Willingness to Pay for Renewable Energy in East Lansing

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Abstract

Utilizing choice experiments, we report that consumers in East Lansing are willing to pay (WTP) an extra $26.19 per month and $14.31 per month to change their electricity source to solar and wind generation respectively. This result indicates that solar energy is preferred to wind.

Respondent characteristics influenced WTP for renewable energy. Those who identified as liberal had, on average, a higher WTP. An increase in the number of children reported by respondents led to an increase in WTP mitigate environmental damages associated with renewable projects, and women overall had a higher WTP for renewable energy than their male counterparts. These results are verified in prior literature on the subject. However, our analysis produced contradicting results regarding education and income, likely as a result of our small and unrepresentative size.

Introduction

With the United Nations Framework Convention on Climate Change (UNFCCC) warning that current climate plans remain insufficient to limit global temperature rise to 1.5 degrees Celsius, there is growing recognition from policymakers and the public that urgent action is needed to address the issue (UNFCCC, 2022). According to recent polling from Yale University, 65% of Americans are worried about global warming, and believe local officials (59%), governors (57%), Congress (61%), and the president (52%) should do more to address the climate crisis (Yale University, 2021).

Renewable energy systems (e.g., solar, wind) are seen as a long-term solution to climate change. By increasing households' renewable energy portfolios, policymakers hope to decrease reliance on fossil fuels and achieve greenhouse gas (GHG) emission

reductions. However, the U.S. remains heavily dependent on petroleum and natural gas (University of Michigan, 2022). In 2022, renewable technologies comprised only 13% of the nations' total energy mix (University of Michigan, 2022). In the state of Michigan, renewables provided about 11% of electricity net generation in 2021 (USEIA, 2022).

When designing policies that increase renewable energy investments, it is important to minimize any perceived costs while maximizing benefits to consumers. Several factors must be considered, including aesthetic effects, environmental damage, and household electricity prices.

Using discrete choice experiments (DCEs), this study determines which attributes impact willingness to pay (WTP) for renewable energy in East Lansing. The goal is to understand the environmental and economic aspects of renewable energy that will direct public uptake and support. By understanding public preferences, this research can be leveraged to achieve optimal policy outcomes.

This paper is split into multiple sections, consisting of a review of the academic literature, our survey design and implementation, methodology, and results. We conclude by discussing the policy implications of our choice experiment survey.

Literature Review

There is a desire amongst policymakers and economists to understand what social, economic, and environmental factors influence an individual's willingness to pay for non-market goods and services. The scholarly literature concerning WTP for renewable energy is increasingly significant, given the proliferation of federal and state policies aimed at expanding alternative energy solutions (e.g., renewable portfolio standards, clean energy tax credits).

In general, this body of work demonstrates that household characteristics–such as educational attainment, race, age, income level, and general environmental attitudes–inform WTP for renewable energy. Batley et al. (2001) illustrated that WTP varies with social status and income, while Borchers et al. (2007) showed that the type of renewable energy significantly influences WTP. Arpan et al. (2017) have produced results showing that liberals are more WTP than conservatives, despite value-signaling and policy framing efforts presented to them.

Results from research conducted by Yale University in 2019 showed that, on average, Americans were willing to pay an extra $16.25 per month to get their electricity from 100% renewable sources (Gustafson et al., 2019).

With our paper, we seek to localize this body of research by examining WTP for renewable energy in East Lansing, MI. Exploring regional variations in national averages is significant, especially for local and state policies that seek to increase renewable uptake. As such, this study considers a multitude of household characteristics and attributes related to renewable energy projects that influence WTP.

Survey Design and Implementation

Choice experiment surveys are a stated valuation method used to derive WTP for non-markets goods and services. This methodology is based on Lancaster's characteristics theory of value and random utility theory. Lancaster's characteristics model states that consumers' derive utility from the attributes of a good, rather than the good itself. Therefore, the value of any good is the sum of the value placed on its individual characteristics (Lancaster, 1966). Meanwhile, random utility theory states only an indirect determination of preferences can be for an environmental good or service, since some determinants of value are unobservable (McFadden, 1974).

For our choice experiment survey, respondents were first asked to provide demographic and other personal information. These questions were aimed at eliciting individual characteristics (e.g., income, race, education) as a means of analyzing disparities in WTP among respondents.

Then, respondents were presented with eight questions in which they were asked to decide between bundles with different levels of the same four attributes associated with renewable energy projects. **Table 1** outlines the attributes and attribute levels used in our survey, which was explained and shown to respondents before they were promoted to answer questions.

Table 1. Attributes and Attribute Levels

Attribute	Levels
1. Type of Energy Source	● Solar ● Wind ● Status quo: present energy mix
2. Aesthetic Effects	● Noise and visual impact observable from home ● No noise and visual impact observable from home ● Status quo: no impact observable from home

3. Action to Reduce Environmental Impact	● Action taken to reduce environmental impacts of renewable energy projects ● No action taken to reduce environmental impacts of renewable energy projects ● Status quo: no action taken
4. Effect on Electricity Bill	● Extra $5/month ● Extra $15/month ● Extra $25/month ● Extra $35/month ● Status quo: no increase in electricity bill

The first attribute, the type of energy source, describes the energy portfolio options available to respondents. Wind and solar energy were chosen due to their prevalence in Michigan's current energy portfolio, as well as their comparative prices. Wind energy is responsible for the majority of renewable generation in Michigan, making up three fifths of the state's renewable energy profile (USEIA, 2022). While less prevalent in the state, solar was chosen due to its average cost per kWh being similar to wind. The national average cost of solar energy is $0.06 per kWh, and $0.02 per kWh for wind energy (USDE, 2017), (USDE, 2019). For this attribute, the status quo refers to a respondents' current energy portfolio, reflecting no changes in renewable energy.

The second attribute, concerning aesthetic effects, speaks to the auditory and visual impacts renewable energy projects have on residents. The levels chosen are concerned with noticeable effects observable from a respondent's home. Visual impacts associated with solar projects include annoyances resulting from light glare reflected off of the panels, whereas auditory impacts, such as wind turbine noise, are associated with wind farms. Respondents are presented with information informing them of whether aesthetic effects (visual or auditory) are associated with a renewable energy project. The status quo is no observable impacts from renewable projects.

The third attribute relates to action taken to reduce the environmental impact of renewable projects, as possible damages that stem from the construction process of wind and solar systems. Activities to mitigate harm include migratory bird surveys to ensure that wind turbines are not being constructed in migration corridors, as well as soil and water studies that help protect wetlands or other vulnerable ecosystems from infilling. The levels associated with this attribute are a binary "action taken", and "action not taken", where the former assumes that such practices were carried out, while the latter assumes environmental protection measures were not taken.

The fourth and final attribute, effect on electricity bills, describes the dollar amount increase that respondents would incur on their energy bill as a result of the choices that they have made. Renewable energy projects are associated with a short-term bill increase, while the respondents' bills do not increase under a status quo alternative. The levels chosen for this attribute range from a $5 monthly increase to a $35 monthly increase, and were selected based on the average per month electricity bill in East Lansing ($137). With a baseline of $137, the prices selected correspond to a 5%, 10%, 15%, and 20% increase in monthly bills, making these levels reasonable enough for respondents to rationally consider.

In our choice experiment, we included a status quo option in each choice set to compare the respondents' preferences of the given scenario with their current situation. The inclusion of a status quo option is necessary in order to estimate the value of WTP (Hanley et al., 2001).

Once the attributes and their levels were chosen, we applied an orthogonal design to reduce the dimensions of a full factorial design matrix, which includes every possible combination of choices. An orthogonal design was chosen due to our sample size, which we expected to be small, and the fact that there are no combinations that are realistically impossible. After reducing to a fractional factorial design, we arrived at eight choice experiment questions. These questions, in addition to the rest of our survey, are presented in **Appendix A**.

A non-probabilistic convenience sample was conducted in order to retrieve synthetic data for our project. As such, results cannot be assumed to be representative of a wider population, and are likely biased according to the characteristics exhibited by our friends, family members, and colleagues.

Surveys were conducted using Qualtrics, an online survey platform between November 4 and November 13, 2022. A total of 64 respondents were sampled, with 56 complete responses used for analysis.

Methodology

As described above, the objective of this study is to estimate how much individuals value various characteristics of renewable energy, in order to predict WTP. The theoretical framework is based on the theory of value and random utility theory. Therefore, we analyze the choice experiment data based on the assumptions that an individual would choose the source of electricity (e.g., solar, wind, or status quo mix)

that yields maximum utility under the budget constraint. An individual's *i* utility when he chooses alternative *j* can be modeled by

$$U_{ij} = \beta_1 * aesthetic\ effect_j + \beta_2 * mitigate\ environment\ effect_j + \beta_3 * energy\ source + \beta_4 * cost_j + \epsilon_{ij}$$

where *aesthetic effect*, *mitigate environment effect* and *cost* are the characteristics of each source of energy. *Energy source* represents the other characteristics that are directly related to each source. β_1, β_2, β_3, β_4 represent the marginal utility or disutility of each attribute and ϵ_{ij} is the part of the utility function that is not observable. From the utility function, the probability of farmer choosing the alternative *j* is

$$Prob(choose\ j) = e^{V_{ij}} / \sum_{k=1} e^{V_{ij}}$$

where V_{ij} denotes the part of utility function that is observable and determined by the level of attributes and individual specific characteristics.

The first model is estimated with a conditional logit model, which assumes that the coefficients are identical across individuals and the error terms are assumed to be independent and identically distributed. In order to consider the heterogeneity of individuals, we further apply a random coefficient logit model. This allows us to vary coefficients across individuals and assume that there are random variations in response to each attribute. All estimations were conducted using mlogit Package in R.

Results

Descriptive Statistics

We received 56 complete responses from individuals living in and around East Lansing. The average age range of respondents was between 25-34 years old, while 48% of respondents were male and 48% were female. The mean annual household income was between $35,001 and $70,000.

Our sample is heavily skewed towards those with a high level of education, liberal political beliefs, white identity, and concern and general knowledge regarding climate change. The average level of education completed is a bachelor's degree, with 76% of the sample classifying themselves as liberal. 63% identified as White, compared to 24% Asian and 7% Black. Meanwhile, 100% of respondents believed climate change was occurring, with 94% stating it was caused by mostly human activities. 64% of those

surveyed were very concerned about climate change, and 82% felt somewhat or strongly personally affected by global warming. **Table 2** highlights our variable definitions and descriptive statistics.

Table 2. Variables Definition and Descriptive Statistics

Variable	Definition	Mean	S.D.
age	Self-reported age (1=18-24, 2=25-34, 3=35-44, 4=45-54, 5=55-64, 7=65-74, 8=75)	2.02	1.19
educ	Highest level of education completed (1=some high school, 2=high school or associates, 3=bachelors, 4=masters, 5=doctoral)	3.59	1.07
gender	Gender identity (1=male, 2=female, 3=other)	1.55	0.56
income	Annual household income (1=≤$35,000, 2=$35,001-$70,000, 3=$70,001-$129,000, 4=≥$129,000)	2.15	1.13
bill	Cost of monthly energy bill (1=≤$50, 2=$51-$100, 3=$101-$150, 4=$151-$200, 5=≥$200)	2.24	1.11
children	Number of children (1=none, 2=1, 3=2, 4=3, 5=≥4)	1.25	0.74
pol_ideo	Political ideology (1=very conservative, 2=slightly conservative, 3=moderate, 4=slightly liberal, 5=very liberal)	4.05	0.98
race	Racial identity (1=asian, 2=black, 3=pacific islander, 4=white, 5=other)	4.20	1.35
prof_status	Professional status (1=retired, 2=full-time, 3=part-time, 4=unemployed)	2.51	0.71
enrgy_satf	Satisfaction with current energy provider (1=very satisfied, 2=somewhat satisfied, 3=somewhat dissatisfied, 4=very dissatisfied)	1.84	0.78
elec_vehc	Number of hybrid or electric vehicles (1=none, 2=1, 3=2, 4=≥3)	1.13	0.38

climt_hpn	Whether climate change is happening (1=yes, 2=no, 3=don't know)	1.00	0.00
climt_cause	Cause of climate change (1=mostly humans, 2=mostly natural, 3=other, 4= don't know)	1.11	0.45
climt_worry	Concern about climate change (1=very, 2=somewhat, 3=not very, 4=not at all)	1.38	0.52
climt_prsnl	Personally affected by climate change (1=strongly agree, 2=somewhat agree, 3=neither agree nor disagree, 4=somewhat disagree, 5=strongly disagree)	2.00	0.95
climt_media	Frequency of climate change in consumed media (1=at least once a week, 2=at least once a month, 3=several times a year, 4=once a year or less, 5=never)	1.56	0.76

WTP Results

Results are estimated using a conditional logit and mixed logit model. Each method is applied with and without the interaction with individual variables. **Table 3** describes the estimated results for each model. Based on the AIC statistic, we discuss the result of mixed logit model with interactions.

The mixed logit model illustrates that our four applied attributes have statistically significant effects on the preferences of renewable energy projects. The negative coefficients of *aesthetic* and *cost* are consistent with the expectation that seeing or hearing a solar field or wind farm, as well as experiencing an increase in their electricity bill, would decrease respondent's utility, therefore negatively affecting their preference for renewable energy. The results are similar in conditional logit model and random coefficient model, suggesting that the estimation results are robust.

Furthermore, the positive coefficient of *env_action* indicates that respondents value action taken to mitigate environmental damages associated with renewable energy projects. This statistically significant effect is shown to increase respondent's utility and positively impact renewable energy preferences.

Table 3. Model Results

Variable	Coefficient (Std.Error.)		
	Conditional Logit	Mixed Logit	Mixed logit with interactions
source_solar	2.4262 *** (0.2625)	2.5950 *** (0.4145)	-3.9311 *** (1.4243)
source_wind	1.3203 *** (0.2240)	1.4178 *** (0.2972)	-3.3915 ** (1.4023)
aesthetic	-1.1607 *** (0.1679)	-1.2399 *** (0.22186)	-1.8524 *** (0.3222)
env_action	1.8933 *** (0.2149)	1.9818 *** (0.2706)	3.5510 *** (1.3162)
cost	-0.0928 *** (0.0097)	-0.0991 *** (0.0148)	-0.1096 *** (0.0162)
*source_solar*pol_ideo*	—	—	0.6747 ** (0.2530)
*source_wind*pol_ideo*	—	—	0.6406 ** (0.2603)
*source_solar*climt_worry*	—	—	1.1530 *** (0.4065)
*source_wind*climt_worry*	—	—	0.6934 ** (0.3310)
*aesthetic*sex*	—	—	0.9820 *** (0.3254)
*env_action*kid*	—	—	0.6766 ** (0.3276)
*env_action*pol_ideo*	—	—	-0.0439 (0.2495)
*env_action*educ*	—	—	-0.4303 * (0.2268)
*env_action*income*	—	—	-0.2628 * (0.1549)

AIC	685.2	692.0	629.5

***, **, * represent statistical significance in 1%, 5%, 10% level respectively

Further analyses are based on the random coefficient logit model to incorporate the heterogeneity of respondents. From the estimated parameter, the WTP for each attribute is calculated.

Results show that consumers are willing to pay an extra $26.19 per month and $14.31 per month to change their electricity source to solar and wind generation respectively. This can be translated into $314.28 per year and $171.72 per year. This is in line with previous literature where the estimated willingness to pay is $162 per year for 80% clean energy (Aldy et al., 2012) and $6.09 per semester for increasing renewable energy by 1% (Komarek et al., 2011). Our choice experiment illustrates that respondents prefer solar energy to wind. This may be respondents internalizing the aesthetic effects of solar energy projects compared to wind farms, to which there are usually more ways to minimize direct observations from households.

Results illustrate that those who identify as politically liberal have a higher WTP for both solar and wind energy, although there is no a statistical correlation with the action variable. This reflects prior literature showing a statistically significant negative relationship between conservatism and willingness to pay for environmental protection (Nawrotzki, 2012), in addition a partisan gap between Democrats and Republicans views of climate change (Kennedy & Johnson, 2020).

Compared to women, men have a statistically significant and higher WTP to avoid the aesthetic impacts associated with a renewable energy project. Meanwhile, with each additional child reported by a respondent, WTP for action to mitigate environmental effects increases by $6.17.

On the other hand, education and income have a statistically insignificant effect on WTP for renewable energy. This result is opposite of existing research. This is likely due to our small sample size, where a higher education level is often associated with a lower income level, since many respondents are students making less than what would be expected given their academic credentials. Additionally, a higher level of education and income are negatively associated with WTP to mitigate the environmental damages resulting from renewable energy projects, counter to what prior studies would have assumed.

Respondents who worry about climate change were more likely to place a higher value on renewable energy energy. In keeping with an overall preference for solar energy, the

increase in WTP is higher for solar energy. On a five-point Likert scale, a one unit increase in concern increased WTP for solar by $10.52 compared to a $6.33 increase for wind.

Conclusion

Choice experiments provide insight into WTP for renewable energy. Our results indicate that respondents are WTP more for solar and wind energy. Specifically, respondents were willing to pay an extra $25.91 per month for solar energy and an additional $14.11 per month for wind energy. This also indicates that among those surveyed, respondents preferred solar to wind energy. These results are in line with previous estimations of WTP.

The choice experiments provided interesting insights into the demographic characteristics influencing WTP. While political ideology did not have a statistical correlation to the action variable, those who identified as liberal had, on average, a higher WTP. This trend is supported by previous research on partisanship surrounding climate related issues.

Other demographic indicators, like number of children and gender, had an effect on WTP. Each additional child reported led to an increase in WTP for environmental protection measures, and women overall had a higher WTP for renewable energy than their male counterparts.

Perception on the danger of climate change was also found to be an influential factor in respondents WTP for renewable energy. Higher levels of concern saw an increase in WTP of $10.52 for solar and $6.33 for wind per increasing level. The differences between solar and wind are consistent with the preferences previously noted. Differences aside, concern over climate change is a notable factor when determining WTP for renewable energy.

Our analysis contradicted previous research regarding WTP and its relation to education and income. While past studies found that higher education and income levels would have a positive effect on WTP for renewable energy, our research yielded an statistically insignificant result. This is likely due to our sample size, as many respondents– who are currently in graduate school– selected income levels uncharacteristically low for their level of educational attainment. A survey with more respondents samples from a more racially, economically, and educationally diverse population would likely correct for this.

If our sample were representative of East Lansing residents, there would be profound implications to consider. Our results show that there is a willingness to pursue projects that lead to more renewable energy, even despite inflationary pressures on household electricity bills. As such, East Lansing and surrounding municipalities should consider ways to incentivize and aid utility providers and individuals in transitioning to renewable energy. This could be accomplished by offering energy providers funding and land to pursue such projects, as well as discounting the property taxes of residents who install solar panels. Given that solar projects are preferable in residential areas, actions should be taken to alter zoning and residential permitting laws to make these solutions amenable to utilities and the public alike.

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Appendix A. Survey Questions

DEMOGRAPHIC QUESTIONS

Q1. What is your age?

A. 18-24 years old
B. 25-34 years old
C. 35-44 years old
D. 45-54 years old
E. 55-64 years old
F. 65-74 years old
G. 75 years or older

Q2. What town/city do you live in?

_____

Q3. What is the highest degree or level of education you have completed?

A. Some High School
B. High School
C. Bachelor's Degree
D. Master's Degree
E. Ph.D. or higher
F. Trade School

Q4. What gender do you identify with?

A. Female
B. Male
C. Non-birary
D. None of the above, please specify: _____

Q5. What is your sexual orientation?

A. Asexual
B. Bisexal
C. Gay
D. Heterosexual or straight
E. Lesbian

F. Pansexual
G. Queer
H. None of the above, please specify: _____

Q6. How many children do you have?

A. None
B. 1
C. 2
D. 3
E. 4+

Q7. What is your current marital status?

A. Married
B. Widowed
C. Divorced
D. Seperated
E. Never married

Q8. Do you consider yourself to be:

A. More conservative than not
B. Slightly conservative
C. Moderate
D. Slightly liberal
E. More liberal than not

Q9. Are you of Hispanic/Latino/Spanish origin?

A. Yes
B. No

Q10. How would you best describe yourself?

A. American Indian or Alaska Native
B. Asian
C. Black or African American
D. Native Hawaiian or Other Pacific Islander
E. White
F. Other

Q11. What is your primary language?

A. English
B. Spanish

C. Arabic
D. Other: _____

Q12. What is your professional status?

A. Retired
B. Full-time
C. Part-time
D. Unemployed

Q13. What is your annual household income?

A. Less than $35,000
B. $35,001 - $70,000
C. $70,001 - $129,000
D. More than $129,000

ENERGY BEHAVIOR QUESTIONS

Q1. Who is your current energy provider?

_____

Q2. Are you satisfied with your current energy provider? If not, why?

a. Very satisfied
b. Somewhat satisfied
c. Somewhat dissatisfied: _____
d. Very dissatisfied: _____

Q3. On average, how much is your monthly energy bill?

a. Less than $50
b. $51-100
c. $101-150
d. $151-200
e. More than $201

Q4. How many electric or hybrid vehicles does your household own?

a. None
b. 1
c. 2
d. 3+

Q5. Does your household have any renewable energy systems on property? (Select all that apply)

a. Solar photovoltaic panel
b. Solar heating
c. Air source heat pumps
d. Biomass system
e. Geothermal Heating
f. Small scale wind
g. Other
h. None

CLIMATE CHANGE PERCEPTION QUESTIONS

Q1. Do you think global warming is happening?

a. Yes
b. No
c. Don't know

Q2. Assuming global warming is happening, do you think it is…

a. Caused mostly by human activities
b. Caused mostly by changes in the environment
c. None of the above, because global warming isn't happening
d. Other: _____
e. Don't know

Q3. How worried are you about global warming?

a. Very
b. Somewhat
c. Not very
d. Not at all

Q4. How much do you agree or disagree with the following statement: "I have personally experienced the effects of global warming."

a. Strongly agree
b. Somewhat agree
c. Neither agree nor disagree
d. Somewhat disagree
e. Strongly disagree

Q5. How often do you hear about global warming in the media?

a. At least once a week
b. At least once a month

c. Several times a year
d. Once a year or less often
e. Never

WTP QUESTIONS

Table 1. Attribute Levels

Attribute	**Levels**
Type of Energy Source	Solar, wind, status quo mix
Aesthetic Effects	Noise and visual impact from home, no noise and visual impact from home
Action to Reduce Environmental Impact	Action taken, action not taken
Effect on Electricity Bill	Extra $5, $15, $25, $35/month

In the following questions, you will be asked to pick between three energy portfolios with different effects on aesthetics, environmental impact mitigation, and your electricity bill. Option 1 and Option 2 will display renewable energy portfolios, while Option 3 will represent your status quo energy mix. Please read through the descriptions below before starting this part of the survey.

- **Energy source** refers to the makeup of your energy portfolio. Choosing “Solar” or “Wind” means that more of your portfolio will come from that form of energy production. Choosing “Status Quo” will result in no change to your portfolio. There will not be any difference in the quality of service received.
- **Aesthetic effects** refers to noise and visual pollution resulting from wind and solar projects that can be felt at home. This includes glare from the reflection of the sun off of solar panels, noise produced by wind and solar facilities, and in general, disturbances to aesthetic value of the area.
- **Action to mitigate environmental impact** refers to actions taken to reduce impact on the environment due to the development of wind and solar projects. This can include practices like identifying migratory bird corridors to prevent conflict with wind turbines, and soil and water surveys to identify how erosion from the creation of solar facilities will affect local aquatic ecosystems.
- **Effect on electricity bill** refers to the additional cost that is charged to your monthly bill as a result of the option that you choose. Choosing Option 3 (i.e. status quo) represents no change in the cost of your bill.

Q1. Suppose Option 1 and Option 2 are the only renewable energy options available. Which one would you choose? Please read all the features and of each option and select the box that represents your choice. If you do not like either Option 1 or Option 2, select Option 3.

Attribute	**Option 1**	**Option 2**	**Option 3**
Energy Source	Solar	Wind	Status Quo
Aesthetic Effects	It is visible from your home	You can hear it from your home	
Action to Mitigate Environmental Impact	Yes	No	
Effect on Electricity Bill	Additional $15/month	Additional $35/month	

Q2. Suppose Option 1 and Option 2 are the only renewable energy options available. Which one would you choose? Please read all the features and of each option and select the box that represents your choice. If you do not like either Option 1 or Option 2, select Option 3.

Attribute	**Option 1**	**Option 2**	**Option 3**
Energy Source	Solar	Wind	Status Quo
Aesthetic Effects	It is visible from your home	You cannot hear it from your home	
Action to Mitigate Environmental Impact	Yes	Yes	
Effect on Electricity Bill	Additional $25/month	Additional $15/month	

Q3. Suppose Option 1 and Option 2 are the only renewable energy options available. Which one would you choose? Please read all the features and of each option and select the box that represents your choice. If you do not like either Option 1 or Option 2, select Option 3.

Attribute	**Option 1**	**Option 2**	**Option 3**
Energy Source	Solar	Wind	Status Quo
Aesthetic Effects	It is not visible from your home	You can hear it from your home	
Action to Mitigate Environmental Impact	No	No	
Effect on Electricity Bill	Additional $35/month	Additional $5/month	

Q4. Suppose Option 1 and Option 2 are the only renewable energy options available. Which one would you choose? Please read all the features and of each option and select the box that represents your choice. If you do not like either Option 1 or Option 2, select Option 3.

Attribute	**Option 1**	**Option 2**	**Option 3**
Energy Source	Wind	Wind	Status Quo
Aesthetic Effects	You can hear it from your home	You cannot hear it from your home	
Action to Mitigate Environmental Impact	No	Yes	
Effect on Electricity Bill	Additional $15/month	Additional $25/month	

Q5. Suppose Option 1 and Option 2 are the only renewable energy options available. Which one would you choose? Please read all the features and of each option and select the box that represents your choice. If you do not like either Option 1 or Option 2, select Option 3.

Attribute	**Option 1**	**Option 2**	**Option 3**
Energy Source	Wind	Solar	Status Quo

Aesthetic Effects	You cannot hear it from your home	It is not visible from your home	
Action to Mitigate Environmental Impact	Yes	No	
Effect on Electricity Bill	Additional $25/month	Additional $5/month	

Q6. Suppose Option 1 and Option 2 are the only renewable energy options available. Which one would you choose? Please read all the features and of each option and select the box that represents your choice. If you do not like either Option 1 or Option 2, select Option 3.

Attribute	**Option 1**	**Option 2**	**Option 3**
Energy Source	Wind	Wind	Status Quo
Aesthetic Effects	You can hear it from your home	You can hear it from your home	
Action to Mitigate Environmental Impact	No	Yes	
Effect on Electricity Bill	Additional $35/month	Additional $15/month	

Q7. Suppose Option 1 and Option 2 are the only renewable energy options available. Which one would you choose? Please read all the features and of each option and select the box that represents your choice. If you do not like either Option 1 or Option 2, select Option 3.

Attribute	**Option 1**	**Option 2**	**Option 3**
Energy Source	Wind	Wind	Status Quo
Aesthetic Effects	You can hear it from your home	You cannot hear it from your home	
Action to Mitigate	No	Yes	

Environmental Impact			
Effect on Electricity Bill	Additional $15/month	Additional $5/month	

Q8. Suppose Option 1 and Option 2 are the only renewable energy options available. Which one would you choose? Please read all the features and of each option and select the box that represents your choice. If you do not like either Option 1 or Option 2, select Option 3.

Attribute	**Option 1**	**Option 2**	**Option 3**
Energy Source	Solar	Solar	Status Quo
Aesthetic Effects	It is not visible from your home	It is visible from your home	
Action to Mitigate Environmental Impact	No	Yes	
Effect on Electricity Bill	Additional $25/month	Additional $35/month	