THE CONSUMER CONNECTION

A CONSUMER-CENTRIC APPROACH TO DELIVERING HOME ENERGY SERVICES

AUTHORS & ACKNOWLEDGMENTS

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ABOUT ROCKY MOUNTAIN INSTITUTE

Rocky Mountain Institute (RMI)—an independent nonprofit founded in 1982—transforms global energy use to create a clean, prosperous, and secure low-carbon future. It engages businesses, communities, institutions, and entrepreneurs to accelerate the adoption of market-based solutions that cost-effectively shift from fossil fuels to efficiency and renewables. RMI has offices in Basalt and Boulder, Colorado; New York City; Washington, D.C.; and Beijing.

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INTRODUCTION

Two-thirds of US homeowners consider home energy performance a top priority, yet actions to improve home energy use lags far behind. Those who have done something seldom invest in whole-home energy upgrades. In sum, a large gap exists between intentions and actual investments, signifying a market failure to address customer needs. Rocky Mountain Institute (RMI) conducted a survey to understand why the market is failing to convert more homeowner interest in energy efficiency into action despite increased spending and efforts to do so.

One problem is that providers of energy upgrades often fail to take a consumer-centered approach. Products are frequently marketed according to the framework or interests of the provider, not the consumer. For example, many home performance contractors start by trying to explain building science to potential buyers, and then find that they get much farther when they switch to providing examples of comfort benefits. The contractor has to understand the building science to execute the upgrade, but that often isn't what motivates the customer.

RMI's Residential Energy+ initiative is based on the idea that a consumer-centered approach to energy-upgrades will unlock the market for energy upgrades faster than approaches that fail to account for consumer interests. While this may seem to be an obvious statement, it is nonetheless an insight that market actors often fail to enact. Service providers need to be more strategic in what types of messengers, financing, and timing makes most sense to consumers in order to spur adoption of residential energy efficiency upgrades.

The goal of the survey was to help all stakeholders including contractors, energy auditors, program administrators, and utilities, understand their best intervention points and take a consumer-centric approach to delivering energy upgrade services. The results reveal pathways that different stakeholders should take to reach consumers for home energy improvements. Consumers prefer to engage with different people at different parts of the upgrade process. Those preferences depend on the type of upgrade and the impetus for the upgrade. Thus, different stakeholders can refine their marketing efforts to a) focus on the right target conditions when a consumer will be most responsive, b) create partnerships with other stakeholders to give consumers what they want across the process, and c) build on best practices to reach customers when they are not well positioned to.

In addition, the survey reveals other important findings around financing, what customers are willing to pay, and motivation. For example, the results indicate a clear consumer preference for financing tools like PACE and on-bill financing, even though these are not available in most locations. These findings have important program implications when we consider the need to meet consumer needs when delivering energy services.

Survey Specifics

RMI conducted the survey of 1,210 homeowners from all 50 US states. The average length of homeownership among participants was 8.72 years. Over 64 percent of the respondents had made energy upgrades to their homes in the past, and on a scale from one to 9 (9 being very interested), the interest in investing in home energy-related upgrades averaged 7. For detailed information on the survey's methodology and demographics, see Appendices A and B respectively.

The survey's questions were based on six different events that trigger interest in an energy upgrade and energy improvements of a solar panel installation or a high efficiency heating, ventilating, and air conditioning (HVAC) system.

TRIGGERS AND TECHNOLOGIES

The Importance of Triggers

Certain triggers spur the implementation of home energy upgrades. For example, residential energy finance providers find that homeowners are more likely to make energy efficiency improvements when an important piece of home equipment fails, such as a heater or air conditioning unit. Other consumers might consider an energy efficiency upgrade when renovating to sell their home. These triggers emphasize the importance of selling a product to people when they want it, not when the provider wants to sell it. Just as an umbrella retailer will sell more umbrellas during a storm than during a drought, service providers should focus on the timing of energy efficiency upgrades and how those triggers affect the consumer pathway. The survey focused on six triggers:

- Purchasing a new home
- Something has broken
- Renovation to sell home
- Renovation for self
- Building a new home
- Anytime

Different triggers signify different pathways to reach the consumer, and should inform marketing efforts. For example, if something has broken, a family member might be the one to spark interest in a more efficient HVAC system, whereas if the consumer is renovating the house to sell it, a real estate agent might be more likely to spark interest in upgrading.

Different triggers are also more likely to spur an upgrade depending on the main concern of the consumer. For example, when a consumer is building a new home or renovating a home for him or herself, the ability to finance the upgrade is an important motivator. This has clear implications for where to focus financing solutions. In contrast, when purchasing a home, personal comfort becomes a much larger motivator, perhaps because the financing mechanisms for buying a home are already well-established and accessible. See Motivation Section and Appendix D for more information.

Technology Bundles

The two technology bundles covered in the survey were a new efficient heating, ventilating, and air conditioning (HVAC) system and installation of solar electric photovoltaic panels (solar PV). The difference in the two technologies means different pathways for consumers.

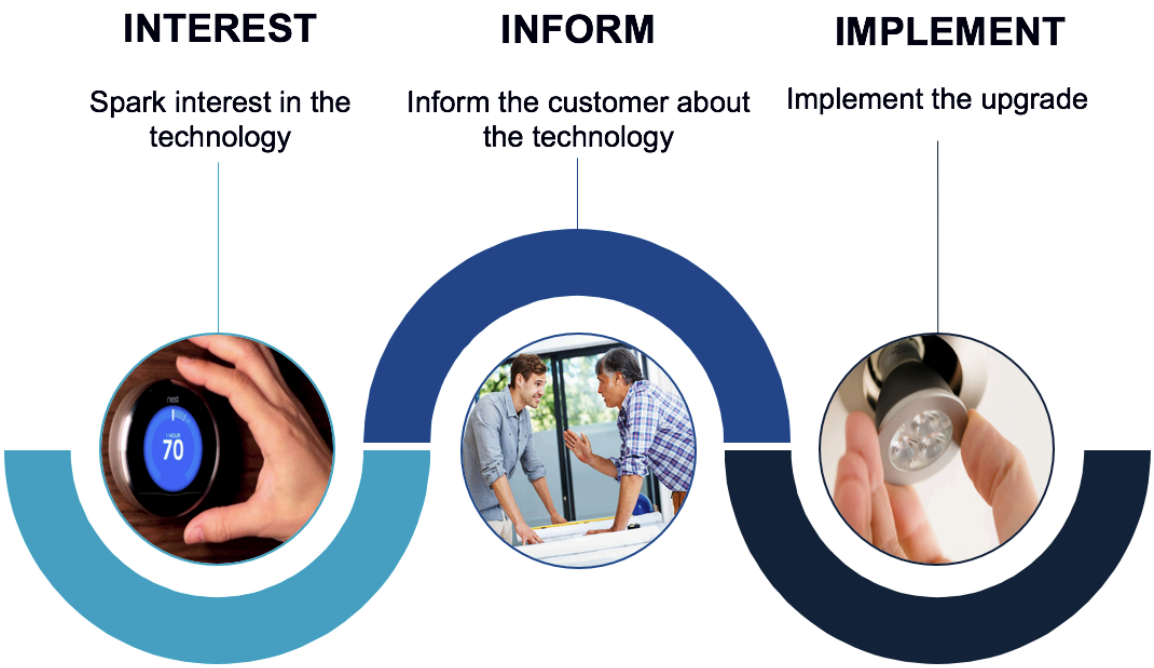
The motivation for the upgrade and the preferred financing method also vary greatly depending on the technology bundle. For example, greater personal comfort is important to homeowners looking to invest in an HVAC upgrade, while increasing the property value of the home is more important to homeowners considering investing in a solar photovoltaic system. This is covered in greater detail in the Motivation and Financing sections.

THE PATHWAYS

As contractors, utilities, energy auditors, and more try to get people to invest in energy efficiency upgrades, there is a certain path consumers follow from being interested in the technology to actually investing in and implementing the technology. Understanding this pathway will help stakeholders recognize when and how to engage customers, who the best person is to convey the information, and what the most likely financing options are. A consumer does not necessarily want to speak to every stakeholder at each step of the process, so learning who is best to convey the information can be an important marketing tool for service providers.

The pathway is broken into three steps: 1) sparking interest in the technology, 2) informing the consumer about the technology, and 3) implementing the upgrade. We have named this the 3i pathway.

FIGURE 1: THE 3I PATHWAY



Interest

Family and friends combined came out as the top messenger to spark interest in home energy upgrades in almost all scenarios. This proves the point that program administrators and service providers should deploy a peer diffusion strategy, engaging with homeowners in ways that promote social interaction and comparison around home improvements. RMI's *Peer Diffusion* report offers the key elements of a peer diffusion strategy—highlighting various online and in-person tactics based on real-world examples—to make quality whole-home energy upgrades more social and their uptake more visible—increasing the appeal and prioritization of these improvements.

The one exception to family and friends being the top messenger to spark interest was when building a new home and considering solar, in which case contractors were preferred slightly more often.

It's important to note that while family and friends combined were the top messengers to spark interest, when broken apart, they had distinct differences. In the majority of cases, family members ranked above friends, typically by two to four times as much. This has important implications for targeted marketing and peer diffusion efforts. In a few cases, friends ranked higher, and sometimes they were roughly even (see Appendix C for more detail).

Inform

The majority of consumers felt that a contractor is the most likely person to provide them with reliable information, followed closely by friends and family and the local utility company. This varies according to the technology and the trigger (see Appendix C). When seeking information, consumers first look to someone who they believe will give them an honest opinion and then value expertise. The least preferred method of seeking information is a consumer doing his or her own research, indicating that people do want external guidance.

Implement

For all triggers and for both technologies, the consumers felt that a contractor was most likely to implement the upgrade.

TABLE 1: CONSUMER PATHWAYS FOR THE HVAC UPGRADE

TRIGGER	INTEREST	INFORM	IMPLEMENT
Repair (something breaks)	1. Family/friends (35%) 2. Contractor (29%)	1. Contractor (33%) 2. Family/Friends (26%) 3. Home Inspector & Utility (14% each)	1. Contractor (85%)
Renovate for self	1. Family/friends (38%) 2. Contractor (18%) 3. Utility (17%)	1. Contractor (26%) 2. Family/Friends (25%) 3. Utility (22%)	1. Contractor (85%)
Renovate to sell	1. Family/friends (25%) 2. Contractor (24%) 3. Real Estate Agent (14%) 4. Appraiser (13%)	1. Contractor (33%) 2. Utility(18%) 3. Home Inspector & Family/Friends (13% each)	1. Contractor (81%)
Home purchase	1. Family/friends (41%) 2. Contractor (24%) 3. Company Salesperson (14%)	1. Contractor (31%) 2. Utility (20%) 3. Family/Friends (15% 4. Home inspector (14%)	1. Contractor (84%)
Build a home	1. Family/friends (26%) 2. Contractor (24%) 3. Company Salesperson (18%)	1. Contractor (34%) 2. Utility (22%) 3. Home inspector (15%)	1. Contractor (90%)
General/anytime	1. Family/friends (31%) 2. Contractor (19%) 3. Utility (18%)	1. Contractor (36%) 2. Family/Friends (28%) 3. Utility (19%) 4. Home inspector (15%)	1. Contractor (84%)

TABLE 2: CONSUMER PATHWAYS FOR THE SOLAR BUNDLE

TRIGGER	INTEREST 	INFORM 	IMPLEMENT 
Repair (something breaks)	1. Family/friends (32%) 2. Contractor (25%) 3. Utility (14%)	1. Contractor (26%) 2. Utility (17%) 3. Inspector (16%) 4. Family/Friends (15%)	1. Contractor (81%)
Renovate for self	1. Family/friends (47%) 2. Contractor (17%) 3. Utility (13%)	1. Contractor (32%) 2. Utility and Family/Friends (each at 17%)	1. Contractor (89%)
Renovate to sell	1. Family/friends (27%) 2. Contractor (21%) 3. Appraiser (18%)	1. Contractor (26%) 2. Friends/Family (18%) 3. Utility (16%)	1. Contractor (82%)
Home purchase	1. Family/friends (33%) 2. Contractor (22%) 3. Utility (18%)	1. Contractor (30%) 2. Utility (19%) 3. Inspector & Co. Salesperson (each at (13%)	1. Contractor (82%)
Build a home	1. Contractor (33%) 2. Company Salesperson (30%)	1. Contractor (30%) 2. Utility & Family/Friends (17%) 3. Home inspector (14%)	1. Contractor (91%)
General/anytime	1. Family/friends (45%) 2. Contractor (19%) 3. Utility (13%)	1. Contractor (28%) 2. Utility (23%) 3. Family/Friends (15%)	1. Contractor (83%)

MESSENGERS

The survey included ten groups that might be involved in the 3i pathway:

- Company salesperson
- Contractor
- Family member
- Friend
- Home appraiser
- Home inspector
- Local government
- Local utility company
- Homeowner
- Real estate agent

The results for good interventions vary for different messengers. Determining how to best use this information requires exploring some of the nuances of the best conditions for different actors to reach different consumers. In general, this information suggests three strategies for reaching consumers:

1. **Focus on the right conditions**—Stakeholders are most likely to successfully move a consumer if they reach the consumer when the consumer would be most interested to hear from them. This is dependent on both the right trigger events, and on the right place within the 3i pathway. This allows for more targeted marketing efforts.

2. **Create partnerships**—Recognizing that no stakeholder is the top preferred messenger for all conditions, stakeholders may do well to partner with other entities to deliver the full 3i path in a way that customers will respond well to.
3. **Implement best practices for supporting other stakeholders**—Just because certain stakeholders are not the top choice for a particular condition doesn't mean that they can't participate. Rather, they can use industry best practices to build on their capacity to deliver results through other stakeholders. For example, many contractors know that word-of-mouth through family and friends is gold for sparking interest, but many miss opportunities to strategically support making it easier for family and friends to deliver that word-of-mouth. Pictures, social media prompts, house parties, and other suggestions from RMI's *Peer Diffusion* report can enhance the likelihood of family and friends becoming allies in reaching others. Similarly, local governments may not be well positioned to drive marketing as their own messenger, but they can support local contractors in delivering services through providing marketing support, quality assurance, or other services.

Finally, it's important to note that simply because we have not highlighted a messenger for a particular condition does not mean that messenger can't have a successful marketing campaign. Some conditions showed clear preferences for a few messengers, but still had other messengers that 1 out of 10 people would turn to. These are still useful market segments to reach. See Appendix C for fuller details on the rankings.

Major Messengers

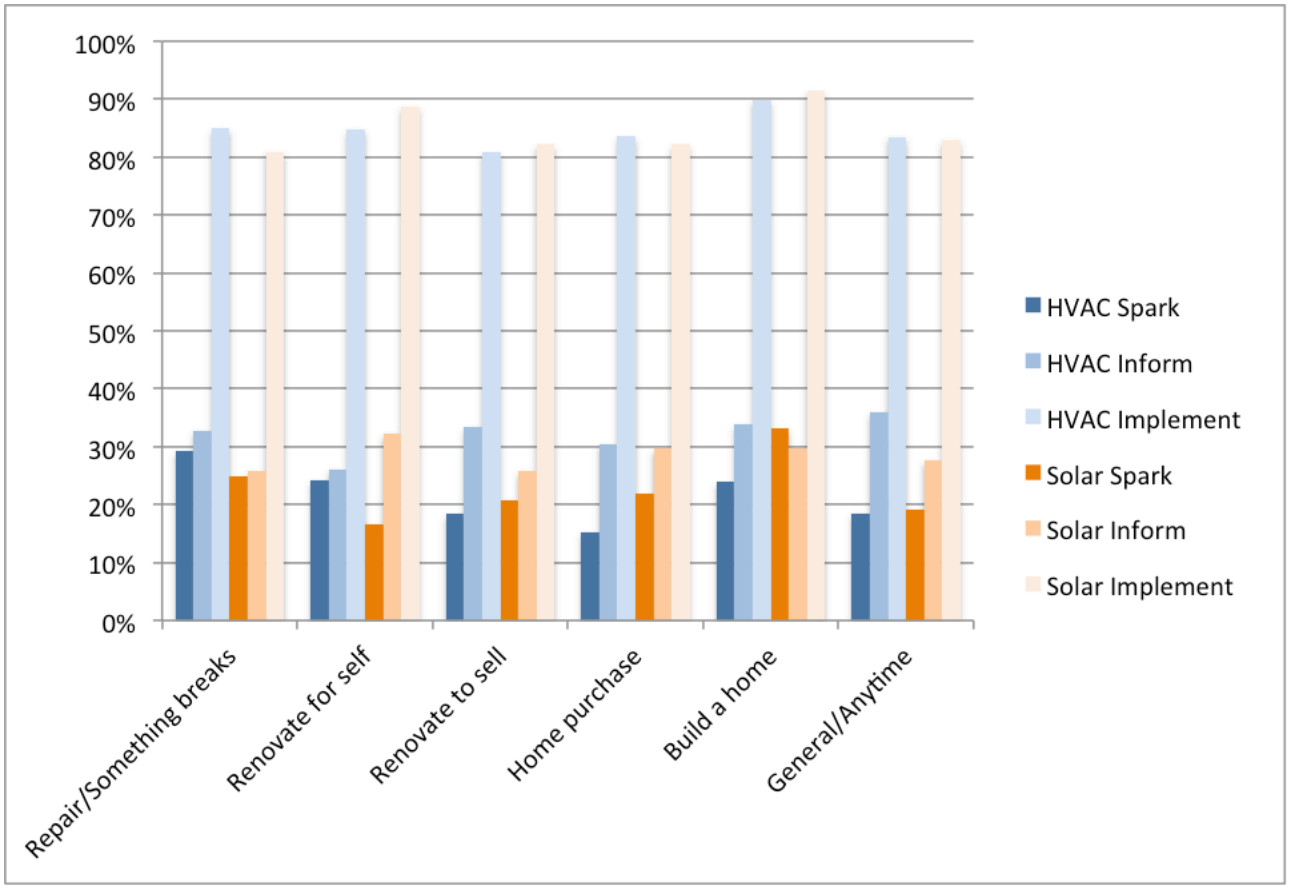
The messengers that can play the largest roles on the 3i pathway include contractors, family and friends, utility companies, home inspectors, and company salespeople.

Contractors:

While mostly a secondary choice for sparking interest in an upgrade, there are times when a contractor might be a good fit for sparking interest: for an HVAC upgrade, the contractor may spark interest in an upgrade if something breaks or if the customer is renovating to sell the house. For a solar upgrade, a contractor may be able to spark interest when building a home. While contractors are the top choice to inform the consumer on the upgrade, consumers are much more likely to look for information about HVAC systems from contractors when building a home than when renovating. And in contrast, consumers are more likely to look to contractors for information on a solar system when renovating than when building. Thus, contractors can use this information to understand when to intervene and which areas on which to focus. Contractors were the top choice by far to implement the upgrade for all triggers and both technologies, although more likely when building a home than for other triggers.

- Top Triggers: All triggers
- Pathway Steps: Interest, inform, implement
- Tech Bundles: HVAC and solar

FIGURE 2: MESSENGER STEPS FOR CONTRACTORS

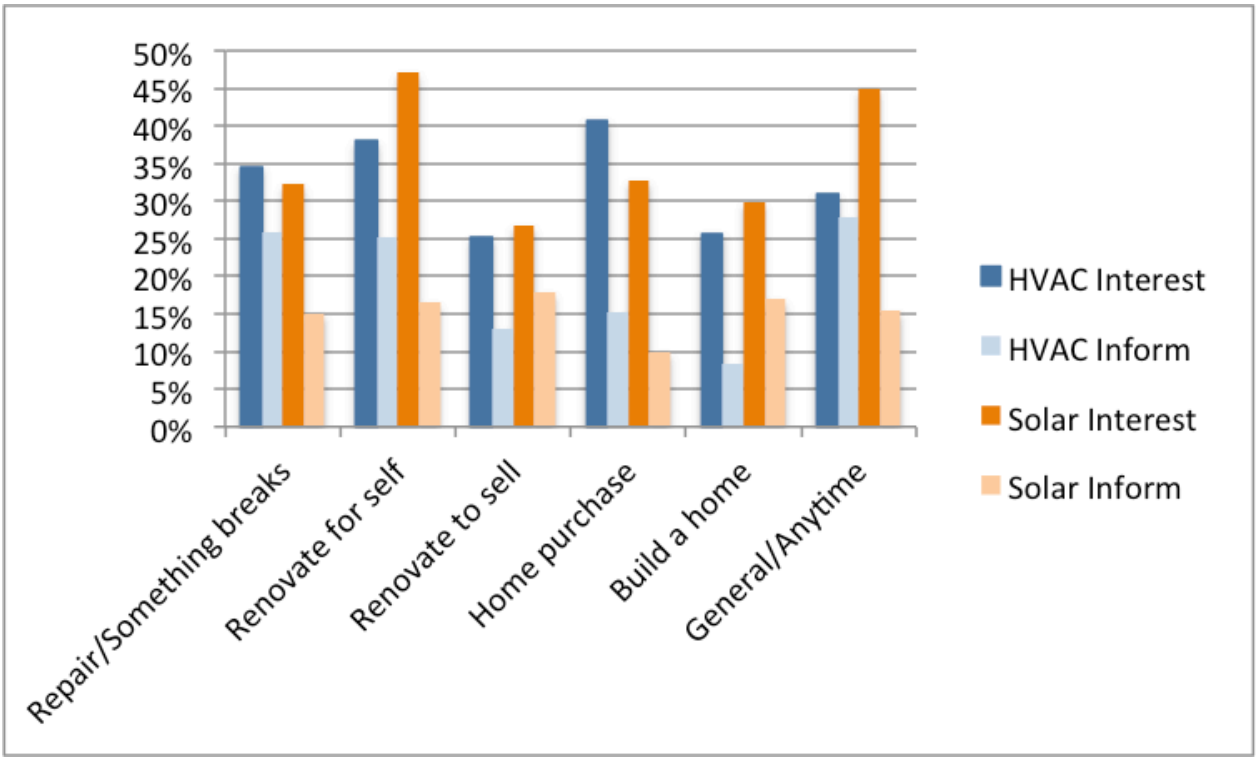


Family and Friends

The majority of people have their interest sparked in a home energy upgrade by family and friends. If the consumer is going to renovate for him or herself, friends and family are also a top choice for informing the consumer about an HVAC upgrade. However, family scored higher than friends in the majority of situations.

- Top Triggers: All triggers
- Pathway Steps: Interest, inform
- Tech Bundles: HVAC and solar

FIGURE 3: MESSENGER STEPS FOR FAMILY AND FRIENDS

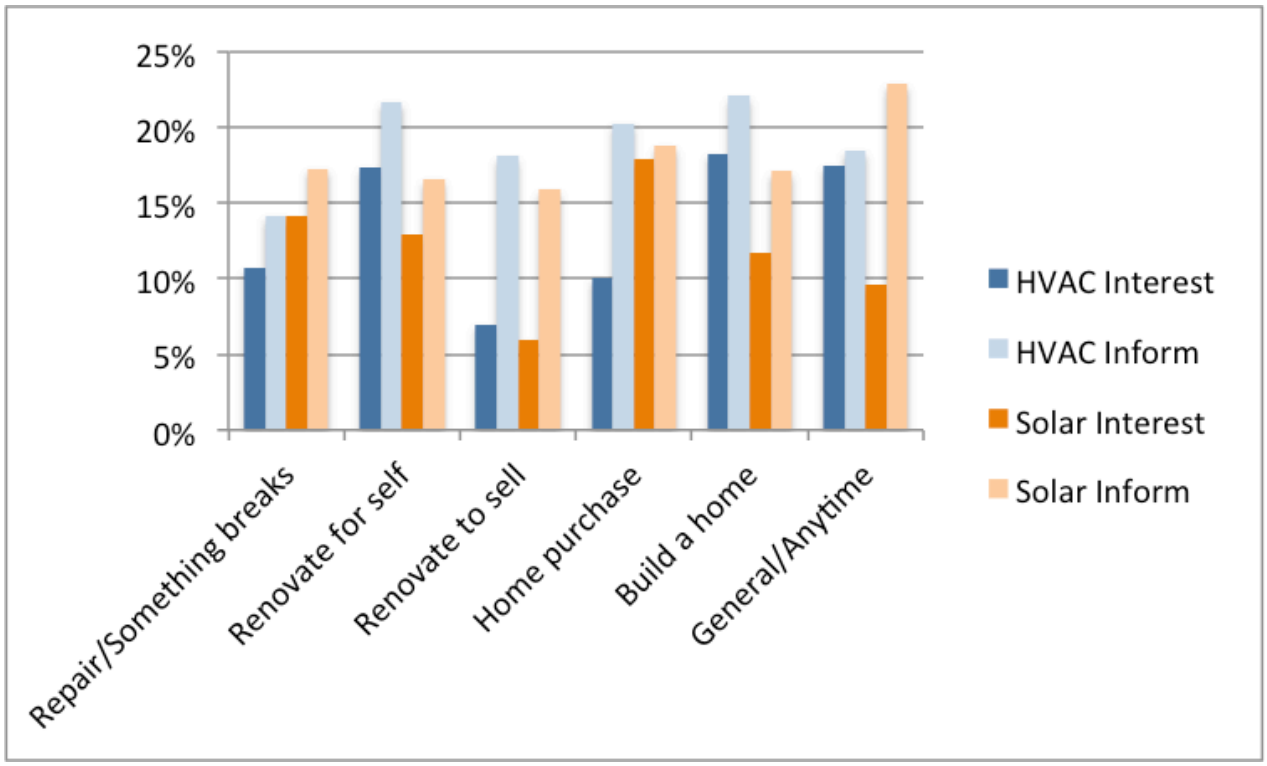


Utilities

The main role that utilities can play is in providing information to the consumer about the energy upgrade. While not the top choice for consumers, utilities were a secondary choice for information for all triggers and both HVAC and solar installations.

- Top Triggers: All triggers
- Pathway Steps: Inform, and some spark
- Tech Bundles: HVAC and solar

FIGURE 4: MESSENGER STEPS FOR UTILITIES

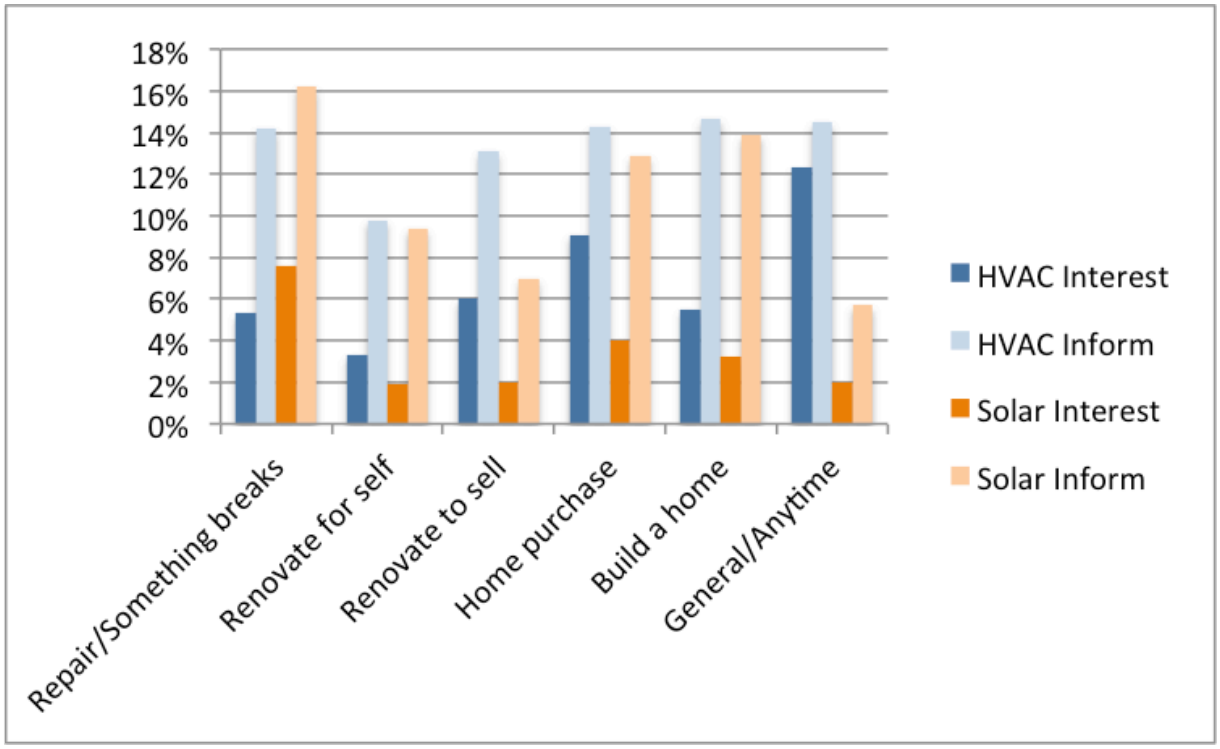


Home Inspectors

Home inspectors can play a role in providing information to the consumer in a few select triggers: if something needs to be repaired, in a new home purchase, or in building a new home. Given the strong ranking that "home inspectors" had in the inform phase, it seems plausible that respondents may have thought this category included home energy inspectors or energy auditors.

- Top Triggers: Repair/something breaks, home purchase, build a home
- Pathway Steps: Inform
- Tech Bundles: HVAC and solar

FIGURE 5: MESSENGER STEPS FOR HOME INSPECTORS

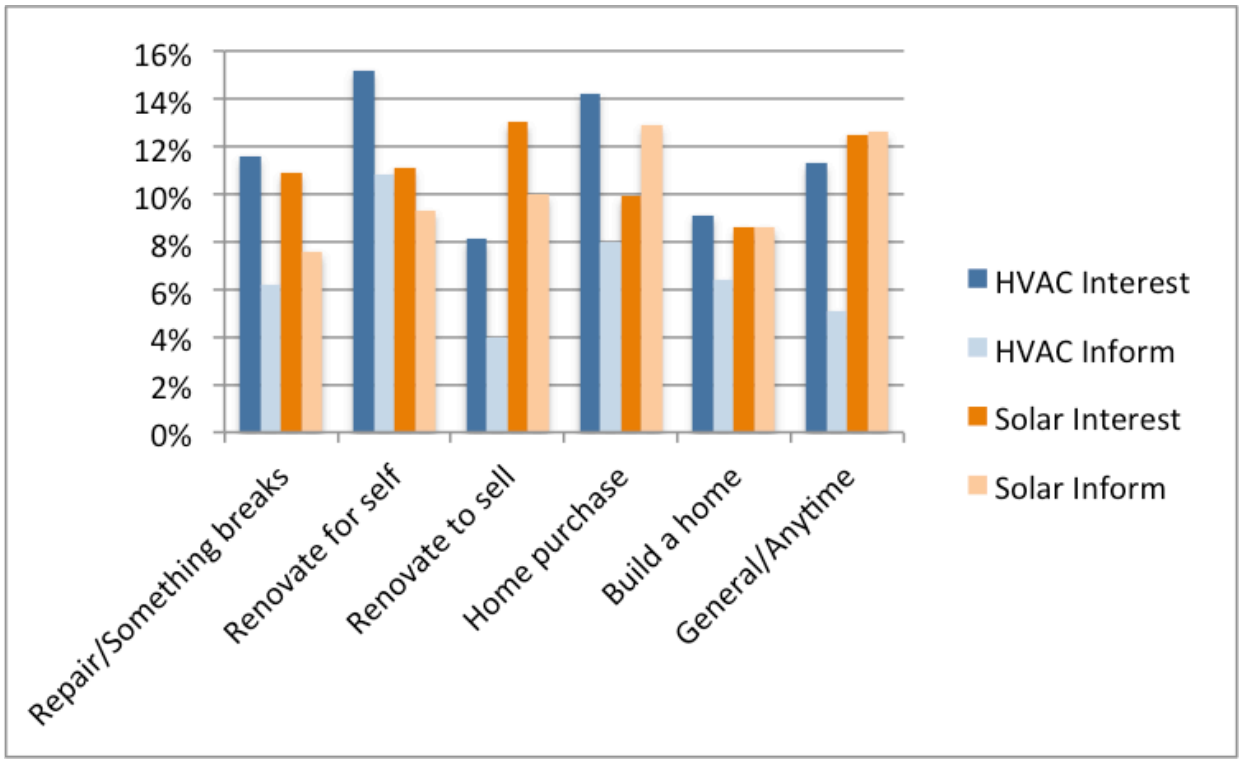


Company Salespeople

Salespeople are only looked at to spark interest in upgrading an HVAC system when a consumer is buying or building a new home. And they are looked to for information when investigating a solar system for a new home purchase.

- Top Triggers: Home purchase, building a home
- Pathway Steps: Interest, inform
- Tech Bundles: HVAC and solar

FIGURE 6: MESSENGER STEPS FOR COMPANY SALESPEOPLE



Additional Messengers

Real Estate Agents

The main role that real estate agents should play is sparking interest in an HVAC upgrade if the consumer is renovating his or her house to sell.

- Top Triggers: Renovate to sell
- Pathway Steps: Interest
- Tech Bundles: HVAC

Appraisers

Like real estate agents, appraisers are only looked to if a consumer is renovating his or her house to sell, and that is to spark interest in either an HVAC upgrade or a solar system.

- Top Triggers: Renovate to sell
- Pathway Steps: Interest
- Tech Bundles: HVAC and solar

Local governments and personal research by the homeowner were not a top or secondary choice for any pathway step. This shows the need for local governments to partner with other stakeholders, and to recognize their role in driving or supporting efforts rather than being the main point of contact for a consumer.

These results can help inform marketing efforts for all different stakeholders, and can help prioritize on which steps each messenger and/or stakeholder should focus and on which steps they should partner with other stakeholders. For example, a utility might try to spark interest in a home energy upgrade through a peer diffusion strategy, and focus its own efforts on providing information on the upgrade, and then recommend contractors to do the actual installation.

For detailed results see Appendix C.

MOTIVATION

There are many different motivating factors that help consumers make the decision to invest in a home energy upgrade. These are important factors to take into account when marketing to consumers. However, motivation is challenging to determine for self-reporting, as self-reporting is not always accurate on this count. For example, in *Quasi-Experimentation: Design and Analysis Issues*, T.D. Cook and D.T. Campbell point out that self-reported data is often not accurate because people tend to report either what they believe the researcher expects to see or what reflects positively on their own abilities, knowledge, beliefs, or opinions.

Respondents were asked to rank their motivations for HVAC upgrades or for solar upgrades across the following possible motivations:

- Short-term costs
- Long-term savings
- Environmental benefits
- Resale value of the home/property value increase
- Greater indoor personal comfort
- Ability to finance the upgrades
- Improved personal health
- Increased automation of a home's technological operations
- Increased use of latest technologies
- Ease of implementation

According to self-reported interests, the most important factor for both the solar and HVAC upgrades was long-term savings. The only time that differs is when people are renovating to sell their home, and then the biggest motivating factor is increasing the resale value of the home. But many experiences in the market suggest that long-term savings often fail to motivate consumers. The classic example from the residential sector is that most people will invest in granite-countertop upgrades on a standard model home, rather than an energy efficiency upgrade, even though both upgrades cost the same and the efficiency upgrade would pay for multiple granite countertops over time. It may be that this motivation is most relevant only after the person has decided he or she is interested in an energy upgrade (after the interest phase), but more research is necessary to explore this further.

For the HVAC upgrade, the second-most important factor is greater indoor personal comfort followed by increasing the resale value of the home. For the solar upgrade the second-most and third-most important factors are increasing the resale value and an ability to finance the upgrades. The least important motivating factors for both technologies are increasing automation of a home's technological operations and increasing use of the latest technologies. The ease of implementation also scored low on importance as a motivating factor, although less so under both renovation triggers.

The top three self-reported motivations for each type of upgrade:

TABLE 3: THE TOP THREE SELF-REPORTED MOTIVATORS

Rank	HVAC Motivators	Solar Motivators
1	Long-term savings	Long-term savings
2	Greater indoor personal comfort	Resale value increase and ability to finance the upgrade
3	Resale value increase	

These top three motivators were ranked significantly higher than the following motivators.

It is important for stakeholders to note that long-term savings scored much higher than short-term costs in importance of making a decision. As noted above, this finding probably requires further research that explores motivations at different points along the pathway, and preferably based less on self-reporting. Anecdotally, we have heard from various contractors that short-term costs or low-rate financing are often useful for sparking interest, but not always necessary once the interest is sparked. In those experiences the attractive costs or financing get the conversation started, but aren't always used by the customer as the work scope changes or other options are presented.

Environmental benefits scored higher for the solar upgrade than for the HVAC upgrade, but still did not make it to the top of the list of motivating factors.

Note that "improved personal health" ranked in the middle (fifth) for HVAC motivations. This is noteworthy since many practitioners consider selling efficiency upgrades with a focus on health a best practice. The middling results in this survey may be the result of a variety of reasons, such as: a) the need for education for consumers to make a connection between HVAC systems and personal health; b) anecdotal evidence that suggests health may be of higher importance to women, while 61 percent of the respondents were male (see Appendix B); c) personal health may be more of a "closing" clincher than a primary motivator. However, it is also important to note that this motivator ranking changed considerably under different trigger conditions, ranking third or fourth for repair, new home purchase, and "anytime" triggers, but seventh or eighth for renovating for self and renovating to sell respectively. Still, the low ranking for renovating for self remains surprising.

See Appendix D for more information on how different trigger conditions relate to different motivations.

FINANCING

The survey asked respondents to rank six different financing methods. The survey included a brief description of each method, since many respondents are unlikely to be familiar with all of the financing instruments. The options included:

- Cash or savings
- Credit card (intend pay off immediately)
- Credit card (intend NOT paying off immediately)
- Bank loan
- Mortgage or HELOC (Home equity line of credit)
- PACE (property assessed clean energy) financing
- On-bill financing

The research indicates that PACE or on-bill financing are consumers' top preference for energy upgrade financing, if they're looking to finance rather than just pay for the upgrades, and when they understand what those mechanisms are. Consumers ranked their financing preferences in the following order:

TABLE 4: FINANCING PREFERENCES

Rank	HVAC Financing Preferences	Solar Financing Preferences
1	Pay upfront with cash or savings	Pay upfront with cash or savings
2	On-bill financing	On-bill financing
3	Credit card (with immediate payoff intention) and PACE financing	PACE financing
4		Credit card (with immediate payoff intention)

These top four motivators were ranked significantly higher than the following motivators. This ranking for the top two options, with PACE or credit cards with an immediate payoff intention in either the third or fourth ranking, held true across all six action triggers.

However, consumers were not familiar with some of the financing methods. On-bill financing, PACE financing, and paying through a mortgage or HELOC all ranked lowest on the list regarding familiarity. This underscores the need to educate consumers on PACE and on-bill financing to increase their appeal. When consumers were introduced to the basic concept, PACE and on-bill financing both ranked well.

Building on the idea that a consumer-centric approach is important for unlocking the energy upgrade market, these survey results suggest that an important gap exists in the market when it comes to home energy upgrade financing. Two of the four top preferred financing mechanisms are simply not available in most regions of the US. For example, Residential PACE is currently only available in three states. This is especially important in the context of serving a wider range of residents. Paying upfront with cash or savings, or paying with a credit card with the intention of paying it off immediately, are great choices, but those options are simply not available for many households. Other financing options, such as on-bill financing or PACE may help serve a wider range of residents.

WILLING TO PAY

Respondents were asked how much they were willing to pay for either an HVAC upgrade or solar PV system. The answers varied quite widely, but the average result was $5,428 for HVAC and $7,575 for solar PV.

These amounts are interesting to note since the typical cost to install solar is quite a bit higher than the average amount homeowners are willing to pay. The average cost to install a solar residential systems is around $2.90/watt nationally. An average residential system between 3 kW and 7 kW will cost $8,700 to $20,300, although various incentives can lower those costs a fair amount. This would suggest that incentives and lowered costs are still necessary for the majority of households to consider rooftop solar PV.

Different triggers caused no significant difference in what people were willing to pay, with one important exception: When facing a scenario where something breaks, homeowners were willing to pay less than in other scenarios. The average of what they would pay in a "something breaks" scenario was $4,914 for HVAC (compared to $5,428 on average across triggers) and $5,773 for solar PV (compared to $7,575 on average across triggers).

TABLE 5: WILLINGNESS TO PAY

Willingness to Pay (averaged across all triggers)	
HVAC	$5,428
Solar PV	$7,575

This may suggest that people feel less flexible in repair situations, and less willing to make a larger expenditure. This might further reinforce the importance of providing financing options for people replacing broken equipment, so they can afford the higher efficiency products.

It is important to note that "willing to pay" data is hard to generalize since we don't know exactly what homeowners are anchoring on in their consideration of what they are paying for. Therefore these results should be considered suggestive for further research and not taken as conclusive.

CONCLUSION

RMI's survey results can help inform stakeholders how to make home energy upgrades more appealing, helping to unlock the US residential market. Solution providers can develop solutions based on what the consumer wants, using the appropriate messengers, right timing, and applicable financing mechanisms. Depending on the consumer pathway, stakeholders should focus on what they do best, and find the appropriate partners to fill in gaps and strengthen their role on a consumer's pathway. The survey also underscores the need for education on different financing options and addressing the gap in regions where certain financing options are non-existent.

RMI believes that if solution providers take a consumer-centric approach using RMI's findings of where they fit on the 3i pathway, they can unlock US homeowner investment in energy efficiency. Failing to design services that meet consumer interests and needs can lead to lost sales, increased acquisition costs, and failure to meet community targets for energy efficiency or carbon reductions.

Whatever your own motivations are for delivering energy services, it is important to understand what consumers actually want. Doing so should result in better results for your program: service providers can increase sales, and communities and local governments can meet broader goals. Meanwhile, more families will benefit from greater health, comfort, cost savings, and property values.

APPENDIX A: METHODOLOGY

Dr. Lauren Cheatham, Assistant Professor of Marketing at Shidler College of Business at the University of Hawaii at Mānoa, designed the survey, collected the data, and ran all analyses. Rocky Mountain Institute designed the overall study and the specific elements to be studied, in coordination with Dr. Cheatham, and developed the industry-relevant insights for publication.

RMI recruited 1,210 US homeowners (M_{age} = 40.12, SD_{age} = 12.22, 39.3% female) from Amazon's Mechanical Turk. The participants took part in exchange for monetary compensation ($1.20 per participant).[i] At the outset of the session, participants were provided with a consent form that explained the basic nature of the research and the expected commitment, including the approximate length of time (10–12 minutes).
Participants were then told they would be asked a number of questions with no right or wrong answers, and to answer the questions according to how they feel. Subsequently they were asked the following three questions about their homeownership experience.

- How many years have you owned your current home?
- Have you ever made any energy-related upgrades to your home? For instance, perhaps you've updated or replaced your windows, installed energy efficient appliances, installed solar panels, or installed new insulation. (Yes or No)
- How interested are you in general in investing in home energy-related upgrades? (scale: 1—not at all interested to 9—very interested).

Following these questions, participants were randomly assigned to one of 12 conditions based on two efficiency upgrade types (solar panel roof installation or high efficiency heating, ventilation, and air-conditioning [HVAC] system) and six upgrade triggers (purchasing a new home, something has broken, renovation to sell home, renovation for self, building new home, or no trigger specified).

Subsequent to manipulation exposure, all participants completed a series of questions designed to gauge their preferences and behaviors related to decision-making around efficient home energy upgrades. At the conclusion of the study, all participants answered standard demographic measures.

The following is a list of the different statistical methods used to analyze the data.

1. 2 X 6 univariate analysis of variance (ANOVA)
2. One-way analysis of variance (ANOVA)
3. Planned contrasts within condition
4. Pairwise comparisons
5. Paired samples t-tests
6. Independent samples t-tests

[i] Turkprime.com was used to recruit participants, allowing for participant restrictions. An additional fee was paid to guarantee that all participants were homeowners.

APPENDIX B: SURVEY DEMOGRAPHICS

Number of participants: 1,210
60.6% male, 39.3% female
Average age: 40.12 years
Average number of years participant has owned home: 8.72
64.8% have made energy-related upgrades to their homes

Race/Ethnicity	Percent
Caucasian	82.6%
Asian	4.0%
African American	5.6%
Hispanic	4.6%
Native American	0.5%
Biracial	2.1%

Household income	Percent
10K or less	2.4%
10-20K	6.6%
20-35K	12.1%
35-50K	16.5%
50-75K	25.3%
75-100K	18.1%
100-150K	14.1%
150K+	4.7%

Education	Percent
Some High School	0.2%
High School	9.7%
Some college	22.3%
Associate's degree	15.7%
Bachelor's degree	34.5%
Professional secondary degree (MBA, JD, MD)	2.0%
Master's degree	13.4%
PhD	1.6%
Other	0.5%

Employment Status	Percent
Not employed	9.8%
Employed, part time	12.1%
Employed, full time	56.5%
Self-employed	12.1%
Retired	5.5%
Other (homemaker, disabled, student)	3.9%

Home Value	Percent
100K or less	20.9%
100-200K	33.7%
200-300K	21.8%
300-400K	11.2%
400-500K	5.5%
500-1M	5.9%
1M+	0.8%

Climate Zone	Percent
1	1.3%
2	14.9%
3	20.8%
4	26.2%
5	28.4%
6	7.4%
7	0.7%
8	0.2%

We also solicited the following demographic information to assure no strange outlier trends in the respondents:

- Relationship status
- Number of children
- Home type
- Number of bathrooms
- Number of bedrooms
- Number of previous homes
- US State
- Moisture regime

APPENDIX C: MESSENGER CHARTS

FIGURE C1: MESSENGER STEPS FOR CONTRACTORS

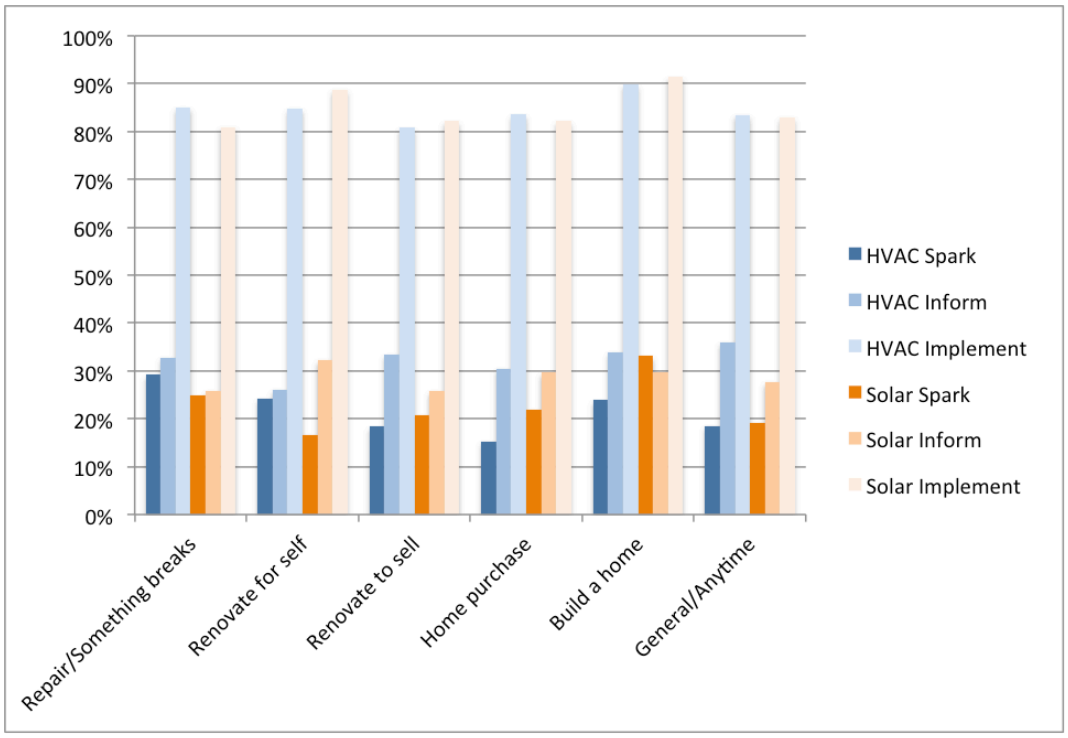


FIGURE C2: MESSENGER STEPS FOR FAMILY AND FRIENDS

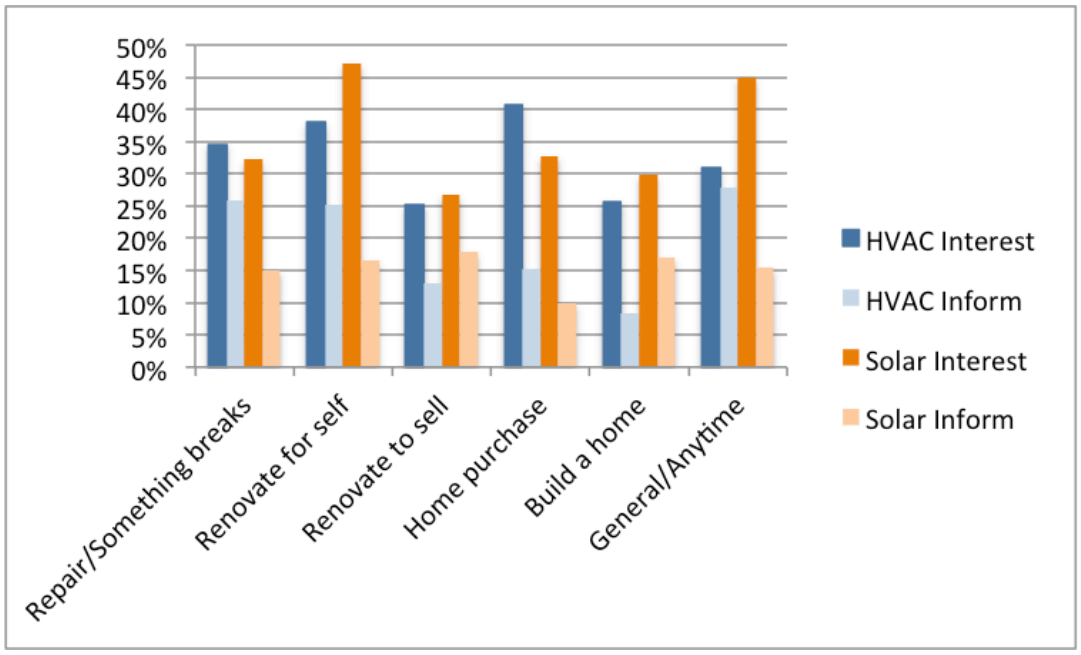


FIGURE C3: MESSENGER STEPS FOR UTILITIES

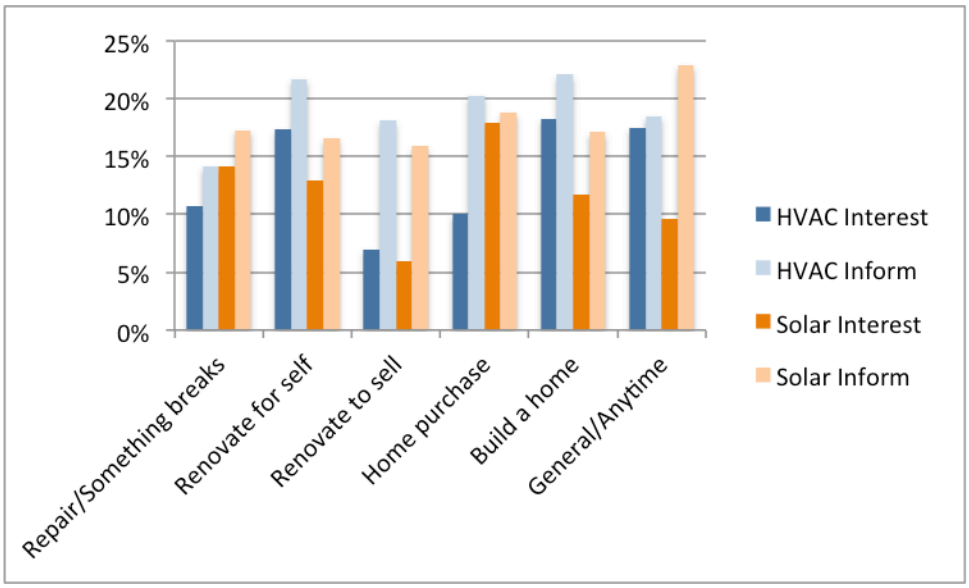


FIGURE C4: MESSENGER STEPS FOR HOME INSPECTORS

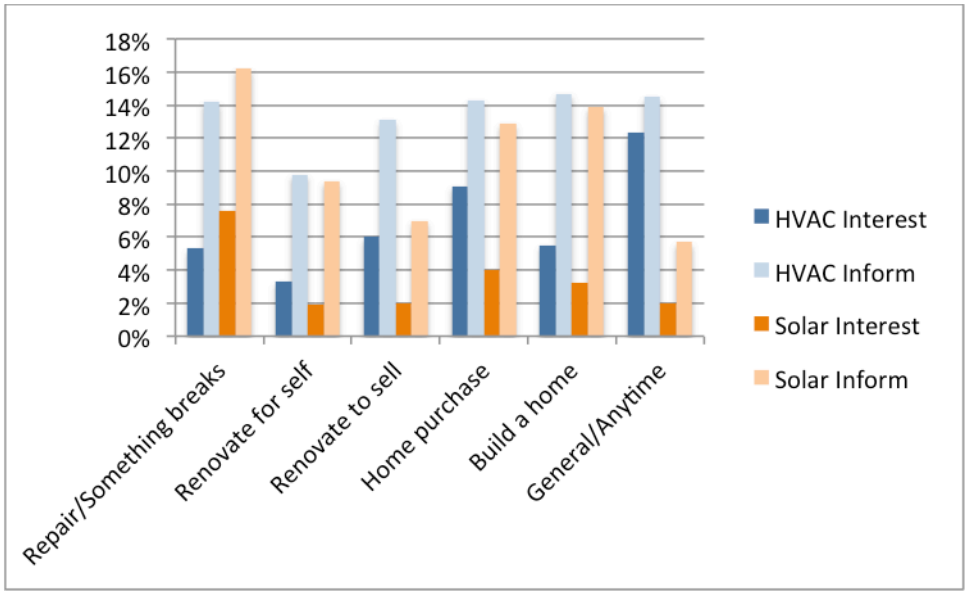
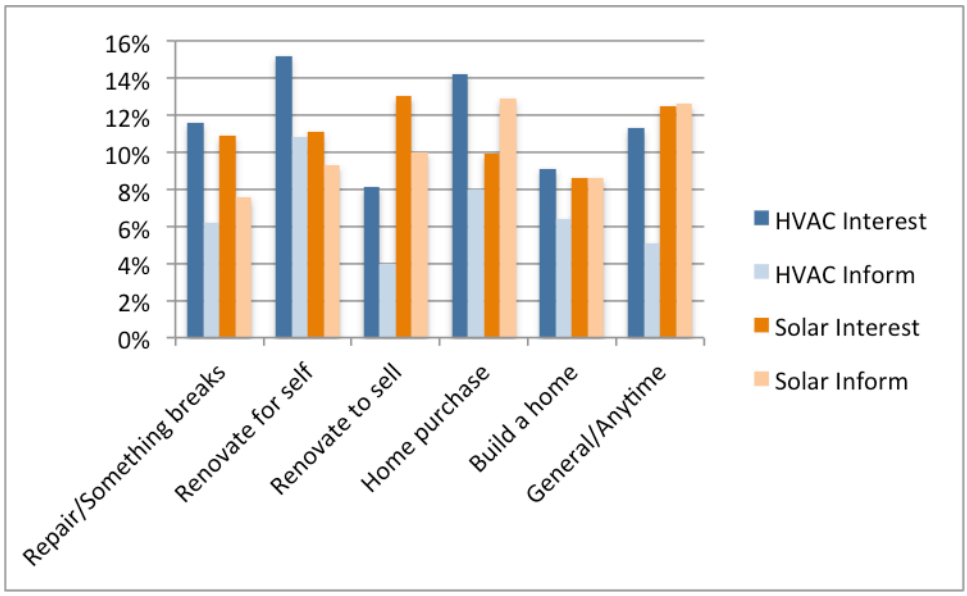


FIGURE C5: MESSENGER STEPS FOR COMPANY SALESPEOPLE



APPENDIX D: MOTIVATIONS BY TRIGGER

TABLE D1: RANK OF MOTIVATING FACTORS

Rank	Motivating Factor
1	Long-term savings
2	Property value increase
3, 4	Ability to finance the upgrades Greater indoor personal comfort
5, 6	Short-term costs Environmental benefits
7, 8	Ease of implementation Improved personal health
9, 10	Increased use of latest technologies Increased automation of a home's technological operations

TABLE D2: MOTIVATIONS BY TRIGGER FOR THE HVAC UPGRADE

HVAC Bundle						
Rank	**Building a Home**	**Home Purchase**	**Something Has Broken**	**Renovate to Sell**	**Renovate for Self**	**Anytime**
1	Long-term savings	Long-term savings	Long-term savings	Property value increase	Long-term savings	Long-term savings
2	Greater indoor personal comfort	Greater indoor personal comfort	Greater indoor personal comfort	Long-term savings	Greater indoor personal comfort	Greater indoor personal comfort
3	Property value increase	Property value increase	Improved personal health	Greater indoor personal comfort	Property value increase	Property value increase
4	Ability to finance	Improved personal health	Property value increase	Short-term costs	Ability to finance	Improved personal health
5	Improved personal health	Environmental benefits	Ability to finance	Ability to finance	Short-term costs	Ability to finance
6	Short-term costs	Ability to finance	Ease of implementation	Environmental benefits	Ease of implementation	Short-term costs
7	Environmental benefits	Short-term costs	Environmental benefits	Ease of implementation	Improved personal health	Environmental benefits
8	Ease of implementation	Ease of implementation	Short-term costs	Improved personal health	Environmental benefits	Ease of implementation
9	Increased use of latest technologies	Increased automation of technologies	Increased automation of technologies	Increased automation of technologies	Increased use of latest technologies	Increased use of latest technologies
10	Increased automation of technologies	Increased use of latest technologies	Increased use of latest technologies	Increased use of latest technologies	Increased automation of technologies	Increased automation of technologies

TABLE D3: MOTIVATIONS BY TRIGGER FOR THE SOLAR BUNDLE

Solar Bundle						
Rank	**Building a Home**	**Home Purchase**	**Something Has Broken**	**Renovate to Sell**	**Renovate for Self**	**Anytime**
1	Long-term savings	Long-term savings	Long-term savings	Property value increase	Long-term savings	Long-term savings
2	Ability to finance	Ability to finance	Ability to finance	Long-term savings	Ability to finance	Property value increase
3	Environmental Benefits	Property value increase	Short-term costs	Ability to finance	Property value increase	Ability to finance
4	Property value increase	Environmental benefits	Property value increase	Ease of implementation	Short-term costs	Short-term costs
5	Greater indoor personal comfort	Greater indoor personal comfort	Environmental benefits	Short-term costs	Environmental benefits	Environmental benefits
6	Short-term costs	Short-term costs	Greater indoor personal comfort	Environmental benefits	Ease of implementation	Greater indoor personal comfort
7	Improved personal health	Ease of implementation	Ease of implementation	Greater indoor personal comfort	Greater indoor personal comfort	Ease of implementation
8	Ease of implementation	Improved personal health	Improved personal health	Increased use of latest technologies	Improved personal health	Increased automation of technologies
9	Increased automation of technologies	Increased use of latest technologies	Increased use of latest technologies	Improved personal health	Increased automation of technologies	Improved personal health
10	Increased use of latest technologies	Increased automation of technologies	Increased automation of technologies	Increased automation of technologies	Increased use of latest technologies	Increased use of latest technologies