

National Grid NY HEHE NEI Report

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Executive Summary

This report presents results from the 2017 evaluation of the Residential High Efficiency Heating Equipment (HEHE) program in New York. The evaluation was conducted by NMR on behalf of National Grid to assess the non-energy impacts (NEIs) of the program. The HEHE program offers incentives against the cost of purchase and installation of energy-efficient heating and water heating equipment to reduce energy consumption. In addition to studying NEIs, we explored program-related rebounding and program satisfaction. This report details the results of a web-based participant survey, which was fielded in April and May of 2017 with 192 customers who participated in the HEHE program in 2014 or 2015.

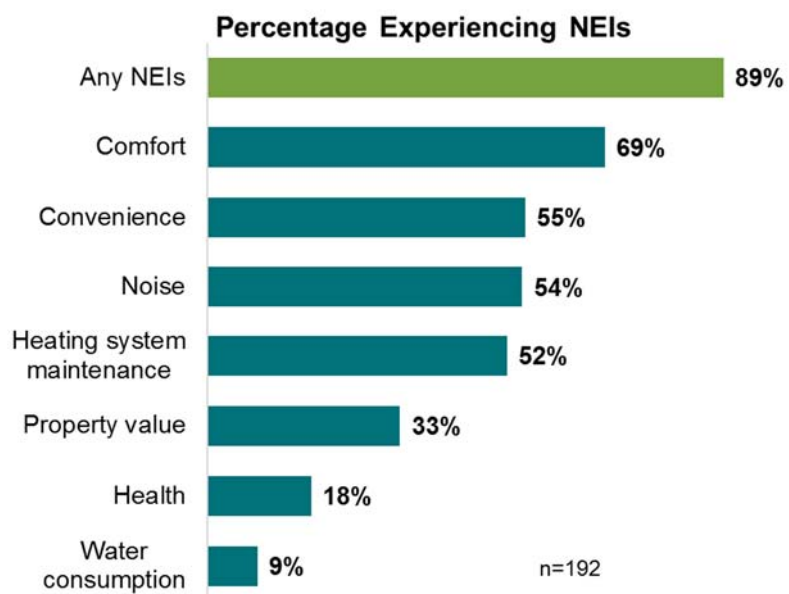
FINDINGS AND RECOMMENDATIONS

Non-Energy Impacts

NEIs are defined as impacts directly resulting from program intervention that are not energy savings; NEIs do not include reduced consumption, demand, or energy bills. NEIs can be positive or negative. The survey explored seven NEIs commonly associated with heating equipment programs like HEHE: changes in noise level, home property value, water consumption, heating system maintenance, health, comfort, and convenience. Regardless of end use, understanding the positive and negative NEIs associated with a program can give greater insight into the value, strengths, and weaknesses that a program is providing to customers.

HEHE measures frequently result in customers experiencing positive NEIs, which they often value the same as or more than potential energy savings.

Survey results indicated that HEHE participants were very likely to have experienced at least one NEI following the installation of the program-supported measure. Eighty-nine percent of respondents reported at least one NEI. These were generally positive NEIs, with 81% of all respondents reporting at least one positive NEI, compared to only 14% who reported at least one negative NEI. Among positive NEIs,



respondents most commonly reported increased comfort (63%), followed by increased convenience (45%) and decreased noise (45%). Among negative NEIs, increased noise was most commonly reported, yet it was reported by only 7% of respondents. Participants who had furnaces installed were the least likely group to report positive NEIs and most likely to report negative NEIs (18%). This group reported increased noise (11%) and heating system maintenance (4%) more often than all other participants.

For nearly all NEI categories, respondents most often indicated that their reported NEIs were equally as important as potential energy savings.

The survey also asked respondents, “Compared to the potential energy savings, was the impact of the NEI less, more, or equally as important?” Though only few respondents observed them, health impacts were most likely to rank higher than potential energy savings—34% of those who reported health impacts associated it with greater importance than energy savings. This was followed by changes in property value (15%), comfort (13%), and heating system maintenance (13%).

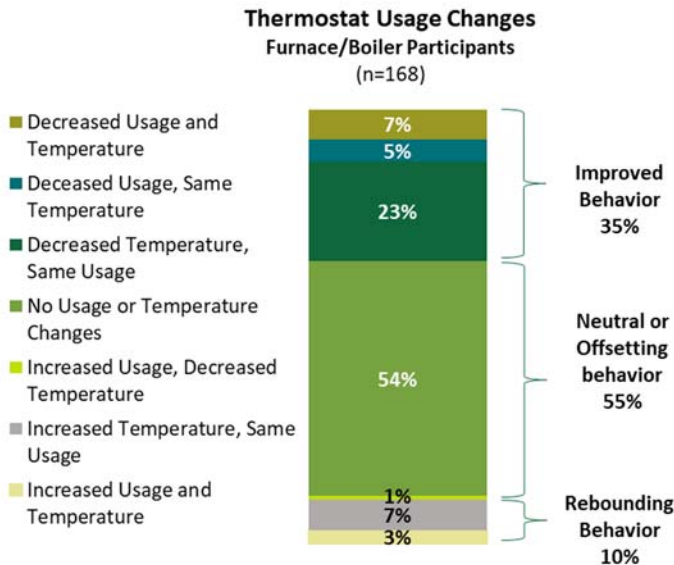
Recommendation. **Leverage NEIs in program marketing materials** with messages about their positive impacts. For example, “More than 80% of HEHE customers report experiencing positive impacts **beyond** saving energy,” or “Customers find that their new boilers and furnaces have increased their comfort.” Appendix B lists these and other findings that could be used to develop marketing messages.

Consideration. While New York regulators do not currently include NEIs in their program cost-effectiveness testing, the program may wish to **preemptively develop NEI values** as a potential justification or preparation for regulatory changes to include NEIs in benefit-cost ratios, which could support the program’s longevity. This effort may take shape in several forms, such as a literature review aggregating NEI values estimated in other regions; a statewide, more extensive, and quantitatively-focused end-user participant survey that asks customers to quantify NEIs’ values compared to potential energy savings; or a consensus panel process whereby regulators and program administrators agree on NEI values. The first method (literature review) may be the most feasible and informative for the near term, laying the groundwork for implementing the second (statewide survey) and/or third (consensus panel) methods. At the same time, National Grid could begin dialogue with the Department of Public Services with the intention of incorporating NEIs into benefit-cost testing.

Rebounding

Rebounding, also known as snapback, refers to inefficient changes in behavior after making a change aimed at increasing energy efficiency, thereby negating or minimizing the energy savings (e.g., taking longer showers after installing a new water heater).

Although many respondents reported more efficient behavior after participating, HEHE measures are associated with some rebounding effects, which may result in lower than expected realization rates.



There is evidence of program rebound effects. Ten percent of customers installing new heating equipment set their thermostats higher and/or turn on their heating systems more frequently during the heating season. While these percentages are small, if extrapolated to the 2014 and 2015 program population, it could mean that over 2,000 furnace/boiler participants and over 250 hot water heater participants are now exhibiting less efficient behaviors. However, over one-third of

customers who purchased new boilers or furnaces (35%) exhibited improved behavior—either turning the system off more frequently or setting it to a lower temperature.

Recommendation. While rebounding behavior appears less frequently than improved behavior, the program may wish to **address the existence of rebounding**. Program administrators could request that installation contractors discuss post-installation behaviors with end-users in an educational discussion. The program could provide end-users with handouts—either distributed through the installation contractors or through the mail following installation—that offer suggestions for leveraging the efficiency of their new equipment. The materials could offer relatable and candid anecdotes about customers who have minimized their energy savings because of snapback behaviors.

Consideration. Billing analyses and savings estimates should account for rebounding behavior in future studies. The technical reference manual may need to be updated to incorporate rebounding effects.

Process and Satisfaction

To gain insight into program satisfaction, we estimated a program **net promoter score (NPS)**. An NPS is a standardized index calculated by subtracting the percentage of program detractors (those rating their likelihood to recommend the program as less than 7) from the percentage of program promoters (those rating higher than 8). Respondents were also asked to rate their satisfaction with the application process.

The NPS score of 72% points to high overall satisfaction with the HEHE program. Satisfaction may be linked to experiences with the application process or incentive levels.

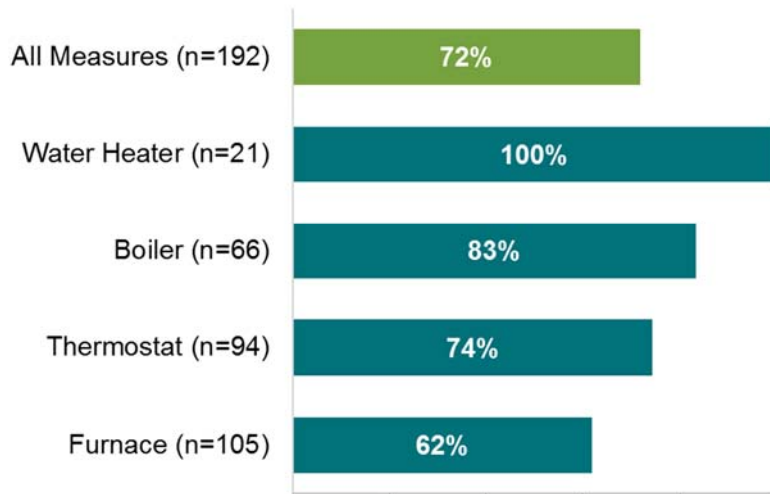
The program earned an NPS score of 72%. After benchmarking it against NPS's associated with other entities, the HEHE NPS is very favorable (see 3.3.1). Across the studies we reviewed, the average NPS's were in the 30% to 45% range (although they related to different programs and designs than the HEHE program).

HEHE participants who installed hot water heaters (n=21) reported the highest NPS at 100%. Meanwhile, participants who installed furnaces (n=105) reported lower NPS's at 62%. However, that anomaly appears to be driven by the 12 respondents who had lower efficiency units installed (AFUE 90%).

Focusing on the 93 participants who all installed AFUE 92% (n=1) or AFUE 94% (n=92) furnaces would yield an NPS of 74%. This association is possibly attributable to differences in realized savings and/or rebate amounts assigned by efficiency level.

Customers also rated their experience with the application process using a 0-10 scale, where 0 was *very difficult* and 10 was *very easy*. The average score of 9.2 indicates that most customers found the application process straightforward. Likelihood to recommend the program was associated with customer experiences with the application process: lower ratings for the application process corresponded with lower ratings for likelihood to recommend the program.

Average Net-Promoter Scores



Consideration. Investigate discrepancies in satisfaction between the following:

- 1) furnace participants and other participants and
 - 2) those with higher efficiency models and those with lower efficiency models installed.
- While this analysis did not compare the proportion of rebate amount to measure cost, the program may wish to measure those proportions to ensure that the ratios are reasonable, particularly for furnaces. Moreover, given that the furnace participants were more likely than others to report increased noise and heating system maintenance (see above), the program could assess the quality of the models currently being installed. The program might consider comparing satisfaction and energy-efficiency levels with the model types installed or eliciting feedback from contractors on the quality of the models as they relate to efficiency levels.

1

Section 1 Introduction and Background

National Grid contracted NMR to identify signs of NEIs resulting from the HEHE program in New York. The HEHE program offers incentives against the cost of purchase and installation of energy-efficient heating and water heating equipment to reduce energy consumption. **NEIs are**

impacts directly resulting from program intervention that are not energy savings; NEIs do not include reduced consumption, demand, or energy bills. They can be positive or negative; common NEIs associated with heating equipment programs like HEHE include changes in noise level, home property value, water consumption, heating system maintenance, health, comfort, and convenience. As a hypothetical example, a home that replaces an older, noisy furnace with a new, quiet furnace (with program support) may experience a reduction in noise—a positive NEI. Conversely, if a home replaces its old furnace with a new furnace (with program support), but the furnace happens to be noisy, the program intervention has—albeit indirectly—led to a negative NEI.

NEIs are historically difficult to substantiate and quantify, particularly those based on subjective experience (e.g., comfort). Since this report is aimed primarily at identifying the existence of HEHE's NEIs, we did not quantify the impacts to the same extent that other studies quantify NEIs. Substantiated NEI values become particularly important when program administrators claim NEIs in their benefit-cost ratios; adding NEIs often leads to an improved benefit-cost ratio, especially for residential programs. Regardless of end use, understanding the positive and negative NEIs associated with a program can give greater insight into the value, strengths, and weaknesses that a program is providing to customers.

This project also evaluated HEHE by analyzing rebound effects (i.e., snapback) associated with the program. Snapback refers to inefficient changes in behavior after making an upgrade aimed at increasing energy efficiency, thereby negating or minimizing the energy savings (e.g., taking longer showers after installing a new water heater).

The interviews gauged two subject areas to gain insight into program satisfaction. First, we calculated a program net-promoter score (NPS), which is an index aimed at measuring customer likelihood to recommend the HEHE program. Second, we asked participants about their experiences with the program application process.

2

Section 2 Methodology

Using a web-based participant survey, programmed and fielded by Research and Marketing Strategies, Inc (RMS), NMR assessed NEIs associated with HEHE by estimating the following: 1) the proportion of participants who reported NEIs and 2) how important those NEIs were relative to potential energy savings from the participant's perspective.

We investigated the following seven NEIs and offered participants the opportunity to mention other NEIs they experienced:

- Noise levels
- Property value
- Water consumption
- Heating system maintenance
- Health
- Comfort
- Convenience

The survey first asked respondents if they had experienced any NEIs since participating in the program and if the changes were positive or negative (*e.g., have noise levels decreased or increased?*). The respondents who reported experiencing NEIs were then asked if these impacts were more important, equally as important, or less important to them than potential energy savings (*e.g., compared to potential energy savings, was the impact on noise levels less, more, or equally important?*).

The survey asked questions to address two additional topics:

- *Rebound Effect (i.e., snapback)*. To measure rebound effects, we obtained the frequency with which customers changed their behaviors to consume more energy than they would have if they had not made an energy-efficiency upgrade (*e.g., does installing an energy-efficient furnace encourage participants to set their thermostats to a higher temperature than they did before?*).
- *Program Process and Satisfaction*. We measured participants' willingness to recommend the program to others (i.e., NPS) and their experience with the application process.

To develop the sample frame, we randomly selected 3,000 customer participants from the 2014 and 2015 HEHE participation data provided by National Grid. RMS sent two mailings of 1,500 postcards each, which invited participants to respond to the online survey. Appendix A provides additional survey fielding details. This method yielded 195 responses, which is a response rate of just under 7%; however, three of those respondents could not confirm measure installation and were removed from the sample.¹

¹ Four percent of the 3,000 postcards (111) bounced back with incorrect or invalid mailing addresses.

Table 1 compares the survey sample of 192 respondents to the 2014 and 2015 HEHE program population, in terms of measures installed. The survey sample was mostly representative of the population, yet it slightly underrepresented the boiler population (34% versus 42%) and slightly overrepresented the furnace population (55% versus 45%).

Table 1: Program Measures – Survey Sample Compared to Overall Population

Measure	Survey Sample			2014 and 2015 Program Population ¹	
	Number of Respondents	% of Measures	% of Customers installing measure ²	% of Measures	% of Customers installing measure
<i>n</i>	192	268	192	33,948	23,036
Boiler	66	23%	34%	29%	42%
Furnace	105	37%	55%	31%	45%
Thermostat	94	33%	49%	33%	49%
Water Heater	21	7%	11%	7%	11%

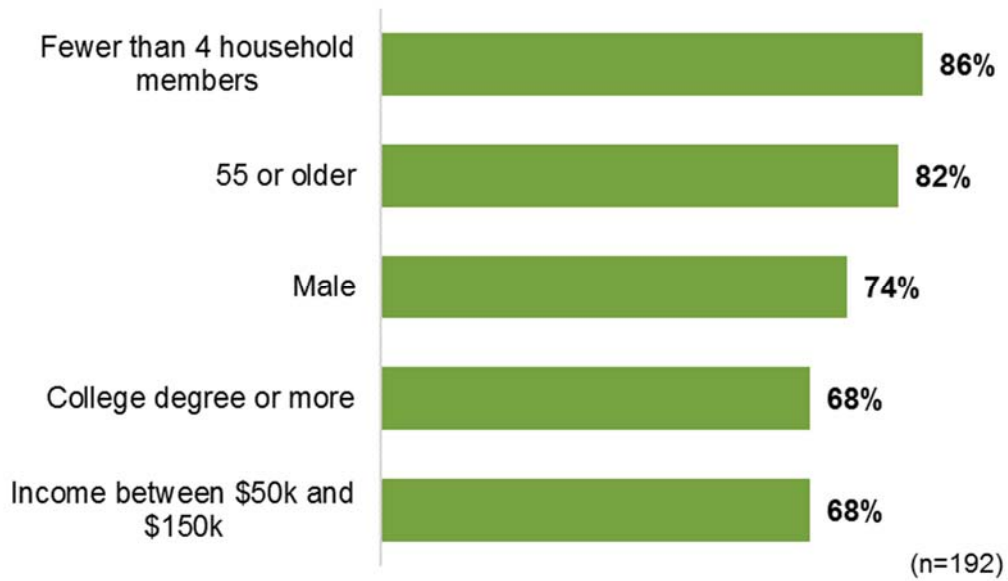
¹ Source: Program participation database

² Customers may receive program support for more than one measure; as such, percentages total to greater than 100%.

Survey respondents were most often male, 55-years old or older, and college or graduate degree recipients. They were also most often living in households with fewer than four members with gross annual incomes between \$50,000 and \$150,000 (Figure 1). Appendix A.3 offers additional demographic details.

Figure 1: Survey Sample – Demographic Snapshot

(Base: All Respondents)¹



¹ Sample sizes vary by characteristic and exclude *Refused* responses from the base.

Appendix B includes the interview instrument, which included 21 questions and took respondents an average of roughly six minutes to complete.

3

Section 3 Results

Our analysis addressed all survey topics: NEIs (the focus of this research effort), rebounding, and program satisfaction. This section describes three key findings in depth. First, **most customers reported at least one NEI**. These were generally positive NEIs including improved comfort, increased convenience, and decreased noise. The small portion who reported negative NEIs described problems with increased noise and required heating system maintenance. Second, **while there was some evidence of rebound effects, some efforts following program installation point to improved behavior that would result in energy consumption reductions**. Nearly one-third of customers who installed a new furnace or boiler (31%) reported that they now set their thermostats to a lower temperature, while 9% set their new units to a higher temperature. Third, **program satisfaction was positive**. The overall NPS score of 72% was high; the customers who installed hot water heaters reported the best experiences. Additionally, satisfaction was highly correlated with customers' experiences with the application process.

3.1 NON-ENERGY IMPACTS

- *The majority of participants reported positive NEIs, which are usually associated with improved comfort and convenience, and decreased noise levels and heating system maintenance.*

Respondents indicated if they had experienced NEIs since participating in the program that resulted from the installation of program measures. As mentioned, we asked about comfort, convenience, noise, heating system maintenance, property value, health, and/or water consumption. We considered positive NEIs *increases* in comfort, convenience, health, or property value, and *decreases* in noise, heating system maintenance, or water consumption. We considered any converse impacts (e.g., an increase in noise or a decrease in property value) negative NEIs. Respondents also had the option to describe any additional NEIs they experienced due to the installation of program measures.

3.1.1 NEIs Overall

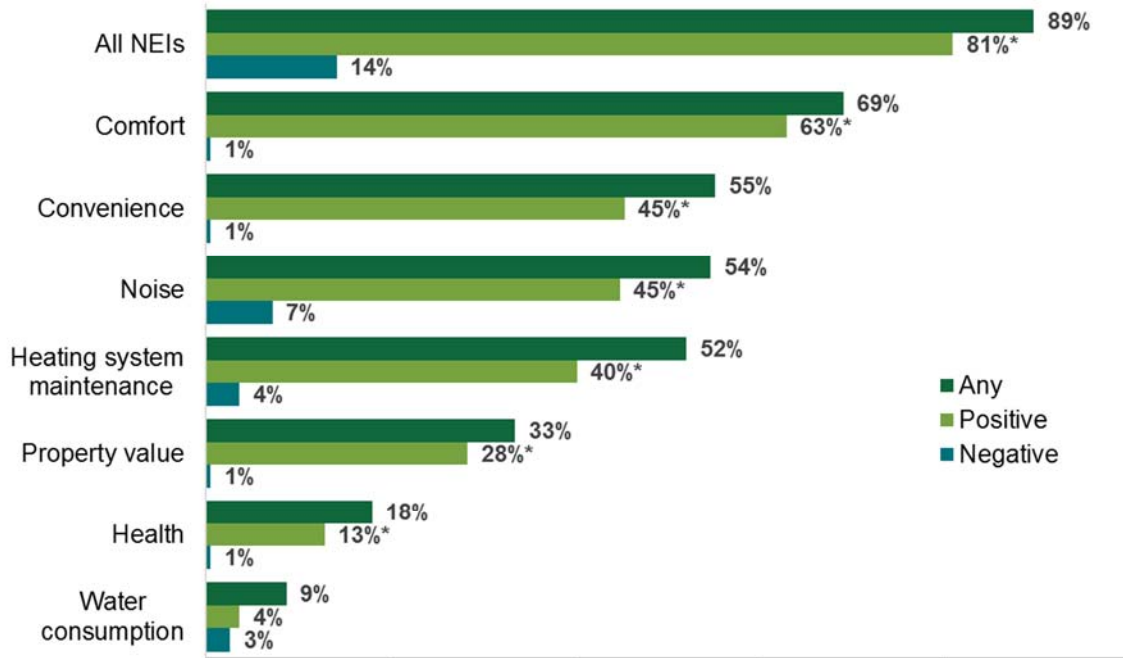
Program measures were associated with positive experiences beyond changing participant energy consumption. Figure 2 illustrates the following results:

- Eighty-nine percent of respondents reported experiencing at least one NEI.
- Few respondents reported any negative NEIs (14%), while four out of five (81%) reported experiencing at least one positive NEI. Respondents were significantly more likely to report at least one positive NEI than they were to report at least one negative NEI.
- Among the positive NEIs, respondents most commonly reported increases in comfort (63%). This was followed by increases in convenience (45%), decreases in noise (45%), and decreases in required heating system maintenance (40%).

- While few participants cited negative NEIs, those reported included increased noise (7%), increases in required heating system maintenance (4%) and increased water consumption (3%).

Figure 2: Reported NEIs

(Base: All Respondents)



*Indicates a statistically significant difference between those experiencing positive and negative NEIs at the 90% confidence level

Note: Multiple responses permitted

(n=192)

Eleven respondents mentioned other types of NEIs that they experienced since installing program measures. Four appreciated that the new equipment made their heating more consistent; for example, one respondent reported that they do not have to adjust the thermostat as frequently because their new furnace “[heats] the house consistently.” Three others noted decreases in odors after replacing their oil-burning boilers. 0 presents their responses in full.

3.1.2 NEIs by Measure

Table 2 compares the seven NEI categories across measure types. Since the survey asked respondents if they experienced NEIs, but did not ask which specific measure each NEI was associated with, a single NEI response may be tied to multiple measures or may not directly correlate to the installation of the specified equipment type. The following summarize survey responses by measure category:

- Compared to each other, those who had boilers (85%), furnaces (81%), thermostats (86%), and water heaters (86%) installed were nearly equally likely to report at least one positive NEI.

- Though there were no statistically significant differences across measure types, participants who had furnaces installed were the least likely group to report positive NEIs and most likely to report negative NEIs (18%). This group reported increased noise (11%) and heating system maintenance (4%) most often. They were less likely than all other groups to report positive changes related to noise, convenience, and property value.
- Participants who had thermostats (72%), furnaces (64%), and boilers (61%) installed were most likely to report positive impacts on their comfort. While more than two-thirds of those with water heaters installed also reported increased comfort (71%), this group was most likely to report increased convenience (76%).
- Unsurprisingly, decreases in hot water consumption were tied mostly to those who had hot water heaters installed (14%), although this was a relatively small impact across all categories.

Table 2: Reported NEIs by Measure

(Base: Respondents who experienced NEIs)

NEI Category	Boiler	Furnace	Thermostat	Hot Water Heater
<i>n</i>	66	105	94	21
Positive				
Any NEI	85%	81%	86%	86%
Comfort	61%	64%	72%	71%
Noise	55%	46%	52%	62%
Convenience	56%	37%	50%	76%
Heating System Maintenance	55%	36%	35%	67%
Property Value	36%	29%	31%	48%
Health	14%	15%	10%	19%
Water Consumption	8%	2%	2%	14%
Negative				
Any NEI	9%	18%	13%	9%
Comfort	-	1%	1%	-
Noise	3%	11%	6%	-
Convenience	-	-	-	5%
Heating System Maintenance	3%	4%	4%	5%
Property Value	-	1%	1%	-
Health	-	1%	-	-
Water Consumption	3%	3%	3%	-

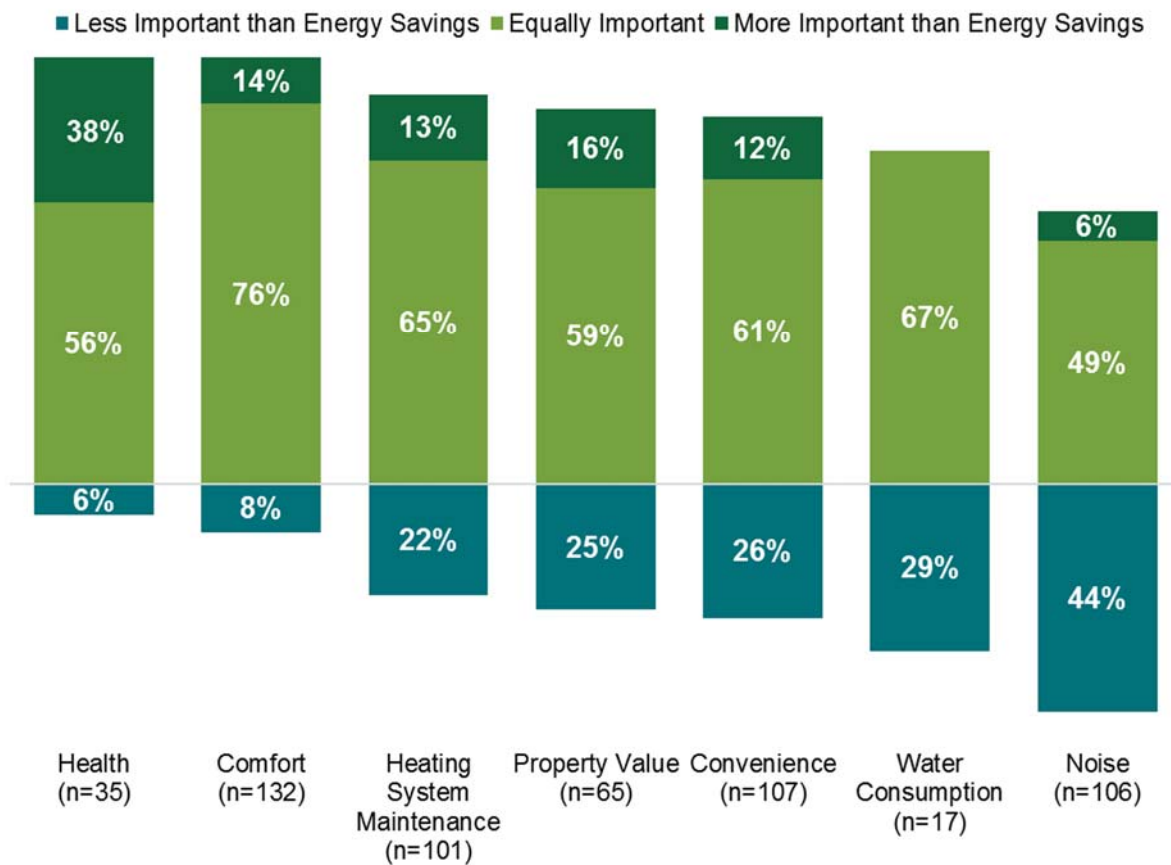
3.1.3 NEIs Compared to Energy Savings

When asked to rate the importance of potential energy savings when deciding to purchase and install the new equipment, using a scale of 1 (*not at all important*) to 5 (*very important*), respondents most often provided a rating of 5 (69%), with an average rating of 4.6. The survey also asked respondents, “*Compared to the potential energy savings, was the impact on the NEI less, more, or equally as important?*”. Their responses, shown in Figure 3, were as follows:

- For nearly all NEI categories, respondents most often said that the NEIs were equally important to potential energy savings.
- Though few respondents observed them, health impacts held the most importance of the evaluated NEIs. The health category had the highest proportion of respondents who experienced it associate it with greater importance than energy savings (38%). This was followed by changes in property value (16%), comfort (14%), and heating system maintenance (13%).
- Water consumption was the only impact that no respondents found to be more important than potential energy savings, although 59% considered water consumption equally important to potential energy savings.
- Changes to noise levels was the NEI category that respondents most frequently estimated to be less important than potential energy savings (44%). In fact, respondents were significantly more likely to consider noise impacts to be less important than energy savings than they were to consider health, comfort, and heating system maintenance impacts less important.
- Participants valued increased noise and increased heating system maintenance—the most commonly reported negative NEIs—less heavily than potential energy savings. Appendix A.2 discusses the relationship between the importance customers placed on NEIs and whether the impacts they experienced were positive or negative.

Figure 3: Reported Importance of NEIs Compared to Energy Savings

(Base: Respondents who reported the NEIs)



*Indicates customers indicating water consumption to be more important than savings differs significantly from all other impacts except noise at the 90% confidence level.

**Indicates customers indicating noise to be less important than savings differs significantly from health, comfort, and maintenance at the 90% confidence level.

Note: Chart excludes *Don't know* responses.

3.2 REBOUNDING

➤ **Survey responses offered some evidence of rebound effects.**

Rebounding refers to inefficient changes in behavior after making an upgrade aimed at increasing energy efficiency, thereby negating or minimizing energy savings. Figure 4 illustrates that 10% of participants who installed furnaces and boilers reported that they either set their temperatures higher or use their heating systems more frequently during the heating season than they did before the program equipment was installed. Figure 4 also demonstrates that 10% of those who installed water heaters now take longer showers.

Figure 4: Reported Signs of Rebound Effects

(Base: Respondents who installed the respective equipment through HEHE)

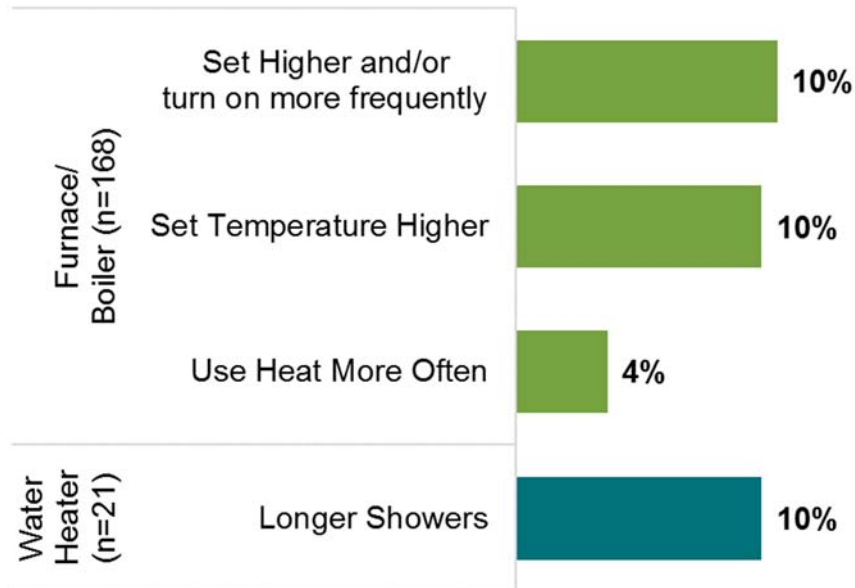


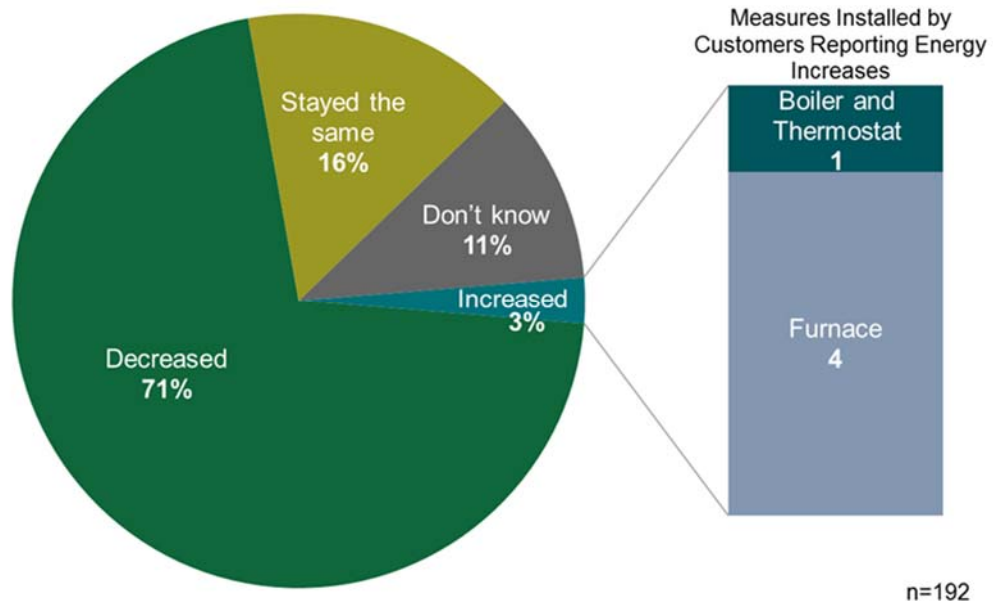
Chart excludes *Don't know* responses

3.2.1 Changes in Energy Consumption

The majority of respondents estimated that their home energy consumption has decreased since installing the new equipment, with only 3% of respondents estimating that it has increased (Figure 5). Of the five customers who reported an increase, four installed a new furnace and one installed both a boiler and a thermostat.

Figure 5: Estimated Changes in Energy Consumption

(Base: All Respondents)



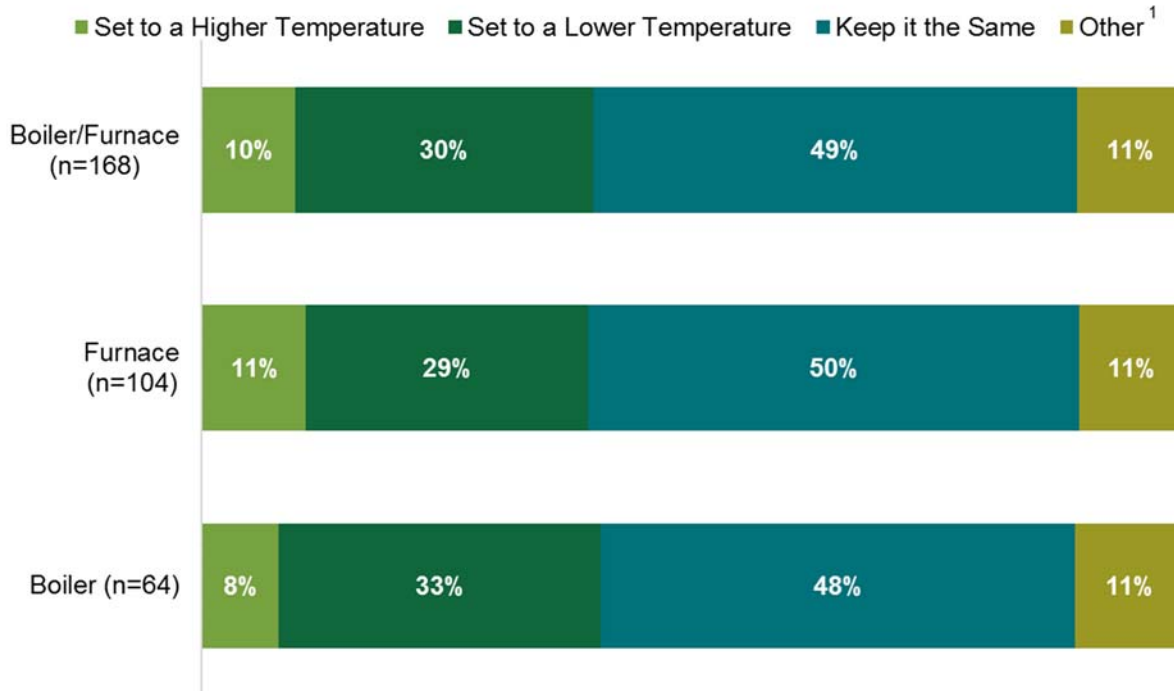
3.2.2 Changes in Thermostat Setting

One-half of those who had boilers and furnaces installed (50%) reported that they have changed the way they set their thermostat *during the heating season* since participating in the program (Figure 6), with 30% of respondents saying that they now set their thermostats to a lower temperature during the heating season than they did prior to participation in the program.

Ten percent of boiler and furnace participants acknowledged that they now set their thermostats to higher temperatures during colder months, which is an indicator of rebounding. Furnace participants were slightly more likely than boiler participants (11% versus 8%) to say that they now set their thermostats to higher temperatures, while boiler participants were slightly more likely than furnace participants (33% versus 29%) to indicate that they set their thermostats to a lower temperature in heating season.

Figure 6: Changes in Thermostat Temperature Setting Behavior during the Heating Season by Measure

(Base: Respondents who installed boilers and furnaces through HEHE)



¹ Other responses include customers who reported setting their thermostats in a more complex manner (e.g. using a 'zoned' system to control different areas separately) but did not indicate that they now set temperatures higher or lower
 Note: Chart excludes *Don't know* responses.

3.2.3 Changes in Heating System Usage

We also asked boiler and furnace participants who reported setting their thermostats differently if they now turn their heating system *on* or *off* more frequently. The majority reported that they have not changed their behavior in that respect (84%). Twelve percent now turn their heating systems off more frequently, compared to just 4% who have found themselves turning their units on more often (Table 3). Between those turning their system off more frequently and those setting it to a lower temperature, over one-third of boiler and furnace participants (35%) exhibited improved behavior *and* exhibited no signs of rebounding behavior.

Three percent of boiler and furnace participants set their thermostats to a higher temperature in addition to turning the new unit on more often, compared to 7% setting their new boiler or furnace to a lower temperature *and* turning it off more frequently. Nearly one-half (48%) of the boiler and furnace participants did not change their temperature settings or the frequency at which they turn their heating systems on or off.

Table 3: Changes in Heating System Usage by Thermostat Behavior and Measure After HEHE Participation

(Base: Respondents who installed boilers and furnaces through HEHE)¹

Behavior/Measure	Heating System Usage		
	Turn on more frequently	Turn off more frequently	No change
Temperature setting behavior			
Set to a higher temperature	3%	0%	7%
Set to lower temperature	1%	7%	23%
Set to the same temperature	0%	2%	48%
Other	0%	4%	7%
Total (n=168)	4%	13%	84%
Measure type			
Boiler (n=64)	5%	13%	83%
Furnace (n=104)	3%	13%	85%

¹ Bases exclude *Don't know* responses.

3.2.4 Changes in Hot Water Usage

When we asked the customers who installed water heaters if their showers were longer, shorter, or the same length as they were before, two of 21 (10%) indicated that their showers are now longer than they had been previously; the other 19 estimated that their shower duration has not changed. This value should be interpreted with caution given the small sample size.

3.3 PROCESS AND SATISFACTION

- *The program NPS of 72% benchmarks well against other businesses and industries. Additionally, participants' likelihood to recommend the program may be linked with the application process.*

To assess program processes and customer satisfaction, we asked respondents about their likelihood to recommend the program and their satisfaction with the application process.

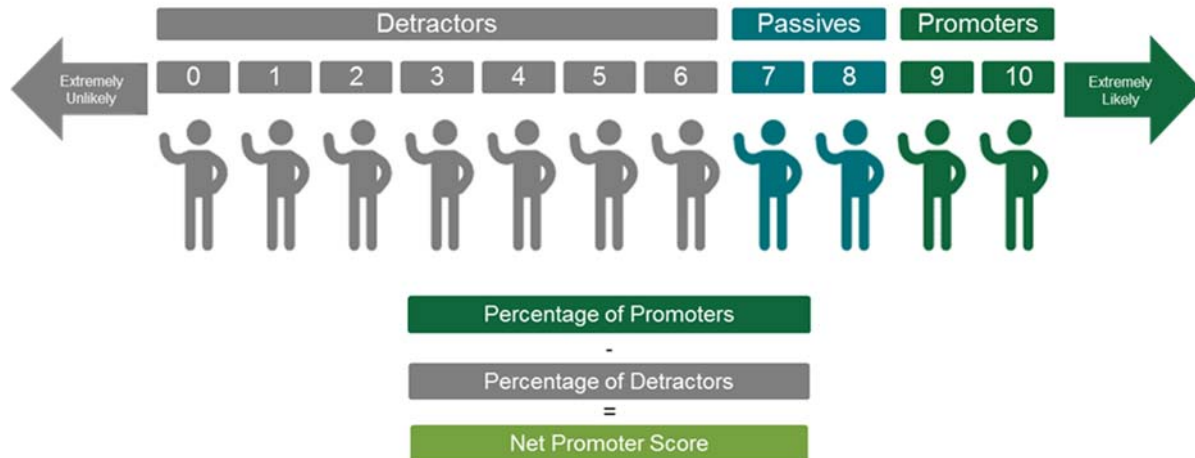
3.3.1 Net Promoter Score

Survey respondents rated their likelihood to recommend the program to others using a scale of 0 (*extremely unlikely*) to 10 (*extremely likely*). Using their responses, we calculated the NPS.² This metric categorizes respondents who rate their likelihood to recommend as a 9 or a 10 as *promoters*—the most likely group to recommend the program. Respondents who rate their likelihood as a 6 or below are considered *detractors*—the least likely to recommend the

² Fred Reicheld, "The One Number You Need to Grow", *Harvard Business Review*, <https://hbr.org/2003/12/the-one-number-you-need-to-grow> (Dec., 2003).

program. Respondents who select a 7 or 8 are considered *passives*, whose likelihood to actively recommend the program is difficult to predict. The NPS is calculated by subtracting the percentage of detractors from the percentage of promoters (Figure 7). In a recent study, the firm Satmetrix reported that 20-60% of organic growth is accounted for by net promoters.³

Figure 7: Net Promoter Score Calculation



Using this formula, we estimated the overall HEHE program NPS to be 72%. This was comprised of 79% promoters, 7% detractors, and 14% passive participants (Figure 8). Most respondents (61%) rated their likelihood to recommend the program as a 10.⁴ On average, the likelihood to recommend was a 9.2, with only three participants giving a rating below 5. Two of the three participants installed new furnaces and one installed a new boiler. Both furnace customers indicated that they gave low ratings because of the cost of the new equipment, which they also found did not work better than their original units. One of these customers reported no NEIs, while the other reported increases in required system maintenance and decreased comfort. The boiler installer attributed his rating to the fact that he never actually received his rebate.⁵

³ “US Consumer 2016 Net Promoter Benchmarks”, *Satmetrix*, <https://www.netpromoter.com/> (Feb., 2016)

⁴ Respondents gave a score of 10 if they had already recommended the program, so some of these participants may have already done so.

⁵ It is possible that the installation contractor integrated the incentive into the cost of installation without notifying the customer.

Figure 8: HEHE Program Net Promoter Score
(Base: All Respondents)



Figure 9 shows NPS overall and by measure type. Customers who installed water heaters had the highest NPS (100%). This is followed by customers who installed boilers (83%), thermostats (74%), and furnaces (62%).⁶ It is unclear why those who had furnaces installed were associated with a lower NPS compared to those who installed other measures; however, the following elements may play a role—most notably efficiency levels:

- Twelve of the 105 furnace participant respondents installed lower efficiency furnaces (AFUE 90%); these respondents provided lower ratings, yielding an NPS of 46%. Excluding those respondents would yield an NPS of 74% among the other 93 furnace participants, who installed AFUE 92% (n=1) or AFUE 94% (n=92) units. This association is possibly attributable to differences in rebate amounts tied to efficiency level: AFUE 90% receives \$140, AFUE 92% receives \$280, and AFUE 94% receives \$420. Boiler participants' NPS also varied by rebate amount, with an NPS of 90% tied to boilers receiving \$560 rebates and an NPS of 77% tied to those receiving \$350. Hot water heaters also receive tiered rebates, yet hot water heaters yielded an NPS of 100% across all respondents. Alternatively, the lower efficiency units could have negative attributes associated with them (i.e., quality) that would imply further investigation. These lower efficiency units could also be resulting in lower energy savings than the higher efficiency units and, therefore, not impressing upon participants the value of the program.
- Furnace participants were the least likely group to report positive NEIs and most likely to report negative NEIs (Section 3.1.2). Given that they reported increases in noise

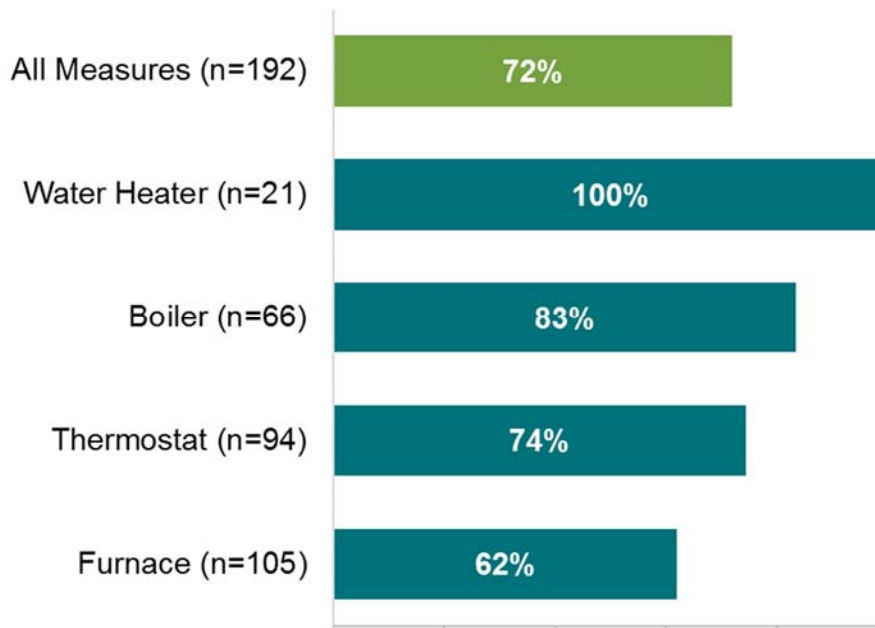
⁶ Note that the water heater sample size is small, however (n=21).

and heating system maintenance most frequently, it is possible that the negative furnace participants reported increased energy consumption more frequently than other measure-type participants—albeit only four furnace participants reported increased energy consumption.

- Customers who applied for furnace rebates accounted for three of the four 0 ratings given to ease of applying, which may have affected their likelihood to recommend the program (Section 3.3.2).
- We received two open ended responses from furnace customers explaining why they would not be very likely to recommend the program. One was frustrated with the cost of the new unit, while the other did not find it to be reliable.
- The measure-specific NPS may also exaggerate the differences in satisfaction across measures. Although furnace customers gave an NPS over 20 points lower than boiler customers, the percentage of detractors was similar (11% of furnace customers vs. 5% of boiler customers).

Figure 9: Net Promoter Score by Measure

(Base: All Respondents)



When comparing the HEHE program’s overall NPS to those in several benchmarking studies, a score of 72% is a favorable rating. Although, we were unable to find NPS data for a similar program.

- A 2016 NPS study assessing businesses and industries, completed by the Temkin Group, found the average, industry-wide NPS for utility companies to be 27%, with a maximum single-utility score of 41%. The average NPS for the appliances industry

was found to be 40%, with a top score of 53%.⁷ The greatest observed NPS in that study was an insurance company with a score of 68%—lower than the HEHE value of 72%.

- A similar study of 247 businesses, completed by Satmetrix, found a maximum NPS of 80% (a clothing store).⁸

Both reports found most industry averages to be in the range of 30% to 45%. Comparing the HEHE program’s overall NPS to these NPS benchmarks suggests that HEHE program customer satisfaction is commendable. However, it is important to note that these reports focused on NPS’s of a full business or industry, rather than for a specific program or aspect of the business.

3.3.2 Application Process

The survey also assessed the customers’ ease of applying to the program. Using a similar 0-10 scale, where 0 was defined as *very difficult* and 10 as *very easy*, customers rated their experience with the application process. On average, they rated the process a 9.2, with one-half of respondents rating it a 9 or 10. Table 4 compares respondents’ likelihood to recommend the program to their application process rating. After binning the application process ratings into *easy* (9 or 10), *moderate* (6-8) and *difficult* (0-5), results indicated that the ease of applying may have played a role in customer likelihood to recommend the program. Customers who rated the application process as difficult gave an average likelihood to recommend a rating of 8.5, while, on average, those who rated it as easy rated their likelihood to recommend a 9.7 (a statistically significant difference). Customers who found the application process difficult most often pointed to the length of the application form (4 of 13) and the difficulty of obtaining the proper documentation (4).

Table 4: Participant Experience with the Application Process

(Base: Respondents involved in completing the HEHE application)

Ease	Ease of Completing Application		Likelihood to Recommend	
	Rating	% of Respondents (n=133) ¹	n	Average (0 to 10)
Easy	9 to 10	50%	67	9.7*
Moderate	6 to 8	35%	46	8.8
Difficult	0 to 5	15%	20	8.5**

* Differs from *Difficult* and *Moderate* groups at the 90% confidence level.

** Differs from the average overall rating of 9.2 (see above) at the 90% confidence level.

¹ Excludes *Don’t know* responses and respondents who did not complete the application.

⁷ “Net Promoter Score Benchmark Study,” *Temkin Group*, <http://temkingroup.com/research-reports/net-promoter-score-benchmark-study-2016/> (Oct., 2016).

⁸ “US Consumer 2016 Net Promoter Benchmarks”, *Satmetrix*, <https://www.netpromoter.com/> (Feb., 2016)



Appendix A Additional Details

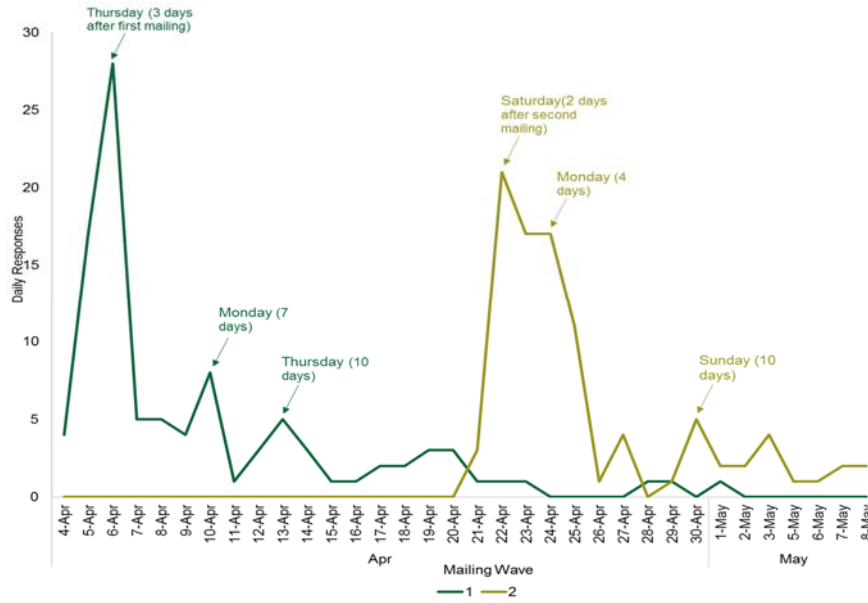
This appendix includes additional details associated with the HEHE program participant survey.

A.1 METHODOLOGY – ADDITIONAL DETAILS

Figure 10 shows the survey completions that we received, starting the day after the first mailing went out (April 4, 2017) and lasting until we closed the online-response portal on May 8, 2017. The following findings may be useful for National Grid to keep in mind for its evaluation efforts:

- Of our 195 respondents, 101 came from the first wave and 94 from the second. Most activity came within the first week after mailing; we received 70% of wave one and 79% of wave two responses within seven days.
- We received our final first-wave response on the 29th day of fielding (out of 35 days), after receiving a total of three responses in the final three weeks. This strongly suggests that had we only completed one mailing, we would have fallen short of our targeted 150 completes, regardless of the time that we left the portal open.

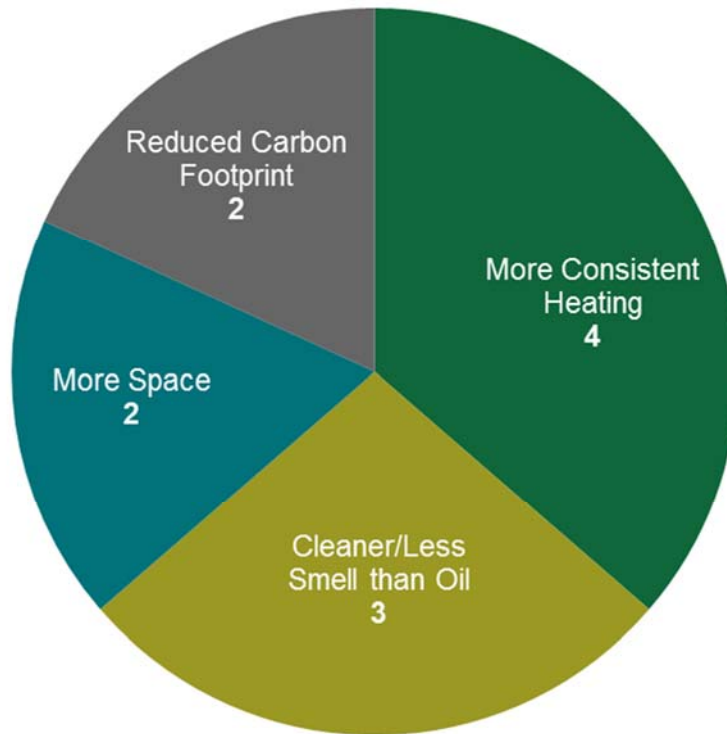
Figure 10: NEI Survey Daily Online Completions by Mailing Wave



A.2 NEIs – ADDITIONAL DETAILS

Figure 11 shows the responses of customers who reported NEIs outside the categories that we specifically asked about. The most common response was experiencing more “even” heating (four responses). One customer describing this impact as, “not having to adjust the thermostat as much [because the new furnace] keeps the heating consistent.”

Figure 11: Other Reported Non-Energy Impacts¹
 (Base: Respondents who reported experiencing “other” impacts)



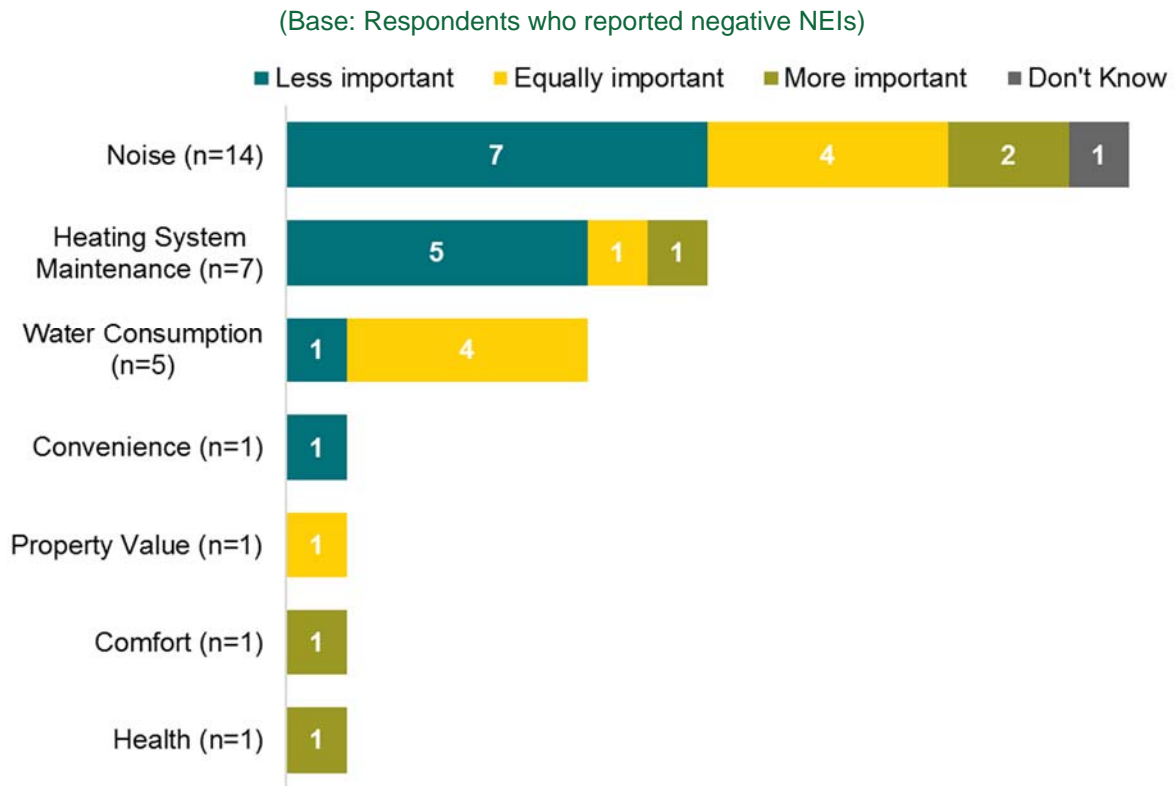
n=11

¹ Excludes several responses that fell into original NEI categories. Due to small sample size, percentage values are not shown.

Figure 12 and Figure 13 show the importance placed on NEIs by the 27 respondents who reported negative and positive impacts, respectively.

- Only five of the 27 customers who reported negative impacts deemed these to be more important than potential energy savings. This included two respondents who reported increased noise, and one respondent each for those who reported negative impacts in heating system maintenance, comfort, and health.
- Customers who reported increases in health (28%), comfort (18%), and property value (16%) most commonly declared these changes to be more important than potential energy savings. While those who reported decreases in noise levels, most frequently found this change to be less important than savings (46%).

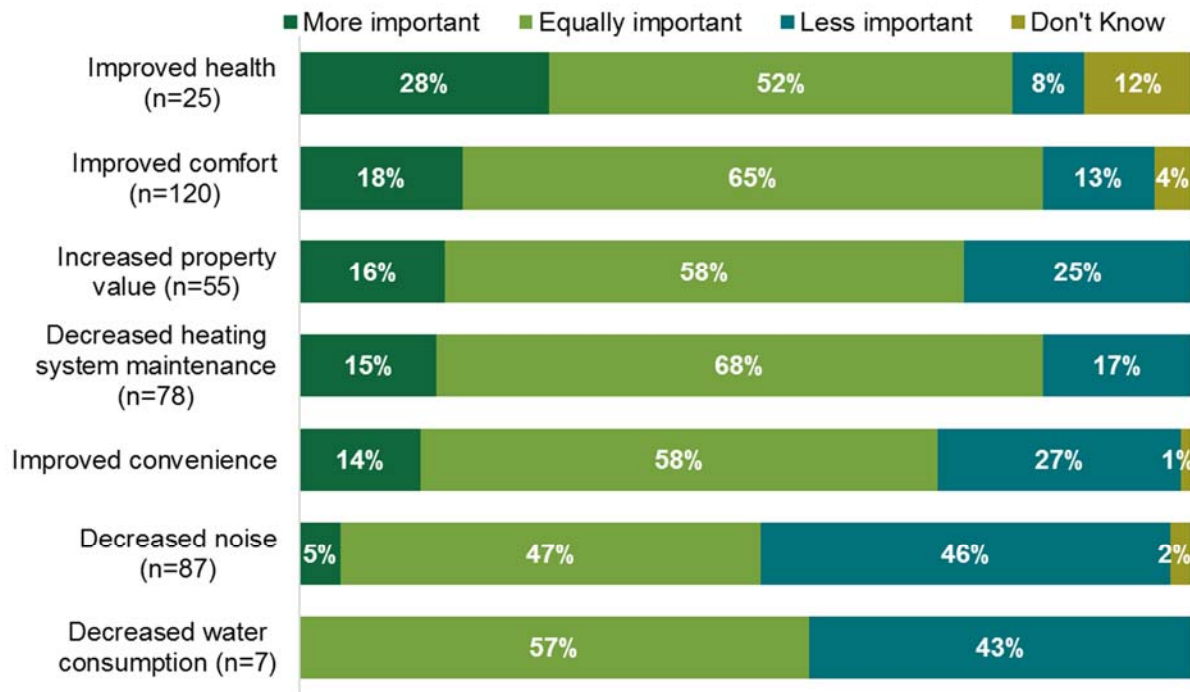
Figure 12: Importance of Negative NEIs Compared to Energy Savings – Count of Responses



Note: Sample sizes are equal to the number of respondents experiencing the NEI. Due to the small sample sizes, percentage values are not shown.

Figure 13: Importance of Reported Positive Impacts

(Base: Respondents who reported any positive NEIs)



Note: Percentages represent the portion of all respondents experiencing the NEI *and* perceiving its importance compared to potential energy savings as so; multiple responses permitted. (n=157)

Table 5 shows participants' reported reasons for difficulty with the application process. The number of respondents who rated the process as difficult was low, and their problems mostly centered around the length of the application or difficulty obtaining necessary information from a third-party (31% each).

Table 5: Reasons for Difficulty Applying

(Base: Respondents who rated ease of applying a four or lower)

Reason for Difficulty Applying	% Responses
<i>Number of Responses</i>	13
Length of Application	31%
Had trouble getting necessary information from a contractor or retailer	31%
Did not initially receive rebate; had to follow up	23%
Could not find the product's model number	15%

A.3 SURVEY RESPONDENT DEMOGRAPHICS

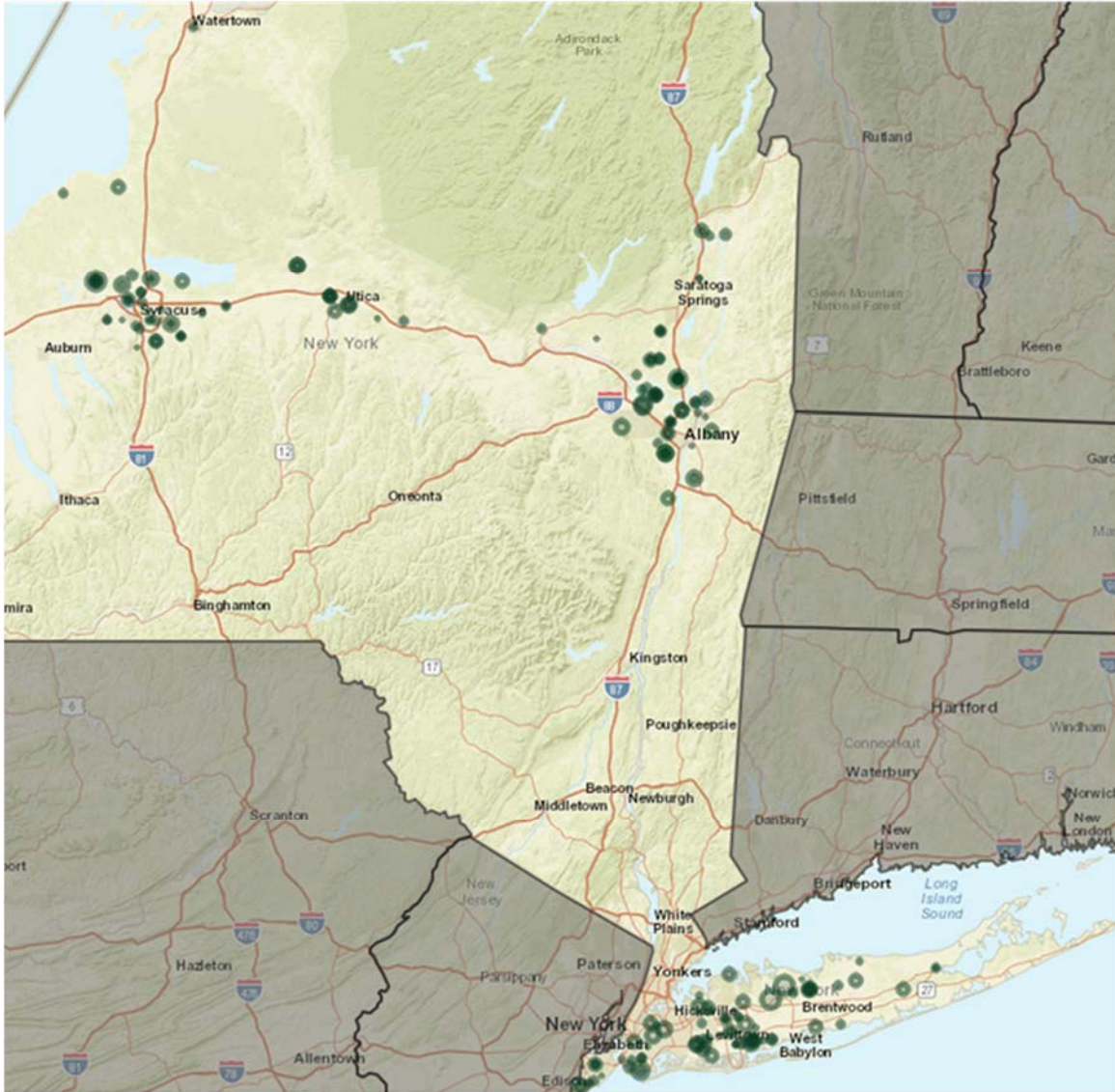
Table 6 shows the demographics of the 195 survey respondents. They tended to be male (72%), 55 or older (80%), and college graduates (69%).

Table 6: Demographics
(Base: All Respondents)

Demographic/Characteristic	n=192
Income category	
Less than \$35,000	6%
\$35,000 to \$49,999	4%
\$50,000 to \$74,999	15%
\$75,000 to \$99,999	19%
\$100,000 to \$149,999	17%
\$150,000 to \$199,999	8%
\$200,000 or more	6%
<i>Refused</i>	25%
Household occupant count	
1	17%
2	51%
3	17%
4	6%
5 to 8	8%
<i>Refused</i>	1%
Education level	
High school graduate or Some high school	9%
Some college or Technical/Trade school graduate	22%
College graduate	31%
Some graduate school	5%
Graduate degree	31%
<i>Refused</i>	2%
Age range	
25 to 34	3%
35 to 44	4%
45 to 54	11%
55 to 64	35%
65 or over	45%
<i>Refused</i>	2%
Gender	
Male	72%
Female	25%
<i>Refused</i>	3%

Figure 14 maps the zip codes of survey respondents. Most were centered around Brooklyn, Long Island, Albany, and Syracuse.

Figure 14: Map of Respondents and NEIs
 (Base: All Respondents; dot sizes correspond to NEIs reported)⁹



⁹ Base map source: <http://leaflet-extras.github.io/leaflet-providers/preview/index.html> (Accessed May 12, 2017)

B**Appendix B Marketing Messages**

In the Executive Summary, we recommend leveraging the NEI findings in program marketing materials. Here, we list findings from the studies that may be used to develop slogans or messages to place in program brochures, applications, and/or websites.

Customers find that their new boilers and furnaces have increased their comfort.

More than 80% of HEHE customers report experiencing positive impacts beyond saving energy.

Four in five participants observe positive impacts—such as increased comfort and convenience—beyond saving energy.

Program-supported equipment has shown to improve customers' comfort and convenience and reduce the amount of system noise they hear.

Two in five participants report that program equipment reduced the amount of heating system maintenance they perform.

More than one-quarter of participants estimate that their property value increased due to program equipment.



Appendix C Customer NEI Survey

[RED] = Instructions for programmer

[Green] = Read-in variable

C.1 INTRODUCTION

[NMR will provide a National Grid logo to appear on this screen]

Thank you for your willingness to complete our survey!

As mentioned in the postcard that we sent you, National Grid has partnered with Research & Marketing Strategies, Inc. (RMS), a third-party market research firm, to learn more about your experience with National Grid's Residential High Efficiency Heating Equipment Program, where you received an incentive for purchasing and installing energy-efficient heating equipment. Your feedback is important and will help ensure that the program is beneficial to National Grid's customers. This survey will take about 10 minutes.

C.2 SCREENING

S1. Our records show that you received a National Grid incentive (issued either to you or your contractor) for the following equipment. Is that correct?

- a. [ASK IF BOIL = 1] A new boiler
- b. [ASK IF FURN = 1] A new furnace
- c. [ASK IF THERM = 1] A new thermostat
- d. [ASK IF HWH = 1] A new water heater

[FOR EACH]

1. Yes
2. No
98. Don't know

[COMPUTE VERIFIED VARIABLES, WHERE S1 = 1: V_BOIL = 1, V_FURN = 1, V_THERM = 1, V_HWH = 1]

TERM1. [READ IF ALL S1 > 1] Thank you for your willingness to complete this survey. Unfortunately, we are only conducting this survey with respondents able to confirm receiving an incentive for the equipment. [TERMINATE]

C.3 REBOUND

R1. [ASK IF V_BOIL OR V_FURN = 1] Since installing the new equipment, have you changed the way you adjust your thermostat?

1. Yes
2. No
98. Don't know

R2. [ASK IF R1 = 1] Since installing the new equipment, during the heating season, do you now typically...

[ALLOW ONE RESPONSE]

1. Set your thermostat to **higher** temperatures than you did before
2. Set your thermostat to **lower** temperatures than you did before
3. Keep it the **same** as you did before
4. Set your thermostat in some **other** way

R2a. [ASK IF R2 = 4] What are you doing with your thermostat now?

[OPEN END RESPONSE]

98. Don't know

R3. [ASK IF R1 = 1] Do you now typically...

[ALLOW ONE RESPONSE]

1. Turn your heating system **on** more frequently
2. Turn your heating system **off** more frequently
3. Use your heating system the **same** as you did before

R4. [ASK IF V_HWH = 1] Since installing the new hot water heater, are your showers typically...

[ALLOW ONE RESPONSE]

1. **Longer** than they were before
2. **Shorter** than they were before

3. **The same length** as they were before

C.4 ENERGY IMPACTS

E1. Since installing the new equipment, has your home's energy consumption...

[ALLOW ONE RESPONSE]

1. Increased
2. Decreased
3. Stayed the same
98. Don't know

E2. How important were potential energy savings to you when you were deciding to purchase and install the new equipment? Please use a scale of 1 to 5, where 1 is *not at all important* and 5 is *very important*.

[ALLOW FOR WHOLE NUMBER RESPONSES 1 TO 5]

98. Don't know

C.5 NON-ENERGY IMPACTS

NE1. Aside from changes in energy consumption, people sometimes experience other types of impacts from installing energy-efficient equipment. Have you experienced changes to any of the following because of the new equipment?

[RANDOMIZE]

- a. Noise in your home
- b. Your home's property value
- c. Your home's water consumption
- d. The amount of maintenance your heating equipment requires
- e. Your or your family members' health
- f. Your or your family members' comfort
- g. Your or your family members' convenience

[FOR EACH]

- 1. Yes
- 2. No
- 98. Don't know

NE2. [ASK FOR NE1a-d WHERE NE1 = 1] Did the new equipment increase or decrease [NE1]? [FOR READ-INS, PLEASE LOWER CASE THE FIRST LETTER]

[FOR EACH]

- 1. Increase
- 2. Decrease
- 3. Neither
- 98. Don't know

NE3. [ASK FOR NE1e-g WHERE NE1 = 1] Did the new equipment improve or worsen [NE1]?

[FOR EACH]

- 1. Improve
- 2. Worsen
- 3. Neither
- 98. Don't know

NE4. Have you experienced any other impacts?

- 1. Yes
- 2. No
- 98. Don't know

NE4a. [ASK IF NE4 = 1] What were the other impacts?

[OPEN END RESPONSE]

- 98. Don't know

NE5. Sometimes impacts that do not relate to energy can be **less** important to you than potential energy savings, sometimes they can be **more** important to you than energy savings, and sometimes they are **equally** as important to you as the potential energy savings.

[ASK WHERE NE1 = 1] Compared to the potential energy savings, was the impact on [NE1] less, more, or equally as important?

[FOR EACH]

1. **Less** important than potential energy savings
2. **More** important than potential energy savings
3. **Equally** as important as potential energy savings
98. Don't know

C.6 PROGRAM SATISFACTION

P1. How likely are you to recommend the Residential High Efficiency Heating Equipment Program to someone else? Use a scale of 0 to 10, where 0 is *extremely unlikely* and 10 is *extremely likely*.

(If you have already recommended the program, please type the number 10)

[ALLOW 0 TO 10 WHOLE-NUMBER RESPONSES]

P2. [ASK IF P1 < 5] Why do you think you would not be very likely to recommend the program?

[OPEN END RESPONSE]

98. Don't know

C.7 DEMOGRAPHICS

You're nearly done. We have some questions for statistical purposes about you and your household. Your responses are strictly confidential.

D1. Including yourself, how many people live in your home most of the year?

[OPEN END NUMERIC]

98. Would rather not answer

D2. What is the highest level of education that you have completed?

1. Less than high school
2. High school graduate
3. Technical or trade school graduate
4. Some college
5. College graduate
6. Some graduate school
7. Graduate degree
98. Would rather not answer

D3. What is your age? Are you...

1. 18 to 24
2. 25 to 34
3. 35 to 44
4. 45 to 54
5. 55 to 64
6. 65 or over
98. Would rather not answer

D4. What category best describes your total household income in 2016 before taxes?

1. Less than \$35,000
2. \$35,000 to \$49,999
3. \$50,000 to \$74,999
4. \$75,000 to \$99,999
5. \$100,000 to \$149,999
6. \$150,000 to \$199,999
7. \$200,000 or more
98. Would rather not answer

D5. Do you identify as male or female?

1. Male
2. Female
3. Other
98. Would rather not answer

Thank you for completing our survey. Your responses are very important to us.