

AI-POWERED HOME ENERGY REPORTS FOR BEHAVIOR ENERGY EFFICIENCY

Bidgely | April 2020

EXECUTIVE SUMMARY

The next generation of Home Energy Reports (HERs) powered by AI (artificial intelligence) are proving to be a more cost-effective and more engaging way to realize energy efficiency and engage both electric and gas utility customers. Leading utilities are utilizing the latest AI technologies to maximize savings and keep up with changing customer expectations.

This whitepaper examines how AI has been applied to HER programs and provides examples of improved energy savings, enhanced customer relationships and reduced program costs.

- HER program targeting and messaging is more accurate with deeper customer intelligence from load disaggregation, which yields greater savings results.
- Digital-first HER programs personalize engagement for each customer, allowing utilities to reach greater numbers of customers with opportunities uniquely tailored to them, at lower cost.
- · Applying AI to paper home energy reports drives higher engagement.
- Hyper-personalized engagement increases customer satisfaction and overall savings.

Al enables deeper understanding of customer behaviors, motivations and propensity. Informed by a strong understanding of customer energy habits and communication preferences it is possible to drive not just energy efficiency, but also new revenue generation, electrification, decarbonization, demand response and program recruitment. Bidgely UtilityAITM makes it possible with the world's most accurate and actionable customer energy profiles and hyper-personalized customer journey design.

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LEGACY HOME ENERGY REPORTS WON'T WORK FOR TOMORROW

Over the last decade, Home Energy Reports have become a staple of utility energy efficiency programs, due in large part to their high effectiveness relative to cost. As E Source research has shown, utility spending on residential behavioral programs makes up approximately 2% of demand side management (DSM) portfolios — but returns 10% of average DSM portfolio energy savings. On average, HER programs return a respectable 1% to 2.5% annual energy savings per customer.¹

However, research on successful, mature behavioral programs has increasingly pointed to the fact that a majority of those treated — 80% of the treatment population — could end up being negative or neutral savers.² In other words, of the treatment group selected for these programs, only 20% will actually save energy, which means money is being wasted on supporting, mailing and communicating to customers that are going in the opposite direction of the treatment. Not to mention that over time HERs become less effective as they treat the same groups with little or no message or report design evolution.

Bidgely takes a data-driven, performance-based approach to helping utilities sustain further energy savings. Combining the power of energy disaggregation with customer engagement allows us to redefine how behavioral energy efficiency programs are conceived, implemented and managed. The end goal is more cost-effective programs for utilities that drive higher customer satisfaction for customers.

Energy disaggregation enables greater understanding of key appliance-level loads which in turn allows utilities to target individual customers with specific, hyper-personalized recommendations, products and services, thereby increasing program effectiveness. In addition, as the pioneer of digital behavioral energy efficiency, Bidgely's digital HERs enable utilities to cost effectively add new customers to HER treatment groups without additional cost.

¹ Robert Walton. "Home Energy Reports: Still the 'biggest, baddest way' to drive customer behavior" UtilityDive, 2019: https://www.utilitydive.com/news/home-energy-reports-still-the-biggest-baddest-way-to-drive-customer-beh/558166/

Opinion Dynamics. "PG&E Home Energy Report (HER) Energy Savings Distribution Analysis and Trends Study" 2018: https://www.baconsrebellion.com/app/uploads/2019/02/PGE_Energy_Savings_Distribution_ Analysis and Attrition Trends Study FINAL-3.pdf

THE POWER OF CUSTOMER INTELLIGENCE TO REDEFINE HER PROGRAM DESIGN

A deep understanding of customers usage and behavior is essential to implementing the right behavioral energy efficiency (BEE) strategy. Customer intelligence enables utilities to understand why customers behave the way they do, what opportunities they have to save and how they want to take on new projects in their home and community. Energy efficiency programs can better leverage big data and artificial intelligence to drive improved customer outcomes by targeting customers with higher savings potential, and engaging customers with targeted messaging that increases energy savings in a way that suits each individual customer's unique usage patterns and preferences.

Bidgely is uniquely equipped to support the next generation of HER design. Through the UtilityAI platform, Bidgely uses both non-smart meter and smart meter data to disaggregate consumption into 11+ appliance level categories which can be interpreted and combined with demographic and behavioral data points. Bidgely is the only energy analytics company with more than 16 patents in load disaggregation, nine years of experience and 30+ data scientists. With over 15 million customers under management we've developed the world's most accurate and actionable 100+ point consumer energy profiles.

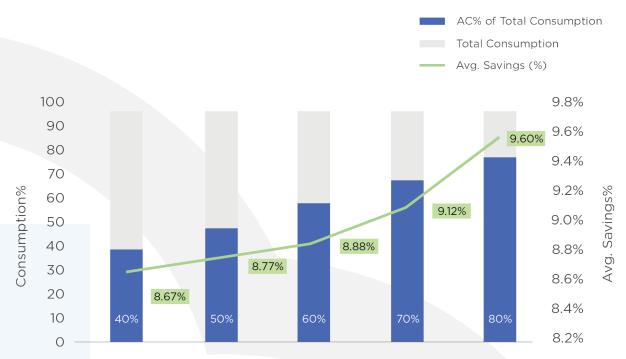
END-USE DISAGGREGATION IDENTIFIES HIGH ENERGY SAVERS

Evolving a BEE program starts with program design. Unfortunately, many utilities today with HER programs in place are delivering them only to the highest consumption customer quartile based on the assumption that quartile delivers the greatest ROI. In fact, Bidgely's findings suggest that high consumption alone is not a reliable indicator of savings potential. Instead, consumption should be combined with end use disaggregation to develop a more accurate basis for the selection of program treatment groups. Unique appliance-level energy usage characteristics are proven to be a better predictor of savings.

Higher AC Consumption Users Can Yield Higher Savings

An analysis of more than 17,000 customers over 12 months targeted by a major north american utility HER program found that higher AC consumption as a percentage of a user's total consumption, is correlated to higher energy savings.

AC% CONSUMPTION AND AVERAGE SAVINGS RATE



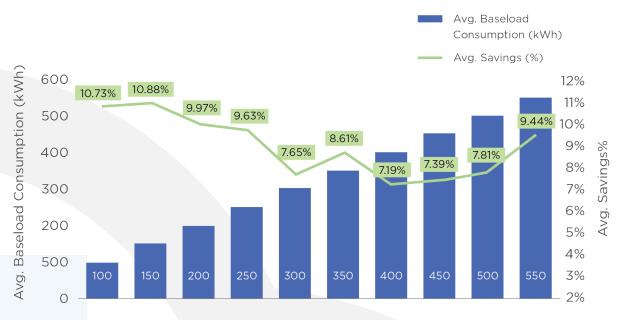
Bidgely's Analyzed Results from HER Program at Southeast IOU

Intuitively, this makes sense. Customers who cool their home at higher levels than their peers are more likely to be cooling inefficiently, thus having an opportunity to reduce. Targeting by AC consumption adds nuance to traditional design: as high consumption homes with low AC consumption actually save less than high consumption homes with high AC consumption. Simple tips like setting their thermostat to an appropriate temperature or not cooling too early in the summer season are well suited to these individuals and will yield measurable savings as part of an HER program.

Lower Base-load consumption Users Yield Higher Savings

An analysis of a program for a leading southwest IOU reveals another important finding: customers with lower base-load consumption had higher savings rates. Base-load represents the consumption which is always-on within a home. Higher and lower base-load users are determined by the base-load consumption as a percentage of their overall usage. Why might low base-load users save more? It could be that they are more energy conscious, having already reduced their base-load usage from plugged-in devices. Or, it may be that users with higher base-load usage have devices that need to run continuously for personal reasons, whereas users with lower base-load usage have more consumption in categories like space heating or lighting that are easier to reduce. In either scenario, results show that lower base-load users seem more willing to adopt energy efficiency measures to save.

AVERAGE BASE-LOAD CONSUMPTION AND AVERAGE SAVINGS RATE



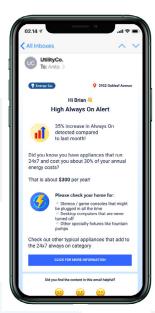
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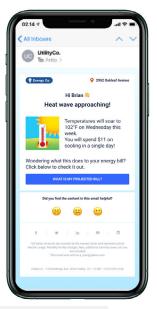
Bidgely's HER solution identifies which customers will be able to save most, targeting HERs to customers with low base-loads and high total consumption in order to yield maximum savings. Having this accurate intelligence gives program designers a real opportunity to use disaggregated end-use consumption, such as AC consumption, as a criteria or factor in treatment group selection. Doing so reduces the chances of treating customers with low or no opportunity to save energy.

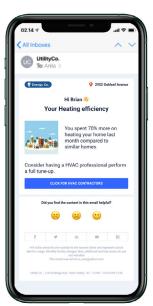
Bidgely's UtilityAI platform develops a unique energy profile for every customer to provide utilities with a granular understanding of savings trends for each appliance category. Entire programs can be analyzed for their effectiveness at reducing loads in always-on, heating or cooling, pool pump, lighting, water heating, refrigeration, cooking, laundry, entertainment, electric vehicle charging and more. Further, savings potential can be assessed at the home level, zip code level, city level, substation level, program level and more. Understanding how different appliances influence savings over time can help utilities resource, organize and support their energy efficiency rebate programs to maximize ROI.

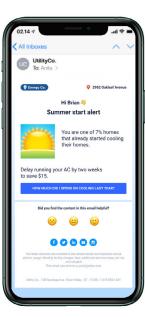
MORE EFFECTIVE HYPER-PERSONALIZED HER MESSAGING REQUIRES DEEP CONSUMER UNDERSTANDING

Beyond treatment design, customer savings messaging strategies can also be shaped by customer intelligence to achieve greater ROI. With the previous examples in mind, program designers can incorporate hyper-personalized AC-related energy efficiency messaging in HER programs targeted to customers with the greatest AC consumption. And they can educate users with high base-load to explain what base-load is and what steps they can take to reduce their loads to generate savings.



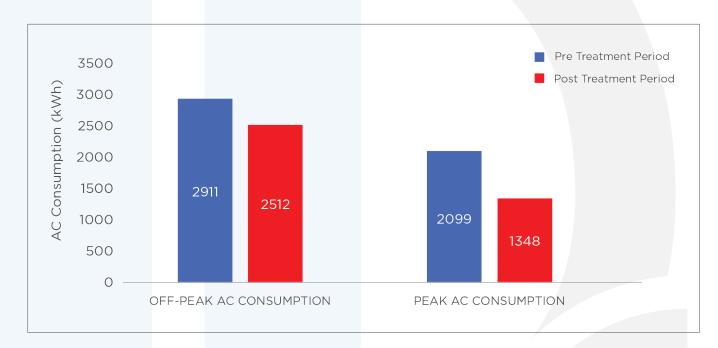






Example of Bidgely's Home Energy Alerts guides customers to be more HVAC efficient

A Bidgely HER program for a leading southwest IOU demonstrated that customers reduced their AC loads as a result of behavioral EE treatment more so during peak times than off-peak times. Customers received targeted insights about their AC consumption and ways to reduce, which were effective when it mattered most. Bidgely's HER program proactively targets the optimal candidates with relevant messages to save energy — and to enroll in demand response programs.



Bidgely Analysis of Appliance-Level Time-of-Use Response to HER Treatment

Targeted messaging is only possible with accurate customer intelligence. Bidgely helps utilities identify the kind of messaging that drives savings. We deliver energy insights crafted to allow and encourage customers to take action quickly, such as adjusting the time at which they start cooling their home paired with a personalized calculation as to how much they could save if they invested in a more efficient HVAC system. In addition to A/B testing, every messaging component uses machine learning to continuously refine the kinds of messages customers receive and who receives them, based on their interactions with every communication sent. Utilities can be assured with quantitative data that their customers are receiving insights and recommendations that generate the biggest impact.

To learn more about hyper-personalized messaging that drives savings, request access to the Bidgely demo portal at https://demo.bidgely.com/

DIGITAL HER PROGRAM SUCCESS STRATEGY

As a digital-first technology company, Bidgely's next-gen digital HER solutions have consistently demonstrated better performance, outperforming paper reports at 25-45% lower cost than incumbent vendors, and achieve average energy savings rates across participants that are much higher than the rate typical to digital HER programs.³ Bidgely's digital HERs are dynamic, mobile-optimized, opt-out email alerts timed to each user's particular billing cycle such that they receive the alert at the precise time they need it. The email alerts contain content derived from the UtilityAI platform, including specific and relevant insights for every customer, itemization of energy spending that adjusts to actual customer behavior (including swings in usage), vacations and other behavior changes, personalized tips for saving energy, and relevant program offers.

³ See this case study for 3rd party verified results: http://go.bidgely.com/rs/492-VKN-623/images/EE Case Study.pdf

Digital Energy Savings on par with paper programs at lower cost

Bidgely's digital HER programs have shown energy savings results on par with paper HER programs disproving the misconception that digital HER programs are not as effective as paper. Many utilities have come to Bidgely specifically to expand their programs to digital. The table below reflects actual customer program results achieved in utilities across North America.

UTILITY	PROGRAM	RESULTS
UTILITY A	Digital (~65%) HERs, paper HERs, and web portal for ~240,000 customers across Nevada	 16.5 GWh savings realized in first year of program (2018) Forecast to deliver 19 GWh savings for 2019 50% open rates for digital HER
UTILITY B	Digital HERs (~50%), paper HERs, and web portal for ~330,000 customers across Utah, Idaho and Wyoming; inherited from Oracle/ Opower	41 GWh in savings25% cost reduction
UTILITY C	Digital HERs, paper HERs and web portal for ~34,000 customers in Washington State; inherited from Oracle/ Opower	9 GWh in savings40% cost reduction
UTILITY D	Digital-only pilot program to evaluate savings potential for 20,000 low-to-medium consumption customers	 1.4% savings realization in one year 40% higher savings than equivalent programs
UTILITY E	Digital-only HERs for lower-than-average- consumption customers; inherited from Oracle/ Opower	 1.1% savings rate in line with past programs 40% cost reduction over paper-based program

Faster Ramp Up

Bidgely's experience transforming behavioral EE programs to maximize digital treatment has shown that digital-only treatment generates an immediate rampup in savings, which results in digital treatment vastly outperforming paper treatment in the initial period of the program. Customers who receive email communications are able to take savings actions immediately, from day one.

Just seven months into the program, an ongoing Bidgely HER program at a leading southeast IOU is generating savings rates for digital-only treatment that are 20% higher than savings rates for paper treatment. While we do expect the total digital and paper savings rates to even out in the long term (1 to 2.5%), the current digital-only savings rate (0.98%) still exceeds the savings rate of an Opower paper HER program previously deployed at the utility.

2x Higher Savings During Peak Months

The savings that were generated by the email channel during the summer period were 2x the savings realized by the paper channel. Email customers saved 1 GWh while customers who received paper-only generated only .5 GWh of savings. This outcome speaks to the value of the multiple touchpoints and personalization made possible by digital HERs to encourage customers to take energy savings steps.

CUMULATIVE SAVINGS RATE FOR EMAIL ONLY PROGRAM VERSUS PAPER ONLY PROGRAM

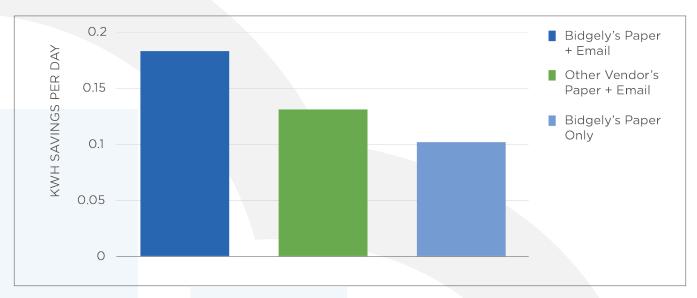


Bidgely's Digital HERs Outperform Paper HERs in Program Launch at Southeast IOU

Greater Savings from Paper + Email

An ADM Study of Bidgely's HER program for a leading utility in the western United States for groups treated with paper + email versus paper-only found that Bidgely's paper + email HER programs generated 80% higher savings than paper-only groups as measured by M&V.⁴ Similar results from other market players also demonstrate uplift, but not as significantly as Bidgely's paper+email program.

CUMULATIVE SAVINGS RATE FOR EMAIL ONLY PROGRAM VERSUS PAPER ONLY PROGRAM



Bidgely's Digital HERs Outperform Paper HERs in Program Launch at Southeast IOU

Sustained or Increased Savings After Paper-HER Transition at Lower Cost

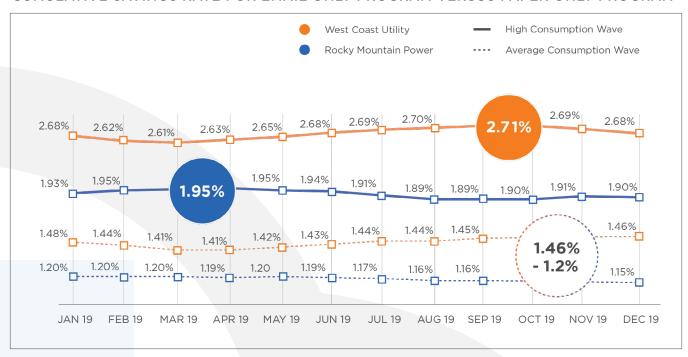
Bidgely's competitive takeovers and transformations of our competitors' paper HER programs have shown that digital-only treatment achieves savings rates on par with paper treatment. Utilities have accomplished the same energy savings but without the cost of printing and mailing paper reports making the overall program much more cost-effective. Our transformation of a former paper-based program at a leading Northwest IOU shows that digital-only treatment can in fact achieve savings rates (1.95%-2.71% for high consumption customers, and 1.20%-1.46% for mid consumption customers) typically associated with paper treatment.⁵

Savings from paper HER programs reach a plateau and trend downwards overtime. Transitioning legacy paper HER recipients to a digital HER program provides a fresh perspective to customers and helps sustain or maintain steady state savings once again and allows even long-time HER program participants to realize new efficiencies.

⁴ ADM Research and Evaluation 2019 report is confidential for our clients. More details about the study can be provided at request.

⁵ Find out how Rocky Mountain Power did this and more at https://go.bidgely.com/RMP-Bidgely Al-HERs Case-Study.html

CUMULATIVE SAVINGS RATE FOR EMAIL ONLY PROGRAM VERSUS PAPER ONLY PROGRAM



Bidgely's Digital HERs Achieve Comparable Savings Rate to Paper HERs at Northwest IOU

Increase customer satisfaction while saving energy

Bidgely designs customer engagement with customer satisfaction in mind. Rolling out a new program and services results in lower complaints and better customer perception of the utility. Bidgely consistently improves customer satisfaction for our global utility partners:

- A project with a North American utility serving 2 million customers has
 driven a 50% reduction in high bill calls and has contributed to an increase
 in JD Power score of two quartiles
- A project with a northwest utility recorded a +20 NPS score (versus typical utility NPS scores that can fall below zero) in a survey sent to customers receiving Bidgely solutions, with 72% of surveyed customers rating our web solution as useful or extremely useful.
- Our work with a 500,000-customer utility in Slovakia, showed that 97% of customers wanted the Bidgely solution to continue and 95% found the solution useful.
- Across all utility projects with email alerts, we earn average "Thumbs Up" ratings of greater than 87% among customers providing feedback.

Savings Among a Wider Range of Customers

Most legacy paper HER programs offer program treatment to only the highest consumption quartile of customers. Bidgely's Al-powered digital first plus paper HER programs provide equitable access to customers of all consumption levels and income ranges by enabling hyper-personalized savings recommendations for a utility's entire service population. This includes disadvantaged communities/hard-to-reach customers not typically viewed as strong candidates for behavioral EE participation. It also includes gas customers who may have been overlooked due to their limited gas fueled applications but who still benefit from behavioral energy savings programs.

UTILITY	PROGRAM	CUSTOMER EXPANSION
DUEL FUEL UTILITY A	Took over Oracle paper HER program for 200k customers	 Cost-effectively expanded to 330k customers Transitioned all treatment customers with emails on file to digital while maintaining savings Broadened program to include 100k average consumption customers
GAS UTILITY B	Took over Oracle paper HER program for 450k customers	 Cost-effectively expanded to 700k customers
GAS UTILITY C	Implemented digital-only HER program alongside existing Oracle HER program	 Focusing on 450k average consumption customers

Bidgely has taken over and expanded (by between 18% to 65%) former legacy programs for more than half a million customers across three major investor owned utilities in both electric and gas. This is made possible by implementing a digital-first strategy that delivers higher value at a lower operating cost.

REVITALIZING PAPER HOME ENERGY REPORTS TO ACHIEVE GREATER SAVINGS

While digital HERs are the future, paper Home Energy Reports continue to be a necessity to reach qualified customers for whom utilities do not have an email address. At some utilities, the no-email population can be upwards of 50%. Because the delivery frequency of paper reports is limited and engagement cannot be measured, every paper report must be designed for maximum impact and incorporate the latest learning in behavioral energy efficiency methodologies. Without such advanced design, the effectiveness of legacy paper reports will diminish over time and potentially generate more customer complaints than compliments.

Bidgely has designed an entirely new approach to paper HERs, delivering content that is more relevant and actionable for customers. The design is more interactive, empowers instead of shames, incorporates better social benchmarking and gamifies the task of saving energy. Our paper journey for behavioral energy efficiency includes diverse communications channels such as annual and mid-year "report cards," seasonal reports, and community reports. Where possible, we also drive customers to digital and self-service channels requiring only a "lazy" (one-click) login to access.

Increase Customer Satisfaction by Empowering Customers Instead of Shaming Them to Save

Bidgely's HERs feature actionable steps customers can take to reduce their energy usage. Similar to an itemized bank statement or phone bill, customers can easily see what specific appliances are driving their total energy costs. Bidgely's UtilityAI then determines if any of those usage categories seem out of the norm or are inefficient for this type of home, prompting an opportunity to save. This itemized energy spending adjusts to actual customer behavior including swings in usage, vacations and other behavior changes.



Example of Itemized Energy Breakdown with QR Code to web portal

Our work with a leading southwest utility on home energy assessments recorded that 84% of customers would recommend our solution to family and friends in a survey sent to customers.

Better Social Benchmarking

Bidgely's utility partners are can be challenged by complaints triggered when customers receive reports that compare them to their neighbors that they think are unfair or inaccurate. Social proof is a powerful psychological tool to help nudge people into the right direction, but Bidgely has found greater success in social motivations that make customers feel positively toward their utility and community rather than negatively. To that end, the Bidgely similar home comparison analysis takes into account the customer's consumption per square footage, location, home type, heating type and more. We further demystify peers by introducing neighborhood insights.





Example Similar Home Comparison Insights with Neighborhood Insights to Demystify Peers

With UtilityAI, we can surface action-inspiring community insights about what actions a customer's neighbors are taking, such as buying an EV, reducing their usage, upgrading their appliances and more. Early results show that this approach generates fewer complaints to the call center and qualitative feedback suggests customers like the approach overall.

Gamification

Energy efficiency gamification means engaging the user in a game-oriented way to achieve energy savings. Here we motivate the users in order to achieve energy efficiency goals by giving them tangible, bite-sized goals for each month.



Example Similar Home Comparison Insights with Neighborhood Insights to Demystify Peers

Hyper-Personalized Customer Journey

Both Bidgely digital and paper HERs contain Al-generated, hyper-personalized content, resulting in specific and relevant customer insights (e.g. "You used 15% more energy to cool your home last month than similar homes did.") and specific and relevant recommendations for behavioral changes, energy products and utility programs that serve customers' goals. Insights are also generated to make sure the customer is on the right rate plan and to identify high usage categories like lighting, heating, or a new appliance like EV charging.

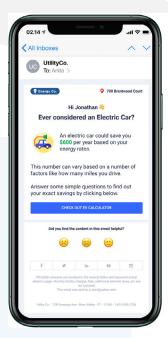


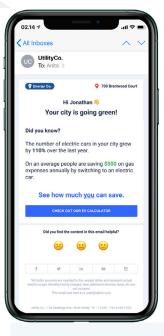
Example Seasonal Insight to Promote Behavioral Change

Winter and summer months represent the best times of the year to reduce energy usage for heating or cooling. With that in mind, Bidgely's HER program includes "Get Ready for Winter/Summer" reports so that customers can take preemptive energy savings steps, such as setting their thermostat ahead of time or insulating their doors. Customers can also compare how well they've done compared to past seasons and to homes similar to their own.

Interactive Design

Further, as customers engage with HERs, UtilityAI[™] platform incorporates the new data and further refines the insights and recommendations each customer sees. Both email and paper HERs seamlessly bring customers to our web portal, which contains a wealth of energy insights, in addition to program and product offers. The unique QR codes allow users to easily see their insights on their personal web dashboard.









Example Electrification Journey for Customers with Propensity to Buy EV

DRIVE MULTIPLE OBJECTIVES BY ENGAGING CUSTOMERS HOLISTICALLY

Customer engagement should not be limited to HERs and energy efficiency. Bidgely's digital and paper engagement tools are in use around the world to meet additional utility objectives such as churn reduction, new revenue generation, electrification, decarbonization, demand response and program recruitment. Starting from a foundation of deeper customer understanding, our utility partners are able evolve from electron energy provider to trusted energy advisor.

For example, with greater customer insight, it becomes possible to more strategically educate customers with a propensity to buy electric vehicles about the benefits of EV ownership, available financial incentives and ways they could save money by switching to an EV. After an EV purchase, the utility can further encourage charging at off peak times. Personalized messaging is only possible with the accurate EV charging detection and estimation for every home that UtilityAl enables.

TAKING THE NEXT STEP

Utilities worldwide are re-evaluating their behavioral energy efficiency programs. What is their cost per kWh? Is digital engagement being leveraged to expand program reach? Were there negative or neutral savers? Could customers be targeted and messaged more effectively? Depending on those answers, it may be time to innovate.

The next step is to consider customer insights. What customer appliances offer the greatest opportunity to save? Which customers are most likely to save energy? What existing intelligence can be drawn out of the utility data lake meter infrastructure? Bidgely works with utilities to generate this intelligence.

With that data foundation, it becomes possible to design engaging customer journeys. Behavioral energy efficiency relies on effective messaging, so it's critical to think through how you want to message, who you want to message to, and how frequently messages should be sent. Bidgely can develop a comprehensive design strategy that includes integrated feedback and learning to generate personalized customer journeys for everyone.

Finally, it is essential to measure program effectiveness. Every interaction with every member of every treatment group should be measured against its impact on overall program savings. This ensures the programs continue to learn and adjust based on changes in customer behavior, regulatory environment and economic landscape. UtilityAI allows HER programs to continually improve and deliver the best in class experience to customers without additional investment.

