Listen Up: Renewable Energy Program Design for All

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ABSTRACT

The utility business model has been constantly evolving in recent years: competitive market forces, state and local policy, and the increased availability of cost-effective energy supply alternatives are requiring utilities to emphasize customer satisfaction and retention. These changing market drivers require greater attention from utilities to design customer-centric renewable energy programs, while regulatory scrutiny emphasizes equitable access to clean energy for all customers. Consumers Energy used findings from behavioral research to design a revenue-neutral renewable energy program that not only meets regulatory obligations but also the needs of its income-qualified population. To enhance its understanding of income-qualified customers' general perceptions about renewable energy, Consumers Energy initiated segment-specific primary research through focus groups and online customer surveys. The purpose of this research was not to determine how to market its existing voluntary green pricing programs to income-qualified customers, but rather to identify the best opportunities to design renewable energy options that are best suited for this population. The surveys offered statistically significant customer insights at 90% confidence with ±10% precision, while the focus groups offered deep, qualitative context. This research revealed that, while income-qualified customers may be price sensitive, they are willing to pay a nominal premium for renewable energy access, and also that slowing climate change is a powerful driver for them to pursue clean energy programs. These research findings prove that no customer segment should be left behind when designing clean energy programs.

Introduction

Since 2015, Consumers Energy has pursued research to understand customer preferences and interest in renewable energy programs. As part of its 2019 voluntary green pricing program planning,[1] Consumers Energy hired Cadmus to conduct primary and secondary research to determine how to better offer programs for income-qualified customers. Based on a literature review and interviews with utility program administrators nationwide, Cadmus determined that, while the successful design and delivery of renewable energy programs that target the income-qualified segment is a primary topic of interest for many jurisdictions across the country, few have determined how to successfully implement a revenue neutral, income-qualified program. Revenue neutrality is a requirement of Consumers Energy's voluntary green pricing programs, as mandated by the Michigan Public Service Commission (State of Michigan 2018). Several of the income-qualified program concepts Cadmus discussed with utility program administrators during the interviews and reviewed in the literature were subsidized in some capacity (Clean Energy States Alliance 2018). Nonetheless, this initial research assisted Consumers Energy with developing near-term program ideas included in its *2019 Voluntary Green Pricing Biennial Report* filed with the Michigan Public Service Commission (State of Michigan 2019); however, the report also acknowledged plans to conduct additional primary research directly with income-qualified customers, as requested by the Michigan Public Service Commission in its October 5, 2018 Order in Case No. U-18351.

To enhance Consumers Energy's understanding of income-qualified customers' general perceptions about renewable energy, Cadmus initiated segment-specific primary research through focus groups and online surveys in 2020 (Consumers Energy 2021). The purpose of this research was not to determine how to market Consumers

[1] Traditionally, customers receive power from their local utility that was generated by a range of sources such as coal, natural gas, nuclear, and renewable energy. Voluntary green pricing programs allow a customer to voluntarily specify to purchase a certain amount of electricity from renewable energy resources. The costs for the voluntary green pricing programs are then billed only to participating customers (State of Michigan 2021).

Energy's existing voluntary green pricing programs to income-qualified customers, but rather to identify the best opportunities to offer renewable energy options to this population. The study was created to address four research objectives:

- Identify income-qualified customers' general energy priorities (including awareness of and interest in renewable energy)
- Identify perceived challenges and barriers to accessing renewable energy
- Understand price sensitivity and willingness to pay for renewable energy products
- Identify the value proposition that drives income-qualified customers to consider renewable energy adoption

The timing of this research is notable. Cadmus conducted focus groups in the first quarter of 2020, prior to awareness of the coronavirus pandemic spreading throughout the United States. Consumers Energy and Cadmus carefully considered the possible impacts of continuing with a large-scale study of income-qualified customers later in the year, paying particular attention to timing, outreach, and customer service. Cadmus fielded an online survey in August 2020, during both an economic recession and the pandemic, when many customers were experiencing new financial hardships. Because the data contained in this paper represent customers' attitudes and outlooks on renewable energy during this unprecedented time, Consumers Energy will continue to monitor customer and market trends when planning for future clean energy initiatives.

Methodology

Focus Groups

Cadmus conducted eight in-person focus groups, offering income-qualified respondents a $100 VISA gift card for participating in the group and providing qualitative insights regarding their attitudes toward renewable energy. Cadmus worked with recruiters from a professional focus group facility to screen customers, using the screening criteria listed in Table 1.

Table 1. Required screening criteria

Criteria	Definition
Customer sector	All respondents must be current Consumers Energy residential electric account holders
Decision maker	All respondents must be household decision-makers regarding electricity payments
Income	All respondents must have a household income at or below 300% of the federal poverty guidelines
Awareness	All respondents must have some awareness of renewable energy

To ensure representation across the state, Consumers Energy identified four locations to host the focus groups: Flint, Muskegon, Jackson, and Cadillac. A total of 56 respondents participated in these focus groups, representing the demographic profiles presented in Table 2. Recruiters collected variables such as household income, ethnicity, gender, and age during the screening process to ensure that each focus group sample was representative of the city or county population. Cadmus used demographic data from the U.S. Census Bureau to develop the sampling criteria for each region.

Table 2. Focus group respondent demographics by region

Demographics	East		West		South		North	
Focus group location (city)	Flint		Muskegon		Jackson		Cadillac	
Number of groups	2		2		2		2	
Respondents per group	6	6	8	9	9	5	6	7
Age								
Between 25 and 64 years	92%		88%		86%		92%	
65 years and over	8%		12%		14%		8%	
Gender								
Male	50%		47%		50%		62%	
Female	50%		53%		50%		38%	
Ethnicity								
White or Caucasian	17%		47%		79%		83%	
Black or African American	75%		29%		21%		0%	
Hispanic or Latinx	8%		6%		0%		0%	
Native American	0%		6%		0%		0%	
Other	0%		12%		0%		17%	
Income								
Most commonly reported income range	Less than $25k		$25k to $50k		$25k to $50k		$25k to $50k	

Surveys

Following analysis of the focus group data, Cadmus conducted an online (and mobile-enabled) survey. Cadmus recruited respondents by sending email invitations to take the online survey, fielded in August 2020, and incented participation by sending a $10 gift card (for Meijer or Amazon, based on each respondent's choice) to eligible customers who completed the survey. Cadmus used screening criteria to ensure that the survey gathered feedback from income-qualified customers: to be eligible to participate in the survey effort, customers had to report that their household income was at or below 300% of the federal poverty level.

Consumers Energy provided email addresses for a population of customers assumed to have a high likelihood of being qualified to participate in the study prior to the income screening. The customers in this population had previously participated in Consumers Energy's income-qualified energy waste reduction programs, enrolled in the winter protection program, received an income credit or shutoff protection, or were seniors on a fixed income. Cadmus used a random sampling approach—stratified by four regions in Michigan (north, south, east, and west) based on the county of each customer's zip code—and contacted a subset of the population for each group. As shown in Table 3, the final survey sample was highly representative of the population's regional distribution.

Table 3. Sampling stratification and survey results

Region	Population Size	Percentage of Population	Number of Survey Respondents	Percentage of Survey Respondents
North	32,300	14%	221	15%
South	58,973	26%	409	27%
East	74,375	33%	467	31%
West	59,356	26%	405	27%
Total	225,004	100%	1,502 [a]	100%

[a] There were 1,502 eligible customers who completed at least part of the survey. Overall, there were 1,242 fully completed surveys.

Cadmus used a test of maximum differences (MaxDiff, also known as best-worst scaling) to identify the renewable energy benefits *most appealing* to income-qualified customers. MaxDiff uses an experimental survey design (meaning it randomly presents information), in which respondents answer a series of similar (yet different) questions about which renewable energy benefit they find the most and the least important. This design more accurately predicts preferences than traditional rating scales and has wide applications to inform education and outreach strategies. After the survey fielding ended, Cadmus used a hierarchal Bayesian regression analysis to calculate utility scores and preference shares for each tested benefit of renewable energy, allowing for a relative ranking of positive messages. Cadmus is able to infer messaging appeal based on the relative importance ranking of each benefit of renewable energy. This enabled Cadmus to define the most powerful value propositions for customers (which may inform effective messaging).

Cadmus derived a **preference share** for each benefit of renewable energy tested that summarizes the MaxDiff model outcomes. The preference share represents the likelihood that the attribute would truly be the most appealing benefit for renewable energy. Across all attributes, this model sets the shares to total 100%, where the most powerful benefits exhibit the largest preference share.

We also produced individual-level **utility scores** for each benefit used in calculating the preference shares. When averaged, these utility scores represent the relative importance of each benefit and indicate how powerful each benefit was to respondents. Overall, positive and higher average utility scores represent more appealing benefits, while negative and lower average utility scores represent less appealing benefits. Values around zero had a similar likelihood of being chosen as most important or least important. Otherwise, absolute values are not critical (meaning that negative values do not necessarily indicate that a benefit was actually seen as a drawback, only that it was preferred less). Though these utility scores do not represent the final analysis output (as the preference share summarizes the model outcome), they do provide a means of comparing each benefit's preference relative to the other benefits and can provide some directional understanding of summary outputs.

Results

Priority Energy Concerns

Income-qualified customers want reliable and affordable energy, and view energy as an interconnected and multipronged issue that also impacts their health and the environment. While customers nearly uniformly agreed that reliability and affordability are important qualities of their electricity (90% and 88% of respondents, respectively, as shown in Figure 1), over half the survey respondents also reported that it is important that their electricity is clean.

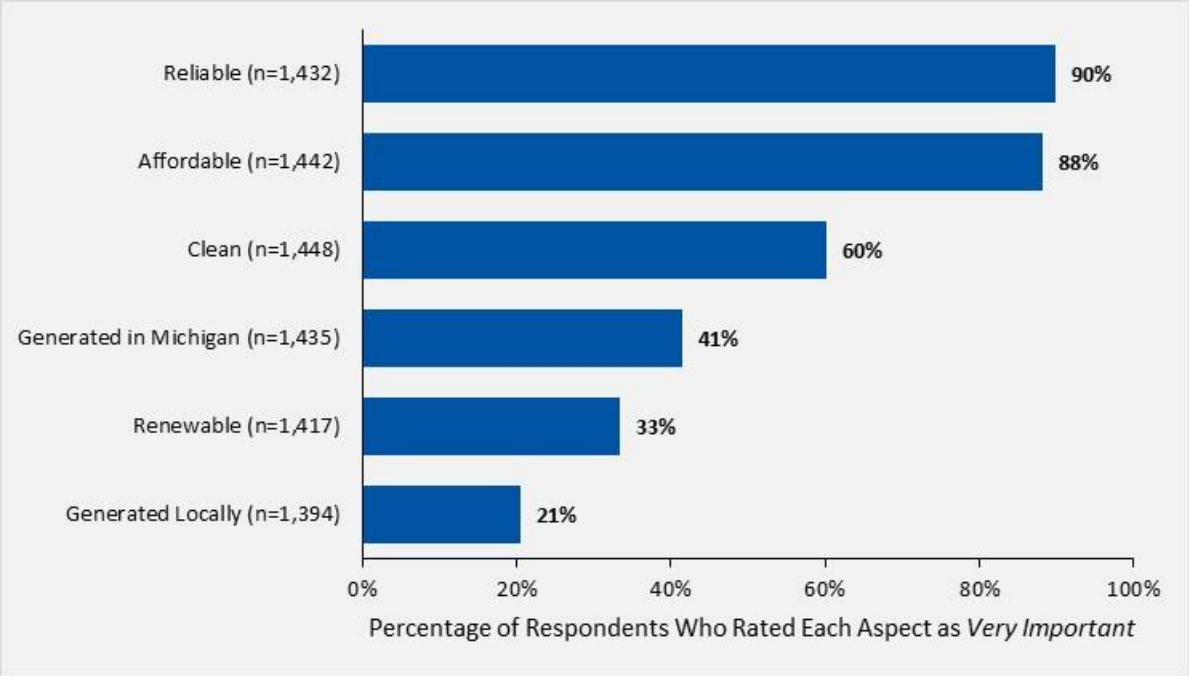

Figure 1. Income-qualified survey respondent ratings of important qualities of electricity

Survey and focus group respondents believe it is important to have a choice in how their energy is generated and that energy generation consider future populations. As one Flint focus group respondent said, "I am not entirely sure how my electricity is currently generated, but a coal-fired plant is my last choice. I have a daughter. I want the planet to be here for my kids and grandkids." Nearly one-third of survey respondents (30%, n=1,454) rated having a choice in how their electricity is generated as *very important* (and another 31% rated this as *somewhat important*). Focus group respondents across Michigan agreed that energy generation "should be a concern for everyone," not only because everyone is paying for the generation, but because everyone has shared environmental concerns. Customers who participated in the focus groups easily connected the link between clean energy, their personal health, and the health of the environment. For example, one Muskegon respondent made a connection between the environment and personal health, stating, "If the environment wasn't so [bad], I wouldn't be so sick."

Market Barriers

Income-qualified customers are aware of and support renewable energy, with 69% of survey respondents holding a favorable opinion of renewable energy. During focus group discussions, customers expressed not only an interest in learning more about how they can obtain renewable energy for their home, but also a desire for Consumers Energy to accelerate the adoption of renewable energy. However, the survey and focus groups revealed multiple real and perceived barriers that income-qualified customers must overcome to feel ready to participate in a program and obtain renewable energy. For example, 50% of the survey respondents do not know how to get renewable energy for their home, 50% said renewable energy is not something they typically read about or hear about, and 61% do not know anyone with renewable energy (Figure 2). These findings indicate that many income-qualified customers have had little exposure to renewable energy within their normal information channels, networks, and communities, and therefore have many questions surrounding the technology and how a program might logistically be implemented.

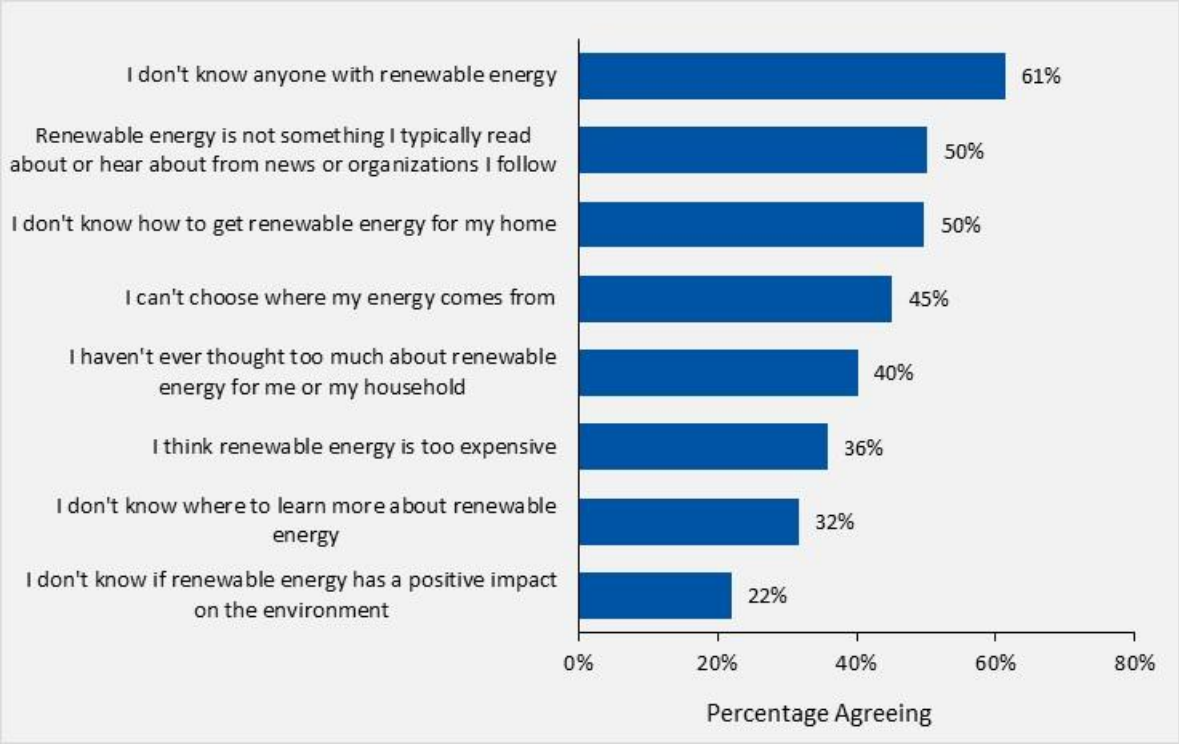

Figure 2. Income-qualified respondents' agreement with renewable energy barrier statements

Survey respondents specifically expressed confusion around several key elements of renewable energy and potential future programs: how renewable energy—particularly solar-only options—will serve as a reliable energy source, how free or discounted programs are funded, and how to use renewable energy credits to fund renewable energy. Respondents who received additional clarifying information about these topics generally rated the information as helpful:

- ***Reliability***. Focus group and survey respondents were consistent in their concerns about losing some reliability in their power supply if relying on solar. Survey respondents said it was helpful to have information explaining how Consumers Energy would manage grid reliability when using solar and wind power (66%; n=359).
- ***Free or discounted programs.*** Respondents exhibited skepticism about a free, donated community solar program.[2] Some customers said they do not understand why energy would be provided to them for free and that there must be some "catch" to participating. As one Cadillac focus group respondent stated, "If it sounds too good to be true, it probably is." Survey respondents who received information about why Consumers Energy would offer a donated community solar program at no cost to them rated this information as one of the most helpful details they received (71%; n=302). Two-thirds of survey respondents (67%; n=300) also said that information about where the donations come from to cover the costs for a community solar program is helpful (a sentiment shared by some focus group respondents). Cadmus asked survey respondents to name credible messengers for a program like this and respondents cited several trusted organizations, including the Michigan Department of Health and Human Services, Consumers Energy, TrueNorth, and the Salvation Army.

[2] Cadmus presented a potential donated community solar program to respondents, through which income-eligible customers would receive a credit on their electric bill for energy generated by a community solar array, funded by public and private donors through non-profit organizations. The donation concept allows the program to remain revenue neutral, as required by the Michigan Public Service Commission (State of Michigan 2018).

- ***Subscribing to renewable energy credits***. Focus group respondents expressed confusion about how they would receive renewable energy in their home after subscribing to a program that does not involve installing on-site solar. They also expressed being more likely to participate in a renewable energy credit subscription program if they had more information about how it works. As one Flint focus group respondent said, "I live in a trailer park, so there is a trailer 15 feet from mine. If I pay more, how do I know I am getting the renewable energy and not the other trailer?" Over half the survey respondents (55%; n=355) found information about how subscriptions of renewable energy credits work and where their energy would come from to be helpful.

Willingness to Pay

Though energy costs are a leading household concern for income-qualified customers,[3] the research revealed that the income-qualified segment not only understands why renewable energy may cost more, but also are willing to pay a nominal amount to obtain renewable energy. Customers agreed with statements that referred to renewable energy as being more expensive in the short term or requiring a fee due to new technology or new infrastructure, while a minority (29%; n=1,057) believe that "renewable energy is free, because the wind and the sun are free" (Figure 3). Customers do expect their energy costs to go down over time. One Flint focus group respondent stated that renewable energy costs more because of its development: "Fossil fuels are established, but when renewable energy is up and running, I assume we would see costs come down."

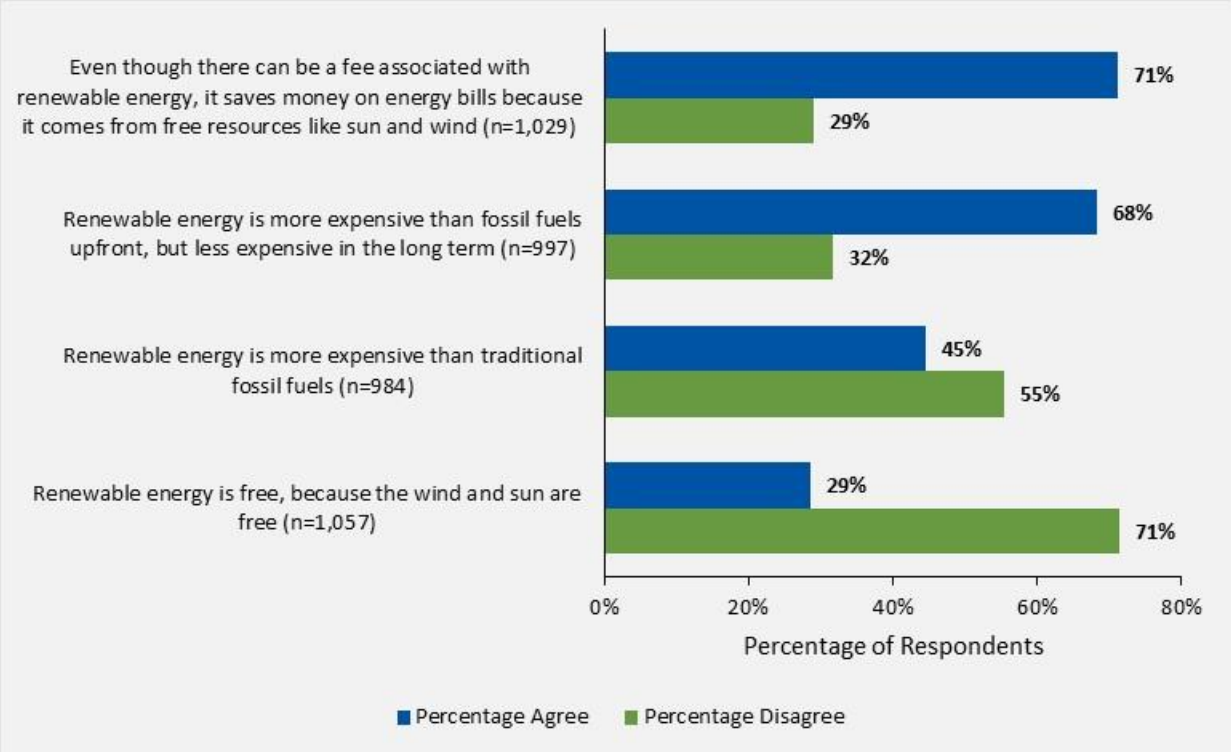

Figure 3. Income-qualified survey respondents' perceptions of renewable energy costs

Focus group respondents reported being willing to pay $5 or even $10 more for renewable energy monthly, comparing that incremental monthly cost to small purchases such as buying soda or coffee. However, though willing to pay, income-qualified customers are price sensitive. Survey respondents were significantly more

[3] Respondents rated energy as their second most important household cost. Thirty-five percent rated energy as their greatest concern, while 48% rated housing costs (such as mortgage or rent) as their greatest concern.

likely to participate in a program that offers renewable energy credits that match 50% of their usage for $3 per month compared to one that offers renewable energy credits that match 100% of their usage for $6 per month ($p$<0.10); however, there was only a 6% difference in market demand for these options, underscoring that some income-qualified customers are still willing to pay more for added access to renewable energy and may appreciate having that type of program choice.

Renewable Energy Drivers

To provide Consumers Energy with relevant information for talking to income-qualified customers about renewable energy, Cadmus used a MaxDiff analysis to identify the *most appealing* benefits of renewable energy. Cadmus tested eight commonly understood benefits and facts about renewable energy that are often cited for pursuing a clean energy future (listed in Figure 4). The goal of this analysis was to determine which benefit resonated most with customers based on their ranking of the relative importance of each.

Survey respondents cited "renewable energy fights climate change because it does not produce greenhouse gas emissions like coal-fired power plants do" as the most important benefit of renewable energy. Focus group participants also cited climate change as a concern. This finding underscores the fact that addressing climate change specifically is a key driver for income-qualified customers, beyond the other benefits. Messages about health and helping future generations were the next most important benefits to income-qualified customers, while they rated job creation and long-term availability as the least important benefits.

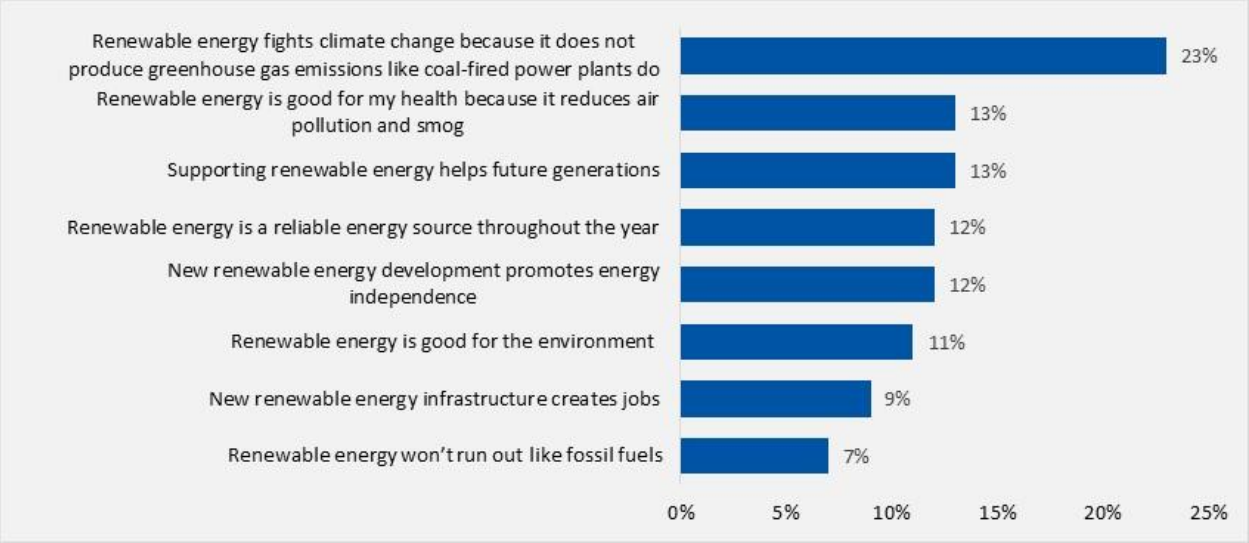

Figure 4. Predicted preference share of renewable energy benefits among income-qualified survey respondents. The preference share is a model output indicating the likelihood that the attribute would actually prove to be the most appealing benefit.

The modeled data provided another layer of insight surrounding customer attitudes. Though the predictive analysis forecasts that "fighting climate change" is likely the most important benefit of renewable energy for the greatest number of customers, Cadmus also found it to be a polarizing message, resonating the least with certain customers.

A key benefit of MaxDiff analysis is the rich data it produces, which can illustrate nuanced and complex attitudes better than an ordinary rating scale would. In addition to the predicted preference share for the most appealing benefit of renewable energy, the analysis also produced average utility scores. These scores represent the relative importance of each feature compared to the other features and are helpful for illustrating respondents' range of opinions. As shown in Table 4, the average utility scores for renewable energy benefits were

relatively clustered; for example, the top benefits were differentiated by less than one point each. This can be interpreted to mean that one benefit does not have a large relative difference over another.

Ordered differently than the preference shares shown above, the average utility score is a function of the number of times each benefit was selected as the most important (driving the score upward) *and* as the least important (driving the score downward). For example, the message, "renewable energy fights climate change because it does not produce greenhouse gas emissions like coal-fired power plants do" was selected as *most* important by 29.5% of respondents and was selected as *least* important by 22.5% of respondents. This creates an average utility score below the score for "renewable energy is good for the environment," which was only selected as least important by 6% of respondents. It is useful to consider both utility scores and preference shares to understand customer values and drivers. For example, while "fighting climate change" was selected most often as the most important benefit of renewable energy, and is predicted to be the most preferred message, the "good for environment" message is less polarizing.

Table 4. Average utility scores of renewable energy benefits

Benefit	Utility Score	Most Important	Least Important
Renewable energy is good for the environment	0.5	23.0%	6.0%
Supporting renewable energy helps future generations	0.2	22.0%	13.5%
Renewable energy fights climate change because it does not produce greenhouse gas emissions like coal-fired power plants do	0.2	29.5%	22.5%
Renewable energy is good for my health because it reduces air pollution and smog	0.0	21.0%	14.5%
Renewable energy is a reliable energy source throughout the year	-0.4	19.5%	19.5%
New renewable energy development promotes energy independence	-0.4	20.0%	21.0%
New renewable energy infrastructure creates jobs	-1.2	13.0%	30.0%
Renewable energy won't run out like fossil fuels	-1.3	12.0%	33.0%

Notes: This data was generated from MaxDiff modeling output. A negative average utility score generally means the feature was chosen as least important more often than it was chosen as most important, or that those options were chosen by roughly the same number of respondents. Negative utility scores should not be interpreted as meaning that respondents viewed this particular trait as a drawback, only that it was not as powerful as messages with a positive utility score.

Research Application to Program Design

Based on the findings from this customer research, Consumers Energy refined its voluntary green pricing program offerings. In June 2021, Consumers Energy launched MI Sunrise Solar, a subset of its Solar Gardens community solar program. MI Sunrise Solar allows nonprofit organizations to procure block subscriptions in excess of their own annual use and to assign the additional blocks to income-qualified residential customers. These subscription costs may be funded through grants or tax-deductible donations. The blocks provide nonprofit organizations and income-qualified individuals with monthly bill credits to reduce monthly energy costs. Subscriptions are assigned to customers by the nonprofit agency for periods of up to three years. After three years, the participating nonprofit may rotate the subscription to a new recipient, so they can distribute the benefits to multiple households, or they may choose to reassign the subscription to the same customer (this is decided on a case-by-case basis). If a previous recipient wishes to continue subscribing to renewable energy on their own, Consumers Energy offers other low-cost voluntary green pricing program options including a Renewable Energy Credit pilot.

Educational institutions are also eligible to participate in MI Sunrise Solar and can secure funding to enroll their electric accounts through grants, donations, or other payment options; these institutions may explain the source of the funding to donation recipients. Nonprofit organizations administering donations are available to explain the program directly to income-qualified customers and provide clarifying information about donation funding sources, as needed. Cadmus tested income-qualified customers' likelihood to participate in a donated

community solar program similar to MI Sunrise Solar during the online survey, estimating 39% market demand for the program concept. MI Sunrise Solar is an innovative program concept that Consumers Energy will continue to monitor and refine as implementation progresses.

Conclusions

While reliability remains a top energy concern for income-qualified customers, the segment also understands the benefits of clean energy for their health, future generations, and the environment. The research revealed that renewable energy is important to this customer group because of the ability to address climate change and help the environment. Based on the MaxDiff test Cadmus employed in the survey, respondents most often selected fighting climate change as the most important benefit of renewable energy, and is predicted to be the most preferred message, yet a message about renewable energy being good for the environment was less polarizing. For example, income-qualified respondents selected the benefit of addressing climate change as the least important advantage of renewable energy nearly as often as they selected it as the most important advantage, implying that messages surrounding the broader environmental benefits of renewable energy may be the best way to reach the most customers.

Overall, the findings illustrate that income-qualified customers value the health and environmental benefits of clean energy as key considerations beyond the impact on their electricity bill. Income-qualified customers understand why renewable energy may cost more up front than fossil fuel energy and are willing to pay more to obtain it, though they favor least cost options.

Income-qualified customers are interested in renewable energy programs and are seeking more information about how renewable energy can become a reality for their home: they value details surrounding payment and assurance of energy reliability as being very important.

To provide equitable access to renewable energy to all customers, it is imperative that utilities and program administrators conduct customer research that goes beyond understanding whether customers will participate in existing programs, but that also explores what renewable energy options customers (especially those who are disenfranchised) want and how and why they take certain actions to pursue clean energy.

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