Louisville Gas and Electric Company and Kentucky Utilities

Appliance Choice Engine Pilot Evaluation Report

TETRA TECH

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1.0 EXECUTIVE SUMMARY

Louisville Gas and Electric Company and Kentucky Utilities (LG&E and KU) offer energy efficiency programs to their customers. These programs cover electric and natural gas energy efficiency measures, including the Appliance Choice Engine (Marketplace), an online platform focused on helping people make better buying decisions. This report details the evaluation activities from November 2019 through November 2021, including results, for the Marketplace pilot. Evaluation results presented in this report generally follow those that were outlined in the Detailed Evaluation Plan (DEP)[1]. We note that not all evaluation activities outlined in the DEP were implemented. Determining the final pilot evaluation methods evolved over time as data and information sources came together.

1.1 BACKGROUND

LG&E and KU have been piloting the Marketplace, an online platform focused on helping people make better buying decisions, that went live on November 4, 2019, and is available to all of LG&E and KU's customers. The fundamental barriers the Marketplace has been working to overcome include:

- Market – customers are unable to choose energy-efficient products if they do not have the tools; and

- Price premium - people associate energy efficiency with a higher price.

LG&E and KU's Marketplace pilot support originated from senior utility leadership focused on customer value. It is LG&E and KU's belief that limited consumer engagement related to household energy use is driven by the lack of the following five primary factors:

1. Awareness

2. Availability of information

3. Customer effort or lack of convenience

4. Understanding the value of products and services

5. Trust in available solutions.

LG&E and KU staff are also aware of customers' growing expectations based on their interactions with other industries and businesses. This creates opportunities for efficiency programs, and the utilities that support them, to work with customers at the critical research time, and customers are ready for that level of interaction. As a result, the pilot has been testing the ability for LG&E and KU to more strongly assume the role of trusted energy advisor, directly influencing customers' energy-efficient product purchase decisions by providing them with information, education, advice, and simplified access to retailers carrying energy-efficient products. Additionally, no rebates were available for purchased energy-efficient products.

The online platform selected was Enervee, which has been serving as a central repository for information on select residential energy-efficient home appliances and consumer electronics, helping LG&E and KU customers conduct relevant research in real-time, including the ability to compare images, specifications, reviews, tips for use, price, vendor locations, incentives/rebates, energy efficiency score, and the true lifetime cost of products.

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[1] The DEP was reviewed by LG&E and KU staff, as well as Enervee staff, and approved on December 26, 2019.

1.2 EVALUATION METHODOLOGY

This report presents the summation of the Marketplace pilot impact and process evaluation activities that have been ongoing since October of 2019. Tetra Tech met regularly with LG&E and KU program staff and Enervee staff, both at the start of the pilot and over the past two years, to inform evaluation activities and key researchable questions. For the impact evaluation, Tetra Tech used well-vetted and publicly available Technical Reference Manuals (TRMs) to determine savings from purchased products[2]. For the process evaluation, Tetra Tech reviewed program materials and conducted a telephone survey of customers who visited the website to determine purchases made, understand customers' experiences with the website offering, website influence, satisfaction with various aspects of the information provided, and LG&E and KU as their energy provider. Additionally, publicly available evaluation reports for similar programs were reviewed.

To measure the success of LG&E and KU's Marketplace pilot, two core hypotheses were defined to test throughout the evaluation period. These hypotheses were targeted at understanding LG&E and KU's residential customers. They span the elements of customer engagement, customer behavior, and customer preference. Understanding the customer ensures alignment of business offerings and introduction of business models that benefit the customer through increased choice and control.

1. Customers may be more engaged in their energy usage and energy management if they have a greater awareness of available products and services that are relevant to them and/or the opportunity to interact with applicable tools through a fun, educational, and engaging online experience.

2. Customers may become engaged in purchasing energy-efficient products and services they value through an information-driven, guided e-commerce experience.

As a result, evaluation activities accounted for several aspects when formulating the research design for this study, including:

- Identifying customers that make a purchase, as it is this group that needs to be considered when estimating potential energy savings.

- For purchases made, determine some means of verifying the efficiency level of the visitors' purchases since energy savings only accrue for efficient model purchases.

- While a visitor may have purchased an efficient model of a product after visiting the website, it is not necessarily the case that website caused the purchase. Thus, a means of assessing influence is needed.

Therefore, the specific key tasks outlined for this study involved:

- Locating LG&E and KU customers that visited the Appliance Choice Engine website

- Determining if the visitors purchased any energy-efficient models from the product categories offered on the website since visiting the website

- Assessing the influence of the website on the visitors' purchase decisions.

Due to the unique nature of the Marketplace, the research team (Tetra Tech, LG&E and KU, and Enervee staff) took a multi-pronged and cross-cutting approach to evaluation that included: a) data from

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[2] Per the evaluation methodology, savings were only able to be determined for products that were purchased and where customers were willing to share purchased product information (e.g., product receipts).

Enervee; b) data from LG&E and KU; c) pop-up surveys; d) participant surveys; and e) assessing savings through well-vetted and publicly available TRMs (Figure 1).

Figure 1. Major Activities that Informed Market-Based Savings Attributable to the Marketplace
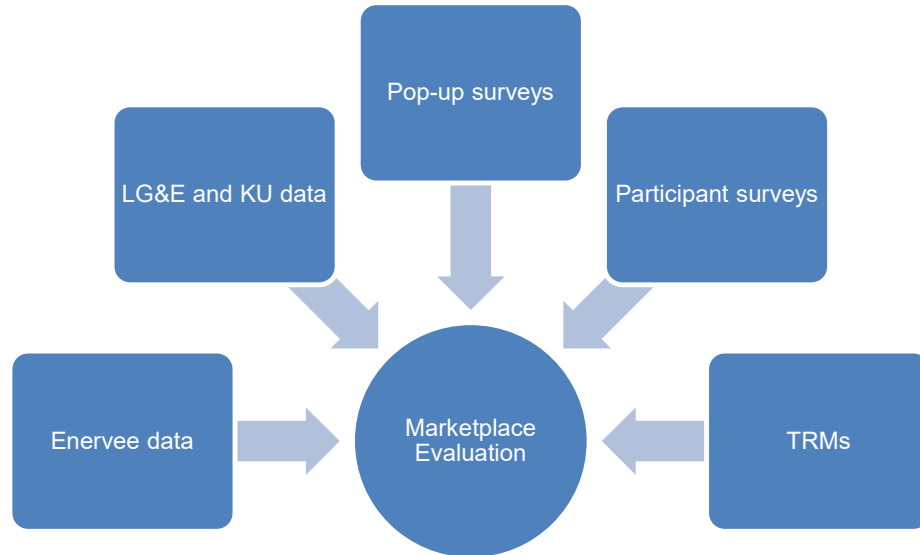
The table below documents the key data sources that were used for this evaluation. The table outlines the source (origination) and purpose of the data that supported addressing the evaluation objectives.

Table 1. Key Data Sources Used to Help Determine Market-Based Savings

Enervee Data	LG&E and KU Data	Pop-up Survey	Participant Surveys	TRMs
• Used to determine initial influence of the choice platform • Platform analytics • Pop-up survey data • Email addresses for visitors that have created a profile	• Used to determine influence of the choice platform • Platform analytics • Email addresses of customers who clicked through from email marketing campaigns	• Used to assess initial satisfaction, whether or not customers would recommend the site, and to recruit for the later participant survey • Verify an LG&E and KU customer	• Used to gather more in-depth information related to influence, satisfaction, awareness sources, improvements, etc.	• Used to determine deemed savings for purchased products

1.3 SUMMARY OF KEY FINDINGS

With a residential customer base of more than 800,000 customers[3], the Marketplace recognized almost 325,000 visitors. From November of 2019 through November of 2021, Tetra Tech estimated that LG&E and KU's Marketplace could have impacted a range of purchased energy-efficient products—approximately 23,000 on the lower end and 97,000 on the higher end[4]. These energy-efficient purchases had the potential of achieving a range of energy savings—approximately one million to almost four million kWh and 150 to 600 kW first-year gross savings, and 17 million to 67 million kWh and 2,700 to almost 11,000 kW lifetime savings as shown in the table below.

Table 2. Summary of Range of Potential Impacts*

All Product Categories	Estimated Gross Units Purchased	First-Year Gross Estimated Savings		Lifetime Gross Estimated Savings	
		kWh	kW	kWh	kW
Overall Totals – Lower Bound	23,431	1,004,980	153.75	17,038,267	2,700.65
Overall Totals – Upper Bound	97,620	3,922,141	616.67	67,435,915	10,828.06

* The gross units purchased to first-year gross estimated energy savings were calculated by multiplying the units by the annual per unit energy savings values (see values in Appendix B). Lifetime gross estimated savings were computed by taking the first-year savings and multiplying them by the effective useful life (EUL) for each product (see values in Appendix B).

The intangible effects that the Marketplace has on LG&E and KU's customer experience should not be overlooked. Surveyed respondents were asked to rate the usefulness on a scale of 1 to 5, where 1 was "not at all useful," and 5 was "extremely useful." Results (Figure 7) showed that most respondents found the Marketplace useful—65 percent rated the usefulness a 4 or 5. The mean rating was 3.66.

LG&E and KU customers were positively affected by their Marketplace experience. Survey data showed that Marketplace visitors appear to value the site (Figure 9), with just over half (53 percent) rating their level of satisfaction an 8, 9, or 10 on a 10-point scale. The mean rating was 7.33. Additionally, surveyed respondents were asked if their opinion of LG&E or KU has improved, worsened, or not changed. As shown in Figure 10, just over a quarter (28 percent) said their opinion of LG&E and KU has improved as a result of their Marketplace experience. Last, a third of survey respondents (32 percent) said they would likely recommend the Marketplace to others (respondents who rated their likelihood a 9 or 10 on a scale from 0 to 10).

Should LG&E and KU continue to offer the Marketplace, it may be beneficial to complete a comprehensive cost-effectiveness assessment to determine the efficacy of delivering energy savings through Marketplace. In particular, this study did not calculate any benefit metrics. Many benefits arise from the Marketplace such as the value of avoided energy use and non-energy benefits such as Greenhouse Gas reductions and increasing LG&E and KU's digitally connected audience.

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[3] LG&E serves 332,000 natural gas and 425,000 electric customers in Louisville and 16 surrounding counties. KU serves 564,000 customers in 77 Kentucky counties and five counties in Virginia.

[4] Due to the nature of how the estimates were derived, there is no confidence interval associated with the lower or upper bound savings estimates.

2.0 INTRODUCTION

This report presents the detailed impact and process evaluation results for the Appliance Choice Engine (Marketplace) pilot offering in Louisville Gas and Electric Company's and Kentucky Utilities' (LG&E and KU) service territory for the implementation period from November 2019 through November 2021. Evaluation results presented in this report generally follow those that were outlined in the Detailed Evaluation Plan (DEP)[5]. We note that not all evaluation activities outlined in the DEP were implemented. Determining the final pilot evaluation methods evolved over time as data and information sources came together.

2.1 PROGRAM DESCRIPTION

LG&E and KU has been piloting the Marketplace, an online platform (website) focused on helping people make better buying decisions, that went live on November 4, 2019, and is available to all of LG&E and KU's customers. The fundamental barriers the Marketplace pilot has been working to overcome include:

- Market – customers are unable to choose energy-efficient products if they do not have the tools; and

- Price premium - people associate energy efficiency with a higher price.

LG&E and KU's appliance choice engine support originated from senior utility leadership focused on customer value. It is LG&E and KU's belief that limited consumer engagement related to household energy use is driven by the lack of five primary factors:

1. Awareness

2. Availability of information

3. Customer effort or lack of convenience

4. Understanding the value of products and services

5. Trust in available solutions.

LG&E and KU staff are also aware of the growing expectations of customers based on their interactions with other industries and businesses. Looking across industries, there are trends that can be leveraged to design a solution that aligns with today's customer expectations. For example, online shopping and research have become the norm. The typical American aged 18 and older spends roughly 10.5 hours each day on gadgets[6], forcing the traditional methods of retail to transform to this heavily-altered consumer behavior. Additionally, consumers seek to educate themselves on a product's price, review, features, and competitors for efficient or inefficient products alike. In fact, according to a recent Pew Research Center study[7], "65 percent of online shoppers said if they needed to make a purchase, they'd compare real-world prices with those online and then buy where they could get the best deal. Only 21 percent said they'd buy without checking online prices for comparison's sake, and only 14 percent said

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[5] The DEP was reviewed by LG&E and KU staff, as well as Enervee staff, and approved on December 26, 2019.
[6] "The Total Audience Report: Q2 2018." Nielsen, 2018. https://www.nielsen.com/us/en/insights/report/2018/q2-2018-total-audience-report/.
[7] Pew Research Center: https://www.pewresearch.org/internet/2016/12/19/online-shopping-and-e-commerce/.

they woud buy online without checking retail prices." Additionally, "online reviews have become very important to Americans' purchasing decisions, Pew also found. Eighty-two percent say they consult online ratings when buying for the first time, and nearly half (46 percent) said that reviews can help them feel more confident about their purchases." This creates opportunities for efficiency programs, and the utilities that support them, to work with customers at the critical research time, and customers are ready for that level of interaction.

As a result, the pilot has been testing the ability for LG&E and KU to more strongly assume the role of trusted energy advisor, directly influencing customers' energy-efficient product purchase decisions by providing them with information, education, advice, and simplified access to retailers carrying energy-efficient products. Additionally, there are no rebates for purchased energy-efficient products.

The online platform selected was Enervee, which has served as a central repository for information on select residential energy-efficient home appliances and consumer electronics, helping LG&E and KU customers conduct relevant research in real-time, including the ability to compare images, specifications, reviews, tips for use, price, vendor locations, incentives/rebates, energy efficiency score, and the true lifetime cost of products. The LG&E and KU online Marketplace product categories have evolved over time.

Enervee, as the implementer, works with retailers, manufacturers, governments, and utilities through an integrated product recommendation platform that processes product specifications, retail product offer data, energy data, utility rate data, and aggregated product reviews on a daily basis. Enervee provides customers' estimates of energy bill savings and total cost of ownership (purchase price plus energy costs) to help understand the true cost of their product purchase and ranks products by translating technical efficiency metrics into a 1 to 100 scale to help make efficiency visible and more intuitively understood. Their tool has dynamic re-ranking capabilities, reflecting changes occurring in the market on a daily basis. Enervee is white-labeled for their partners, with customers able to purchase products via their preferred online or brick-and-mortar retailer.

Driven by Enervee's platform, every day, LG&E and KU's appliance choice engine analyzes data on tens of thousands of energy-efficient products like appliances, televisions, smart thermostats, and water heaters. Customers find prices, consumer ratings, energy-efficiency ratings, and product details all listed in one convenient location to ensure they find the most efficient products at the lowest prices. Comparing products can be time-consuming and cumbersome. LG&E and KU's Marketplace does all of the homework for customers by streamlining the comparison process between products. Customers can also save product searches or sign-up for price drop alerts and access extensive expert reviews and product comparisons.

LG&E and KU's Marketplace ultimately has been working to deliver the following benefits:

- Personalized energy saving insights, plans, and offerings

- Consolidated source of products/services for customers to more easily make informed decision about energy offering purchases

- Easy to understand estimate of savings and discounts, and related services

- Provides opportunity to deepen customer relationship and establish additional customer touchpoints.

The marketing for the pilot is shared between LG&E and KU and Enervee. Marketing channels include radio, paid search, paid advertising, sweepstakes, email marketing, social media, and blogs.

2.2 EVALUATION METHODS

2.2.1 Summary of Researchable Questions and Evaluation Activities

This section describes the analytic methods and data collection activities implemented as part of the Marketplace pilot evaluation. In collaboration with LG&E and KU staff and Enervee staff, Tetra Tech designed a methodology to evaluate the pilot and address the researchable questions outlined in the program's DEP. The process evaluation activities were designed to examine both internal pilot processes and customer response to the pilot. The focus of the process evaluation activities was to better understand operations, assess the overall effectiveness of operations, and identify areas for improvement. The impact evaluation activities were designed to assess market-based savings—those resulting from market influence and behavioral changes (e.g., the information and score provided by Enervee) for energy-efficient purchases. Specifically related to program impacts, the following two key factors in how LG&E and KU have implemented the Marketplace made determining how to estimate sales and energy savings challenging:

- **Visitors and purchases are not tracked.** Products are not actually sold through the Appliance Choice Engine platform, and there is limited reporting available to determine which visitors might have made a purchase.

- **Need to determine efficiency level of purchases.** The Appliance Choice Engine platform provides information for all models available within the included product categories, thus some purchases will likely be energy-efficient, but some will also likely be inefficient. Only efficient model sales contribute to energy savings.

The table below documents the key researchable evaluation questions based on information gathered during the in-person Kick-off Meeting on October 9, 2019, that included LG&E and KU staff (energy efficiency and marketing staff) and Enervee staff. This matrix also provides an overview of the evaluation activities that supported addressing the questions.

Table 3. Researchable Questions

Researchable Question	Activity to Support the Question
Customer Awareness and Marketing	
How did customers learn about the online platform? Why did customers visit the online platform?	• Program staff discussions • Participant surveys
Administration and Processes	
Is there any part of the pilot processes that are unclear? How can the process be improved?	• Program staff discussions • Participant surveys
Ease of Participation	
What barriers exist for participation in the pilot?	• Program staff discussions • Logic model • Participant surveys
What is the process customers go through for the pilot? How many touch points?	• Program staff discussions • Logic model • Process flow diagram

Researchable Question	Activity to Support the Question
Satisfaction	
Are participants satisfied with level of information provided? What could be improved? What was most helpful? Would customers recommend the pilot?	• Pop-up surveys • Participant surveys
Does participation affect participants' perception of the utility?	• Participant surveys
Customer Characteristics and Decision-Making Processes	
Do customers plan to make a purchase? Did customers make a purchase? Would they recommend the online platform?	• Pop-up surveys • Participant surveys
What other sources did customers use to research their product purchase (if any)? How useful was the online platform information? Has participation generated interest in installing energy-efficient products?	• Participant surveys • Logic model
What are the characteristics of the participating population and how does that compare to the eligible population?	• Participant surveys
Performance Indicators	
Is the appropriate information being collected to support quality assurance/ quality control processes, as well as evaluation activities?	• Program staff discussions • Logic model
Are goals set appropriately? What barriers were there to reaching goals and metrics, or why might the pilot exceed goals?	• Program staff discussions • Logic model
Market-Based Savings	
What are reasonable savings for the pilot to claim?	• Participant-provided purchase receipts • Publicly-available TRMs • Secondary literature review

2.2.2 Detailed Evaluation Activities

The table below provides a summary of the activities performed to support the evaluation of this pilot.

Table 4. Evaluation Activities Summary

Evaluation Type	Activities
Overarching Evaluation	**Program staff discussion.** Tetra Tech had in-depth conversations during the in-person Kick-off Meeting and had on-going discussions over the course of 2020 and 2021 with LG&E and KU staff (energy efficiency and marketing staff) and Enervee staff.
Impact Evaluation	**Marketing analytics.** Information being collected and tracked by Enervee was assessed early in 2020 to help ensure the appropriate information was being collected and to determine if the information could be used to assess the influential effect on customers' purchasing decisions. **Secondary literature review.** Tetra Tech staff searched and reviewed publicly-available evaluation reports for similar types of programs from across the country. This activity was completed to guide the market-based estimated savings methodology development.

Evaluation Type	Activities
	Determine market-based savings estimates. Participants who responded to the web survey and said they made a purchase were asked to share the product receipt. Information from these receipts were used to determine if the product purchased was energy-efficient, and if so, well-vetted and public TRMs were used to estimate savings.
Process Evaluation	**Participant customer survey.** Tetra Tech received 1,553 completed web surveys from LG&E and KU customers who had visited the Appliance Choice Engine online platform.

The figure below shows the timeline of key evaluation activities implemented between November 2019 and December 2021 to support the evaluation of this pilot.

Figure 2. Evaluation Activities Timeline
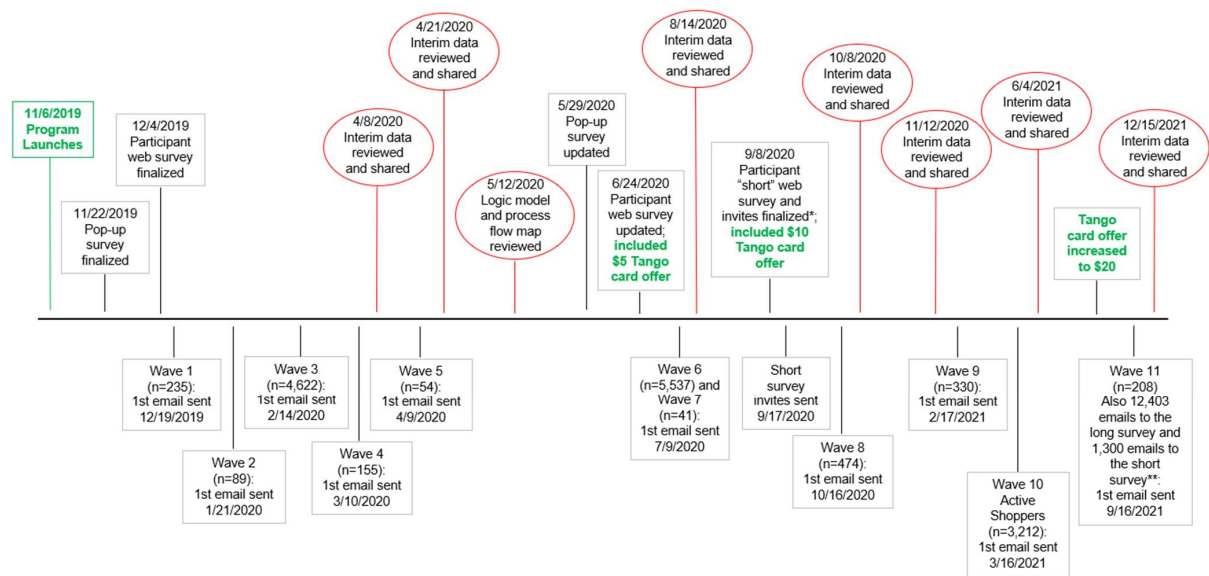
* The "short" web survey was developed to try to continue to find purchasers. Two different email invitations were sent:
- One invitation was sent to the people who had not yet completed the full web survey.
- The other invitation was sent to the people what had completed the full web survey but said they had not purchased anything.

** Sent to the uncompleted long and short survey cases in the previous 1 - 10 waves, as relevant.

Below is more detail about the methodologies used for the different evaluation activities associated with LG&E and KU's Appliance Choice Engine pilot evaluation.

Develop program theory, logic model, and process flow map. A logic model is typically established as a basis for assessing program flow. A logic model is a graphic representation of a program and its processes. It has the goal of making the program's assumptions explicit by, for example, identifying the linkages that are assumed to exist among the problem or situation the program is designed to address, the intervention that is to be made (specifying both inputs and outputs), and the program's intended impact (including short, medium and long-term outcomes). Logic models also serve to identify processes and relationships critical to the program's performance. The process mapping detailed the steps to participation from the point of view of the program and program participants. A copy of the logic model and process flow map can be found in Appendix A.

Pop-up web survey. The research team developed a web-based pop-up survey to increase the likelihood of locating Marketplace visitors and those who made a purchase. All visitors to the website who remained there for at least 30 seconds received the pop-up web survey. The first iteration of the brief pop-up survey asked website visitors to categorize themselves into age groups, satisfaction with the website, purchase plans, likelihood to recommend the website, and if they would be willing to participate in future surveys. Email addresses were collected from those that agreed to be contacted for future surveys. To try to help increase the number of completed pop-up surveys and emails provided, the number of questions was revised and only focused on purchase behavior and collecting email addresses. A copy of both iterations of the pop-up web survey can be found in Appendix C.

Participant customer web survey. Tetra Tech received 1,553 completed web surveys. Web survey invitations were sent periodically to customers who had provided their email addresses through the pop-up web survey and to select LG&E and KU customers[8]. There were 11 "waves" of email invitations delivered to 14,970 unique email addresses[9]. The participant web survey included process-related questions, such as satisfaction with their experience with the Marketplace and LG&E and KU. To help determine pilot impacts, the web survey included questions about purchases, influence indicators, and awareness of behaviors that could impact savings. The survey also included additional questions that probed certain aspects of the Marketplace, such as those aimed at better understanding how visitors valued certain aspects of the website and understanding the customers' purchase journey. The participant web survey went through a few iterations throughout 2020 and 2021. A copy of the participant web survey can be found in Appendix D, including a documentation of changes to the original final survey instrument.

Marketing-driven analytics. Various marketing activities were implemented to promote the Marketplace, including paid search, digital banners, radio, Spotify, social media, newspaper, sweepstakes, special date promotions (e.g., Black Friday, Cyber Monday), etc. Open rates and click-through rates for each promotional activity were tracked. This data was shared with Tetra Tech to analyze early in the evaluation process to ensure the appropriate information was being collected. These marketing activities included a unique user ID with the URLs that directed traffic to the online platform, allowing customers who have visited the platform to be surveyed, if deemed appropriate to do so[10]. Tetra Tech determined that Enervee was collecting a substantial amount of information and was reporting to LG&E and KU accordingly throughout 2020 and 2021.

Conduct a secondary literature review. When LG&E and KU launched the Marketplace, this type of online platform was still a relatively newer energy efficiency program model (hence, the "pilot" aspect for LG&E and KU). Because of this, the process to estimate the potential for savings was also new, particularly from a non-rebate program. Across the country, a few programs had been in the field for a year or two and had publicly available evaluation results. These evaluation reports and discussions with the evaluation report authors were reviewed and used to help determine how to estimate the market-based savings from the Marketplace pilot.

Determine market-based savings estimates. This activity was a key evaluation outcome. To provide defensible savings estimates, there needed to be proof of energy-efficient purchases made as a result of access to the online platform. Because website visitors and their purchases could not be directly tracked, customers who responded to the web survey and said they made a purchase were asked to share the product receipt. Information from these receipts was used to determine if the product

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[8] This included "active shoppers," as defined by Enervee, and was based on customer web activity.

[9] These are not necessarily unique customers, as individuals can have more than one email address.

[10] At the time the DEP was finalized, only customers who agreed to additional research through the pop-up web survey were sent the participant web survey invitation. Over the course of the evaluation timeframe, there were additional select groups of LG&E and KU's customers that were included in survey efforts, but not all.

purchased was energy-efficient, and if so, well-vetted and public TRMs were used to estimate potential savings.

Reporting. As outlined in the DEP and reflected in Figure 2 above, Tetra Tech met with LG&E and KU staff and Enervee staff periodically throughout 2020 and 2021 to provide evaluation updates and interim results. This included an early review of market-driven analytics to ensure the appropriate information was being collected and an on-going review of survey data, including assessment and analysis of received purchase receipts.

2.2.3 Study Design

This section presents the detailed methodology to determine the potential for energy savings. As alluded to earlier, Tetra Tech needed to account for several aspects of the online platform when formulating the methodology to try to determine defensible energy savings attributable to LG&E and KU's Marketplace platform. In particular:

- While many people may visit the online platform, only customers who made a purchase can be considered when computing energy savings. However, while Marketplace does track an array of information such as the number of visitors, the pages viewed by each visitor, the products viewed, and click-throughs to affiliate sites, Marketplace has limited ability to identify particular visitors and does not have the ability to track or identify particular visitor purchases, making finding visitors who have made purchases after visiting the site a significant challenge.

- Marketplace presents visitors with information and specifications for all available models within each product category (with the exception of lighting, which only shows bulbs that meet the California Energy Commission specification), not just efficient models (though the efficient models are prioritized and emphasized via the Energy Score). Because energy savings only accrue for efficient model purchases, some means of verifying the efficiency level of the visitors' purchases were needed.

- While a visitor may have purchased an efficient model of a product after visiting Marketplace, it is not necessarily the case that website caused the purchase. Thus, a means of assessing attribution was needed.

As such, the specific tasks outlined for this study involved:

- Locating LG&E and KU customers that visited Marketplace

- Determining if the visitors purchased energy-efficient models from the product categories offered on the website since visiting the website.

To identify Marketplace website visitors, and ultimately product purchasers, Tetra Tech worked with LG&E and KU staff and Enervee staff to develop two web-based surveys:

1. **Pop-up web survey.** It was determined that the best way to try to identify customers who may have made a purchase as a result of information provided through the online platform was to create a pop-up web survey. All visitors to the website who remained there for at least 30 seconds received the pop-up web survey. The first iteration of the brief pop-up survey asked website visitors to categorize themselves into age groups, satisfaction with the website, purchase plans, likelihood to recommend the website, and if they would be willing to participate in future surveys. Email addresses were collected from those that agreed to be contacted for future surveys. To try to help increase the number of completed pop-up surveys

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and emails provided, the number of questions was revised and only focused on purchase behavior and collecting email addresses.

2. **Participant customer web survey.** Participant customer web survey invitations were sent periodically to customers who had provided their email addresses through the pop-up web survey and to select LG&E and KU customers. There were 11 "waves" of email invitations delivered to 14,970 unique email addresses. The participant web survey included process-related questions, such as satisfaction with their experience with the Marketplace and LG&E and KU. To help determine potential pilot impacts, the web survey included questions about purchases, influence indicators, and awareness of behaviors that could impact savings[11]. The survey also included additional questions that probed certain aspects of the Marketplace, such as those aimed at better understanding how visitors valued certain aspects of the website and understanding the customers' purchase journey.

The figure below visually depicts the core elements of the two-step web-based survey process.

Figure 3. Marketplace Web Surveys Logic Flow

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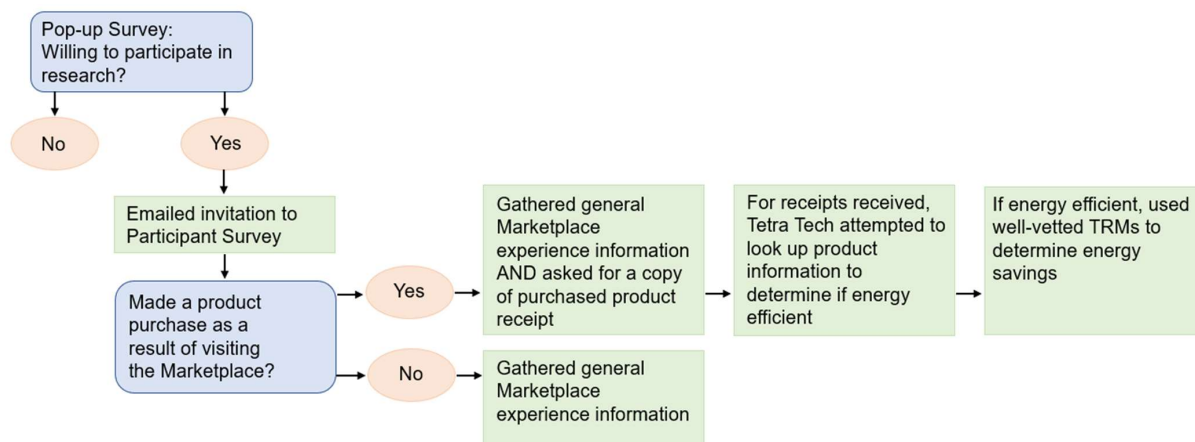
[11] An important consideration when determining impacts from energy-efficient products is if the product is installed. For example, a substantial amount of the estimated kWh is from LED light bulb purchases. If these LEDs are not installed, they are not contributing to energy savings. This level of investigation was not part of the study design, but should be considered, if possible, in future research.

3.0 IMPACT EVALUATION FINDINGS

This section presents the LG&E and KU's Marketplace pilot impact evaluation results. The impact evaluation was designed around the key researchable questions (Section 2.2.1) and the study methodology (Section 2.2.3).

3.1 MARKET-BASED SAVINGS ESTIMATES

The methodology used to determine estimated purchases, and subsequent estimated energy savings, was derived from a similar method used for other Marketplace evaluations[12], with some nuances due to the somewhat unique nature of LG&E and KU's Marketplace not offering rebates for any products. While the foundational methodology behind the estimates provided for LG&E and KU's Marketplace pilot follow industry standards, without rebates or other direct forms of tracking product purchases, it would not be prudent to attribute a single estimated product purchase number, or estimated energy and demand savings numbers. Instead, Tetra Tech has provided a lower and a higher range of potential energy-efficient product purchases and potential savings estimates[13].

For the Marketplace timeframe beginning in November of 2019 and going through November of 2021, Tetra Tech estimated that LG&E and KU's Marketplace could have impacted a range of purchased energy-efficient products—approximately 24,000 on the lower end and 97,000 on the higher end. These energy-efficient purchases had the potential of achieving a range of energy savings— approximately one million to almost four million kWh and 160 to 660 kW first-year gross savings, and 17 million to 67 million kWh and 2,800 to over 11,000 kW lifetime savings as shown in the table below.

Table 5. Summary of Range of Potential Impacts*

All Product Categories	Estimated Gross Units Purchased	First-Year Gross Estimated Savings		Lifetime Gross Estimated Savings	
		kWh	kW	kWh	kW
Overall Totals – Lower Bound	23,850	1,013,706	164.21	17,169,164	2857.56
Overall Totals – Upper Bound	97,314	3,906,424	664.80	67,059,115	11,524.05

* The gross units purchased to first-year gross estimated energy savings were calculated by multiplying the units by the annual per unit energy savings values (see values in Appendix B). Lifetime gross estimated savings were computed by taking the first-year savings and multiplying them by the effective useful life (EUL) for each product (see values in Appendix B).

3.2 DETAILED POTENTIAL IMPACT ANALYSIS

This section presents the detailed methodology to determine the number of gross products purchased, and the electric energy and demand savings from those purchased products. As mentioned earlier, LG&E and KU are implementing the Marketplace pilot without offering rebates or incentives. The approach used for estimating purchased products and the potential energy savings for non-rebated

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[12] The potential estimated savings model has been adapted based on ODC's model from other similar program evaluations. Two key differences in determining the potential number of purchased products and savings for LG&E and KU's Marketplace is that Tetra Tech: 1) did not determine an "influence score," as LG&E and KU does not need to report net-to-gross information; and 2) weighted data based on two categories to provide a range of potentials rather than a single number.

[13] Due to the nature of how the estimates were derived, there is no confidence interval associated with the lower or upper bound savings estimates.

product purchases differs somewhat from recent approaches used for estimating savings resulting from rebated or other tracked product purchases. The process Tetra Tech employed for estimating the potential for savings from non-rebated purchases is shown in the figure below.

Figure 4. Non-Rebated Product Purchases – Potential Savings Estimation Model
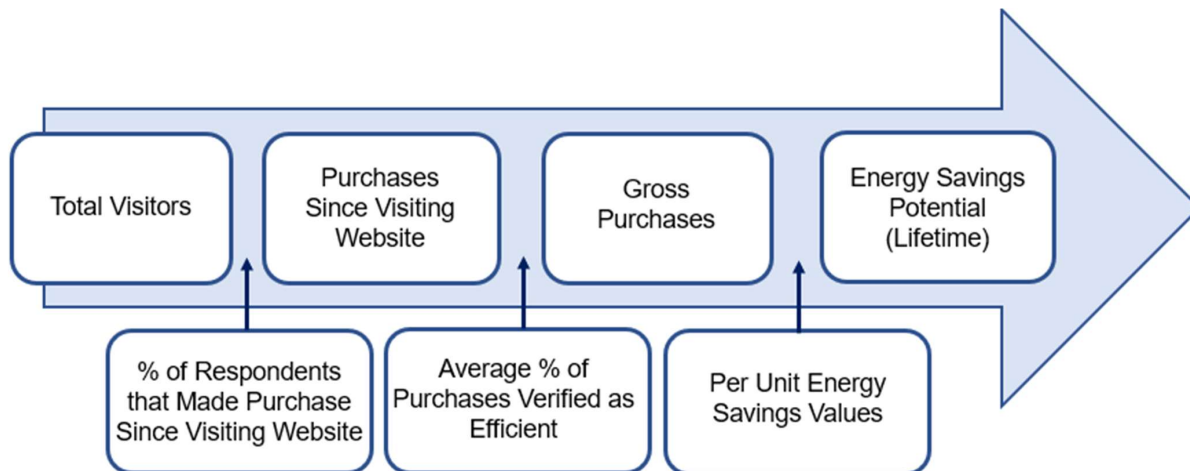
To start, Tetra Tech needed to estimate the proportion of customers that made a purchase in each product category since visiting the Marketplace. These purchases then needed to be assessed to determine if they were energy-efficient purchases. To estimate these numbers, Tetra Tech had to rely on information provided through the participant web surveys—in particular, survey respondents were asked if they made a purchase, and if so, were asked to provide Tetra Tech with a copy of the purchased product's receipt. Across the 1,553 completed participant web surveys, responses for product purchases offered through the Marketplace totaled 407[14].

In the first five waves of participant web surveys, respondents were not offered an incentive to provide a product receipt. Beginning with wave 6, respondents were offered an incentive if they were willing/able to provide a photo of the purchase receipt, product nameplate, product model number, or other ways to verify the product. To try to increase the number of receipts provided by customers, the incentive amount increased over time—first, a $5 Tango gift card was offered for each product receipt, this increased to $10 and again to $20 per product receipt provided. The $20 Tango gift card level seemed to impact the number of receipts received. Of the 132 product receipts that customers provided, 89 were received at the $20 level, and 43 were received at the incentive levels below that, including the no incentive level[15].

Next, Tetra Tech had to read the product receipts and document model numbers. Not all product receipts were legible—Tetra Tech staff were able to identify 97 model numbers from the 132 product receipts provided. For the legible product information, Tetra Tech looked up model numbers to determine if the product was energy-efficient (e.g., on an ENERGY STAR qualified product list). For light bulbs, Tetra Tech found that not all model numbers were ENERGY STAR-certified. However, from

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[14] Product purchase choices through both the web survey and receipts were not restricted to those offered through LG&E and KU's Marketplace. As a result, some customers noted purchasing products that were not offered through the Marketplace. Only products that were offered through the Marketplace are included in product counts and savings estimates.

[15] Tetra Tech notes that, at least in part, the increase in receipts received could have also been a result of more customers being aware of the Marketplace.

product descriptions, Tetra Tech could determine that all light bulb receipts were for LED bulbs. As a result, Tetra Tech counted all light bulb purchases as energy-efficient. A total of 60 receipts included energy-efficient product purchases. It is this receipt information from which two different weighting scenarios were established to try to estimate both a lower bound and an upper bound for the potential number of energy-efficient products purchased and resulting energy savings[16].

The table below shows the total number of eligible Marketplace products purchased based on web survey responses (Column A[17]). Column B is the number of receipts with valid product information, and Column C represents the number of products verified as energy-efficient. To estimate the lower range of the total number of energy-efficient products purchased, Tetra Tech divided Column C by Column A (percent is in Column D). To estimate the higher range of the total number of energy-efficient products purchased, Tetra Tech took the average energy-efficient purchases across all product categories—60 products verified as energy-efficient divided by 97 valid product receipts[18] (percent is in Column E[19]).

Table 6. Efficient Eligible Model Verification and Estimates

Product Category	Number of Products Purchased	Number of Receipts with Valid Product Information	Number of Products Verified as Efficient	Percent Verified as Efficient Within the Product Category	Average Percent Verified as Efficient
	A	B	C	D = C / A	E
Air conditioner (window AC)	18	2	2	11.111%	
Air purifier	14	3	3	21.429%	
Clothes dryer (electric)	39	6	4	10.256%	
Clothes dryer (gas)	1	2	1	100.000%	
Clothes washer	44	14	12	27.273%	
Dehumidifier	13	1	1	7.692%	
Dishwasher	32	11	9	28.125%	61.86%
Electronics	71	10	0	0.000%	
Freezer	15	2	2	13.333%	
Light bulbs	69	18	18	26.087%	
Power strips	19	2	0	0.000%	
Refrigerator	48	14	6	12.500%	
Thermostat	9	2	2	22.222%	
Water heater (electric)	9	2	0	0.000%	
Water heater (gas)	6	2	0	0.000%	
Overall Totals	**407**	**97**	**60**	**14.742%**	**61.86%**

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[16] Because the LG&E and KU Marketplace does not offer rebates, Tetra Tech found it prudent to employ more than one method to provide a range of potential impacts rather than a single number.

[17] The number of web survey completes (1,553) is statistically valid at the 95 percent confidence level, with a +/- 2 percent standard error. Given this, Tetra Tech considered web survey responses a valid representation of the total number of Marketplace visitors from November of 2019 through November of 2021 (324,900), which is why product purchase information recorded through the web surveys is used for weighting purposes.

[18] This is similar to the method employed by ODC in other Marketplace evaluations.

[19] See Appendix B for the percent of energy-efficient receipts for each product category.

3.2.1.1 Lower Bound Potential Estimates

The table below reflects the inputs used to determine the lower bound of energy-efficient purchases made as a result of the Marketplace. Column F shows the total number of Marketplace visitors to the website over the study period (used as the population for weighting purposes). Column G is the estimated purchase rates for each product category computed as population-weighted averages. Column H is the product of Columns F and G and represents the estimated number of total purchases since the Marketplace has been implemented. Column D represents the percent of purchases estimated to be energy efficient within each product category (carried from Table 5, above). Column I is the number of purchases estimated to be efficient, or gross units, which is the product of Columns H and D.

Table 7. Estimated Gross Units Purchased – Lower Bound

Product Category	Total Number of Visitors*	Population Weighted Percent of Purchases	Total Estimated Number of Purchases	Percent of Purchases Verified as Efficient	Total Estimated Number of Efficient Purchases (Gross Units)
	F	G	H = F x G	D	I = H x D
Air conditioner (window AC)	324,900	1.16%	2,929	11.111%	418
Air purifier		0.90%	2,929	21.429%	628
Clothes dryer (electric)		2.51%	8,159	10.256%	837
Clothes dryer (gas)		0.06%	209	100.000%	209
Clothes washer		2.83%	9,205	27.273%	2,510
Dehumidifier		0.84%	2,720	7.692%	209
Dishwasher		2.06%	6,695	28.125%	1,883
Electronics		4.57%	14,854	0.000%	0
Freezer		0.97%	3,138	13.333%	418
Light bulbs**		4.44%	14,435	26.087%	15,063
Power strips		1.22%	3,975	0.000%	0
Refrigerator		3.09%	10,042	12.500%	1,255
Thermostat		0.58%	1,883	22.222%	418
Water heater (electric)		0.58%	1,883	0.000%	0
Water heater (gas)		0.39%	1,255	0.000%	0
Overall Totals	**324,900**	**26.21%**	**85,148**	**14.742%**	**23,850**

* LG&E and KU provided the number of monthly visitors from November 2019 through November 2021 on December 21, 2021.

** To this point, light bulb purchases were counted at the "pack" level. To estimate savings, Tetra Tech transposed the number of bulbs per pack into a total bulb count, as the deemed savings per-unit savings for light bulbs are per bulb. Tetra Tech could do this because the receipt product information included a description of how many bulbs were in the purchased pack.

To determine the lower bound potential savings impacts, Tetra Tech converted the gross units purchased (Column I is from Table 6, above) to first-year gross energy savings (Columns J and K) by multiplying the units by the annual per unit energy savings values (found in Appendix B). Lifetime savings (Columns L and M) are computed by taking the first-year savings and multiplying them by the effective useful life (EUL) for each product (found in Appendix B).

Table 8. Potential First-Year and Lifetime Savings Estimates – Lower Bound

Product Category	Gross Number of Energy Efficient Units	First-Year Gross Savings		Lifetime Gross Savings	
		kWh	kW	kWh	kW
	I	J	K	L = J x EUL	M = K x EUL
Air conditioner (window AC)	418	8,726	10.46	130,897	156.91
Air purifier	628	24,477	3.14	220,296	28.24
Clothes dryer (electric)	837	133,893	17.99	2,142,290	287.87
Clothes dryer (gas)	209	5,230	0.06	83,683	1.00
Clothes washer	2,510	147,115	18.83	1,618,266	207.12
Dehumidifier	209	24,268	5.65	291,218	67.78
Dishwasher	1,883	36,904	2.64	405,947	29.00
Electronics	0	0	0.00	0	0.00
Freezer	418	19,582	3.18	430,801	69.96
Light bulbs	15,063	513,798	90.38	10,275,961	1,807.56
Power strips	0	0	0.00	0	0.00
Refrigerator	1,255	78,830	11.89	1,340,103	202.12
Thermostat	418	20,882	0.00	229,702	0.00
Water heater (electric)	0	0	0.00	0	0.00
Water heater (gas)	0	0	0.00	0	0.00
Overall Totals	**23,850**	**1,013,706**	**164.214**	**17,169,164**	**2,857.56**

3.2.1.2 Upper Bound Potential Estimates

The table below reflects the inputs used to determine the upper bound of energy-efficient purchases made as a result of the Marketplace. Columns E, F, and G are all the same as what was presented in the previous tables. Column E (from Table 6) represents the average energy-efficient purchases across all product categories. Column N is the number of purchases estimated to be efficient, or gross units, which is the product of Columns H and E.

Table 9. Estimated Gross Units Purchased – Upper Bound

Product Category	Total Number of Visitors*	Population Weighted Percent of Purchases	Total Estimated Number of Purchases	Percent of Purchases Verified as Efficient	Total Estimated Number of Purchases (Gross Units)
	F	G	H = F x G	E	N = H x E
Air conditioner (window AC)		1.16%	3,766		2,329
Air purifier		0.90%	2,929		1,812
Clothes dryer (electric)		2.51%	8,159		5,047
Clothes dryer (gas)		0.06%	209		129
Clothes washer		2.83%	9,205		5,694
Dehumidifier		0.84%	2,720		1,682
Dishwasher		2.06%	6,695		4,141
Electronics	324,900	4.57%	14,854	61.86%	9,188
Freezer		0.97%	3,138		1,941
Light bulbs**		4.44%	14,435		53,574
Power strips		1.22%	3,975		2,459
Refrigerator		3.09%	10,042		6,212
Thermostat		0.58%	1,883		1,165
Water heater (electric)		0.58%	1,883		1,165
Water heater (gas)		0.39%	1,255		776
Overall Totals	**324,900**	**26.21%**	**85,148**	**61.86%**	**97,314**

* As noted earlier, LG&E and KU provided the number of monthly visitors from November 2019 through November 2021 on December 21, 2021.

** As noted earlier, light bulb purchases were counted at the "pack" level. To estimate savings, Tetra Tech transposed the number of bulbs per pack into a total bulb count, as the deemed savings per-unit savings for light bulbs are per bulb. Tetra Tech could do this because the receipt product information included a description of how many bulbs were in the purchased pack.

To determine the upper bound potential savings impacts, Tetra Tech converted the gross units purchased (Column N is from Table 8, above) to first-year gross energy savings (Columns O and P) by multiplying the units by the annual per unit energy savings values (found in Appendix B). Lifetime savings (Columns Q and R) are computed by taking the first-year savings and multiplying them by the EUL for each product (found in Appendix B).

Table 10. Potential First-Year and Lifetime Savings Estimates – Upper Bound

Product Category	Gross Number of Energy Efficient Units	First-Year Gross Savings		Lifetime Gross Savings	
		kWh	kW	kWh	kW
	N	O	P	Q = O x EUL	R = Q x EUL
Air conditioner (window AC)	2,329	48,580	58.233	728,706	873.50
Air purifier	1,812	70,056	9.06	635,906	81.53
Clothes dryer (electric)	5,047	807,500	108.51	12,919,995	1,736.12
Clothes dryer (gas)	129	3,235	0.04	51,763	0.62
Clothes washer	5,694	333,663	42.70	3,670,293	469.75
Dehumidifier	1,682	195,146	45.42	2,341,749	545.06
Dishwasher	4,141	81,164	5.80	892,805	63.77
Electronics	9,188	0	0.00	0	0.00
Freezer	1,941	90,844	14.75	1,998,562	324.55
Light bulbs*	53,574	1,827,426	321.45	36,548,523	6,428.94
Power strips	2,459	0	0.00	0	0.00
Refrigerator	6,212	390,084	58.84	6,631,436	1,000.20
Thermostat	1,165	58,125	0.00	639,378	0.00
Water heater (electric)	1,165	0	0.00	0	0.00
Water heater (gas)	776	0	0.00	0	0.00
Overall Totals	**97,314**	**3,906,424**	**664.80**	**67,059,115**	**11,524.05**

4.0 PROCESS EVALUATION FINDINGS

This section details the findings of the process evaluation activities. The process evaluation was designed around the key researchable questions (Section 2.2.1) and the study methodology (Section 2.2.3).

4.1 SHOPPING BEHAVIORS

The survey asked respondents if they were actively shopping for an energy-using product when they visited the Marketplace or if they expected to buy such a product within the next three months[20]. The figure below shows that about one in 10 (eight percent) were shopping to buy when they visited the Marketplace. Almost three-quarters (70 percent) of survey respondents were not in the market to purchase anything within the next three months.

Figure 5. Shopping Timeframe (n = 769)
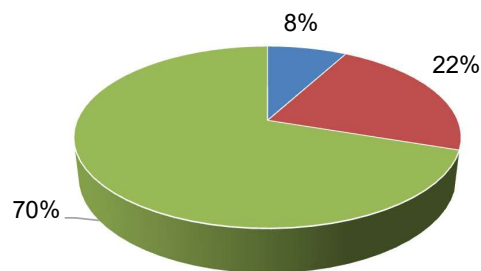
- Yes, shopping to buy now
- Yes, planning to buy within 3 months
- No, not in the market to buy anything within the next 3 months

Source: Participant Web Survey (Q1N)
Don't know and refused responses were excluded

Survey respondents were asked if they made a product purchase after visiting the LG&E and KU Marketplace, and if so, what type of product was purchased (respondents were provided product categories from which to choose). The figure below shows the number of purchases made by product category—electronics (n = 71) and lightbulbs (n = 69) was the most common purchases[21].

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[20] This question was added to the survey in July of 2020, so not all respondents were asked this question.

[21] The product categories reflected in this figure are not exactly the same as the product categories used to estimate potential impacts. This because Tetra Tech received receipts for products that were not identified as being purchased.

Figure 6. Number of Purchases Made by Product Category (n = 417)

Source: Participant Web Survey (P1)
Don't know and refused responses were excluded

4.2 SHOPPING EXPERIENCES

For those respondents who said they made a purchase, the survey asked respondents how useful the information on the LG&E and KU Marketplace was in helping them make their decision to purchase. Respondents were asked to rate the usefulness on a scale of 1 to 5, where 1 was "not at all useful," and 5 was "extremely useful." The figure below shows the results of this question, revealing that most respondents found the Marketplace useful—65 percent rated the usefulness a 4 or 5. The mean rating was 3.66.

Figure 7. Usefulness of Marketplace in Decision-Making (n =211)
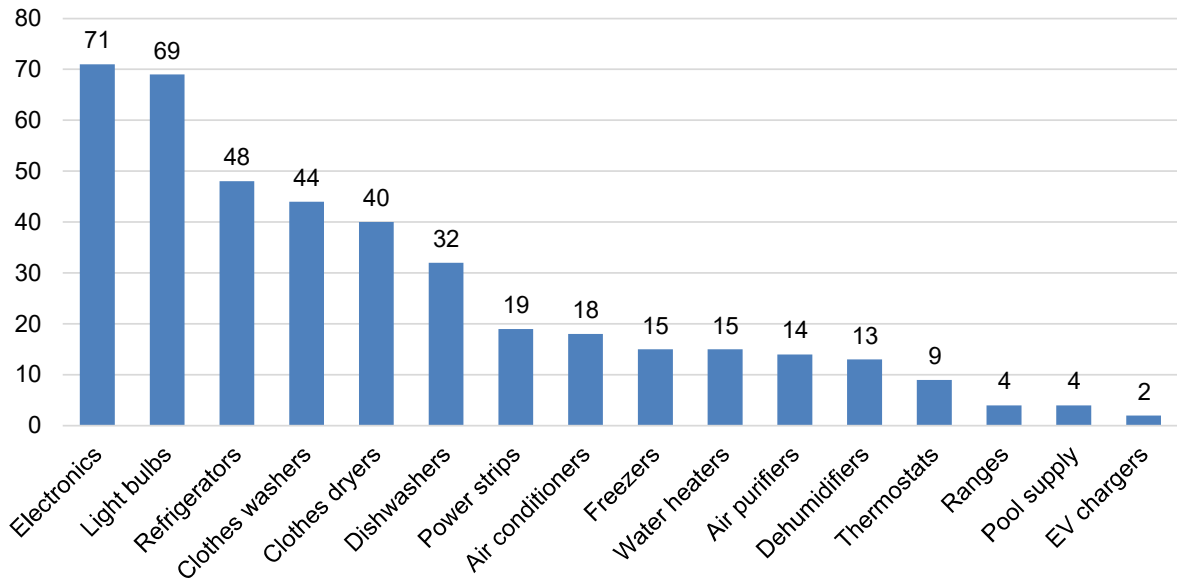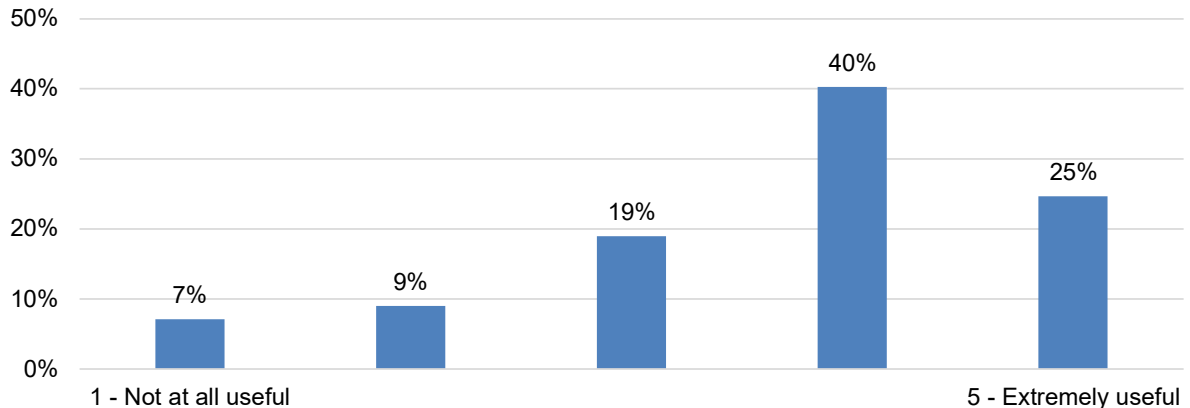

Source: Participant Web Survey (M15)
Don't know and refused responses were excluded

Surveyed respondents were asked to rate a number of Marketplace features each on a scale of 1 to 5, where 1 was "not at all helpful," and 5 was "extremely helpful." The figure below shows the results of this question, revealing that the most helpful features were the energy efficiency score (Enervee Score) (76 percent rated 4 or 5) and the estimated bill savings (YOUSAVE) (71 percent rated 4 or 5). The lowest rated features for helpfulness were Top Picks for You and EcoView (55 percent rated 4 or 5).

Figure 8. Helpfulness of Marketplace Features

Feature	1 - Not at all helpful	2	3	4	5 - Extremely helpful
The energy efficiency score (Enervee Score) (n = 193)	6%	2%	16%	31%	45%
Estimated energy bill savings (YOUSAVE) (n = 190)	8%	4%	17%	28%	42%
Popularity / star rating (n = 188)	8%	6%	20%	30%	35%
Product comparison (n = 141)	8%	7%	20%	31%	34%
List of product features/specifications (n = 189)	8%	5%	22%	32%	32%
Cost to buy and run model (CLEARCOST) (n = 184)	9%	5%	23%	31%	32%
Where to buy (n = 189)	11%	7%	29%	23%	31%
Retail price information (n = 193)	7%	6%	28%	28%	31%
Price drop alerts (n = 166)	13%	13%	23%	23%	27%
EcoView (n = 169)	8%	9%	28%	28%	27%
Top Picks for You (n = 139)	12%	9%	24%	28%	27%

Source: Participant Web Survey (MI1)
Don't know and refused responses were excluded

4.3 SATISFACTION

The realization of energy savings is only one goal associated with implementing the Marketplace for LG&E and KU. The utilities also expect to positively affect customer satisfaction by providing the Marketplace to its customers. Overall, the results indicate that the Marketplace is positively affecting satisfaction. The figure below shows the responses to a question asking website visitors how satisfied they were with the website overall. Marketplace visitors appear to value the site, with just over half (53 percent) rating their level of satisfaction an 8, 9, or 10 on a 10-point scale. The mean rating was 7.33.

Figure 9. Overall Website Satisfaction (n = 1,549)
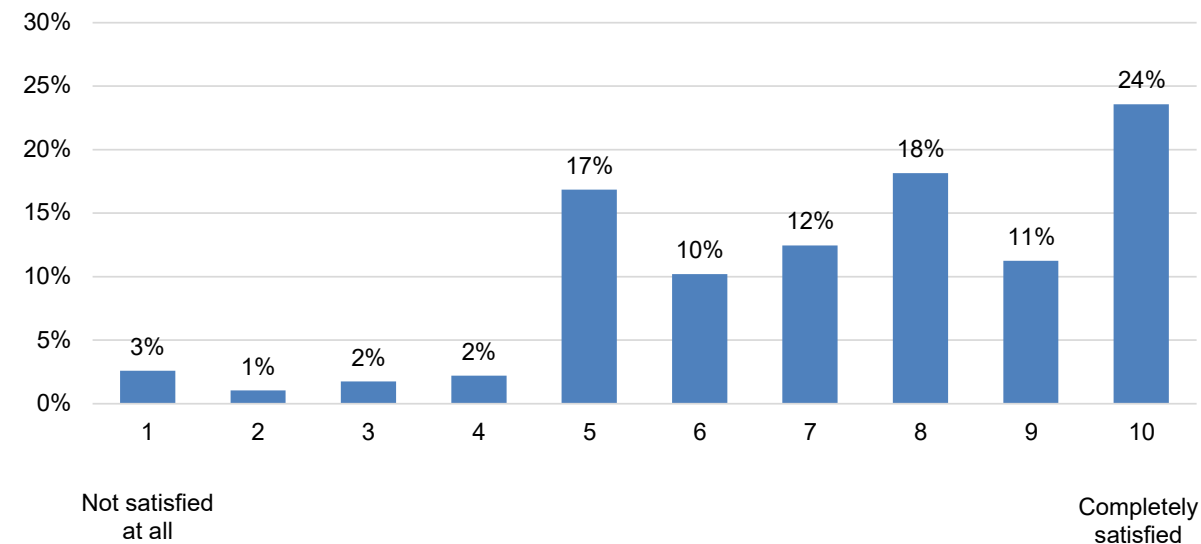
Source: Participant Web Survey (SAT3)
Don't know and refused responses were excluded

Another measure of satisfaction is customers' perceptions of LG&E and KU as a result of their Marketplace experience—surveyed respondents were asked if their opinion of LG&E or KU has improved, worsened, or not changed. As shown in the figure below, just over a quarter (28 percent) said their opinion of LG&E and KU has improved as a result of their Marketplace experience.

Figure 10. Opinion of LG&E and KU as a Result of Marketplace (n = 1,352)
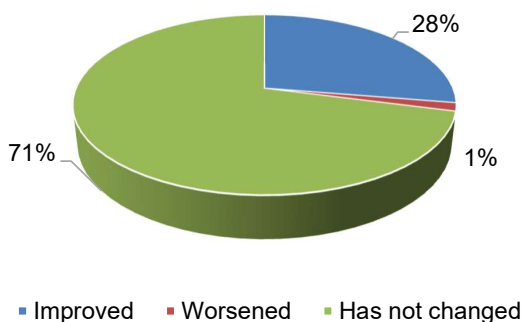
Source: Participant Web Survey (SAT5)
Don't know and refused responses were excluded

An additional way to look at satisfaction is by determining the Net Promoter or Net Promoter Score (NPS)[22]. The NPS is calculated based on responses to a single question: How likely is it that you would recommend our company/product/service to a friend or colleague? The NPS is then the percentage of customers rating their likelihood to recommend a company, a product, or a service to a friend or colleague as 9 or 10 ("promoters") minus the percentage rating this at 6 or below ("detractors") on a scale from 0 to 10. Respondents who provide a score of 7 or 8 are referred to as "passives."[23] The result of the calculation is expressed without the percentage sign. Promoters are considered likely to exhibit value-creating behaviors, such as buying more, remaining customers for longer, and making more positive referrals to other potential customers. Detractors are believed to be less likely to exhibit the value-creating behaviors.

Table 11. Net Promoter Score Scale

-100		0	30	70	100
	Needs Improvement (-100 – 0)	**Good** (0 – 30)	**Great** (30 – 70)	**Excellent** (70 – 100)	

Based on web survey respondent answers, the Marketplace pilot has an NPS of -16 (32 percent – 48 percent = 90).

Table 12. Marketplace NPS

NPS Score and Category	Surveyed Respondents
NPS Score	
Promoters (rating 9 or 10)	32%
Passives (rating 7 or 8)	20%
Detractors (rating 0 – 6)	48%
Respondents	**840**

Source: SAT5A (Participant Web Survey)
Don't know and refused responses were excluded
Rated on a scale of 0 to 10, where 0 was "extremely unlikely" and 10 was "extremely likely"

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[22] NPS is a management tool used as a measure of customer satisfaction and has been shown to correlate with revenue growth relative to competitors. NPS has been widely adopted by Fortune 500 companies and other organizations. Scores vary substantially among industries, so a good score is simply one whose trend is better than that of competitors in the same industry, as measured by double-blind benchmark research. The metric was developed by (and is a registered trademark of) Fred Reichheld, Bain & Company and Satmetrix. It was introduced by Reichheld in his 2003 Harvard Business Review article, "The One Number You Need to Grow". Its popularity and broad use have been attributed to its simplicity and its openly available methodology.

[23] The response categories to this question changed in July of 2020. Respondents to the participant web survey version implemented prior to July of 2020 were asked to rate their likelihood of recommending the Marketplace as "not at all likely," "not very likely," "somewhat likely," "very likely," or "extremely likely."

4.4 DEMOGRAPHICS

Finally, the participant web survey asked respondents several questions about themselves and their households. Respondents were much more likely to own their residence than rent.

Table 13. Own or Rent Residence

Characteristic	Surveyed Respondents
Own or Rent	
Own	80%
Rent	20%
Respondents (n)	**1,301**

Source: Questions DEM2

Don't know and refused responses are excluded

Half of the participants (52 percent) were 55 years or older. The mean number of people living in the household was 2.35. Levels of education varied, although almost two-thirds (63 percent) had at least a college education. Income levels also varied—approximately one-third (36 percent) recorded that their household income was $75,000 or more and almost a quarter (21 percent) recorded their household income as being in the $50,000 to $75,000 category.

Table 14. Respondent and Household Characteristics

Characteristic	Surveyed Respondents
People Living in Residence	
Mean	2.35
Respondents (n)	**583**
Household Income	
Less than $10,000	4%
$10,000 to less than $20,000	9%
$20,000 to less than $30,000	9%
$30,000 to less than $40,000	11%
$40,000 to less than $50,000	12%
$50,000 to less than $75,000	21%
$75,000 to less than $100,000	14%
$100,000 to less than $150,000	14%
$150,000 to less than $200,000	5%
$200,000 or more	3%
Respondents (n)	**1,001**

| Characteristic	Surveyed Respondents
Highest Level of Education in Household	
1st through 8th grade	< 1%
Some high school	1%
High school graduate or equivalent	10%
Some college or technical school	26%
College graduate	35%
Graduate/post-graduate school	28%
Respondents (n)	**1,289**
Age of Respondent	
18–34	10%
35–44	18%
45–54	21%
55–64	26%
65 or older	26%
Respondents (n)	**1,275**

Source: Questions DEM3, DEM12, DEM13, DEM14

Don't know and refused responses are excluded

TETRA TECH

APPENDIX A: LOGIC MODEL AND PROCESS FLOW MAP

Figure A-1. Appliance Choice Logic Model

Activities	Develop Program Infrastructure	Market Program	Appliance Choice Website	Evaluate Program
Outputs	Determine program requirements		Customers go to website; eligibility determined	Program approved by stakeholders
	Hire implementation contractor		Efficient product comparisons presented to customers	Evaluation conducted
	Unique tracking id for each customer who has an email address created; allows micro level market intelligence analysis as needed	External communications include information about the Appliance Choice website and promote Enervee Score	Energy attributes and implications of product choice provided	Recommendations generated
	Develop marketing materials	Conduct digital marketing to engage customers	Product links are available	
	Program information posted to website	Collect market intelligence	Collect market intelligence	
	Customer service			
Short to medium term outcomes (1 - 2 years)	LG&E and KU staff knowledgeable about the program and its offerings	Increased awareness	Customer uses Enervee Score to consider more efficient product(s) purchase	Determine products purchased and energy saved
	Program design and delivery is continuously improved	Customer reviews information provided	Customer purchases more efficient product(s) and installs	Recommendations incorporated into program
	Appliance Choice program goals are achieved within budgetary constraints	Customer decides to make a purchase based on information provided	Efficiency behavior reinforced	Program process improves
		Increased interest and use of the website	Customer explores additional product(s) to purchase	Program goals modified
			Household energy consumption reduced	
			LG&E and KU strengthens relationship with customers	
Long term outcomes (3+ years)	LG&E and KU employs best practices in program design and applications	Increased market awareness of energy efficient products	Customers actively seek more efficienct products; retailers offer more efficient products	

Figure A-2. Appliance Choice Process Flow Map
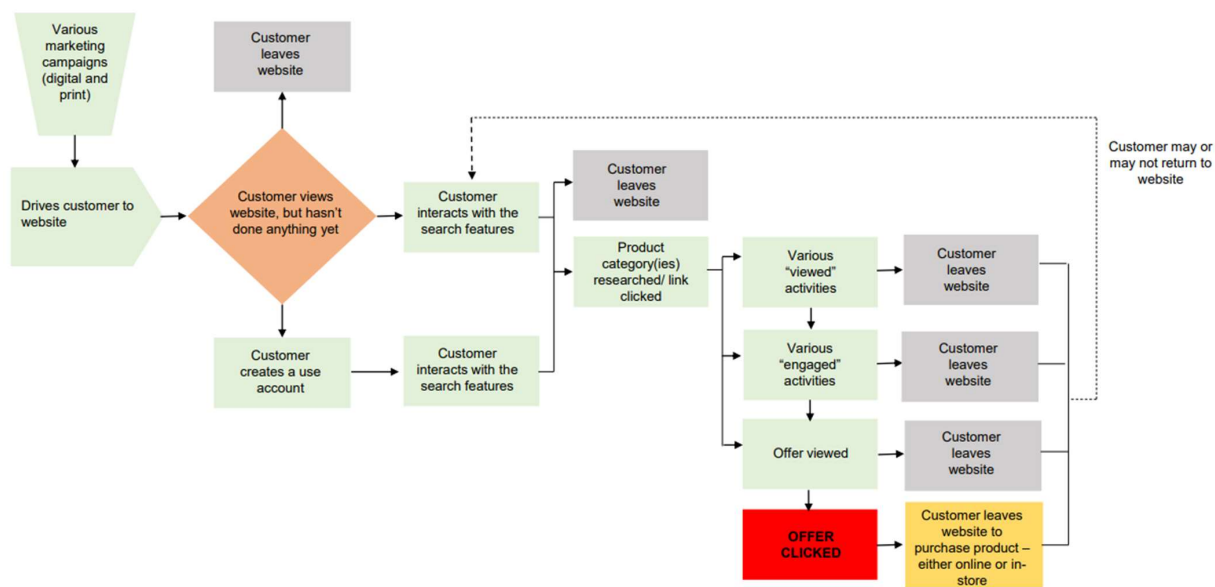
APPENDIX B: ENERGY-EFFICIENT PRODUCT AND SAVINGS CALCULATIONS

For products offered through LG&E and KU's Marketplace[24], the table below shows the total number of products purchased based on web survey responses (Column A). Column B represents the number of receipts with valid product information, and Column C represents the number of products verified as energy-efficient. Column E reflects the percent of products found to be energy efficient (Column C) as a subset of the valid product receipts (Column B) for each product category and overall.

Table B-1. Efficient Model Verification and Associated Percentages

Product Category	Number of Products Purchased (from web survey)	Number of Receipts with Valid Product Information	Number of Products Verified as Efficient	Percent Verified as Efficient
	A	B	C	E = C / B
Air conditioner*	18	2	2	100.00%
Air purifier	14	3	3	100.00%
Clothes dryer (electric)	39	6	4	66.67%
Clothes dryer (gas)	1	2	1	50.00%
Clothes washer	44	14	12	85.71%
Dehumidifier	13	1	1	100.00%
Dishwasher	32	11	9	81.82%
Electronics	71	16	0	0.00%
Freezer	15	2	2	100.00%
Light bulbs	69	18	18	100.00%
Power strips	19	2	0	0.00%
Refrigerator	48	14	6	42.86%
Thermostat	9	2	2	100.00%
Water heater (electric)	9	2	0	0.00%
Water heater (gas)	6	2	0	0.00%
Overall Totals	**407**	**97**	**60**	**61.86%**

* These were all assumed to be window air conditioners.

---

[24] Product purchase choices through both the web survey and receipts were not restricted to those offered through LG&E and KU's Marketplace. As a result, some customers noted purchasing products that were not offered through the Marketplace. These products were not included in savings estimates.

The table below documents the deemed (per unit) energy (kWh), demand (kW), and effective useful life (EULs) for each product category. Values were largely derived from the Illinois Technical Reference Manual (TRM). The kWh and kW values were used to determine first-year gross savings. Lifetime gross savings are calculated by multiplying the first-year gross savings by the EUL.

Table B-2. Deemed Energy Savings and EULs

Product Category	Per-Unit kWh	Per-Unit kW	Per-Unit EUL
Air conditioner	20.86	0.0250	15
Air purifier	39.00	0.0050	9
Clothes dryer (electric)	160.00	0.0215	16
Clothes dryer (gas)	25.00	0.0003	16
Clothes washer	58.60	0.0075	11
Dehumidifier	116.00	0.0270	12
Dishwasher	19.60	0.0014	11
Electronics*	0.00	0.0000	4
Freezer	46.80	0.0076	22
Light bulbs	34.11	0.0060	20
Power strips	0.00	0.0000	8
Refrigerator	62.80	0.0095	17
Thermostat	49.91	0.0000	11
Water heater (electric)	0.00	0.0000	10
Water heater (gas)	0.00	0.0000	10

* Of the 28 receipts received and categorized as "Electronics," Tetra Tech was able to confirm that 16 were not ENERGY STAR rated, for 8 receipts there was not enough product information available to make an ENERGY STAR determination, and for 4 receipts the ENERGY STAR designation was not applicable. As a result, no savings were allocated to this equipment category.

APPENDIX C: POP-UP WEB SURVEY INSTRUMENTS

Appliance Choice Engine Pop-up Web Survey
FINALIZED November 22, 2019 – Iteration #1

INTRODUCTION
You have been selected to answer a few quick questions about the LG&E and KU Marketplace website. Please keep in mind that your responses will be kept strictly confidential and none of your answers will be presented in a manner that can identify you.

S1   What is your age? [SINGLE RESPONSE]

01	Under 18 years of age	**[TERMINATE –> GO TO END]**
02	18-34 years of age	
03	35-44 years of age	
04	45-54 years of age	
05	55-64 years of age	
06	65 or older years of age	
99	Decline to answer	**[TERMINATE –> GO TO END]**

INTRO The LG&E and KU Marketplace website is a new service being offered to customers.

Q1   Which of the following do you identify as your electric utility provider? [SINGLE RESPONSE]

01   Louisville Gas & Electric (LG&E)
02   Kentucky Utilities (KU)
03   Old Dominion Power Company (ODP)
04   Other (Please specify)
05   Don't know

Q2   How satisfied are you with the LG&E and KU Marketplace? [SINGLE RESPONSE]

1	2	3	4	5	6	7	8	9	10

Not satisfied at all   Completely satisfied

Q3   Do you plan to make a purchase based on the information provided on the LG&E and KU Marketplace website? [SINGLE RESPONSE]

01   Yes
02   No

Q4   How likely are you to recommend the LG&E and KU Marketplace website to a friend, colleague, or relative? [SINGLE RESPONSE]

0	1	2	3	4	5	6	7	8	9	10

Not at all likely   Extremely likely

Q5   In order to improve the LG&E and KU Marketplace for other people like you, would you be willing to participate in future surveys about your experiences with the LG&E and KU Marketplace? [SINGLE RESPONSE]

01   Yes **-> PROVIDE SCREEN TO ENTER EMAIL ADDRESS**
02   No

END   Thank you for your time today

Thank you for your feedback!

Appliance Choice Engine Pop-up Web Survey
FINALIZED May 22, 2020 – Iteration #2

INTRODUCTION
The LG&E and KU Marketplace is a new service being offered to our customers. We invite you to answer 3 quick questions to help us evaluate this new website. Your responses will be kept strictly confidential, and none of your answers will be presented in a manner that can identify you.

Q1N   Are you actively shopping for an energy-using product now, or do you expect to buy such a product within the next 3 months?

01   Yes, shopping to buy now
02   Yes, planning to buy within 3 months
03   No, not in the market to buy anything within the next 3 months

Q2   Do you plan to make a purchase based on the information provided on the LG&E and KU Marketplace website? [SINGLE RESPONSE]

01   Yes
02   No
03   Maybe

Q5   In order to improve the LG&E and KU Marketplace for other people like you, would you be willing to participate in future surveys about your experiences with the LG&E and KU Marketplace? [SINGLE RESPONSE]

01   Yes **-> PROVIDE SCREEN TO ENTER EMAIL ADDRESS**
02   No

END   Thank you for your time today

Thank you for your feedback!

APPENDIX D: PARTICIPANT WEB SURVEY INSTRUMENT

Sample Variable List

CASEID   Unique case identifier created by Tetra Tech

PIN   Web survey password

CU_ID   Identifying number from LG&E and KU marketing email

FNAME
LNAME   Contact listed in participant files

UTILITY   Customer utility provider
    1   Louisville Gas and Electric (LG&E)
    2   Kentucky Utilities

EMAIL   Participant email address

WAVE   Date sample was delivered to Tetra Tech

QUOTA   Utility based on the
    1   Louisville Gas and Electric (LG&E)
    2   Kentucky Utilities
    3   Other

Employment

PREAMBLE   Thank you for agreeing to participate!

In order to improve the LG&E and KU Marketplace, we are asking about your experiences with the site.

Your responses will be kept strictly confidential and none of your answers will be presented in a manner that can identify you.

If you have any questions about this study, please contact Tetra Tech at LGEandKUstudy@tetratech.com or if you would like speak with someone at LG&E or KU, please feel free to contact us at 800-356-5467.

A1   [SHOW ONSCREEN WITH PREAMBLE] Do you or anyone in your household currently work for Louisville Gas and Electric or Kentucky Utilities?

(Select one response)

01   Yes
02   No
88   Don't know

INELIGIBLEA1 [SKIP IF A1 = 2] Employees are not eligible to complete the survey. Thank you for your time and have a nice day.

    01   Terminate survey and go to https://lge-ku.com/residential-energy-efficiency

Participation Experience

**** 26Feb2020: Question dropped. All respondents skip.
**** 01Jul2020: Question brought back in.

S1   [IF EMAIL_Q1 = 1,2 SET S1 = EMAIL_Q1 OTHERWISE ASK] Have you visited the LG&E and KU Marketplace?

The LG&E and KU Marketplace is a website that helps you shop for energy efficient products like appliances and electronics. It gives detailed information including the best retail price, an efficiency score called the "Enervee Score," cost to own and operate each product, full product specifications, and links to stores where you can make a purchase.
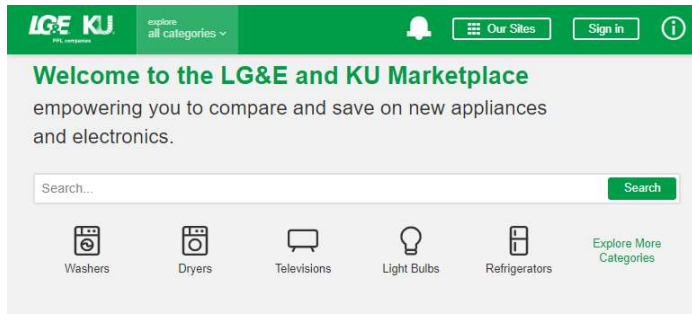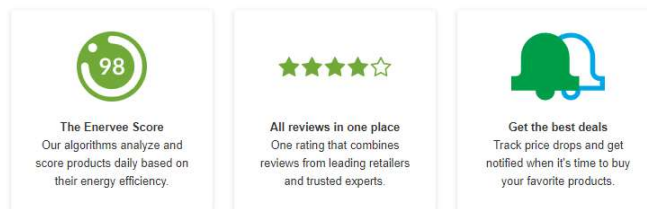
(Select one response)

    01   Got it
    88   I don't remember visiting the Marketplace website

**** 26Feb2020: Question dropped. All respondents skip.
**** 01Jul2020: Question brought back in.

INELIGIBLES1 [SKIP IF S1 = 1] Those are all the questions we have for you. Thank you for your time and have a nice day.

> 01   Terminate survey and go to https://lge-ku.com/residential-energy-efficiency

*** 26Feb2020: Options 01,07,08,09, and 10 no longer visible to respondents
*** 01Jul2020: Question dropped; Instead of deleting out of the survey it is always skipped
~~**AW1**   [ALL SKIP] Next, I would like to ask you some questions about your experience with the LG&E and KU Marketplace.~~

~~How did you learn about the LG&E and KU Marketplace?~~

~~*(Select all that apply)*~~

~~**Utility**~~
~~01   A bill insert in your monthly bill~~
~~02   LG&E and KU's corporate website (www.lge-ku.com)~~
~~03   LG&E or KU's Power Source Newsletter~~
~~04   An email from LG&E or KU~~
~~05   A LG&E or KU call center representative~~

~~**Other source**~~
~~06   Digital advertisement in search results~~
~~07   Retail store~~
~~08   Newspaper~~
~~09   Radio~~
~~10   Social media (e.g., Facebook or Twitter)~~
~~11   Friend/family member/other business~~
~~12   Other (please specify)~~
~~88   Don't know~~

*** 01Jul2020: Question dropped; Instead of deleting out of the survey it is always skipped
~~**V1**   Why did you decide to visit the LG&E and KU Marketplace?~~

~~*(VERBATIM RESPONSE)*~~

**** 01Jul2020: Question added
Q1N   Are you actively shopping for an energy-using product now, or do you expect to buy such a product within the next 3 months? *(Select one response)*

> 01   Yes, shopping to buy now
> 02   Yes, planning to buy within 3 months
> 03   No, not in the market to buy anything within the next 3 months

P1	After visiting the LG&E and KU Marketplace, did you make a purchase of any of the following products?

(Select all that apply)

00 I did not make a purchase [SKIP to SAT3]		
01 Air purifier	09 Projector	17 Air conditioner
02 Connected home	10 Sound bar	18 Evaporative cooler
03 Dehumidifier	11 Tablet	19 Electric water heater
04 EV charger	12 Television	20 Gas water heater
05 Light bulbs	13 Video game console	21 Wifi-enabled thermostat
06 Power strips	14 Dishwasher	22 Clothes washer
07 Pool pump	15 Freezer	23 Electric clothes dryer
08 Monitor	16 Refrigerator	24 Gas clothes dryer
25 Other (describe)		
88 Don't know **[SKIP to SAT3]**		

**** 01Jul2020: P2 and P3 dropped. Instead of deleting out of the survey it is always skipped

~~P2~~

~~P3C01 P3C02 P3C03 P3C04 P3C05 P3C06 P3C07 P3C88 P3C07O~~

[PROGRAMMER NOTE: START ROSTER (MI2, MI5, and MI3)]
IF MORE THAN 1 PRODUCT SELECTED IN P1 ASK ABOUT 2 RANDOM PRODUCTS]

Marketplace Influence

MI2	Why did you buy a new **<PURCHASED_PRODUCT>**?

(Select one response)

01	My existing **<PURCHASED_PRODUCT>** stopped working
02	I wanted to replace my existing **<PURCHASED_PRODUCT>,** even though it was still working
03	I did not previously own a **<PURCHASED_PRODUCT>**
04	Purchasing an additional **<PURCHASED_PRODUCT>**
88	Don't know

MI5	How useful was the information on the LG&E and KU Marketplace in helping you make your decision to purchase the **<PURCHASED_PRODUCT>?**

(Use slider to respond)

01	1 – Not at all useful
02	2
03	3
04	4
05	5 – Extremely useful

****   01Jul2020: Question dropped; Instead of deleting out of the survey it is always skipped

~~**MI3**   [ALL SKIP] Can you provide the model number for the **<PURCHASED_PRODUCT>** you purchased?~~

~~01   (VERBATIM RESPONSE)~~
~~02   No~~
~~88   Don't know~~

**** 01Jul2020: Question added

MI3a   We want to understand how much energy is used by the product you purchased. To do this, we need your help, and **you'll receive a $<AMOUNT> Tango gift card as a thank you!**

Are you willing to submit your online purchase receipt, a photo of your in-store purchase receipt, and/or a photo of the model number for your **<PURCHASED_PRODUCT>**? *(Select one response)*

01   Yes
02   No

**** 01Jul2020: Question added

MI3b   [DISPLAY IF MI3a = 1] Great! See below for examples of typical product email receipt for online purchase, in-store receipt, and product nameplate. Please either upload the file(s) here or email it to LGEandKUstudy@tetratech.com. Please make sure the model number is legible. See examples below.

Example of email receipt for online dryer purchase with model number:

Example of in-store receipt for lighting
purchase with model number:

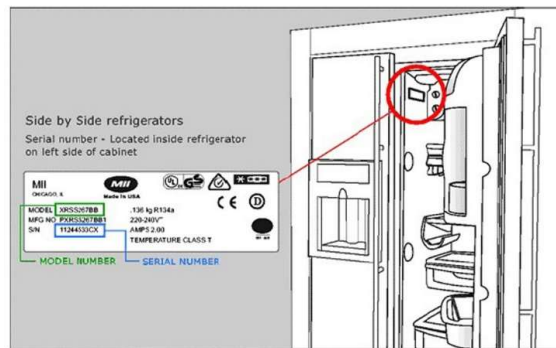
Example of where to find a refrigerator
nameplate with model number:

[FILE UPLOAD]

> 01   Upload the file
> 02   Email the file

**** 01Jul2020: Question added
MI3C   [SHOW IF MI3A=01 AND MI3B=01]

> [UPLOAD FILE]

[END ROSTER]

**** 01Jul2020 Drop questions MI1J MI1K MI1KO; Instead of deleting out of the survey it is always skipped.

Questions added MI1L MI1M

MI1   On a scale of 1 to 5, where 5 is "extremely helpful" and 1 is "not at all helpful," how helpful were each of the following features on the LG&E and KU Marketplace in your shopping experience? [PROGRAMMER NOTE: RANDOMIZE CATEGORIES]

For MI1A through MI1M
__   [ALLOW 1 to 5]
       77   I do not recall this feature
       88   Don't know
       99   Left empty

MI1A   The energy efficiency score (Enervee Score)
MI1B   Retail price information
MI1C   Estimated energy bill savings (YOUSAVE)
MI1D   Cost to buy and run model (CLEARCOST)
MI1E   Popularity / star rating
MI1F   Where to buy (links to online and local retailers)
MI1G   List of product features/specifications
MI1H   EcoView
MI1I   Price drop alerts
~~**MI1J**   [ALL SKIP] Filter and sort functionality~~
~~**MI1K**   [ALL SKIP] [CAN BE LEFT EMPTY BY RESPONDENT] Other (please specify)~~

~~**MI1KO**[ALL SKIP] [SHOW IF MI1K=1,2,3,4,5] Specify other feature.~~
MI1L   Product comparison
MI1M Top Picks for You (recommended products)

**** 01Jul2020 Questions dropped AG1A AG1B; Instead of deleting out of the survey it is always skipped
~~**AG1A**~~
~~**AG1B**~~

Satisfaction and Recommendations

SAT3 On a scale of 1 to 10 where 1 means "not satisfied at all" and 10 means "completely satisfied," how satisfied are you with the LG&E and KU Marketplace?

(Use slider to respond)

___   [ALLOW 1-10]

SAT4 Why did you rate your satisfaction with the LG&E and KU Marketplace that way?

(VERBATIM RESPONSE)

**** 01Jul2020: Question changed scales. Old scale had the 50 added to the codes.

SAT5A How likely are you to recommend the LG&E and KU Marketplace to friends or family members? Please answer on a scale of 0 to 10, where 0 is "extremely unlikely" and 10 is "extremely likely." *(Use slider to respond)*

For cases after 01Jul2020
00	0 – Extremely unlikely
01	1
02	2
03	3
04	4
05	5
06	6
07	7
08	8
09	9
10	10 – Extremely likely
88	Don't know

For cases before 01Jul2020
51	Not at all likely
52	Not very likely
53	Somewhat likely
54	Very likely
55	Extremely likely

SAT8 What did you like best about the LG&E and KU Marketplace?

(VERBATIM RESPONSE)

SAT9 [SHOW ON SCREEN WITH SAT8] If you could change *one* thing about the LG&E and KU Marketplace, what would it be?

(VERBATIM RESPONSE)

SAT5 Would you say your opinion of LG&E or KU has improved, worsened, or not changed as a result of your experience with their Marketplace?

(Select one response)

01	Improved
02	Worsened
03	Has not changed

Demographics

DEM2 You're almost done. We would like to ask you a few additional questions to better understand your household.

Do you own your home or are you renting?

(Select one response)

01   Own
02   Rent
99   Prefer not to answer

**** 01Jul2020: Question added.
DEM3 How many people currently live in your household full time?

__   Total number of people (0-20)
99   Prefer not to answer

DEM12 What is your age?

(Select one response)

01   18 to 34
02   35 to 44
03   45 to 54
04   55 to 64
05   65 or older
99   Prefer not to answer

DEM13 What is the highest level of education that the head of household has completed so far?

(Select one response)

01   1st through 8th grade
02   Some high school
03   High School Graduate or equivalent (includes GED)
04   Some College or technical school
05   College graduate (includes 2- or 4-year degree)
06   Graduate/post-graduate school (schooling beyond 4-year degree)
99   Prefer not to answer

DEM14 Including wages, salaries, pensions, Social Security and other sources of income for all members of your household, what was your total household income before taxes in 2019?

(Select one response)

01   Less than $10,000
02      $10,000 to less than $20,000
03      $20,000 to less than $30,000
04      $30,000 to less than $40,000
05      $40,000 to less than $50,000
06      $50,000 to less than $75,000
07      $75,000 to less than $100,000
08      $100,000 to less than $150,000
09      $150,000 to less than $200,000
10      $200,000 or more
99   Prefer not to answer

**** 01Jul2020 Question added
CARD [IF MI3AR1 or MI3AR2 = 1] Please type in your name and email address so we can send a thank you $5 Tango gift card.

CARD_NAME   Your name: _____
CARD_EMAIL   Email address: _____ (validation)

INT99 Thank you for your participation!

Please hit Submit to enter your answers.

[IF MI3 = 1] You should receive an email in the next few weeks from "Tango Card" for the e-gift card.

CO   Completed online

APPENDIX E: PARTICIPANT SURVEY RESPONSE RATE AND EMAIL INVITATIONS

From December 2019 through September 2021, Tetra Tech emailed 14,970 email invitations to LG&E and KU customers. Of those, 1,553 participant web surveys were completed. The overall response rate was 10.4 percent, which is above average for a web-based survey. The average survey length was 4.4 minutes.

The table below shows the detailed response rate by wave and overall. To maximize the response rate, each of the 14,970 customers was emailed two invitations—an initial invitation and a reminder invitation about five days after that, using LG&E or KU's logo. A copy of the invitations can be found after the table below.

Table E-1. Participant Survey Response Rate by Wave

	Wave Number, Dates Sent, and Number of Email Invitations											
	2019		2020						2021			
	1	2	3	4	5	6	7	8	9	10	11	
	Dec 6	Dec 31	Jan 20	Mar 11	Apr 10	Jul 15	Jul 15	Oct 16	Feb 17	Mar 8	Sep 16	Overall
Sample	**235**	**89**	**4,622**	**155**	**54**	**5,537**	**41**	**474**	**330**	**3,212**	**211**	**14,970**
Not a utility customer	0	0	0	0	0	0	0	0	0	0	0	0
Eligible sample	235	89	4,622	155	54	5,537	41	474	330	3,212	211	14,970
Screened out	23	4	217	10	3	514	1	38	32	279	7	1,128
Incompletes (partial surveys)	24	6	276	10	4	271	3	21	13	151	6	785
Not completed	112	70	3,390	88	35	4,352	33	370	249	2,607	187	11,503
Completed	76	9	739	47	12	400	4	45	36	174	11	1,553
Response Rate (completed / eligible sample)	**32.3%**	**10.1%**	**16.0%**	**30.3%**	**22.2%**	**7.2%**	**9.8%**	**9.5%**	**10.9%**	**5.4%**	**5.2%**	**10.4%**

Figure E-1. Initial Email Invitation

Dear LG&E or KU Customer,

Thank you for visiting Louisville Gas and Electric Company and Kentucky Utilities' Marketplace and for being willing to participate in surveys about your experiences with the Marketplace. Your input is critical to make improvements to the Marketplace for others like you that also visit the Marketplace, so we need your help!

Please log on here to complete the survey.

This survey only takes 4 to 5 minutes to complete, and your responses will remain anonymous and confidential.

If you made a purchase after visiting the Marketplace and tell us through the survey which product model you bought, we'll send you a $10 gift card as a token of our appreciation. Having this information will help us better understand the energy savings from that product.

LG&E and KU have partnered with Tetra Tech, an independent research firm, to conduct this survey. If you have any questions or suggestions about the survey, please call Tetra Tech's toll-free number (800-454-5070) and leave a message for Gwen Zimmerman. If you have any questions about the purpose of the study or its use and would like to speak with someone at LG&E or KU, please feel free to contact us at 800-356-5467.

Thank you in advance for your help!

Sincerely,
Energy Efficiency Department

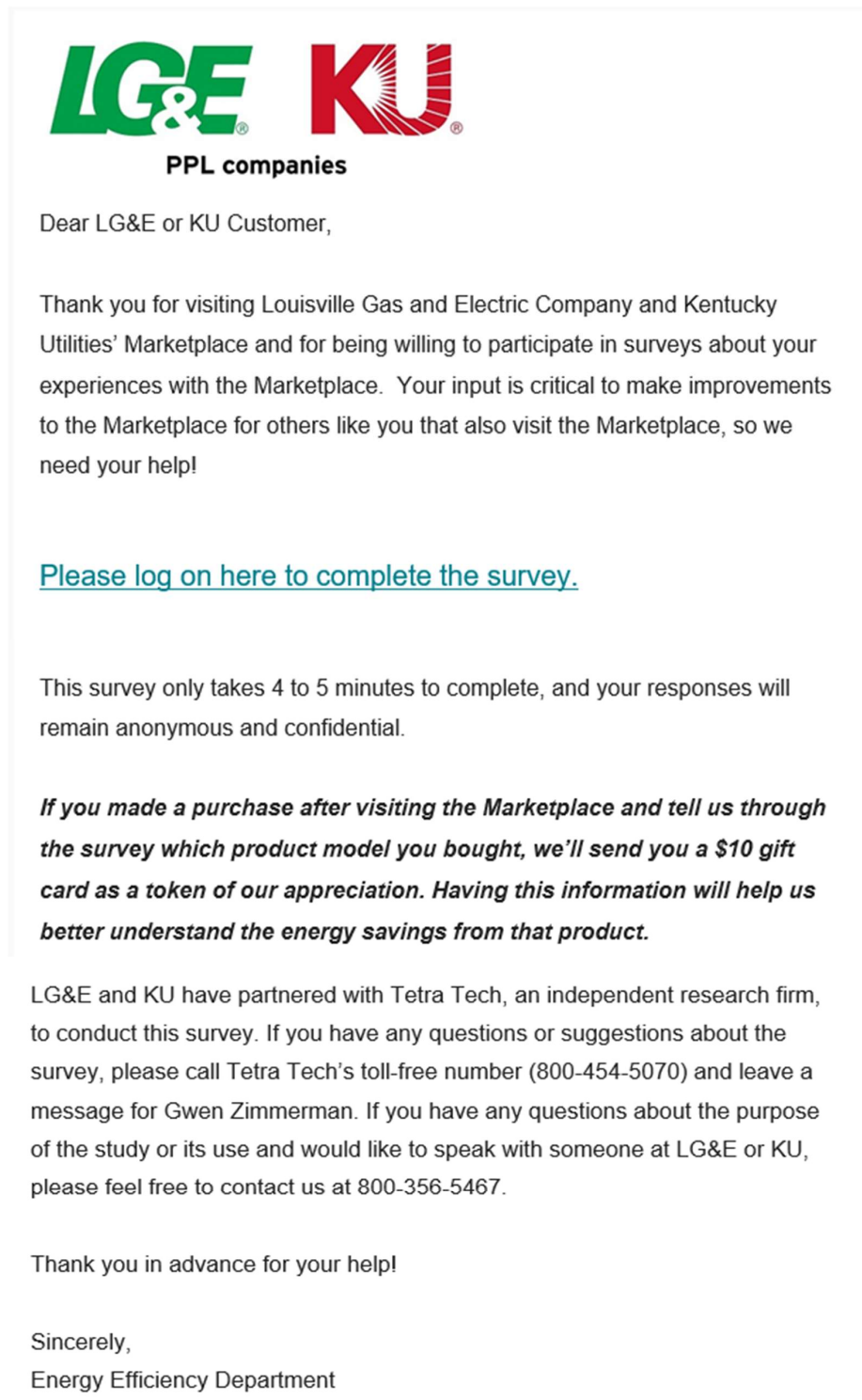**Figure E-2. Reminder Email Invitation**

Dear LG&E or KU Customer,

We recently contacted you about a survey related your experiences with Louisville Gas and Electric Company and Kentucky Utilities' Marketplace, but noticed you haven't completed it. Your input is critical to make improvements to the Marketplace for other people like you that also visit the Marketplace, so we need your help!

Please log on here to complete the survey.

This survey only takes 4 to 5 minutes to complete, and your responses will remain anonymous and confidential.

If you made a purchase after visiting the Marketplace and tell us through the survey which product model you bought, we'll send you a $10 gift card as a token of our appreciation. Having this information will help us better understand the energy savings from that product.

LG&E and KU have partnered with Tetra Tech, an independent research firm, to conduct this survey. If you have any questions or suggestions about the survey, please call Tetra Tech's toll-free number (800-454-5070) and leave a message for Gwen Zimmerman. If you have any questions about the purpose of the study or its use and would like to speak with someone at LG&E or KU, please feel free to contact us at 800-356-5467.

Thank you in advance for your help!

Sincerely,
Energy Efficiency Department