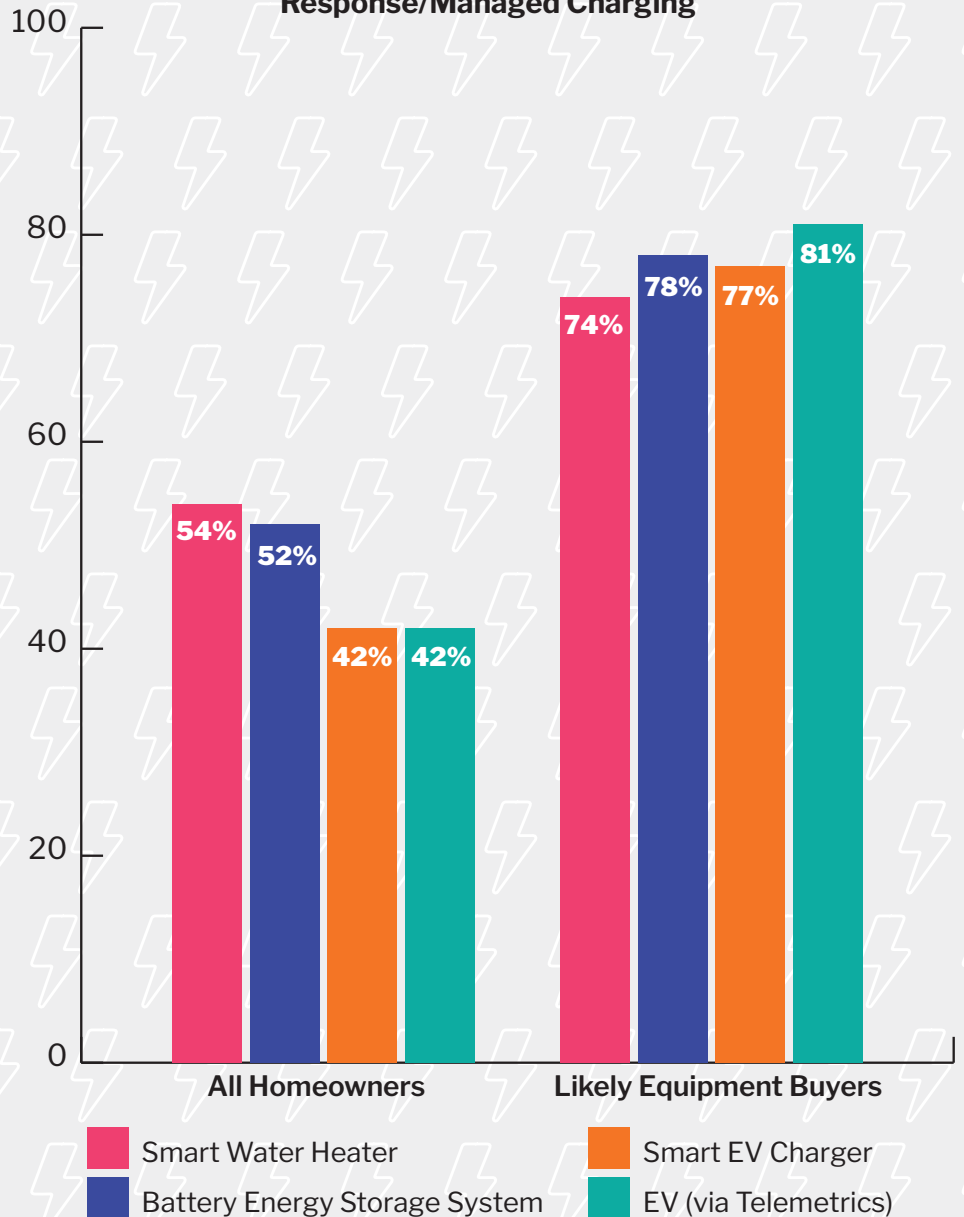
Study Findings

More than 40% of homeowners indicated willingness to allow utilities to control devices such as thermostats or water heaters, provided incentives and opt-out options are available.

Participation rates increase significantly among current equipment owners and likely buyers.

Our study also identified four distinct customer segments based on advanced electric equipment ownership, purchase propensity, willingness to participate in load management programs, and response to program messaging. Findings show that approximately 40% of homeowners already own or are interested in advanced electric technologies and are highly open to utility load management participation, while an additional 39% could be persuaded with the right combination of incentives, messaging, and program design. Specifically, the market consists of Current Electrification Leaders (8%), who are already engaged with advanced electric technologies; High-Potential Flex Adopters (32%), who represent the strongest opportunity for future electrification and load management growth; Value-Oriented Persuadables (39%), who respond best to practical benefits such as affordability and resilience; and Skeptical Traditionalists (20%), who remain the most difficult segment to engage. These findings reinforce the importance of targeted outreach strategies that align program offers with customer motivations, readiness, and perceived value.

Percent Likely/Very Likely to Allow Demand Response/Managed Charging



Unlocking Flexibility

Franklin Energy Insight

Electrification and load management are not separate strategies; they are part of the same customer journey. Customers who adopt advanced electric technologies are not only more capable of participating in load management programs; they are significantly more willing to do so. Familiarity with connected devices, combined with a clear understanding of benefits, increases comfort with utility interaction and control. This creates a natural progression from adoption to engagement to active participation.

Combining efficient equipment, generation, and storage with load management and the right rate plan increases the odds that customers will see stable or declining, rather than increased, bills (a common concern for electrification initiatives in many parts of the country).

Connected devices such as smart thermostats, heat pump water heaters, EV chargers, and battery storage systems form the foundation of scalable VPP strategies. But participation doesn't happen automatically. It must be designed, communicated, and incentivized from the start. Equipment must be correctly commissioned, apps need to be downloaded and synced with the right time-of-use periods, and customers need to be educated on how to optimize their new equipment and their behavior.

Beyond enrolling customers, there is an opportunity to orchestrate a network of flexible, responsive homes. Utilities that successfully connect electrification with load management can transform individual upgrades into coordinated grid assets, delivering value for both customers and the system as a whole.



Implications for Utilities



Integrate Programs from the Start

Break down silos between energy efficiency, electrification, and demand response programs. Design a unified customer journey where adoption of new equipment automatically introduces load management opportunities.



Make Participation Simple and Low-Risk

Customers are more willing to participate when the utility's level of control feels limited and optional. Offer clear incentives, straightforward enrollment, and easy opt-out options. Default enrollment (with the ability to override) and automation can significantly increase participation without increasing friction.



Leverage High-Propensity Customers

Current equipment owners and likely adopters are your strongest entry point. These customers are more familiar with technology and more open to participation. Prioritize outreach to recent participants in electrification or rebate programs and use those touchpoints to introduce demand response and VPP opportunities.



Incentivize Participation—Not Just Adoption

Shift program design to reward both installation and ongoing engagement. Tie equipment incentives to enrollment in demand response or managed charging programs and offer ongoing value through bill credits or performance-based incentives to sustain participation over time.



Segment and Target Program Offers

Not all customers respond to the same technologies, incentives, or messaging. Use behavioral and demographic insights to tailor outreach, prioritize high-propensity participants, and align program offers with customer motivations, readiness, and comfort with utility-managed technologies.

Designing Programs That Work

Study Findings

According to our study, participants showed a clear preference for outcome-based, bundled, and resilience-driven solutions, while programs perceived as complex, restrictive, or low-value underperform.

The most appealing options were:



Solar battery storage systems

- » 37.8% most appealing
- » 17.5% least appealing
- » +20.3 net appeal (highest overall)



Solar photovoltaic systems

- » 30.3% most appealing
- » 21.3% least appealing
- » +9.0 net appeal



Bundled electrification packages

- » 27.9% most appealing
- » 20.8% least appealing
- » +7.2 net appeal

Franklin Energy Insight

While incentives may be a factor, program design ultimately determines participation.

Homeowners are not evaluating individual technologies; they are evaluating outcomes. Offers that provide independence, resilience, and control consistently outperform those focused on single measures or abstract benefits.

Battery storage stands out not simply as a technology, but as a solution to a real and growing concern: reliability. When paired with solar or electrification upgrades, it transforms the value proposition from efficiency to energy security.

Equally important is simplicity. Bundled offerings with turnkey installation reduce decision fatigue, eliminate the need for multiple contractors or transactions, and create a clearer path to action. In contrast, fragmented programs with assessments, standalone rebates, or unmanaged offerings fail to convey immediate value.

This is also where electrification and load management converge. Bundled, connected technologies not only increase adoption; they also create a ready-made pathway for participation in demand response and VPP programs.

The takeaway is clear: customers don't engage in programs. They engage in outcomes.

Designing Programs That Work

Implications for Utilities



Design Around Outcomes, Not Products

Structure programs around what customers value, including resilience, comfort, and control, rather than individual technologies. Position offerings as solutions instead of equipment upgrades. Align messaging, incentives, and program design to deliver a clear, outcome-driven value proposition.



Bundle for Simplicity and Impact

Combine technologies such as solar, battery storage, HVAC, and electrical upgrades with air-sealing and insulation to create integrated, turnkey packages. Bundling increases perceived value, simplifies decision-making, and reduces friction by minimizing the number of steps, vendors, and choices required from the customer.



Eliminate Low-Value Entry Points

Standalone assessments, fragmented rebates, and programs without clear benefits underperform. Replace these with guided pathways that move customers directly from interest to installation, supported by contractor networks and simplified enrollment processes.



Build Programs That Enable Participation

Ensure all incentivized technologies are connected and capable of participating in demand response and VPP programs. Pair installation incentives with enrollment and clearly communicate the ongoing value, such as bill credits, incentives, and improved reliability, to drive sustained engagement.



Frame the Message Around Personal Benefits

Homeowners respond more strongly to electrification messaging that emphasizes tangible personal benefits—such as comfort, reliability, resilience, health, and energy independence—rather than abstract environmental outcomes. Resilience, particularly maintaining comfort and functionality during outages, emerged as a key motivator and strengthens the value proposition for battery storage, load management, and VPP participation. Utilities should frame programs around homeowner control, convenience, and immediate value while positioning demand response and VPP programs as tools that enhance, rather than restrict, comfort and reliability.

Turning Insight Into Action

The opportunity is clear. Homeowners are interested in electrification and increasingly open to participating in load management programs, but interest alone doesn't drive action.

What does? Aligning with what people actually care about: comfort, reliability, resilience, and control. When electrification is positioned this way and paired with simple, well-designed programs, adoption follows.

The same customers ready to electrify are also ready to participate. That creates a powerful opportunity to connect technologies, unlock flexibility, and build scalable VPP solutions that benefit both customers and the grid.

Franklin Energy helps utilities bring this all together, turning insight into programs that work, and strategies into measurable results.

Ready to turn these insights into program strategy?

Connect with Franklin Energy to explore how electrification, load management, and customer segmentation insights can inform your utility's program design, customer engagement, and VPP strategy.

Schedule a Meeting

Want to go beyond the highlights?

Download the full study to explore the data, deeper insights, and strategies shaping the future of electrification.



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