REMOTE HOME ENERGY ASSESSMENTS

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Contents

About ACEEE

The **American Council for an Energy-Efficient Economy** (ACEEE), a nonprofit research organization, develops policies to reduce energy waste and combat climate change. Its independent analysis advances investments, programs, and behaviors that use energy more effectively and help build an equitable clean energy future.

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Executive Summary

KEY FINDINGS

- Remote home energy assessments can be an excellent option when targeted to the right customers, such as younger, more tech-savvy customers.
- Customers who choose remote assessments are generally satisfied with them and usually complete follow-up actions.
- Remote assessments can expand the reach of energy efficiency assessments and help the United States reach its retrofit goals.
- Experienced assessors are best suited for conducting remote home energy assessments, as experience in the field is particularly important for remote assessments (more than for in-person assessments).
- Remote assessments are convenient for both customers and assessors, can result in greater customer engagement compared to in-person assessments, and can potentially increase program cost effectiveness.
- Behavioral science principles can improve the soft skills necessary for assessors to boost their conversion rates during remote assessments. Remote assessments require customers to conduct the assessment themselves and therefore present opportunities for customers to personally experience issues such as air drafts and heat loss—experiences that can persuade customers to act.

EVALUATING AND IMPROVING REMOTE HOME ENERGY ASSESSMENTS

Using data sources from multiple stakeholders, as well as a deep dive into relevant behavior science principles, we examined the effectiveness of remote assessments and how they can be improved. Based on our analysis of customer satisfaction data provided by energy assessment companies and our own independent survey of nearly 350 assessment recipients (comparing those who received in-person assessments to those who received remote assessments), we offer evidence-based recommendations to maximize the likelihood of conversion from remote assessments.

Remote assessments are not only necessary to expand the reach of energy efficiency, they are also effective, useful for encouraging energy upgrades, and popular with customers. They are an excellent complementary option for utilities to provide alongside in-person assessments, especially for certain demographic groups such as younger and more tech-savvy customers. We offer recommendations on how to target offerings to customers who will benefit most, as well as suggestions for how assessors can improve their "soft skills" using behavioral science.

REMOTE ASSESSMENTS

Remote assessments typically require the homeowner to use a device with a camera (usually a mobile phone) to walk the assessor through the home while the assessor collects pertinent data. The assessor then explains the findings and recommendations to the homeowner, either directly after the assessment or in a follow-up call a few days later, usually including a summary report for future reference. The remote assessment process is relatively simple from the homeowner's perspective, with the assessor handling all the software inputs and data collection using home energy modeling tools such as HEAT or Snugg Pro to estimate energy consumption and possible areas for improvement. Some programs and assessors also use additional data such as utility bill and weather data, home geometry data gathered using software tools, or any other information collected in advance.

SUMMARY OF FINDINGS

Details of how we came to these findings and conclusions are available in the appendices. We especially urge interested readers to examine Appendix B, which contains details of relevant behavioral science insights and examples of how they can be applied in the field.

Assessors

The most successful remote assessments were conducted by assessors who drew from knowledge acquired over years of field experience with in-person home energy assessments and retrofits, enabling those remote assessors to effectively guide homeowners to collect the most relevant information and make recommendations without being on-site. Remote assessments save time and money by reducing transportation demands on assessors, and they can help educate hard-to-reach customers, such as those in rural areas, about the benefits of energy efficiency, with the goal of upgrading more homes.

Homeowners

The remote format is appealing to homeowners for several reasons. First, it saves transportation time and money, especially in rural communities, and those savings can be passed along to the customer to allow program administrators to offer discounted or free assessments. In addition, remote assessments ensure the right service provider is sent to the home, and it alleviates safety and privacy concerns from customers who prefer not to have strangers in their homes (especially during a pandemic). The best candidates for remote assessments are younger customers, as they reported higher overall satisfaction and fewer technical issues with remote assessments. Perhaps as a result, they also followed through with recommended upgrades and installed free items (e.g., lightbulbs and power strips) more often than older groups, especially customers 65 years or older. Some older customers may be better suited for in-person assessments.

The Benefits of Remote Assessments

Overall, remote assessments are convenient for both customers and assessors and can potentially increase program cost effectiveness. Importantly, from a behavioral science perspective, remote assessments, by nature, force homeowners to engage in the process: to

walk through the house and be an active participant. By contrast, an in-person assessment lets the homeowner disengage while the assessor works, with the two reuniting only for a summary at the end. Active engagement and direct experience are key ingredients for changing perceptions and encouraging adoption of energy upgrades. Customers who receive remote assessments usually complete follow-up actions, either installing free items they received or purchasing recommended measures (e.g., insulation or HVAC upgrades).

Remote assessments can also augment in-person assessments by providing an initial determination of which upgrades would offer the greatest energy efficiency improvements. The in-person assessment is then shortened so that it simply confirms the information previously gathered, focuses on the most pressing problems, and installs any necessary items the customer may need to help save them energy.

Improving Remote Assessments with Behavioral Science Insights

We also examined how remote assessments could be improved by applying behavioral science insights that can potentially increase customer follow through. Based on our research, we suggest that assessors empathize and develop rapport with the customer, engaging them in the assessment as much as possible and personalizing it to what the customer has in the home or may be interested in. We also suggest explaining *why* the customer should take specific actions, using vivid language to help the customer better understand. Finally, we suggest making the assessments as convenient as possible, both for assessors and customers. Appendix B provides examples of how each of these strategies can be (and were) applied in the field during assessments we directly observed.

Limits of Remote Assessments

Despite the advantages and potential of remote assessments, there are still some aspects of in-person assessments that remote assessments cannot replicate, such as tests that require special equipment (e.g., blower door tests). In addition, remote assessments rely on customers having good Internet connectivity throughout the house and a working smart phone, and they require the customer to move around the house at the guidance of the assessor, criteria that will not be met by all customers. That said, experienced assessors can often tell what a home needs without special testing, and remote assessments could be used as a screening tool to determine if an in-person visit is required and to identify the most pressing areas it should focus on, expediting the homeowner's referral to the appropriate contractor.

CONCLUSION

In sum, remote assessments have some advantages over in-person assessments and should continue to be offered as an optional tool for customers. Certainly, many customers will prefer in-person assessments, but younger, tech-savvy customers could get many of the same benefits from remote assessments, with increased convenience and engagement. Some assessment program implementers have also found success with a hybrid model in which remote assessments precede in-person assessments. Regardless, remote assessments

can help promote energy efficiency upgrades among homeowners, and with the application of strategies informed by behavioral science, they can maximize effectiveness.

Table ES 1. Summary of differences between remote and in-person assessments

Characteristic	In-person assessment	Remote assessment
Duration	2–4 hours	45–90 minutes
Cost	Often subsidized or free for homeowner; without subsidy about $145–420; Expensive for contractor	Often subsidized or free for homeowner; without subsidy about $200–250; Relatively inexpensive for contractor
Homeowner characteristics	Good for all ages and abilities, especially older homeowners	Best for younger homeowners; not recommended for ages 65+ or homeowners with Internet connectivity or mobility issues
Privacy	Requires assessor to enter home and access all areas	Homeowner has more control over what assessor sees
COVID-19	Assessor must enter home; CDC lists this type of activity as "less safe" than comparable activities with non-household members outdoors or in more spread-out spaces	Assessor does not physically enter home until necessary (for follow-up visit or installation); risk of COVID-19 transmission is greatly reduced or eliminated
Engagement and participation	Homeowner can participate with assessment but does not have to	Homeowner must actively participate and is, on average, more engaged in assessment
Follow-up actions	Homeowner installs free and paid upgrades at roughly the same rate as remote assessment recipients; older customers *may* conduct more follow-up after in-person than remote assessments	Homeowner installs free and paid upgrades at roughly the same rate as on-site assessment recipients; younger customers *may* conduct more follow-up after remote than in-person assessments
Satisfaction with assessment	Homeowners are highly satisfied with assessments, slightly more than with remote assessments (this may be because of a self-selection bias)	Homeowners are highly satisfied with assessments, but slightly less than with in-person assessments (this may be because of a self-selection bias)
Assessor experience	Can be conducted by assessors with all levels of experience	Best conducted by highly experienced assessors
Depth of assessment	In-person assessments can include in-depth elements and tests, if necessary	Experienced assessor can provide accurate assessment for most homes, but some tests cannot be conducted

Introduction

Home energy assessments began in the 1970s, during the energy crisis, to identify leaks and energy waste in homes.[1] In the years since, they have become a standard practice for utilities and governments making energy upgrades in American homes (Alliance to Save Energy 2013). Moreover, they have become popular among homeowners looking to improve energy efficiency for a variety of reasons, from saving money to reducing greenhouse gas emissions to ensuring good indoor air quality. Thanks to improvements in technology and Internet speeds, these assessments can often be done remotely. Although remote assessments were in development before the COVID-19 pandemic (e.g., the Tennessee Valley Authority's Virtual Home Energy Evaluation), their deployment quickly accelerated during 2020 and 2021, helping to keep energy workers employed and support continued progress on residential energy efficiency (CLEAResult 2020; Ray 2020; Walton 2020; BPA 2020; Flessner 2020; Corvidae 2020). As with telemedicine, many homeowners, utilities, and energy assessors discovered that remote assessments were not only viable but also economical and convenient; they have the potential to expand capacity, reach new audiences, and help the United States meet climate goals by reducing energy use in more homes.

This report investigates how remote home energy assessments can be used most effectively. We gathered raw customer satisfaction data from seven energy assessment providers and conducted our own independent survey and analysis using Tennessee Valley Authority (TVA)[2] assessment recipients (see Appendix A and Appendix C for details). The TVA survey included both remote and in-person assessment recipients (nearly 350 in total) and allowed us to compare customer perceptions of these two programs during the same period. On top of these findings, we offer evidence-based recommendations for how to maximize conversion rates in remote assessments by applying established principles of behavioral science. Over the last six decades, psychologists have learned a great deal about behavior change, sales, and "conversion," i.e., getting consumers to act based on recommendations from experts or incentive offers from businesses, utilities, or government entities. We urge readers interested in these specific insights to examine Appendix B or our accompanying tip sheet for contractors (available on the ACEEE website), which contain descriptions and examples of how to apply them in the field.

[1] Assessments were primarily referred to as "audits" at that time. Today, the term "audit" has generally fallen out of favor (possibly because it is associated with the negative experience of a "tax audit"), and only used to refer to very in-depth examinations, if at all.

[2] TVA is a large utility that provides electricity to several local power companies, industrial customers, and federal installations in Tennessee and parts of six surrounding states.

Energy Assessments as a Climate Solution

Reducing energy usage and improving efficiency in residential buildings are critical to cutting carbon emissions in the United States. Compared to other energy-conserving behaviors (e.g., setting back thermostats, switching off lights), a one-time investment in an installation of a residential efficiency upgrade may be the most effective way homeowners can reduce their electricity and fossil fuel consumption (Gardner and Stern 2008). For example, air sealing and boosting insulation can save an average of 11% of total energy costs while reducing drafts and improving comfort (ENERGY STAR 2021). The primary purpose of a home energy assessment is to evaluate the present state of a home's energy performance and identify opportunities for efficiency improvements.

Remote Energy Assessments

Through online video interactions, an assessor can evaluate a home offsite. Since the beginning of the COVID-19 pandemic, this option has allowed companies to continue providing assessment services while preserving jobs during the economic downturn. Even as in-person assessments become feasible again, the option to have a home evaluated remotely creates opportunities to serve hard-to-reach customers and upgrade more homes. With the current U.S. administration's plan to weatherize 2 million homes over 4 years (Biden 2020), remote assessments could offer a way to inexpensively assess (or pre-screen) large numbers of homes before deploying contractors or do-it-yourself energy kits to install upgrades.

Home energy assessors are not the only ones exploring remote assessment possibilities. Before the COVID-19 pandemic, many industries had begun conducting remote assessments as a time- and cost-saving alternative to physical assessments. For example, remote streetscape audits, which use tools like Google Street View to track conditions related to infrastructure, safety, and aesthetics, collect measurements comparable to physical audits (Badland et al. 2010; Gullon et al. 2015; Mooney et al. 2017; Hanibuchi, Nakaya, and Inoue 2019). Like other types of assessments, remote energy assessments[3] may therefore be a logical next step for assessing home energy use.

How does a remote home energy assessment work? Homeowners are often screened to verify if they would be a good fit for a remote assessment (e.g., have good Internet

[3] In this report, we refer to "remote energy assessments" as a process in which the resident does a self-assessment of the home with the guidance of either a live energy professional or a structured set of instructions (usually with an energy professional available by phone for help). We did not include other types of virtual assessment procedures, such as those that model energy use from energy consumption data alone (e.g., EnerWisely), or those that use publicly available scraped data to estimate energy use of a residence (e.g., Energy Estimator), although those can also be useful and effective.

connectivity, can reasonably move about the home). Then, the homeowner and assessor arrange a time to conduct the assessment at their convenience. The homeowner sends over preliminary information (e.g., age and type of home, heating and cooling systems, service type), and the assessor provides a list of basic tools to have on hand (e.g., tape measure, ladder) (Ray 2020). Some assessors also collect additional data such as utility bill, weather, or home geometry data gathered using software tools. At the arranged time, the assessor briefly describes how the process will work, verifies the accuracy of any preliminary information collected, reviews safety protocols, and discusses what to do if technical issues arise. Some also ask the homeowner which areas of the home they would most like to focus on.

The assessor then guides the homeowner through various tasks as the homeowner walks through the house, pointing a camera (usually a mobile phone camera) and taking measurements where requested. The assessor can guide the homeowner in finding certain technical features like the faceplate of the heating system, and if safe, to look into attics, crawlspaces, and other relevant areas (Corvidae 2020). The assessor can take pictures and scan serial numbers to review appliances, insulation, and other opportunities for energy efficiency improvements (Flessner 2020).

The assessor ultimately explains the findings and recommendations to the homeowner, either at the end of the assessment or in a follow-up appointment, and usually includes a summary report for future reference. A recording of the session may also be available for review, and the assessor may schedule a follow-up call with the homeowner to answer any questions about installing any free items that have been received (e.g., lightbulbs, faucet aerators). Homeowners report that this process is surprisingly easy and quick (Ray 2020), taking between 45 and 90 minutes in total (Walton 2020).

The remote assessment process tends to be relatively simple from the homeowner's perspective. Typically, only easy-to-find items are required for the assessment to be conducted (e.g., a flashlight to look under sinks or other dark spaces), and the assessor handles all the software inputs and data collection using home energy modeling tools such as HEAT (Hancock Software 2021) or Snugg Pro (Snugg Pro 2018) to estimate energy consumption and possible areas for improvement.

Importantly, remote assessments are possible because they draw on knowledge acquired over years of field experience with in-person home energy assessments and retrofits. This knowledge enables remote assessors to effectively guide homeowners to collect the most pertinent information and to make recommendations without being on-site at the house. As one expert we interviewed said, "Some energy assessors know 80% of what they'll

recommend before they even enter the door." All of this makes the process straightforward for homeowners.[4]

The Advantages of Remote Energy Assessments for Achieving Climate and Energy Goals

Given the scale of weatherization and retrofits needed to meet carbon-reduction goals, remote energy assessments are an invaluable and necessary tool. Their benefits are not limited to the era of the COVID-19 pandemic. The remote format is appealing to customers who may have concerns about a stranger entering their homes; it saves time and money by reducing transportation demands on assessors; and it promotes engagement, which can help educate rural or otherwise hard-to-reach customers about the benefits of energy efficiency, with the goal of increasing access to assessments and ultimately upgrading more homes.

INCREASES PRIVACY

Homeowners who are concerned about privacy or simply want to minimize the number of people entering their homes may prefer remote assessments. The procedure offers the homeowner more control over what an assessor sees while still allowing the assessor to get the information needed for providing recommendations (Corvidae 2020).

SAVES TIME, WHICH IMPROVES ACCESS

Remote assessments are less time-consuming than physical assessments because they reduce travel time and usually take less time to conduct. Assessors normally spend a large amount of time traveling to the homes under inspection, and this can limit the availability of the service (Flessner 2020; Corvidae 2020). Moreover, homeowners in rural communities tend to have higher energy burdens than those in urban centers but are less attractive customers for home energy contractors because of the large distances between homes (Tucker and Sobin 2020). This means that energy upgrade services are less available in rural communities.

Remote assessments can be arranged and conducted with less notice (and therefore shorter lead time) than in-person visits, making them more accessible for homeowners and allowing assessors to reach more households in the same amount of time (BPA 2020; Corvidae 2020; Leslie et al. 2012). Sending easy-to-install upgrades to customers (such as LED bulbs or power strips) and letting them install the items on their own time can shorten the time

[4] Remote energy assessments can provide the information needed for most typical energy upgrades, but they are not intended to substitute for in-depth energy or home health audits, such as those needed for atypical homes or deep energy retrofits.

required of the assessor. That said, this practice is also possible to implement with some in-person assessments.

SAVES MONEY

Remote assessments save money for both assessors and homeowners. They are less costly to conduct than in-person assessments, as assessors do not have travel costs, and are often offered to homeowners at low or no cost (Flessner 2020; Corvidae 2020).

Remote assessments also help assessors, contractors, and programs save money by ensuring the right service provider is ultimately sent to the home. For example, if there are limited envelope improvement opportunities but the HVAC needs to be replaced, then the project can be referred to an HVAC contractor. Remote assessments allow homes with significant opportunities, such as envelope sealing, to be prioritized, while those with limited opportunities can receive relevant information to follow up on independently (for example, upgrading appliances or lightbulbs). If there are non-energy-related repairs that must be done first, such as mold remediation, the homeowner can get guidance on how to proceed, and the program can follow up later. Time is not wasted sending contractors to homes that cannot be accessed.

PROMOTES CUSTOMER ENGAGEMENT

Importantly, from a behavioral science perspective, remote assessments, by nature, force homeowners to engage in the process because the remote format requires homeowners to walk through the house and be an active participant (Walton 2020; Flessner 2020; Corvidae 2020; Leslie et al. 2012). By contrast, an in-person assessment lets the homeowner disengage while the assessor works, with the two reuniting only for a summary at the end. Active engagement and direct experience are key ingredients for changing perceptions and encouraging adoption of energy upgrades (Gonzales, Aronson, and Costanzo 1988).

The Viability and Usefulness of Remote Energy Assessments

Based on the data we gathered from surveys, interviews, and a literature review, four elements stood out as making remote assessment programs effective for both encouraging customers to follow through on recommendations and providing value to assessment providers:

- They are convenient for both customers and assessors.
- They can result in greater customer engagement than in-person assessments.
- There is more potential for increased program cost effectiveness than with in-person assessments, providing the ability to do more assessments and be more targeted with in-person follow-ups.
- They allowed for continued interactions with customers during the pandemic and will likely continue to do so in the future.

Both customers and assessors we surveyed cited convenience as a benefit of remote assessments. Experts also mentioned how engaged customers are in remote assessments; this high engagement made it easier for the assessors to educate customers on energy use in their homes and explain the importance of implementing recommendations. In our survey of Tennessee Valley Authority (TVA) customers, those who had a remote assessment rated "engagement in the process" significantly higher than those who had an in-person assessment. Finally, the potential for increased program cost effectiveness, highlighted several times by experts, makes remote assessments an attractive option even when social distancing is not necessary.

Remote Assessment Customers Are Satisfied and Engaged, and They Follow Through with Recommendations

We examined customer satisfaction data provided by seven remote energy assessment providers, in addition to conducting our own independent survey of nearly 350 assessment recipients. Overall, customers loved the remote assessment programs, with a pooled average satisfaction rating of 90% across programs that sent us data. Across two programs that asked the question, 81% of customers said they would recommend it to others.

SATISFACTION

Customer satisfaction data we collected from TVA customers shows that assessment recipients enjoyed the remote programs, finding them convenient, easy, and helpful. They rated the assessors as courteous and professional. Assessors worked with customers to find a time best suited for them to complete the assessment, and they often were flexible in terms of going where the customer wanted to go in the home or discussing problems the customer wanted to focus on while still providing structure and guidance to the assessment.

They also reported that the assessment addressed most, if not all, of their concerns, and that they learned a great deal about their homes. That said, there is still some room for improvement. Assessors could sometimes pay closer attention to the pre-assessment forms they provide to homeowners (e.g., verifying the information before beginning the session), and they could personalize the home assessment to the customer more (reducing the amount of generic advice).

In the TVA data we collected, we found high overall customer satisfaction with remote assessments (rated an average of 6.34 out of 7). In open-ended questions, customers stated that they appreciated the friendliness, professionalism, and thoroughness of the assessor, as well as how the assessor identified potential improvements to the home.

Notably, however, customers who received remote assessments rated them slightly (but significantly) lower in overall satisfaction than those who received in-person assessments (rated 6.54 out of 7). This difference may be due to a self-selection bias: all the homeowners who did in-person assessments *wanted* in-person assessments, but many homeowners who

did remote assessments may have been forced to do them remotely (or forego doing them at all) because of the pandemic. Indeed, when we focused only on the period after COVID-19 restrictions began to ease in most of the United States (i.e., when vaccines became widely available), this difference in satisfaction was reduced slightly (moving from being statistically significant to borderline significant), suggesting that perhaps when customers could more freely choose the type of assessment they preferred, the difference in satisfaction could be attenuated. However, this sub-analysis had a small sample size and should be confirmed with a larger analysis. Moreover, this slight difference did not result in less follow through by participants or a reduced likelihood of recommending the assessment to others.[5]

Customer engagement, including walking through the house and participating in the assessment as it progressed (as rated along a seven-point scale), was significantly higher in the remote than in-person assessments. When engagement and participation are required by the process of assessment, customers really do engage more. Decades of research into human behavior have shown that engagement is often a precursor to action and following through with recommendations (e.g., Gonzales, Aronson, and Costanzo 1988).

For the customer satisfaction data provided to us from "full" programs (pre-meeting questionnaire, video walkthrough, and post-assessment report), a small number of customers reported that the assessor could improve the process by paying closer attention to the pre-assessment form so that they were not asking for information already provided, and that the assessment suffered in areas of the home with weak Wi-Fi. A few also noted that the assessment might benefit from more visual tools (such as online video tutorials or screen sharing capabilities).

For the customer satisfaction data provided to us from "form-based" programs (customers received online forms for self-assessment, sometimes with survey or follow-up options via phone call), participants most often suggested improving the post-assessment report by clarifying information, providing more details, or making sure that the information is accurate and correct.[6] They also suggested getting the website or online form to run better, or clarifying how to use it, as well as making the report more personal and less generic.

[5] Another possible explanation for the slightly higher self-reported satisfaction with in-person assessments may be an increased "social desirability bias" (Fisher 1993). That is, respondents felt an increased social pressure to rate the assessment highly because they met the assessor in person. We have no data that could test this idea, but it is a common phenomenon in similar types of research.

[6] In some cases, homeowners made statements such as "recommendations did not apply to my home." We are not entirely sure why this happens, but we believe it could be a mix of the algorithm not correctly producing recommendations (or not requesting all the needed data) and the homeowner not providing the necessary or correct information.

Finally, some customers mentioned that the energy kit they received by mail was either insufficient or not very good (a problem that occurs with in-person and "full" remote assessments, but occurs slightly more often with "form-based" programs). This information came from one "form-based" program, designed to have customers complete an online survey and then provide them with an energy kit if they are eligible. Listening to customer feedback and improving the energy kits sent to each home may help increase the chances that the homeowner will subsequently install those items. Further tailoring the kits based on the information the homeowner provides can also encourage item installation.

FOLLOW-UP ACTIONS

Customers who receive remote assessments usually conduct follow-up actions. In both our own survey and those we received from assessment providers, we found that customers tended to install free items and paid upgrades at similar rates for in-person and remote assessments. Although rates of installation of free items did not generally differ statistically between remote and in-person assessments, we did notice a borderline significant trend by age of customers. Younger customers trended toward doing more installations after remote assessments than in-person assessments, as we describe in the next section.

The most common reasons for not installing a product were not needing the product, not liking the product, or not finding the product convenient to install. Given that self-reported confidence and understanding of the installation process were relatively high for all respondents, it is unlikely that these factors would explain choosing not to install free items. Possibly, in-person assessments have a slight advantage in installation of free items because assessors can eliminate issues by asking the homeowners what free items they would like and then directly installing those items.

Many customers report "planning" to move forward with recommendations, but getting them to actually follow through on measures other than free upgrades is difficult. Even in programs where customers give very high ratings, the rates of purchase and installation are low (as is often the case for in-person assessments). However, one "form-based" program, designed mainly to deliver free upgrades to homeowners, still found that two-thirds of customers also paid for additional upgrades (an average of 1.4 additional home upgrades: usually air sealing, insulation, or windows).

The Best (and Worst) Candidates for Remote Energy Assessments

Effectively targeting remote assessments to the right customers can go a long way to determining customer satisfaction and follow through. We analyzed our customer survey by demographic subgroup (table 1 below provides a summary of all key findings) and found that one demographic characteristic was particularly important: age. Younger customers (30–34 years old) who had remote assessments were slightly more satisfied with them than

those who had in-person assessments.[7] Older customers, especially those aged 65–74 years old, rated satisfaction with their remote assessments significantly lower than their in-person assessments. This may be partly because older customers were more likely to report technical problems. These trends are shown below in figure 1.

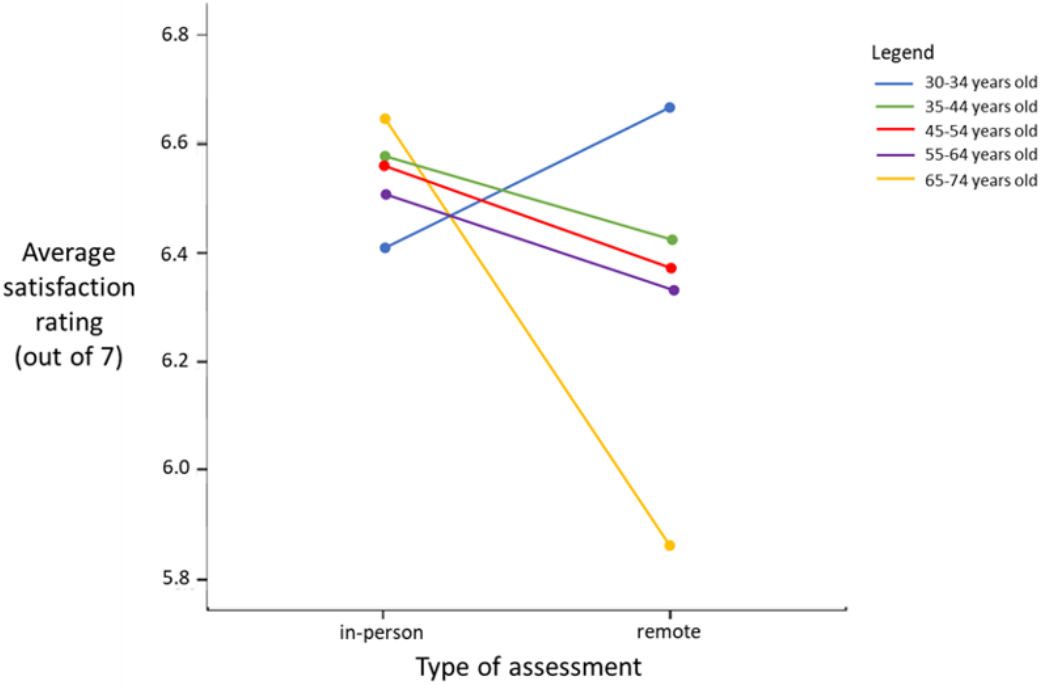

Figure 1. Average rating of overall satisfaction (out of 7), by assessment type and age group

All but the oldest and youngest customers installed a higher percentage of free items after receiving remote assessments than in-person assessments. We found a borderline significant trend in which customers aged 65 years or older installed a smaller percentage of the free items they received if they had remote assessments. The youngest customers also installed a smaller percentage of free items; this was an unusual diversion from the general trend of results, which may stem from a combination of the small sample size of this age group and/or the fact that younger people have already installed items like efficient light bulbs. Once again, however, the oldest participants appear to be poor candidates for remote assessments.

Similarly, we observed a pattern of follow-up actions in which the youngest age groups purchased the highest percentage of recommended measures after remote assessments

[7] We removed homeowners under 30 years old and over 74 years old from the analysis because both groups were too small to draw meaningful conclusions.

(relative to in-person assessments), and the oldest age group (65–74) purchased the smallest percentage of recommended measures after remote assessments (relative to in-person assessments). Although not significant, this trend falls in line with the overall finding that the oldest customers tend to prefer in-person assessments, tend to install a higher percentage of free items after in-person assessments, and tend to purchase more upgrades after in-person assessments (income level does not appear to predict these differences). Younger participants, especially those 35 years or younger, show the opposite trend. Remote assessments are a promising method of encouraging home upgrades (and may even be better than in-person assessments for young people), but they are not as effective for customers aged 65 or older.

We did not find that satisfaction with assessments varied as a function of customers' genders, income levels, or education levels. Nevertheless, we had too limited a sample of customers with low income and low educational attainment to make strong conclusions about those groups. We have heard from program managers and implementers that customers in these demographic categories may be more likely to have poor Internet access or older technology (e.g., standard phones rather than smart phones) and, as such, may be poor candidates for remote assessments as well.

We also attempted to examine satisfaction and likelihood of follow-up actions among rural (versus urban) participants. Although there appeared to be a slight (non-significant) trend toward rural participants preferring, and responding more favorably to, in-person assessments than remote assessments, this was likely because rural respondents were also generally older and/or lacked adequate Internet access. Moreover, the small sample number of remote rural assessments in our sample made this analysis inconclusive. Future research should examine this question in more depth.

Table 1. Summary of key findings in our customer satisfaction survey with TVA customers

Hypotheses	Findings
Customers rate satisfaction slightly higher after in-person assessments (6.54 out of 7) than remote assessments (6.34 out of 7).	Supported; Statistically significant, $p < .05$ (but may be partly explained by self-selection or social desirability bias)
Customers aged 30–34 years were more satisfied with remote assessments than in-person assessments, and customers aged 65–74 were more satisfied with in-person than remote assessments.	Supported; Statistically significant, $p < .05$
Customers participated more during remote assessments than in-person assessments (self-rated along seven-point scale).	Supported; Statistically significant, $p < .05$
Customers aged 65 years or older installed a smaller percentage of free items they received after remote assessments than in-person assessments, and customers aged 35–64 installed a higher percentage of free items after remote assessments than in-person assessments.	Somewhat supported; Trended toward significance and should be confirmed with a larger sample, $p = .06$

Hypotheses	Findings
Homeowners in each age group under 65 years old purchased a higher percentage of recommended measures after remote assessments (relative to in-person assessments), and the oldest age group (65–74) purchased the smallest percentage of recommended measures after remote assessments (relative to in-person assessments).	Somewhat supported; Not significant, p > .05, but matches pattern of other data
Willingness to recommend the assessment to others differed between remote and in-person assessments.	Not supported; Not significant, p > .05
Rates of installation of free items varied between remote and in-person assessments.	Not supported; Not significant, p > .05
Rates of purchase of recommended measures varied between remote and in-person assessments.	Not supported: Not significant, p > .05
Customer satisfaction varied as a function of gender, income level, or education level.	Not supported: Not significant, all p > .05 (however, low-income and low-education groups were underrepresented in our sample)
Satisfaction with remote assessment differs between urban and rural participants.	Not supported; Not significant, p > .05

Improving Remote Assessments with Behavioral Science Insights

Based on our extensive review of behavioral science research, as well as observations of remote assessments in progress, we have seven basic suggestions for assessors conducting remote assessments. In Appendix B and our tip sheet for contractors (available on the ACEEE website), we provide detailed descriptions of each of these insights and examples of how assessors used them in the assessments we observed. We encourage assessors to consider how they might integrate these insights into their assessments. The use of "soft skills" can increase the likelihood that customers will follow through with assessor recommendations.

- Empathize and develop rapport with the customer. Asking many questions and complimenting the customer (e.g., for energy upgrades they have already done or for their work on the assessment process itself) can also help.
- Engage the customer in the assessment as much as possible, creating a sense of ownership in the process and potentially encouraging a tacit commitment after the assessment. If the opportunity emerges, consider giving something for free, or using the foot-in-the-door or door-in-the-face techniques (explained in Appendix B in more detail).

- Make the assessments as convenient as possible, both for assessors and customers. Consider scheduling issues and adeptness with technology.
- Provide explanations for what to do and why to do it, using vivid language (e.g., metaphors) to help the customer gain a deep and full understanding of their energy waste.
- Personalize the assessment and suggestions to what the customer has in the home and may be interested in, as opposed to offering generic advice that could be applied to any home.

Disadvantages of Remote Assessments

Despite their many advantages and potential to educate new customers about energy efficiency, there are some features of in-person assessments that current remote assessments simply cannot replicate. Perhaps most important is that they cannot include certain tests that require special equipment, especially blower door testing, combustion safety testing, and thermal imaging (Ray 2020; BPA 2020; Corvidae 2020; Leslie et al. 2012). However, in interviews we conducted, program administrators told us that experienced assessors could effectively assess most homes even without these tests. Moreover, providing necessary equipment to the homeowner ahead of time can also help[8] (Corvidae 2020). It is important to always explain that measures obtained remotely may lack the specificity of those gathered by an expert in person (Avina and Rottmayer 2016). Thus, in-person follow-up assessments could be recommended in appropriate situations. In the future, some of these tests could perhaps be compensated for with creative new approaches such as drone thermal imaging or lower cost indoor air quality sensors.

Remote assessments are heavily reliant on access to a smart phone or tablet, as well as good Internet connectivity throughout the entire house (including around the outside, in some cases), which could be a problem for some homeowners (Corvidae 2020). The remote format also requires the homeowner to be able to move around the house according to the guidance of the assessor, which may be difficult for homeowners with mobility issues (Corvidae 2020). For these reasons, remote assessments may never be able to fully replace physical assessments and may instead be recommended as a preliminary or supplementary option (BPA 2020). More research is needed into these potential problems and solutions, especially regarding issues of specific in-person tests and measurement accuracy.

[8] One program implementer we interviewed said video equipment (e.g., iPads) was sometimes sent to customers beforehand and then assessors talked with customers via the equipment.

How Can Remote Assessments Augment and Complement Traditional Assessment Programs?

A few programs we looked at have already started working on ways to mix in-person and remote assessments and create hybrid programs (e.g., Xcel Energy and CenterPoint Energy's Home Energy Squad administered by CEE).[9] Specifically, the remote assessment is used to determine which upgrades would offer the greatest energy efficiency improvements, and the in-person assessment can be used to confirm the information previously gathered, focus on the most pressing problems, and install any necessary measures the customer may need to help save energy. Combining the two approaches could lead to increased program cost effectiveness, as the overall process could run more efficiently, while potentially reaching more customers and better ensuring that they follow through with recommendations and installations. The customer survey data we received for one of the hybrid programs are promising, although more research is needed. At the very least, remote inspections and assessments can be used as a screening tool to identify and diagnose many issues, helping expedite the homeowner's referral to the appropriate contractor.

PROGRAM IMPLEMENTER, CONTRACTOR, AND ADMINISTRATOR PERSPECTIVES ON REMOTE ASSESSMENTS: LACK OF CONTRACTOR PUSHBACK

Most assessors were amenable to switching from in-person to remote assessments, possibly because the program implementers had tried to work with them in advance to make the transition to remote assessments as smooth as possible. Those assessors who were reluctant to work remotely argued that they needed to be on site to do a proper assessment (e.g., perform blower door test), and they thought (perhaps erroneously) that remote assessments would increase time spent on each customer, affecting their quoted prices and deadlines. Nevertheless, experienced assessors said they could assess most homes without these tests.

One program administrator pointed out to us that some contractors are perhaps being asked to do too much, having to be good at both the technical piece (e.g., gather scoping data, take pictures of items) and at sales and marketing. At least one program we are aware of, therefore, tries to better manage the work asked of contractors by focusing on convincing the customers to improve the home and leaving the contractors to install the suggested improvements. Specifically, this program collects home information to create a tailored report and project proposal for upgrading the home. After going through the proposal with the customer and receiving approval to move forward, the program works with local contractors to confirm the information remotely and in person, and then move

[9] For example, see www.mncee.org/home-energy-squad.

forward with the project. The program handles the interactions with the customers, allowing the contractors to focus on installing the upgrades.

Conclusion

Remote assessments allowed contractors and assessors to continue working during the COVID-19 pandemic, even when they could not enter customers' homes. Given that remote assessments are likely to persist regardless of the status of COVID-19, we offer recommendations on exactly how to target offerings to customers who will benefit most, as well as suggestions for how assessors can improve their "soft skills" using behavioral science (to close more sales). This is helpful for both energy contractors who want to increase profits and program administrators who want to address climate change. It is a win-win.

We find that remote assessments are necessary to expand the reach of energy efficiency; they are effective, useful for encouraging energy upgrades, and liked by customers. Remote assessments should continue to be offered as an optional tool for customers. Certainly, many customers will prefer in-person assessments, but younger tech-savvy customers could get many of the same benefits from remote assessments, with increased convenience and engagement (and possibly even higher conversion rates). Some assessment program implementers have also found success with a hybrid model in which remote assessments precede in-person assessments, usually as a screening tool. Remote assessments can help promote energy efficiency upgrading among homeowners, and with the application of a few strategies from behavioral science, they can maximize effectiveness.

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Appendix A. Additional Data on Customer Surveys and Interviews

DATA COLLECTED BY EXTERNAL SERVICE PROVIDERS: POOLED RESULTS

We received raw data from customer surveys and interviews from seven programs, totaling 761 participants. These were surveys conducted by the organizations providing the assessments, not by ACEEE directly. Four of the programs were full remote energy assessments with a pre-meeting questionnaire, video walkthrough, and post-assessment report. The other three programs had online forms for self-assessment, sometimes with survey or follow-up options via phone call; we refer to such programs as "form-based" programs because they were primarily conducted by the customer completing online forms (with guidance). One of the "full" assessment programs included both a remote and in-person assessment piece for most customers, with a small number receiving only a remote assessment. All programs provided a post-assessment report.

Given that these data were provided by the organizations that offer the service, we cannot strictly verify the validity of the results. In addition, the sample sizes vary dramatically between organizations, with half of the programs surveying only five people. Combined with only four of the programs being "full" assessment programs, we are hesitant to draw strong conclusions. However, there are still several important results from the data that should be taken under consideration, and we also supplemented these with our own independent customer survey.

Regarding customer complaints about these programs, some could have been avoided with an in-person assessment. For example, some customers stated that the assessment was impersonal or generic, or that they experienced technology issues or overall frustration with the process. However, for both the "full" and "form-based" programs, tech issues appeared not to cause serious disruption to the assessments overall. Only a small number of people reported technical difficulties as a significant barrier that prevented them from doing the assessment.

A few customers also made comments about explicitly preferring an in-person assessment, or at least desiring a "live" person to follow up, although these complaints were uncommon compared to how much customers said they liked the programs. This suggests that remote assessments should not replace in-person replacements but instead should be presented as an alternative for those who want it.

Customer Learning

Three programs asked customers whether they learned anything from the assessment. In general, scores were high, albeit with significant room for improvement for both "full" and "form-based" assessments. Across full programs, customers rated their degree of learning from the assessment as 72 out of 100. This was similar for form-based programs; however,

we were not able to calculate an exact percentage because some questions were rated along a scale with multiple points and others were "Yes/No." When one form-based program asked about specific learning outcomes, it revealed that most customers did not retain what they learned, although it only surveyed a small number of customers.

Usefulness

Three programs asked if the assessment addressed the customers' concerns, and they found this to be almost universally true (98% said yes, concerns were addressed). Two programs, both full, asked about the report that was generated after the assessment. One program's customers rated it as highly valuable (4.33 out of 5), but only five people were interviewed. The other found that customers most appreciated how it helped them understand the information better while acting as a reference to clarify next steps.

Assessor

Customers generally liked the assessors when they interacted with them. Customers of one full program unanimously agreed that the energy assessor was courteous and professional, although again, only five people were interviewed. Two form-based programs offered energy assessors for consultation if the customer wanted to speak to someone; the assessors were generally rated as highly knowledgeable, available, and helpful.

Comparison to In-Person Assessments

One full program gave remote assessments followed by in-person assessments for most customers, but also gave remote-only assessments to a few customers. Remote-only assessments may have been slightly less effective in this group. The customers who received the remote and in-person assessment rated the remote piece as very useful. However, comparing the remote and in-person assessment to the remote-only assessment of the program, we found satisfaction, likelihood of following through on recommendations, and confidence in the recommendations all to be slightly lower in the remote-only group than in the group that had both types of assessment. However, this was based on a small number of remote-only customers and at a time when in-person was most likely not possible (or was dangerous due to COVID-19). Therefore, the customers might have had to do a remote assessment when they otherwise would have preferred an in-person assessment. In other words, the results may be skewed due to selection bias rather than due to problems with the program.

OUR OWN INDEPENDENT SURVEY: TVA DATA RESULTS

We surveyed 343 customers from TVA, 227 of whom received an in-person assessment, and 116 of whom received a remote assessment. Of these, 64 customers reported having prior experience with an in-person assessment at some point before their remote assessment, and of those participants, the majority said they preferred in-person to remote assessments when asked.

Overall Customer Experience

Most participants rated their overall experience of the assessment positively. Of the remote participants (116 in total), very few rated their experience with the video platform negatively, with the overwhelming majority ranking it positively. Similarly, most remote assessment participants had few to no technology-related issues, and those that did had only minor issues that did not affect the assessment.

Participants who had a remote assessment rated their overall experience with the process slightly (but statistically significantly) lower than those who had an in-person assessment (6.34 versus 6.54 out of 7), $t(341) = 2.11$, $p = .04$, $d = -0.27$. We thought this difference might in part be due to customers being required to have a remote assessment when they might have preferred an in-person assessment, so we examined overall experience again, but only for assessments that had been conducted when customers had a choice (that is, when COVID-19 vaccines were made universally available), resulting in 142 in-person and 31 remote participants. We found the same trend, that those who had remote assessments tended to rate their overall experience lower, but the difference was only borderline significant, $t(171) = 1.93$, $p = .06$, $d = -0.40$, perhaps because there were fewer participants included in the analysis, or perhaps because the self-selection bias was reduced, as participants may have opted to do remote assessments because they preferred that option, rather than because they had to.

Likelihood of Recommending the Assessment

Participants who had remote assessments did not differ significantly in the likelihood that they would recommend the process to others, relative to those who had in-person assessments (6.11 versus 6.18 out of 7), $t(341) = 0.36$, $p = .72$, $d = –0.05$.

Customer Participation and Involvement

On average, customers who had remote assessments rated their involvement in the process significantly higher (6.17 out of 7) than those who had in-person assessments (5.74 out of 7), $t(341) = –2.41$, $p = .02$, $d = 0.28$.

Follow-Up Actions for Remote Versus In-Person Assessments

We asked both in-person and remote assessment recipients which free items they received after their assessments and how many of those free items they installed. We used these responses to calculate a percentage of installed (versus received) items for each customer. In-person and remote assessment recipients did not differ significantly in their percentage of free items installed (77% versus 73%, respectively), $t(243) = –0.624$, $p = .53$, $d = 0.08$.

Similarly, we asked both in-person and remote assessment recipients which paid upgrade recommendations they received, and how many of those paid upgrades they adopted. The percentage of upgrades purchased (versus recommended) did not differ significantly between remote and in-person assessment recipients (50% versus 44%, respectively), $t(296) = –1.23$, $p = .22$, $d = 0.15$.

The Best Customers for Remote Assessments

We looked at several demographic sub-groups to learn if age, gender, income, or education were related to satisfaction with the assessment or likelihood of following through with recommendations. Each of these demographic sub-groups was examined for differences between remote and in-person assessments using a two-way ANOVA.

Age

Older customers, particularly those 65 to 74 years old, rated overall satisfaction statistically significantly higher when they received in-person assessments than when they received remote assessments, $F(4, 282) = 2.85$, $p = .02$, $\eta_p^2 = .04$. Those who were younger than 35 years old expressed slightly higher satisfaction with remote assessments than in-person assessments.[10] Customers between 35 and 64 generally expressed slightly higher satisfaction when they received an in-person assessment than when they received a remote assessment.

One reason that older customers participating in remote assessments may have been less satisfied could be that they experienced more technology problems. Indeed, our analyses show that, although only a small number of customers reported experiencing technology problems that seriously disrupted the assessment, all of them were among customers 55 years or older, as shown in figure 2 below.

[10] We removed customers under 30 years old and over 74 years old from the analysis because those groups did not have enough customers.

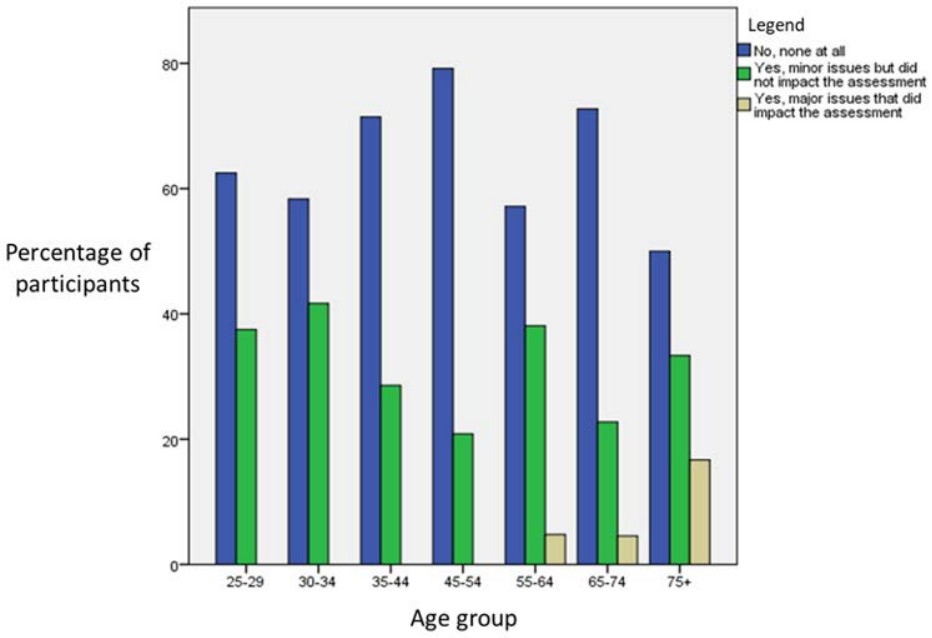

Figure 2. Percentage of participants experiencing technical issues in remote assessments, split by age group and number of technical issues.

The difference in satisfaction with remote (versus in-person) assessments was echoed, for the most part, in a borderline significant parallel pattern in installation of free energy upgrades, $F(4, 197) = 2.32$, $p = .06$, $\eta_p^2 = .05$. As shown in figure 3 below, older customers who received remote assessments installed a smaller percentage of the free items they received than they would have if they had in-person assessments, while all but the youngest customers installed a higher percentage of free items after receiving a remote assessment.[11]

Strangely, the youngest homeowners (30–34 years old) installed a smaller percentage of items from the remote assessment compared to the in-person assessment, a similar trend to that of 65–74-year-olds. However, the reason that they behaved this way is likely not because of technical difficulties. Instead, we believe this trend could be explained by a combination of two things: a small sample size of the participants who were 30–34 years old, had a remote assessment, and installed fewer than half the free items they received; and younger customers tending to already have items like efficient light bulbs installed in their homes.

[11] To remain consistent with the previous analysis, we dropped customers under age 30 and above age 74 from the analysis. Nevertheless, the 30–34 age group was also small for the remote assessment group in this analysis ($n = 8$), and this could have contributed to the borderline (rather than significant) result.

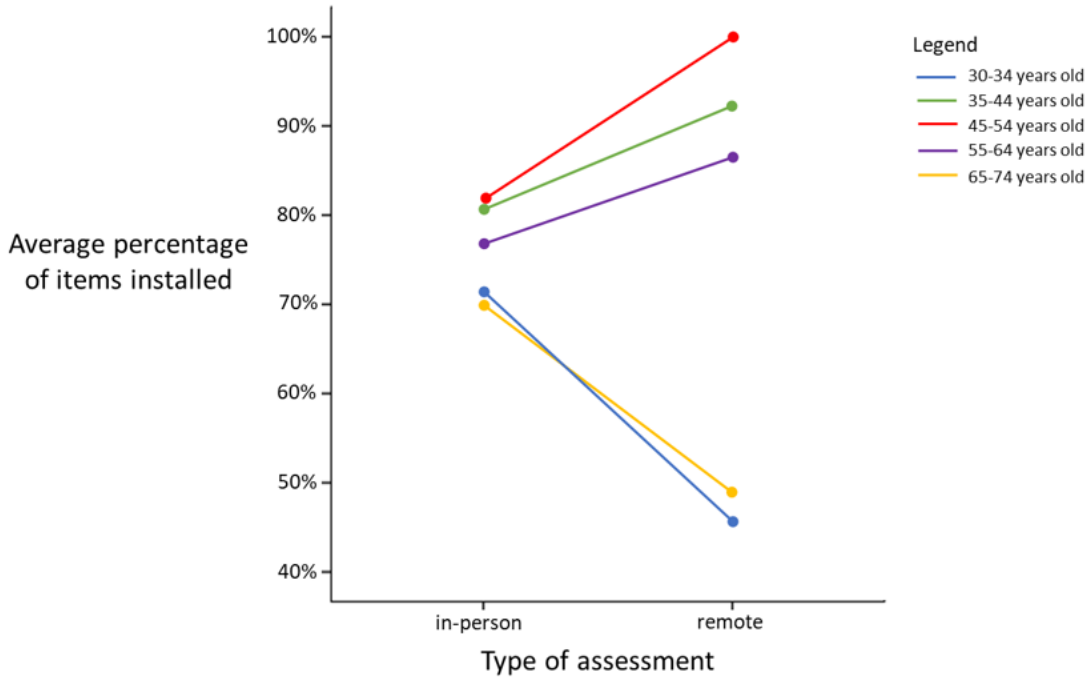

Figure 3. Average percentage of free items received and subsequently installed, split by type of assessment type and age group.

The percentage of recommended measures purchased by homeowners followed a similar pattern as that of installing free items (see figure 4 below). The oldest age group (65–74) purchased a smaller percentage of recommended measures after receiving remote assessments (as compared to in-person assessments), and the other age groups (especially the youngest groups, 30–44), purchased a higher percentage of recommended measures after receiving remote energy assessments (as compared to in-person assessments). While there was no statistically significant difference, this general trend matches that of other analyses above, $F(4, 244) = 0.91$, $p = .46$, $\eta_p^2 = .02$.[12]

[12] To remain consistent with the previous analysis, we dropped customers under age 30 and above age 74 from the analysis.

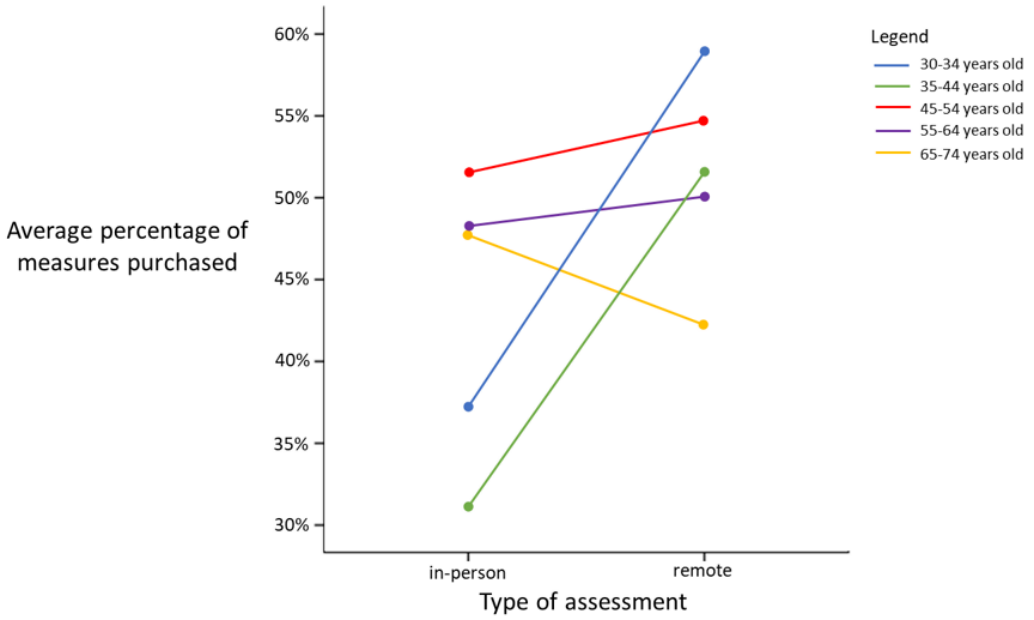

Figure 4. Average percentage of recommended measures purchased and subsequently installed, split by type of assessment type and age group.

Gender, Education, and Income

There were no statistically significant differences between customers of different genders, income levels, or education levels in terms of overall satisfaction (all $p > .05$). Across demographic groups, customers generally rated in-person assessments slightly higher, but there were no significant interaction effects with demographic variables. That is, both males and females significantly preferred in-person assessments. Customers with different income and education levels generally rated in-person assessments slightly but non-significantly higher than remote assessments. However, unlike age groups, there were no statistically significant differences in satisfaction ratings among income levels or education levels.

Appendix B. Behavioral Science Insights and Direct Observation of Assessments in Progress

In this section, we present the results of an extensive literature review on evidence-based behavioral science strategies for encouraging customers to act, as well as describing when and how these strategies are used in the field by assessors we observed in action.

Remote energy assessments provide a unique opportunity to leverage behavioral science to make assessments more impactful. As we have described in previous reports (Sussman and Chikumbo 2017; Sussman, Chikumbo, and Miller 2019), behavioral insights can be applied to in-person assessments and assessment reports to maximize the likelihood that customers will follow through with recommendations; some of these can also be carried over to remote assessments. Indeed, a few behavioral science techniques may be easier to apply in remote assessment situations than in person. The techniques discussed here can be applied both in person and remotely.

In the remote assessments we shadowed (with a select number of highly trained and experienced experts), assessors naturally engaged in several actions to maximize the likelihood that customers would follow through on their recommendations. We describe them below as "behavioral insights in action" observations. Most commonly, we found that assessors developed rapport by ensuring customers were comfortable, provided personalized energy-saving tips, and explained not just what to do but also why to do it. Some assessors made use of vivid language to convey the magnitude of what they were saying, but this strategy was employed less often. Most assessors did a good job of integrating at least some of these recommendations into their assessments, but most could nevertheless improve further.

ENGAGEMENT AND ACTIVE PARTICIPATION

Perhaps the most important advantage of remote assessments over in-person assessments is the ability to actively require the customer to participate in the assessment. Our customer survey showed that those who received a remote assessment engaged significantly more in the assessment process than those who received an in-person assessment. Research reports and interviews with program administrators and contractors suggests that this is because active participation with in-person assessments is optional, whereas it is required for a remote assessment. Certainly, we recommend active engagement for in-person assessments (Sussman and Chikumbo 2017; Sussman, Chikumbo, and Miller 2019), but it must necessarily be part of any remote assessment.

Studies have shown that the more visceral an experience is for someone, the greater an impact it has on them. Engaging customers in the assessment process can promote experiential processing or learning. This method of learning is particularly helpful for more abstract concepts when the customer must exert significant mental effort to process the information (Myers et al. 2012). Directly experiencing and engaging with the assessment can

help customers better understand the information they are receiving and increase the chances that they follow through with the provided recommendations.

An actively engaged customer provides opportunities for the assessor to apply additional behavioral science-based strategies such as the "foot-in-the-door" technique or the "door-in-the-face" technique, or by soliciting a commitment to follow through or leveraging the reciprocity norm (the natural urge to reciprocate when someone does a favor, provides a service, or gives an item for free).

Behavioral Insights in Action: Engagement and Active Participation by Assessors

As part of the assessment process, customers receive feedback and advice in real time, which increases the engagement compared to receiving everything at the end when the assessor goes over the report with them. Assessors also often ask for pictures of certain parts of furnaces or appliances, which sometimes requires the customer to look for the information and gives the assessor time to explain what the information is for or what is happening in the system. In the ride-alongs we viewed, customers frequently reached out and touched the weatherstripping of doors while the assessor described why it was important to make sure they are properly weatherized and sealed. In one assessment we shadowed, the customer put a hand on the air duct where dust builds up if air is leaking, as the assessor explained what was happening. The same customer also fixed the dryer vent flaps so they were closed instead of opened when the assessor was discussing potential holes into and out of the home where air could escape, and later touched the hot and cold pipes of the water heater (which had not been used in some time) while the assessor explained how the system worked.

Foot-in-the-Door

This strategy involves asking a customer to engage in a small behavior before later making the actual target request. Asking for an initial small request increases the likelihood of a larger request being granted (Freedman and Fraser 1966). To some degree, simply proceeding with the assessment is an example of fulfilling a small request, which naturally makes follow through more likely. However, the foot-in-the-door technique can be further leveraged during an assessment by "leveling up" requests throughout the assessment rather than going straight to the large-scale recommendations at the end of the session. For example, the assessor may start the assessment in a location of the home that typically requires small inexpensive upgrades, such as lighting or pipe insulation, perhaps explaining that they will be sent to the homeowner for free after the assessment. After getting buy-in on installing those upgrades, the assessor could move on to slightly larger or more expensive items. This strategy works by capitalizing on the natural inclination of most people to want to act consistently and avoid performing inconsistent actions (what behavioral scientists refer to as cognitive dissonance) (Kantola, Syme, and Campbell 1984).

Door-in-the-Face

This strategy inverts the foot-in-the-door technique by initially introducing a large expensive home upgrade that is very unlikely to be installed, followed by a more modest (target) home upgrade that then seems affordable in comparison. In what behavioral scientists call the "anchoring and adjustment heuristic," the first (big) option presented to people sets a mental "anchor" against which future (smaller) options are measured and, by comparison, seem more appealing (Tversky and Kahneman 1974). Anchoring is familiar from contexts that involve negotiation: A salesman might suggest a price for a car that the customer then negotiates down from; the customer perceives a "win" even if the price is still fairly high. The door-in-the-face technique may be preferred to the foot-in-the-door technique if upgrade recommendations do not naturally increase in small steps, as required by the foot-in-the-door strategy. Instead of progressing from discussing free items (e.g., installing a free LED bulb) to a larger upgrade (e.g., shifting to a heat pump), it may be better to start with a very big action—which is unlikely to happen (e.g., replacing the furnace and AC)—and then scaling back to the more modest item (e.g., shifting to a heat pump).

Public Commitment

Soliciting a commitment from a customer during an assessment makes it more likely that the customer will later follow through with the recommendation they committed to. Residents who make public commitments to save energy, for example, are more likely to reduce consumption than those who are not asked to make a commitment (Pallak and Cummings 1976). This does not necessarily mean that the assessor should ask a customer to commit to every action as it is recommended, but by ensuring that the customer understands the importance of each action, they may naturally be inclined to agree that they should follow through. This agreement is a sort of tacit commitment—one that can sometimes be strengthened through questions such as "do you see why this might be important to deal with?" This sort of "buy-in" can also be used as a step in the foot-in-the-door strategy.

Behavioral Insights in Action: Foot in the Door, Door in the Face, and Soliciting Commitment

A few assessors naturally employed the foot-in-the-door and soliciting-commitment techniques. In an example of the foot-in-the-door strategy, one assessor went over the recommendations by first explaining the free items the customer could receive (in this case, lightbulbs and faucet aerators), then stated that those items probably would not make much difference in terms of energy savings and what they have seen of the house, and instead suggested that the customer focus on the bigger items like the fridge and dishwasher. Another assessor started by providing several smaller, easy to implement suggestions, then recommended insulating a bedroom wall to make the room more comfortable.

In an example of soliciting commitment, one assessor encouraged the installation of LED bulbs. The assessor started by explaining the benefits of LEDs, and then moved to asking if the customer wanted them and would install them. Only after this commitment was made

did the assessor process the request for bulbs. By doing so, the assessor maximized the likelihood that the bulbs would be installed when they arrived.

EMPATHY AND RAPPORT

Showing empathy and building rapport increases the persuasiveness and effectiveness of salespeople (McBane 1995; Nguyen et al. 2019). By listening, being patient, polite, and respectful, and making sure the customer feels comfortable, energy assessors can better persuade customers to take steps to reduce energy consumption in their homes. This may be easier in person than remotely but can be done in either situation. Therapists, doctors, and other healthcare workers stress the importance of establishing rapport partly for the same reason—it makes the patient more likely to act on their recommendations (Leach 2005).

Behavioral Insights in Action: Empathy and Rapport by Assessors

In all the assessments we viewed, the assessor politely and patiently explained things to the customer and answered any questions or concerns. In one ride-along we shadowed, the energy assessor greeted the customer, thanked them for joining the video chat, and asked them how to pronounce their name (the assessor stressed the importance of getting the customer's name right). The assessor also sympathized with the customer about the pandemic by explaining that there might be some background noises from their children attending virtual school. Another addressed several concerns the customer had about being required to install the free items they would receive. The assessor calmly and patiently explained that the customer would not be required to do anything involuntarily, that the assessment was about creating a plan to help them achieve savings down the line. The assessor answered all the homeowner's questions, and the homeowner was noticeably happier and more engaged in the process after the assessor explained the program to them.

COMPLIMENTS

Customers want to feel like their home is wonderful and they are great people (don't we all). Not surprisingly, people who receive compliments are subsequently more likely to comply with a request (Grant, Fabrigar, and Lim 2010). Thus, assessors may be more successful in soliciting follow through if they compliment customers on efficient aspects of their homes (or even non-efficiency-related attributes such as saying "you have a beautiful home"), as well as their personal actions (e.g., "good job preparing for this session" or "good question"). Customers often like showing off the actions they have already taken to improve the efficiency of their homes. Assessors should avoid downplaying those steps and instead acknowledge and praise them, as this builds the customers' confidence and self-esteem. It also provides a form of positive reinforcement (Skinner 1953), which makes the homeowner more likely to perform those energy-saving actions again (i.e., perform more energy upgrades).

Behavioral Insights in Action: Compliments by Assessors

During one assessment, whenever the home tour went to a new area of the home, the homeowner made a point of explaining the various energy upgrades that were already made in that place. The assessor politely complimented the homeowner on all the progress made on the home so far and acknowledged those efforts. This helped develop rapport and generally put the homeowner in a good mood. The homeowner later reported liking the assessor, and this could have been part of the reason.

PERSONALIZATION

Studies have shown that tailoring energy upgrade suggestions to the intended recipient increases effectiveness (e.g., Boomsma et al. 2016). If the customer has previously completed a questionnaire outlining concerns about the home's energy use, the assessor should tailor the evaluation accordingly; this makes it more likely that the customer will follow through with what the energy assessor recommends (Sussman, Chikumbo, and Miller 2019). In addition, collecting additional data such as utility bill and weather data or home geometry data gathered using software tools can help the assessor further personalize the assessment and subsequent recommendations to the homeowner. Similarly, tailoring the energy kit sent to the home can further ensure that those items are subsequently installed. Conversely, generic recommendations that are general and broadly applicable to all homes may engender a feeling that the assessor did not listen to the customer's concerns and perhaps is too lazy or uncaring to explain how it relates to the customer's home. These types of generic suggestions also leave the customer unsure of exactly what next steps should be taken.

Behavioral Insights in Action: Personalization by Assessors

Several program implementers mentioned discussing with the customer—at the beginning of the walkthrough—what the customer is most interested in accomplishing during the assessment, and this was reflected in the assessments we shadowed. In addition, during each of the assessments, the energy assessor rarely gave information that was not relevant to what was discussed with the customer. All the energy-saving tips and tricks applied to the appliances and systems in the customer's home and were usually given while they were examining the items. During the assessments, a few energy assessors also determined how many bulbs were already LEDs, or whether the customer already had low-flow showerheads or faucet aerators, so that they were not sending the customer items they had no use for.

EXPLANATIONS

Explaining to the customer not only what the energy assessor wants done but also why they should do it may help convince the customer of an upgrade's importance, which may then encourage follow-up action. Previous research has examined the effect of providing a reason for a request on the likelihood that the request will be complied with (Parry 2009; Baranova and Dingemanse 2016). One thought is that having sufficient justification for an action reduces the potential for a homeowner to experience cognitive dissonance, which may increase the likelihood of them complying with the recommendation, even if that recommendation is contrary to their beliefs (Gerard, Conolley, and Wilhelmy 1974). Tailoring

the explanation to the homeowner might also increase compliance with suggested upgrades (Abdulrahman et al. 2019).

Behavioral Insights in Action: Explanations by Assessors

In all the assessments we shadowed, energy assessors took the time to explain why they were asking the customer to do something. Usually this was associated with, for example, why the customer was looking at a particular part of the furnace or getting the serial numbers from a particular appliance (the assessor can look up the appliance and determine age and efficiency information). However, if assessors suggested a way to make something more energy efficient or provided a tip to save energy, they also explained how that recommendation would help the customer save energy. In addition, most of the assessors highlighted the importance of using simpler language, rather than talking in overly technical terms, to provide the explanations to the customer.

VIVID LANGUAGE

Using vivid language can help customers understand the magnitude of their energy issues and visualize elements of energy use that might otherwise be invisible. Information is most impactful when communicated vividly, rather than through dry facts and statistics (Yates and Aronson 1983; Jackson 2005; Borgida and Nisbitt 1977; Fuller et al. 2010). In a previous study in which energy assessors were trained in behavioral insights, assessors who actively engaged homeowners during the assessment, used vivid language, employed message-framing strategies, and elicited some level of commitment to act could also increase their chances of converting an assessment into action (Gonzales, Aronson, and Costanzo 1988). In that study, assessors were trained to use metaphors such as a "naked attic" ("it's as if your home is facing winter not just without an overcoat, but without any clothing at all"), and "if you were to add up all the cracks around and under the doors of your home, you'd have the equivalent of a hole the size of a football in your living room wall… think for a moment about all the heat that would escape from a hole that size."

Remote assessments may also offer a special opportunity for increasing the vividness of the post-assessment report, an opportunity that would be more difficult to replicate after an in-person assessment. Remote sessions, unlike physical assessments, can be easily recorded for later review (Corvidae 2020), and could potentially tag suggestions in a report with relevant video clips from the customer's home assessment. Additionally, augmented reality, an emerging technology, can overlay information on the user's view of the home, and function as an interactive summary of the results (CLEAResult 2020; Leslie et al. 2012). This could provide an additional level of vividness to otherwise less-engaging paper reports, which could potentially help persuade customers to follow through on recommendations.

Behavioral Insights in Action: Vivid Language by Assessors

One assessor described the customer's house as a bubble that can be "popped" by pipes, electric wires, or poorly weatherized doors and windows, which will let air in or out of the house and cause the heating and cooling system to work harder to make up for it. The same

assessor also compared the coils of a fridge to the radiator of a car, describing how both can build up debris, making them run harder and use more energy. This kind of vivid metaphoric language can clarify otherwise ambiguous issues and help convey the urgency of fixing energy problems in the home.

CONVENIENCE

Convenience is a cornerstone of many behavioral interventions and is frequently cited by behavioral insight teams as a primary motivator of behavior change (e.g., Service et al. 2014). Accessibility and convenience lead to participation and behavior change: making things easier makes them more likely to be done (Palmer et al. 2013; Hoicka, Parker, and Andrey 2014; Boucher, Arajúo, and Hewitt 2018; Gamtessa and Guliani 2019). Remote assessments are typically more convenient for customers than in-person assessments, an observation supported by the customer surveys completed for this project.

Assessment providers can maximize the convenience of remote assessments by allowing customers to use the technology platform they are most comfortable with (e.g., Zoom or even a phone if having difficulty with other software). They could also minimize the duration of the assessment and offer assessments during times that are most convenient for the customer. Taking steps like these to increase convenience may reduce barriers to action (e.g., having to take multiple days off work to upgrade a home) and thus make follow through more likely.

Behavioral Insights in Action: Convenience

We learned of several examples of assessors making the assessments as convenient as possible through discussions with them and observations of ride-alongs. One assessor mentioned to us the importance of being flexible and being able to adapt to the customer's mood toward the assessment. Specifically, if the homeowner seems disinterested, the assessor might speed through sections quickly and not take up more of the customer's time than necessary. This assessor did just that, gathering only the most critical information while remaining polite, listening to what the customer said, and trying to make the customer as comfortable as possible.

Assessors generally tried to work with their customers, confirming at the beginning of the sessions that the scheduled meeting was still a good time for them, and working with them to focus on the areas the homeowner was most interested in. Also, if the homeowner was not comfortable going into certain areas of the home, the assessor reassured them that that was okay and worked with them on other areas.

Most of the convenience generated in the remote assessments happened on the back end, outside the ride-alongs themselves. For example, assessors looked up information on the home ahead of time and then confirmed the information with the customer at the beginning of the assessment. They also worked with the customer to find a good time for the assessment and sent out emails and texts in advance to make sure they understood how to access the video platform and what to do if the connection fails, as well as how to contact

the assessor with further questions. Essentially, then, all the customers had to do was click on a link or open the video platform, listen to the assessor guide them through the home, and then go through the report with the assessor. They did not have to leave the house or worry about someone else in their home, the assessment was quick and to the point, and now they simply had to wait for any free items to arrive and a follow-up phone call if one was scheduled.

GIVE SOMETHING TO GET SOMETHING

This strategy involves the assessor providing something to the customer for free (or cheap) to invoke a desire to repay the assessor by following through on recommendations. The so-called "reciprocity norm" explains that most people feel an unconscious drive to repay someone who has given them something or done something for them (Gouldner 1960; Berkowitz 1972; Cialdini 1993). This naturally occurs in some assessment programs because the assessment itself may be a free service that comes with free energy upgrades or rebates upon completion. However, the assessor can also further invoke the reciprocity norm during interactions by explicitly mentioning these benefits early in the process, or by throwing in a "sweetener" such as free gifts, additional personal advice, or answering questions about the home that might normally be presented as "out of scope" for an assessment.

Behavioral Insights in Action: Give Something to Get Something

One assessor stated at the beginning of the assessment that the purpose was to help the customer figure out ways to save energy and money, not to sell anything. The assessor talked through what measures would be free to the customer, promised to discuss rebate options during the assessment, and mentioned some other items available if the home qualifies. Later, the assessor was unable to determine whether the showerhead in one of the bathrooms was an energy-efficient model, and offered to send the customer a new showerhead to replace the current one and make sure the customer has the energy-efficient option.

Appendix C. Detailed Characteristics of Remote Energy Assessments

Remote energy assessment providers gave us an overview of the landscape and basic understanding of remote assessment programs in the United States and Canada. In this section, we describe this basic information and how we acquired it.

METHODOLOGY

In October 2020, we used an ACEEE email blast to solicit program information on any program in the United States offering remote residential energy assessments. Information was collected in an online survey that included five closed-ended questions and four open-ended questions covering topics including program service area, benefits and challenges of remote assessments, and the general assessment process. There were 21 responses to this initial survey.[13] We combined responses to the survey with an Internet search to produce a database of programs available to consumers. Although not exhaustive, this database gave us an idea of the types of programs that are offered.

We then conducted 14 follow-ups to the ACEEE initial survey (seven in-depth interviews and seven responses to open-ended email questions) to learn about the perspectives of people and organizations that administer or implement remote assessment programs. We also conducted four additional interviews with experts who did not submit an initial response. Of all these experts, 4 were utilities, 13 were program administrators, and 1 was an expert in data management and reporting. We coded answers to determine possible themes among responses.

PROGRAMS WE REVIEWED

We reviewed a total of 21 programs. Of these programs, 15 were full remote programs, 5 were form-based remote assessment programs, and 1 was a hybrid of remote and in-person programs. Almost all programs were in the United States, with a few in Canada.

Pre-meeting Questionnaire

Most programs (67%) conduct pre-meeting questionnaires, collecting basic information about the home (such as age and home type) and demographics of the customers. Data on heating and cooling systems, condition of appliances in the home, service type (e.g., electric, gas), and basic energy usage or copies of utility bills are also gathered when possible. Experts worked to set expectations with the customer for what is needed from them (e.g., tools or other information to have on hand) and what they need or want from the program

[13] After removing three duplicate responses. two virtual programs, one software program, and one program that is still in development.

implementers (e.g., areas they would like to focus on) as part of the assessment. They also verified what technology was available to the customer (e.g., smart phone or regular phone) and what areas of the home customers would have access to.

Video Walkthrough

Most programs (81%) conduct video walkthroughs with the customer. The most common areas looked at were heating and cooling systems, appliances, doors, windows, and lighting. Some programs also examined the attic and insulation, and a few others let the customer direct the walkthrough (showing the assessor the areas the customer felt were most important to show).

STREEM and FaceTime are the most common video platforms used to conduct the video walkthrough with the customer. Zoom. Doxy.me, Microsoft Teams, Google Meet, Google Duo, Surfly, or Snugg Pro are other video platforms frequently used. Most walkthroughs lasted 30 minutes to an hour (an in-person assessment can last two to four hours).

For customers unable to participate in a video walkthrough, either due to mobility or technology challenges, assessors often resorted to audio only (with the customer describing the home verbally, following the assessor's instructions) or used an in-person assessment. One program offers gift cards to offset phone data consumption to qualifying customers and is working on a lower-quality video platform that uses less phone data.

Of the programs that do not conduct video walkthroughs, a few are self-service, that is, the customer receives an assessment kit and conducts the assessment, with energy assessors standing by if they have questions. A couple of programs conduct an online survey or chat on the phone to gather home information and create a tailored report for the customer, then walk through the report with the customer and provide follow-up assistance with installing items if needed.

Health- and Safety-Related Issues

Many programs (52%) look for health- and safety-related issues in the home while conducting the assessment. The most common health-related issue to look for was mold, and assessors often also confirmed that customers had smoke detectors and carbon monoxide monitors in their home. In addition, assessors examined the water heater for signs of potential backdrafting of fuel-fired heaters, which is a major safety issue. When they find a health- or safety-related issue, some programs refer the customer to someone who can fix the problem, others fix it once on site or offer other opportunities for assistance with the issue, and still others provide solutions to prevent more damaging health- or safety-related issues, such as encouraging frequent cleaning of air filters or recommending water heater best practices. This is an additional benefit of remote assessments: Contractors can avoid driving to homes before knowing if a health concern must be addressed. Health and safety issues can prevent contractors from installing upgrades and, in some cases, from conducting an assessment.

Cost of Assessment and Follow-Up Actions

Most programs offer the remote energy assessments for free to customers. If not free, the average cost is about $230. If repairs or upgrades are recommended, one program has the customer pay off the upfront costs, installation, and other fees in a savings-based financing program, where there is no cost to the customer if the customer does not realize any utility cost savings from upgrades.

Once the remote assessment is complete, 81% of programs send a report to the customer, 62% discuss the results with the customer (either right after the assessment or in a follow-up call), and 48% conduct an in-person visit if appropriate. Most programs (86%) provide energy efficiency products or upgrades with the assessment (either free or discounted), such as LED lightbulbs, showerheads and aerators, or power strips. Some also provide water heater blankets and pipe wrap, or smart thermostats for customers to install.

Elements of Remote Programs: Summary

Most programs (67%) collect preliminary information from the homeowner in a pre-visit questionnaire. Additionally, although most programs send a report to the customer after the assessment (81%), over one-third (38%) do not discuss the report directly with the customer. Direct customer engagement is important for guiding the participant through various barriers to action (Sussman and Chikumbo 2017). Most programs also provide free or discounted energy efficiency products (86%), which is an important first step in customers following through with the recommendations. The video walkthrough, which 81% of programs include, is also helpful for ensuring the customer engages in the assessment process and has a chance to learn about energy use in the home.