2-20-2023

Public Support for Community Microgrid Services

Janie M. Chermak
University of New Mexico, jchermak@unm.edu

Jesse Ian Kaczmarski
University of New Mexico, jikaczmarski@unm.edu

Spring 2020 Microgrid Contingent Valuation

Start of Block: Introduction and Screener Questions

consent

Consumer Acceptance and Demand for Access to a Microgrid

Dr. Janie Chermak, from the University of New Mexico Department of Economics, is conducting a research project. The purpose of the research is to investigate how US households use electricity in their homes and their views towards public spending on microgrids for upgrading electricity infrastructure. You are being asked to participate because you volunteered to participate in online surveys through Qualtrics or one of their partners.

Your participation will involve answering questions about your energy use in an online survey. The survey should take about 15 minutes to complete. Your involvement in the research is voluntary, and you may choose not to participate, or revoke your participation at any time. There are no names or identifying information associated with your responses. There are no known risks in this research, but some individuals may experience discomfort or loss of privacy due to the personal nature of some questions. Data will be stored on Qualtrics servers with industry standard security. Further information can be found at https://www.qualtrics.com/security-statement/. The non-identifiable information may be used for future research or shared with other researchers without your additional informed consent.

The findings from this project will be used to further ongoing research into the feasibility and consumer acceptance of microgrid systems in their community. If published, collected data will be presented in summary form only.

If you have any questions, concerns, or complaints about the research, please feel free to call Dr. Janie Chermak at [redacted] If you have questions regarding your rights as a research participant, or about what you should do in case of any harm to you, or if you want to obtain information or offer input, please contact the UNM Office of the IRB (OIRB) at (505) 277-2644 or irb.unm.edu.

- ○ No, I do not want to participate in this study (0)
- ○ Yes, I agree to participate in this study (1)

Skip To: failure If Consumer Acceptance and Demand for Access to a Microgrid Dr. Janie Chermak, from the University o... = No, I do not want to participate in this study

Page Break

transition_1 Thank you for agreeing to participate in our survey. Your insights are valuable to further understanding the thought processes behind consumer choices and electricity. At this point, you are likely familiar with the Qualtrics platform, so in this section we will ask various questions to ensure that we have a representative sample of the 4-corners states (AZ, CO, NM, UT).

---

state In which state do you live?

- ○ Arizona (1)
- ○ Colorado (2)
- ○ New Mexico (3)
- ○ Utah (4)

Page Break

getsbill Does your household receive a monthly electric bill directly from a power or utility company?

- ○ No, or not sure (0)
- ○ Yes (1)

Skip To: failure If Does your household receive a monthly electric bill directly from a power or utility company? = No, or not sure

Page Break

X→

paysbill Is the monthly electric bill you pay only for your household's electricity use (and not for other houses, other apartments, or any other residential housing unity)?

- ○ No (0)
- ○ Yes (1)

Skip To: failure If Is the monthly electric bill you pay only for your household's electricity use (and not for other... = No

Page Break

female What is your gender?

- ○ Male (0)
- ○ Female (1)
- ○ Other or none of the above (2)

Page Break

birth_year Please enter the year that you were born (YYYY).

Page Break

hispanic Do you consider yourself to be Hispanic, Latino, or Spanish?

- ○ No (0)
- ○ Yes (1)

Page Break

race Which of the following best describes your race? Check all that apply.

- [ ] White (1)
- [ ] Black or African American (2)
- [ ] Asian (3)
- [ ] Native Hawaiian or Pacific Islander (4)
- [ ] American Indian or Alaska Native (5)
- [ ] Other (Please specify) (6) _____

Page Break

rural How would you classify your primary residence?

- ○ Urban (0)
- ○ Rural (1)

Page Break

income What is the range that best describes your total household income in 2019?

- ○ Less than $20,000 (1)
- ○ $20,000 to $29,999 (2)
- ○ $30,000 to $49,999 (3)
- ○ $50,000 to $74,999 (4)
- ○ $75,000 to $99,999 (5)
- ○ $100,000 to $149,999 (6)
- ○ $150,000 to $199,999 (7)
- ○ More than $200,000 (8)

Page Break

education_quota Have you obtained a college degree?

- ○ No (no college or some college but no degree) (0)
- ○ Yes (Associate's, Bachelor's, Master's, Doctoral and/or Professional) (1)

Skip To: transition_2 If Have you obtained a college degree? = No (no college or some college but no degree)

Skip To: transition_2 If Have you obtained a college degree? = Yes (Associate's, Bachelor's, Master's, Doctoral and/or Professional)

Page Break

failure Unfortunately, you do not meet the basic requirements to take this survey. These requirements ensure that we have a representative sample of electric ratepayers. Thank your for your time.

Skip To: End of Block If Unfortunately, you do not meet the basic requirements to take this survey. These requirements ens... Is Displayed

Page Break

transition_2 Based on your responses to the screening questions, you are eligible to take-part in the full survey.

This survey involves real policy choices about important issues, and we will provide information that we want you to consider when choosing responses. This means that you need to avoid lengthy interruptions during the survey process, so we are asking you to complete the survey in a single sitting. As previously noted, the survey should take only about 15 minutes to complete.

The following section will ask you about your electricity use and your relationship with your electricity provider.

End of Block: Introduction and Screener Questions

Start of Block: Electricity Use and Provider Relationship

type_bill
Electricity Use and Provider Relationship
How do you receive your electric bill?

- ○ Digitally (Paperless billing) (1)
- ○ In the mail (2)

---

pay_mechanism How do you pay your electric bill?

- ○ Autopay (1)
- ○ In person (2)
- ○ Mailing a check (3)
- ○ Online (credit/debit or checking account) (4)
- ○ Over the phone (5)

---

bill_stats Does your bill show your historical electricity use? For example, your bill may include a section that shows how your current electricity use compares to previous months.

- ○ No (0)
- ○ Yes (1)
- ○ Not sure (9)

---

usage_relative Compared to your neighbors, how much electricity do you think you use? (make your best guess)

- ○ Less (1)
- ○ About the same (2)
- ○ More (3)
- ○ Not sure (9)

---

tracking On a scale from zero to four, where zero means *not carefully at all* and four means *very carefully*, how carefully do you track your household electricity use and expenditures from month-to-month?

- ○ 0 - Not carefully at all (1)
- ○ 1 (2)
- ○ 2 (3)
- ○ 3 (4)
- ○ 4 - Very carefully (5)

Page Break

ownership What is the ownership structure of your electric provider? (Please do not guess, if you are not sure select the last option)

- Municipal (1)
- Investor Owned (2)
- Cooperative (3)
- Not sure (9)

---

cust_share Most utility bills comprise of a customer charge (the amount you pay for having an account) and a commodity charge (the cost of the electricity that you use). On average, does the customer charge make up the majority of your bill during the winter months?

- No (0)
- Yes (1)
- Not sure (9)

---

best_interest Do you think that your current electric provider always keeps customers' best interests in mind when making decisions?

- No (0)
- Yes (1)

---

reliable On a scale from zero to four, where zero means not at all reliable and four means very reliable, how would you rate the reliability of your electric provider?

- ○ 0 - Not at all reliable (1)
- ○ 1 (2)
- ○ 2 (3)
- ○ 3 (4)
- ○ 4 - Very reliable (5)

---

confidence Electric providers often have to decide which projects to spend money on. How confident are you that your electric provider will make objective and correct decisions?

- ○ Not at all confident (1)
- ○ Somewhat not confident (2)
- ○ Neither confident nor unconfident (3)
- ○ Somewhat confident (4)
- ○ Completely confident (5)

Page Break

outage_relative Do you think your household has more outages than average in the 4-corners (AZ, CO, NM, UT)?

- ○ No (0)
- ○ Yes (1)
- ○ Not sure (9)

---

outage_occurrence How long ago was your household's most recent power outage?

- ○ My home has never experienced a power outage (1)
- ○ Less than 6 months ago (2)
- ○ More than 6 months, but less than 1 year ago (3)
- ○ More than 1 year ago (4)
- ○ Not sure (9)

Skip To: dr_experience If How long ago was your household's most recent power outage? = My home has never experienced a power outage

Skip To: dr_experience If How long ago was your household's most recent power outage? = Not sure

---

Page Break

outage_recent_length To the best of your memory, approximately, how long was your household’s most recent power outage?

- ○ A few minutes, but less than one hour (1)
- ○ A few hours (1-4 hours) (2)
- ○ Multiple hours (5-11 hours) (3)
- ○ Half a day to a full day (12-24 hours) (4)
- ○ 1-3 days (5)
- ○ 4-6 days (6)
- ○ One week (7 days) (7)
- ○ More than one week, but less than one month (8)
- ○ Greater than one month (9)

---

outage_longest To the best of your memory, how long ago was your household's longest power outage?

- ○ Less than 6 months ago (1)
- ○ More than 6 months, but less than 1 year ago (2)
- ○ More than 1 year ago (3)

---

outage_longest_lengt To the best of your memory, what is the longest power outage ever experienced by your household?

- ○ A few minutes, but less than one hour (1)
- ○ A few hours (1-4 hours) (2)
- ○ Multiple hours (5-11 hours) (3)
- ○ Half a day to a full day (12-24 hours) (4)
- ○ 1-3 days (5)
- ○ 4-6 days (6)
- ○ One week (7 days) (7)
- ○ More than one week, but less than one month (8)
- ○ Greater than one month (9)

Page Break

dr_experience In the last five years, has your household participated in a demand response or energy management program with an electricity provider? For example, a program that rewards your household for reducing electricity use during certain hours of the day.

- ○ No (0)
- ○ Yes (1)

Page Break

Display This Question:

If In the last five years, has your household participated in a demand response or energy management... = Yes

dr_opinion In your opinion, how successful was (or is) the program?

- ○ Not at all successful (1)
- ○ Somewhat unsuccessful (2)
- ○ Somewhat successful (3)
- ○ Very successful (4)

Page Break

read_test In the next section, we will provide you with relevant information on some electric grid upgrades that are being considered in the 4 corners states. These upgrades are being considered broadly and will require significant investment by electric providers.

It is important that you read the information in its entirety. To show that you are reading the information in this survey, skip this question without selecting an answer.

Do you agree?

- ○ No (0)
- ○ Yes (1)

Page Break

End of Block: Electricity Use and Provider Relationship

Start of Block: Direct/Indirect Valuation

info_1

What is the problem?

The electric grid faces high levels of demand during the summer, largely driven by cooling devices. This increased demand on the grid can be so intense that it triggers what is called a grid stress event. During these events, the electric grid is at a heightened risk of brownouts, blackouts, or catastrophic failure. In addition to grid stress events, weather-related disasters have become more frequent in the past decade. Natural disasters often cause power outages or lack of sufficient power supply for a significant amount of time. In an effort to increase the electric grid's resilience to demand and weather-related disasters, microgrid installations prove to be a solution.

What is a microgrid?

A distributed feeder microgrid is a small generation facility that produces electricity (either renewable or non-renewable). These units can boost the electricity supply in a given area such as a small residential area, critical infrastructure, university campuses, and even large commercial complexes. During a stress event, a microgrid can supply power for those connected, or even send power back to the larger grid if needed for stability. This can increase the reliability of the system.

Page Break

info_2

Benefits of a microgrid

There are multiple benefits associated with the adoption of a microgrid. In this section, we will focus on the benefits to residential users such as yourself. Microgrids have many capabilities that benefit residential users.

Economic: A microgrid can respond to real-time changes in electricity prices and use this information to prioritize the lowest-cost method of generation. **Resilience**: During and after a catastrophic event such as a weather-related natural disaster the microgrid can serve customers with electricity even if the larger electric grid is not able to do so. **Reliability**: Microgrids can reduce the frequency and duration of power outages for those who are connected to it directly. This is done by using stored electricity or generating new electricity. This can reduce stress on the grid and may reduce the duration of an outage for those who are not directly connected to the microgrid. **Environmental**: Microgrids operate by adding renewable or fossil fuel electricity production to the grid. A microgrid can utilize on-site renewable generation such as solar panels and that electricity is sent back to the grid to be used in place of fossil fuel generation. Currently, about 20% of microgrids utilize strictly renewable sources

What are the costs of a microgrid?

Microgrids can have both economic and environmental costs. Microgrid costs vary by the needs of the end-user and the type of electricity generation. Hybrid microgrids, which produce a mixture of renewable and non-renewable electricity (i.e. solar and diesel), are common as they are able to produce electricity at any time of day. A recent study found that the cost of production from these systems in the United States averaged $0.35 per kilowatt-hour (kWh). For context, the average price that residential consumers pay for electricity in the 4-corners is $0.12 per kWh.

In addition, microgrids that use fossil fuel for generation produce pollution. Communities that adopt fossil fuel microgrids could experience higher levels of pollution than before.

Page Break

info_3

What does this have to do with me?

Adding a microgrid to the community requires significant investment by electric providers. As a customer, the revenue required to make investments, upgrades, and repairs to the electric grid are often embedded in your monthly electric bill. As such, we are interested in your perspective on microgrids.

The next section will provide you with specific examples of microgrids and their uses.

Page Break

info_4 On the previous page, you were given a technical explanation on how microgrids work. On this page, you will be introduced to some examples on how microgrids are used in the real world.

Examples of Microgrids in Use

Example 1: Critical Infrastructure

Microgrids can serve as backup systems to infrastructure that is deemed critical during an emergency. For example, the Denver International Airport is planning to install a microgrid to support critical operations.

Example 2: Isolated Communities

Communities located at the end of the electric line are often subject to a higher number of outages when grid stress or natural disasters occur. For example, a microgrid installation in the rural town of Borrego Springs, CA was able to insulate against many power outages caused by wildfires and other outage events.

Page Break

info_5 Now that we've provided you with some knowledge about microgrids and their potential, we ask you to consider the following scenario for research purposes.

The following scenario that you are being asked to consider is hypothetical in nature. Similar types of studies to this one find that responses can be skewed by this fact. For example, respondents often overstate how much they would be willing to pay for a good or service when in real life, they would pay much less or not at all. This often occurs when a response is meant to convey a point of view verses whether they would actually pay the amount that is asked in the question.

We ask that you do not make decisions in this way, but to answer as sincerely and realistically as possible. Assume from herein that if you are asked to pay for something, that you are willing and able to do so in real life.

Page Break

vote_no_cost Assume that your electric provider held a referendum style vote of its customers on whether to add a microgrid to your community at no upfront cost to you. If more than 50% of respondents vote yes, your electric provider would install this microgrid.

Taking into consideration your desire for the microgrid installation, would you vote for the referendum to install the microgrids?

- ○ No (0)
- ○ Yes (1)
- ○ Not sure (9)

---

certain_no_cost On a scale from zero to ten, where zero means not at all certain and ten means completely certain, how sure are you about your answer?

▼ 0 - Not at all certain (1) ... 10 - Completely certain (11)

Page Break

Display This Question:

If Group = 1

vote_comp_direct Now assume that your electric provider held a referendum style vote on whether to add a surcharge to your electricity bill for a duration of 2 years (24 billing cycles). This surcharge would pay for the installation of a microgrid. **Also assume that the electric provider guaranteed that the microgrid would directly benefit your community by providing electricity to the community and support for critical infrastructure during stress events.** If more than 50% of respondents vote yes, your electric provider would install this microgrid and increase your electric bill (the amount is listed in the question below).

Taking into consideration your desire for the microgrid installation as well as your current disposable income, would you vote for the referendum to install the microgrids if the electric provider added a surcharge of $${e://Field/wtp_bid} to your monthly electric bill for 24 billing cycles?

- ○ No (0)
- ○ Yes (1)
- ○ Not sure (9)

Display This Question:

If Group = 2

vote_comp_indirect Now assume that your electric provider held a referendum style vote on whether to add a surcharge to your electricity bill for a duration of 2 years (24 billing cycles). This surcharge would pay for the installation of a microgrid. **Also assume that the electric provider stated that the microgrid would be installed in a nearby community, but in times of grid stress, this microgrid could reduce the probability of outages to your community.** If more than 50% of respondents vote yes, your electric provider would install this microgrid and increase your electric bill (the amount is listed in the question below).

Taking into consideration your desire for the microgrid installation as well as your current disposable income, would you vote for the referendum to install the microgrids if the electric provider added a surcharge of $${e://Field/wtp_bid} to your monthly electric bill for 24 billing cycles?

- ○ No (0)
- ○ Yes (1)
- ○ Not sure (9)

---

certain_comp On a scale from zero to ten, where zero means not at all certain and ten means completely certain, how sure are you about your answer?

▼ 0 - Not at all certain (1) ... 10 - Completely certain (11)

Page Break

Display This Question:

If Now assume that your electric provider held a referendum style vote on whether to add a surcharge... = No

Or Now assume that your electric provider held a referendum style vote on whether to add a surcharge... = Not sure

Or Now assume that your electric provider held a referendum style vote on whether to add a surcharge... = No

Or Now assume that your electric provider held a referendum style vote on whether to add a surcharge... = Not sure

protest We would like to know why your household would not vote for the infrastructure upgrades. Please select the most important reason.

- ○ I don’t think the utility has the right to apply a surcharge (1)
- ○ I don’t think my neighbors would vote for the referendum either (2)
- ○ I don’t like microgrids (3)
- ○ Renewable energy will not solve all of our problems (4)
- ○ I don’t want my current bill to change (5)
- ○ I don’t trust my electric provider (6)
- ○ This program is not worth it to me (7)
- ○ The surcharge lasts too long (8)
- ○ I can’t afford the surcharge (9)
- ○ I would prefer my money to go to something else (10)
- ○ The surcharge is too high (11)
- ○ I’m not sure that microgrids have the capability to provide me benefits (12)
- ○ I don’t think I should be responsible for the reliability of the grid (13)
- ○ Other reason (please specify) (99)

_____

Page Break

believe_bill Do you think that these upgrades would decrease the cost of electricity or delay the need to increase the cost of electricity?

- ○ No (0)
- ○ Yes (1)

---

believe_reliable Do you think that microgrids would improve the reliability of the power supply, thereby decreasing the likelihood of blackouts or brownouts in your service area?

- ○ No (0)
- ○ Yes (1)

---

believe_env Do you think microgrids contribute to a significant reduction in emissions from electricity generation?

- ○ No (0)
- ○ Yes (1)

---

tech On a scale from zero to four, where zero means not at all confident and four means very confident, how confident are you that technology can minimize the societal impacts of climate change?

- ○ 0 - Not at all confident (1)
- ○ 1 (2)
- ○ 2 (3)
- ○ 3 (4)
- ○ 4 - Very confident (5)

Page Break

transition_5
Thank you for your participation so far. Your responses to the general acceptance of microgrids is valuable, but in the next section we will focus on the role that microgrids could play in mitigating wildfires.

End of Block: Direct/Indirect Valuation

Start of Block: Wildfire Valuation

info_6 Some wildfires are started by sparks from power distribution infrastructure such as an electricity transmission line. When a wildfire is sparked, shutting down critical lines can help mitigate the damage from the fire, but this action shuts off electricity to the people receiving electricity via that line. Introducing a microgrid could reduce service interruption. Upgrading the grid infrastructure with a microgrid can strengthen resilience and reliability during wildfires. Microgrid installations can provide power to critical facilities such as hospitals and fire stations during crucial time periods.

wildfire_affect Has your household ever been affected by a wildfire (loss of power, loss of property, evacuated or displaced, etc.)?

- ○ No (0)
- ○ Yes (1)
- ○ Not sure (9)

Page Break

Display This Question:

If Has your household ever been affected by a wildfire (loss of power, loss of property, evacuated o... = Yes

wildfire_recent Approximately how recent was this wildfire?

- ○ The 2020 fire season (1)
- ○ The 2019 fire season (2)
- ○ Between the 2015 and 2018 fire season (3)
- ○ Before 2015 (4)

Page Break

insurance Does your homeowner or renter's insurance cover damages caused by wildfires?

- ○ No (0)
- ○ Yes (1)
- ○ I do not have homeowner or renter's insurance (2)
- ○ Not sure (9)

---

wildfire_infra If electricity infrastructure was responsible for a wildfire, which of the following actions would you be in favor of the electricity provider taking?

- ○ Introduce a microgrid to the electricity grid if possible (1)
- ○ Trim trees around power lines and update infrastructure so that power lines do not spark onto nearby trees (2)
- ○ Do nothing (3)
- ○ Not sure (9)

Page Break

info_7 Wildfires can be costly and deadly. For example, in California, PG&E infrastructure sparked during a high wind event, resulting in the Camp Fire, which destroyed 13,900 homes in 2018. The company pled guilty to 84 counts of involuntary manslaughter and was charged 3.5 million dollars in fines, which led to PG&E filing for bankruptcy. These costs will presumably be passed onto customers. The 2011 Las Conchas fire was one of New Mexico's largest fires burning over 156,000 acres. The fire was started by a tree falling onto a transmission line as a result of a high wind event. A jury found the electricity provider was 75% responsible for the negligence. Use of microgrids that would allow shutdown of transmission lines during these high wind events could reduce the probability of wildfire, while still providing power to communities.

Display This Question:

If Group = 1

vote_comp_wildfire_d Now assume that your electric provider held a referendum style vote on whether to add a surcharge to your electricity bill for a duration of 2 years (24 billing cycles). This surcharge would pay for the installation of a microgrid. **Consider also that your electric provider guaranteed that the microgrid would directly benefit your community by providing electricity to the community, supporting critical infrastructure during high wind events, and reducing the probability of wildfire**. If more than 50% of respondents vote yes, your electric provider would install this microgrid and increase your electric bill (the amount is listed in the question below).

Taking into consideration your desire for the microgrid installation as well as your current disposable income, would you vote for the referendum to install the microgrids if the electric provider added a surcharge of $${e://Field/wtp_bid} to your monthly electric bill for 24 billing cycles?

- ○ No (0)
- ○ Yes (1)
- ○ Not sure (9)

Display This Question:

If Group = 2

vote_wildfire_comp_i Now assume that your electric provider held a referendum style vote on whether to add a surcharge to your electricity bill for a duration of 2 years (24 billing cycles). This surcharge would pay for the installation of a microgrid. **Consider also that your electric provider guaranteed that the microgrid would indirectly benefit your community by reducing the probability of wildfire.** If more than 50% of respondents vote yes, your electric provider would install this microgrid and increase your electric bill (the amount is listed in the question below).

Taking into consideration your desire for the microgrid installation as well as your current disposable income, would you vote for the referendum to install the microgrids if the electric provider added a surcharge of $${e://Field/wtp_bid} to your monthly electric bill for 24 billing cycles?

- ○ No (0)
- ○ Yes (1)
- ○ Not sure (9)

certain_comp_wildfir On a scale from zero to ten, where zero means not at all certain and ten means completely certain, how sure are you about your answer?

▼ 0 - Not at all certain (1) ... 10 - Completely certain (11)

Page Break

wildfire_prev On a scale from zero to four, zero means not at all important and four means very important, in general, how important is the prevention of human-caused wildfires to you?

- ○ 1 - Not at all important (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 - Very important (4)

---

wildfire_concern On a scale from zero to four, where zero means not at all concerned and four means very concerned, how concerned are you about wildfire impacting your community?

- ○ 1 - Not at all concerned (1)
- ○ 2 (2)
- ○ 3 (3)
- ○ 4 - Very concerned (4)

Page Break

transition_9 Thank you for your participation so far. This concludes the valuation exercise and you will not be asked to vote on any more programs. We are interested in your opinions towards the environment and your electricity use. Since we are not able to survey all residents in the 4-corners, your opinions are very important to us.

Page Break

End of Block: Wildfire Valuation

Start of Block: Attitudes and Preferences

renewable_focus Would you have been more or less likely to vote for the previous programs if the microgrid used entirely renewable energy? (i.e. solar or wind)

- ○ Less likely (1)
- ○ My response would not have changed (2)
- ○ More likely (3)

---

conservation_hh On a scale from zero to four, where zero means not at all important and four means very important, in general, how important is electricity conservation **to your household**?

- ○ 0 - Not at all important (1)
- ○ 1 (2)
- ○ 2 (3)
- ○ 3 (4)
- ○ 4 - Very important (5)

---

conservation_resp On a scale from zero to four, where zero means not at all important and four means very important, in general, how important is electricity conservation **to you personally**?

- ○ 0 - Not at all important (1)
- ○ 1 (2)
- ○ 2 (3)
- ○ 3 (4)
- ○ 4 - Very important (5)

---

imp_supply On a scale from zero to four, where zero means strongly disagree and four means strongly agree, how much do you agree with the following statement?: “It is important to have as much electricity as I need when I need it.”

- ○ 0 - Strongly disagree (1)
- ○ 1 (2)
- ○ 2 - Neither agree no disagree (3)
- ○ 3 (4)
- ○ 4 - Strongly agree (5)

Page Break

renewable_supply Have you ever opted into a program with your provider that aims to supply a certain share of your electricity from renewable sources?

- ○ No (0)
- ○ Yes (1)
- ○ Not sure (9)
- ○ I would if I had the option (10)

---

nature On a scale from zero to four, where zero means that nature is robust and not easily damaged and four means nature is fragile and easily damaged, how do you view nature?

- ○ 0 - Robust and not easily damaged (1)
- ○ 1 (2)
- ○ 2 (3)
- ○ 3 (4)
- ○ 4 - Fragile and easily damaged (5)

---

pollution On a scale from zero to four, where zero means not at all concerned and four means very concerned, how concerned are you about air and water pollution created by electricity production at power plants?

- 0 - Not at all concerned (1)
- 1 (2)
- 2 (3)
- 3 (4)
- 4 - Very concerned (5)

---

climate_change On a scale from zero to four, where zero means strongly disagree and four means strongly agree, how strongly do you agree or disagree with the following statement: “Climate change is occurring and is, at least partially, caused by humans”

- 0 - Strongly disagree (1)
- 1 (2)
- 2 - Neither agree no disagree (3)
- 3 (4)
- 4 - Strongly agree (5)

Page Break

project_ranking Assume that your community can spend a fixed amount of money for public interest projects. Please rank the following projects in terms of what you think is most important to least important.

_____ Expanding electricity infrastructure and improving electricity reliability (1)
_____ Expanding water infrastructure and improving water availability (2)
_____ Expanding national parks acreage and improving wildlife conservation in national parks (3)
_____ Expanding and improving public transportation (4)
_____ Improving air quality (5)
_____ Improving healthcare access and the public health infrastructure (6)

Page Break

transition_10 Thank you for your participation so far. In the next section we will ask you about your ideological and political beliefs. We understand that these are very personal questions and some might feel uncomfortable, but as a reminder, all of your information is anonymous. We ask that you answer these questions are accurately as possible.

Page Break

End of Block: Attitudes and Preferences

Start of Block: Ideological Questions

cost_sharing Do you think that customers should bear some cost in improving the electricity grid?

- ○ No (0)
- ○ Yes (1)

right_access Do you think people have the right to electricity access?

- ○ No (0)
- ○ Yes (1)

Page Break

ideol On a scale of political ideology, individuals can be arranged from strongly liberal to strongly conservative. Which of the following categories best describes your views?

- ○ Strongly Liberal (1)
- ○ Liberal (2)
- ○ Slightly Liberal (3)
- ○ Middle of the Road (4)
- ○ Slightly Conservative (5)
- ○ Conservative (6)
- ○ Strongly Conservative (7)

---

party With which political party do you most identify?

- ○ Democratic Party (1)
- ○ Republican Party (2)
- ○ Independent (3)
- ○ Other (please specify) (4) _____

Page Break

voter_prev Did you vote in the last presidential election (2016)?

- ○ No (0)
- ○ Yes (1)

---

voter_current Do you plan to vote in the upcoming presidential election (2020)?

- ○ No (0)
- ○ Yes (1)

---

voter_contact Have you ever contacted your representatives to express an opinion on a political issue?

- ○ No (0)
- ○ Yes (1)

---

voter_work Have you ever worked or volunteered for a candidate who is running for an elected office?

- ○ No (0)
- ○ Yes (1)

Page Break

transition_11 In electricity research, we often find that responses are influenced by household characteristics such as the size of the home, number of people in the household, etc. In the next section, we will ask you about your household characteristics.

Page Break

End of Block: Ideological Questions

Start of Block: Household Characteristics

rent Do you rent or own your primary residence?

- ○ Rent (1)
- ○ Own (2)

home_work_pre Before the coronovirus pandemic, did you or anyone in your household telecommute and/or work from home more than three days per week?

- ○ No (0)
- ○ Yes (1)

home_work_post Since the coronovirus pandemic, are you or is anyone in your household telecommuting and/or working from home more than three days per week?

- ○ No (0)
- ○ Yes (1)

average_bill What is your household's average monthly electric bill during the summer (June-August)?

- ○ Less than $50/month (1)
- ○ $50 to $100/month (2)
- ○ $100 to $150/month (3)
- ○ $150 to $200/month (4)
- ○ $200 to $250/month (5)
- ○ More than $250/month (6)
- ○ Not sure (9)

Page Break

house_size Approximately, how large is your primary residence (in square feet)?

- ○ Less than 500 square feet (1)
- ○ 500 to 999 square feet (2)
- ○ 1000 to 1999 square feet (3)
- ○ 2000 to 2999 square feet (4)
- ○ 3000 to 3999 square feet (5)
- ○ 4000 square feet or more (6)

---

residence_type Which of the following best describes your primary residence?

- ○ A single-family detached house (1)
- ○ A single-family attached house (e.g., a townhome, garden home, or duplex that is attached to one or more other houses) (2)
- ○ An apartment, condominium, or loft (3)
- ○ A mobile home or trailer home (4)
- ○ An individual room in a house or apartment (5)
- ○ Other (please describe) (6) _____

---

residence_age Approximately how old is your residence? Use your best judgment.

- ○ Less than 5 years old (1)
- ○ Between 5 and 15 years old (2)
- ○ Between 15 and 30 years old (3)
- ○ Between 30 and 60 years old (4)
- ○ Older than 60 years (5)

Page Break

X→

efficiency_upgrades Have you improved the energy efficiency of your home? For example, installing energy efficient windows, high R-value insulation, or Energy Star appliances?

- ○ No (0)
- ○ Yes (1)

X→

renewable_own Do you have any renewable electricity generation at your home? (i.e. solar panels, small wind turbine, etc.)

- ○ No (0)
- ○ Yes (1)
- ○ I am not allowed to make this decision (those who rent apartments for example) (9)

---

num_people How many people are currently living in your primary residence (including yourself)?

- ○ 1 person (just me) (1)
- ○ 2 people (2)
- ○ 3 people (3)
- ○ 4 people (4)
- ○ 5 or more people (5)

X→

sensitive_groups Does your household include any of the following people? Check all that apply

- ☐ Seniors (65 years old and above) (1)
- ☐ Children (3-18 years old) (2)
- ☐ Babies and toddlers (3 years old or younger) (3)
- ☐ Individuals with physical disabilities (4)
- ☐ Individuals with special medical needs (5)
- ☒ None of the above (9)

Page Break

cooling_method Do you have any of the following cooling devices in your home? Check all that apply.

- [ ] Central electric air conditioner ("A/C") (1)
- [ ] Evaporative cooler ("swamp cooler") (2)
- [ ] Individual electric window or wall cooling unit (3)
- [ ] Ground heat exchanger or heat pump (4)
- [ ] Fans (ceiling, floor, or tabletop) (5)
- [ ] Other cooling device (6)

Page Break

transition_11 Thank you for your continued participation. In this final section, we will ask you about your demographic characteristics. This will help us ensure that we have a group of respondents who are representative of the 4-corners.

End of Block: Household Characteristics

Start of Block: Sociodemographic Characteristics

education Which of the following best indicates your highest level of completed education?

- Less than High School (no diploma or GED) (1)
- High School diploma or GED (2)
- Some college, but no degree (3)
- Associate's degree (4)
- Bachelor's degree (5)
- Master's degree (6)
- Professional or doctoral degree (e.g. PhD, MD, DDS, JD, etc.) (7)

employment What is your current employment status? Check all that apply.

- [ ] Employed (full-time) (1)
- [ ] Employed (part-time) (2)
- [ ] Self-employed (3)
- [ ] Not currently employed (4)
- [ ] Retired (5)
- [ ] Student (6)
- [ ] Other (please specify) (7) _____

covid_impact
Has your household income been affected by the coronavirus pandemic?

- ○ No (0)
- ○ Yes (1)

Page Break

end

Survey Complete

Thank you very much for your input on grid infrastructure upgrade options in the Southwest. If you have any questions or comments about the survey or you would like references to any of the information provided, you may leave them in the comment box below.

_____

_____

_____

_____

_____

End of Block: Sociodemographic Characteristics