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BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

IN THE MATTER OF THE INVESTIGATION OF THE COSTS AND BENEFITS OF PACIFICORP'S NET METERING PROGRAM	**Docket No. 14-035-114** **TESTIMONY OF RYAN EVANS IN SUPPORT OF UTAH SOLAR ENERGY ASSOCIATION'S OBJECTION TO ROCKY MOUNTAIN POWER'S COMPLIANCE FILING**

Q. Please state your name, business address, and present position with Utah Solar Energy Association ("USEA").

A. My name is Ryan Evans. My business address is 9690 South 300 West Suite 300, Sandy, Utah 84070. I am the President of the Utah Solar Energy Association.

Q. Please describe your education and business experience.

A. I earned a Bachelor of Science degree from the University of Utah in 1999. I have served as the President of USEA since July of 2016. Prior to that I spent thirteen years in various roles with the Salt Lake Chamber, Utah's largest business association. For ten of those years I was involved in public policy and economic development initiatives at a state wide level. Additionally, I was the staff lead on air quality and small business issues. My role at the Salt Lake Chamber gave me great insight into the business community and intersection between sound public policy, economic development and the community prosperity.

Additionally, I am currently on the national advisory board for Chambers for Innovation and Clean Energy, the Governor's Clear Air Action Team, the Utah Clean Air Partnership (UCAIR, treasurer), and US Chamber Institute for Organization Management Advisory Board.

Q. Please describe USEA.

A. USEA currently represents approximately 60 of the nearly 100 solar installation companies and businesses that support solar in Utah. The core mission is to champion the growth of Utah's solar industry through advocacy, education, and business services. USEA supports all aspects of the solar industry including residential, commercial,

industrial customers. Additionally, USEA supports utility scale solar, as well as the trades and professions that support these companies.

USEA is a fast growing organization – a year ago, the association had only a handful of supportive organizations. As the solar industry has grown in our state, so has the interest in being a part of an aligned, well-informed and strong community of partners. USEA, as a trade organization, provides a forum for solar companies and support industries to come together to discuss policy, technical information, marketing and other topics where communicating on issues and working on joint goals propels the industry forward in Utah's market.

Q. What are your duties as the President of USEA?

A. As President, I oversee all aspects of operations for USEA including public policy matters, business development, personal and professional development programming, public affairs and communications. I also monitor and work to promote solar issues on a national level as a member of the state affiliate network in the Solar Energy Industries Association, a national solar association that champions the use of clean, affordable solar by expanding markets, removing market barriers, strengthening the industry and educating the public on the benefits of solar energy.

Q. Please provide a summary of your Direct Testimony?

A. The purpose of my Direct Testimony is to provide the Commission with background information on the rooftop solar industry in the State of Utah, and on a national level. I discuss the positive economic impacts of the solar industry on the State of Utah. Next I address USEA's concerns with Rocky Mountain Power's proposal in this proceeding to the extent that certain portions of the proposal could act as a severe disincentive to

participation in NEM programs. I recommend that the Commission reject Rocky Mountain Power's proposed rates and instead adopt a rate that fairly and adequately incents Rocky Mountain Power's customers to participate in NEM programs. I also recommend the Commission accept Rocky Mountain Power's proposal to grandfather existing customers into their existing rate schedule.

USEA witness, Mr. Micah Stanley, addresses the benefits Utah's net metering program brings to the grid. Additionally his testimony will outline and detail specific inaccuracies within the Studies and testimony submitted by Rocky Mountain Power to justify their proposed changes to NEM rate structure.

Q. Please provide an overview of the solar industry's economic impact on a national level and in the State of Utah.

A. There are 9,000 American solar companies that employ over 260,000 workers and invest tens of billions of dollars into the national economy. In 2016, one of every fifty new jobs in the United States was created in the solar industry. Solar makes up only 1.4% of total electricity generated with an expectation that by 2020 it will produce close to 4% of the total generation. There are now an estimated 1,347,000 solar installations in the United States that supply enough energy to power 8.3 million households.

There are an estimated 4,408 solar jobs in the State of Utah. Utah gained 1729 solar jobs in 2016 alone, which made it our state's fastest growing industry. Installers, sales firms, manufacturers, finance companies and distributors to the industry all contribute to the jobs created.

Q. What is the State of Utah's policy on renewable resources, NEM and distributed generation?

A. The State of Utah has an inclusive energy policy that promotes adequate, reliable, sustainable and clean energy sources. While Utah does not have a renewable energy standard, it does have a renewable energy goal of 20% by 2025 for electric utility corporations. Utah has laid out a net metering policy through statute, rule and rulings by the Public Service Commission that codify a customer's right to participate in distributed energy production and net metering. Utah requires that electric corporations make a net metering program available to its customers and allow customer generation systems to be interconnected to its facilities.

Q. What is USEA's position on Utah's net metering policy?

A. A state should foster policy that promotes long term economic, community and societal well-being. Utah has done a good job over the years of doing just that and is recognized as a leading state for innovation. We believe that promoting a fair net metering policy that encourages growth of the solar market will lead to further innovations and, ultimately, a stronger grid and overall energy infrastructure, as well as reduced energy rates for all residents.

USEA strongly supports Utah's NEM policy. Not only is the policy responsive to a clear customer desire to participate in these programs, but NEM has also had a positive impact on multiple aspects of Utah's economy: it has created competition in the solar market, diversified our energy sources, helped drive down energy prices, potentially created a more stable grid and provided Utahns with more security should the grid ever be compromised by a natural or other disaster. NEM has created real, long term jobs in our state, attracted millions of dollars in outside investment and created an atmosphere

where individual residents are investing in our state's energy infrastructure, distributed generation solar and other grid upgrades that come with more DG solar.

According to studies conducted by Smart Grid Consumer Collaborative, as many as 50% of households with installed solar, also have an electric vehicle. More and more often, solar installations are also being paired with energy efficiency measures and smart thermostats. Each year energy storage prices drop (as solar has for years) and will soon be much more common as residents look to store the energy they produce and benefit the utility with a distributed source of energy to draw from when needed.

Increasingly, consumers are using smart thermostats to reduce their energy footprint, producing their own electricity with solar panels and saving it for future use with a home battery. More and more companies, locally, are looking to the near future and seeking out energy storage options to meet customer interest. We should ensure that the trend of pairing solar with other beneficial products (EVs for air quality, energy efficiency for conservation, and storage for its benefits for peak demand and emergency preparedness) continues.

Q. Please provide an overview of the economic benefits NEM purchase and installation has provided to the State of Utah.

A. According to the National Renewable Energy Laboratory ("NREL") and their Jobs and Economic Development Impact ("JEDI") Model, there is substantial benefit to Utah as a result of NEM customers. In 2016 alone, using a conservative average of 7kW sized installations and Rocky Mountain Power's new NEM customer number of 9,874, Utah received a total economic impact from residential rooftop solar of $302,745,597, including approximately $13 million in sales tax.

Q. Why do Utahns choose rooftop solar?

A. In 2016, USEA conducted a survey of 485 customers who had recently installed rooftop solar on their homes in Utah, and 89.66% responded that saving money on their electric bills was a factor for installing a photovoltaic system on their home. Additionally, 76.67% responded that they cared about the environment and/or wanted to reduce their carbon footprint. 76.27% responded that they would like some level of energy independence.

Q. With that background in mind, do you expect the rate of rooftop solar expansion in Utah to continue at its current pace?

A. Rocky Mountain Power witness Mr. Gary Hoogeveen stated in his Direct Testimony that Rocky Mountain Power is requesting to change its rate structure because "generous government subsidies," among other factors, has caused "exponential growth" in residential net metering customers.[1] He stated that growth in residential net metering customers has caused the current ratemaking structure to become "unsustainable."[2] Mr. Hoogeveen states later in his testimony that "time is off the essence due to the increasing growth in net metering customers."[3] I believe Mr. Hoogeveen's concerns are exaggerated. Given there is a sunset for both the state and federal incentive, and the great importance of the smaller state level credit in a customer's decision to participate in NEM programming, it is easy to see that the phase out of both will impact future sales and that the current trajectory of sales will not continue.

Q. Please explain.

[1] November 9, 2016 Direct Testimony of Mr. Gary Hoogeveen at page 4, lines 76-82.

[2] *Id.*

[3] *Id.* at page 6, lines 125-128.

A. In the same USEA survey I discussed above, we also gauged the level of importance the state tax credit made in a customer's decision-making process. Respondents in our survey indicated that the Utah Renewable Energy Tax Credit (Residential) was:

- very important and would not have installed a system without it (50.52%), or
- important and was an important factor in purchasing (32.37%).

Only 11.34% indicated that the tax credit was helpful, but that they might have proceeded without it. A mere 5.77% indicated that the tax credit was not needed and that they would have installed without the state credit.

The current state tax credit is now, as a result of HB 23, set to phase out and expire after 2021. The credit will be reduced by $400 each year until it expires. Similarly, the Residential Federal Income Tax Credit ("ITC") is also set to phase out and expire after 2021. Under the ITC, residential customers receive a 30% tax credit through 2019. In 2020 the credit is reduced to 26%, and in 2021 it is reduced to 22%.

Given the phase-out of these incentive programs, I believe Mr. Hoogeveen's concerns about the rate of residential net metering customers participating in NEM programs are premature and not based on correct projections.

Q. Turning now to Rocky Mountain Power's proposal in this proceeding, please briefly describe the new rate structure proposed by Rocky Mountain Power?

A. RMP is proposing a three part rate structure that would increase set monthly costs, increase demand charges and change the reimbursement rates for NEM customers.

Q. What effect would the RMP proposal have on rooftop solar?

A. The structure proposed by RMP would make roof top solar economically infeasible for most customers as it would greatly alter the rate of return and economics that make rooftop solar attractive to customers. This in turn would slow or stop the booming solar economy. We see this by looking at a similar rate design proposed and adopted in Nevada. Due to the chilling effect this similar rate structure had on solar, the Nevada Legislature just passed AB405 to bring NEM back to Nevada.

Q. What is your recommendation on Rocky Mountain Power's proposed rate structure?

A. USEA recommends that the Commission reject Rocky Mountain Power's rate structure and adopt a rate structure that fairly and adequately incents them to participate in NEM programs.

Q. What is your understanding of the public's support of Rocky Mountain Power's net metering proposal in this proceeding?

A. In November, 2016 Dan Jones & Associates conducted a statewide survey, that asked respondents a variety of questions relating to Rocky Mountain Power's net metering proposal in this proceeding and net metering programs generally. The results were revealing:

- 76 percent oppose an increase in electricity costs for customers with rooftop solar and the same percentage agrees that
- 76 percent believe that Rocky Mountain Power's proposal unfairly discriminates against customers who are trying to reduce their reliance on energy from the utility.

- 82 percent believe rooftop solar customers should have the right to reduce their electricity usage without paying additional fees.
- 82 percent of respondents are concerned that the requested rate increase shows Rocky Mountain Power may be trying to limit competition.

Q. Rocky Mountain Power's proposal supports keeping current net metering customers on the existing net metering program and their current rate schedule. What is your opinion on that aspect of Rocky Mountain Power's proposal?

A. Rocky Mountain Power witness Mr. Gary Hoogeveen states in his November 9, 2016 Direct Testimony:

> The Company supports keeping the current net metering customers on the existing net metering program and their current rate schedule. We acknowledge that current customers made investments based on the current structure and respect the customers' need for reasonable certainty for recovery of their investments. The Company expects this issue to be considered in a future proceeding. Current customers may voluntarily opt in to the new Schedule 5.
>
> In addition, current net metering customers generally do not have meters that are capable of billing the on-peak demand charge that is included in the proposed rate structure. Transitioning these customers to the new schedule would be operationally and administratively challenging.[4]

Additionally, in RMP's letter on November 18, 2016 to existing net metering customers, the company expressed their opinion that no changes should come to existing customers because of the investment they had made: "*The company acknowledges that current net metering customers have made investments based on the current rate structure and respects our customers' need for reasonable certainty for recovery of their investments. As a result, our filing does not recommend changes to rates for existing net*

[4] November 9, 2016 Direct Testimony of Mr. Gary Hoogeveen at page 11, lines 224-233.

metering customers. As with other electric issues, the Commission ultimately will decide net metering rates."

USEA strongly supports this aspect of Rocky Mountain Power's proposal and recommends that the Commission accept it. Customers who installed solar under net metering should be grandfathered. Customers should have a reasonable expectation that rates will not change dramatically. If customers are forced off their existing tariff and onto a new rate schedule with dramatically different rates, potential future customers may find that they cannot reasonably rely on NEM program rates, and this could act as a disincentive to participation in NEM programs going forward.

Q. Does this conclude your testimony?

A. Yes, it does.

[signature on the following page]

Certification:

Pursuant to Utah Code Ann. § 78B-5-705, I declare under criminal penalty of the State of Utah that the foregoing is true and correct to the best of my knowledge.

Executed on June 8, 2017

By: 

Ryan Evans

CERTIFICATE OF SERVICE
Docket No. 14-035-0114

I hereby certify that a true and correct copy of the foregoing **TESTIMONY OF RYAN EVANS** was served by email on this 8th day of June 2017, on the following:

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ATTACHMENT 1

APPENDIX A

Solar Jobs by State, 2016

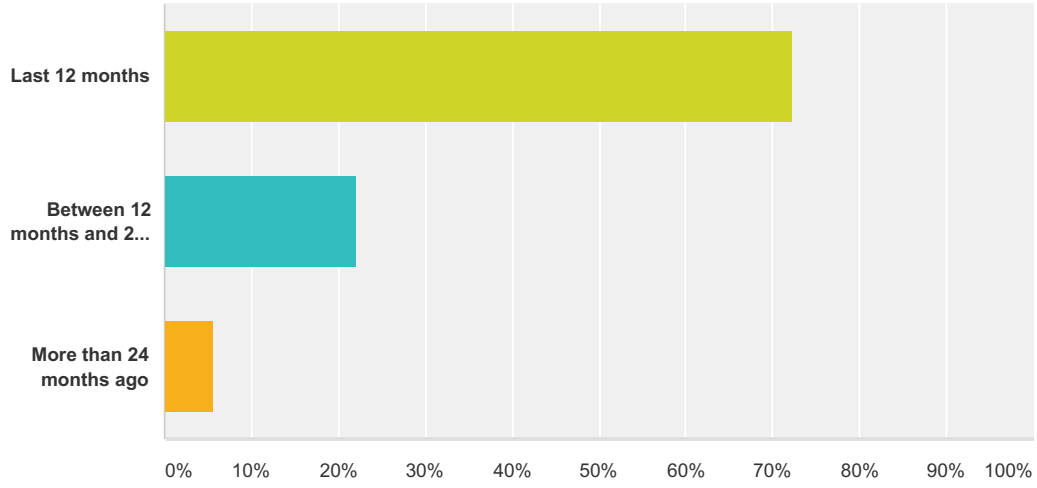
State	2016 Solar Jobs	2015 Solar Jobs	Year/Year Growth	Solar Jobs Rank	Solar Jobs Per Capita Rank	Ratio of Solar Worker to Overall Workforce
AK	64	33	94%	51	51	1:11593
AL	530	287	85%	42	49	1:9176
AR	271	264	3%	47	50	1:11015
AZ	7,310	6,922	6%	7	13	1:948
CA	100,050	75,598	32%	1	4	1:392
CO	6,004	4,998	20%	10	12	1:923
CT	2,174	1,951	11%	30	19	1:1645
DC	1,180	1,000	18%	35	6	1:578
DE	363	452	-20%	46	34	1:2626
FL	8,260	6,560	26%	5	31	1:2496
GA	3,924	3,185	23%	16	35	1:2627
HI	3,194	2,814	14%	21	5	1:447
IA	563	349	61%	41	38	1:2987
ID	611	381	60%	39	36	1:2756
IL	3,718	3,483	7%	17	40	1:3443
IN	2,700	1,567	72%	28	30	1:2457
KS	467	282	66%	44	48	1:6709
KY	1,202	1,002	20%	33	41	1:3693
LA	2,922	1,974	48%	24	18	1:1602
MA	14,582	15,095	-3%	2	1	1:304
MD	5,429	4,269	27%	12	9	1:862
ME	572	330	73%	40	27	1:2329
MI	4,118	2,779	48%	15	28	1:2411
MN	2,872	1,995	44%	25	23	1:1922
MO	2,380	1,854	28%	29	32	1:2561

State	2016 Solar Jobs	2015 Solar Jobs	Year/Year Growth	Solar Jobs Rank	Solar Jobs Per Capita Rank	Ratio of Solar Worker to Overall Workforce
MS	883	560	58%	37	39	1:3384
MT	168	109	54%	49	47	1:6204
NC	7,112	5,950	20%	8	16	1:1427
ND	175	117	50%	48	44	1:4342
NE	1,585	776	104%	32	15	1:1203
NH	1,184	731	62%	34	14	1:1127
NJ	6,056	7,071	-14%	9	17	1:1477
NM	2,929	1,899	54%	23	8	1:711
NV	8,371	8,764	-4%	4	2	1:351
NY	8,135	8,250	-1%	6	29	1:2427
OH	5,831	4,811	21%	11	25	1:1992
OK	814	395	106%	38	46	1:4819
OR	4,509	2,999	50%	13	11	1:908
PA	3,061	2,498	23%	22	43	1:4177
RI	1,176	941	25%	36	10	1:898
SC	2,772	1,764	57%	27	20	1:1790
SD	478	319	50%	43	21	1:1811
TN	3,548	3,798	-7%	19	22	1:1875
TX	9,396	7,030	34%	3	37	1:2965
UT	4,408	2,679	65%	14	7	1:692
VA	3,236	1,963	65%	20	33	1:2600
VT	1,767	1,367	29%	31	3	1:353
WA	3,681	2,262	63%	18	24	1:1980
WI	2,813	1,941	45%	26	26	1:2054
WV	381	349	9%	45	45	1:4809
WY	152	90	70%	50	42	1:3841

ATTACHMENT 2

Q1 Did you install your solar system in the:

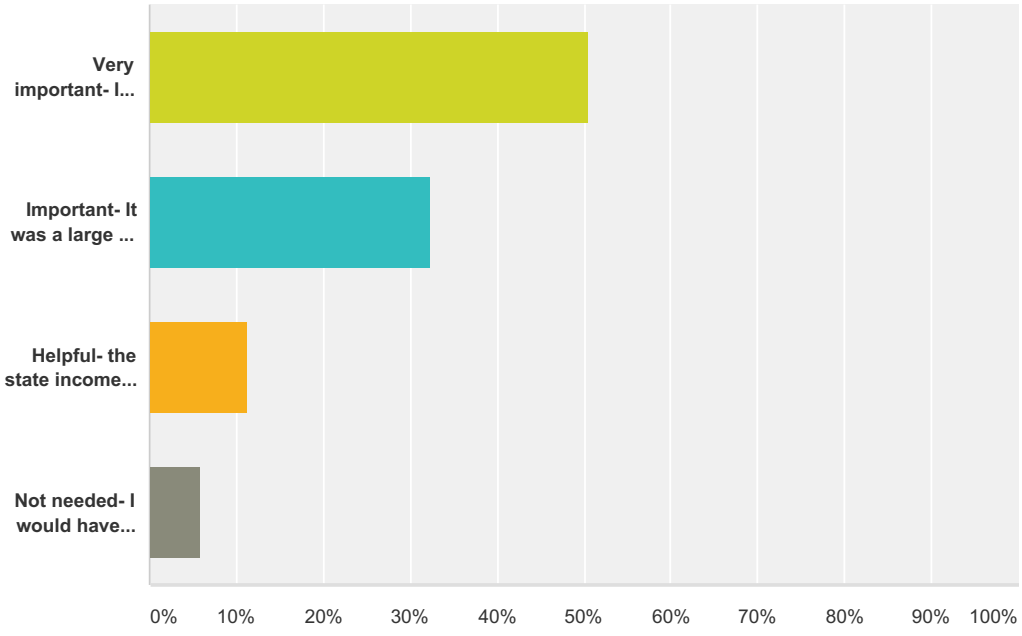
Answered: 493 Skipped: 0



Answer Choices	Responses	
Last 12 months	**72.21%**	356
Between 12 months and 24 months	**22.11%**	109
More than 24 months ago	**5.68%**	28
Total		**493**

Q2 How important was the Utah State Income Tax Credit in your decision to install a pv system on your home?

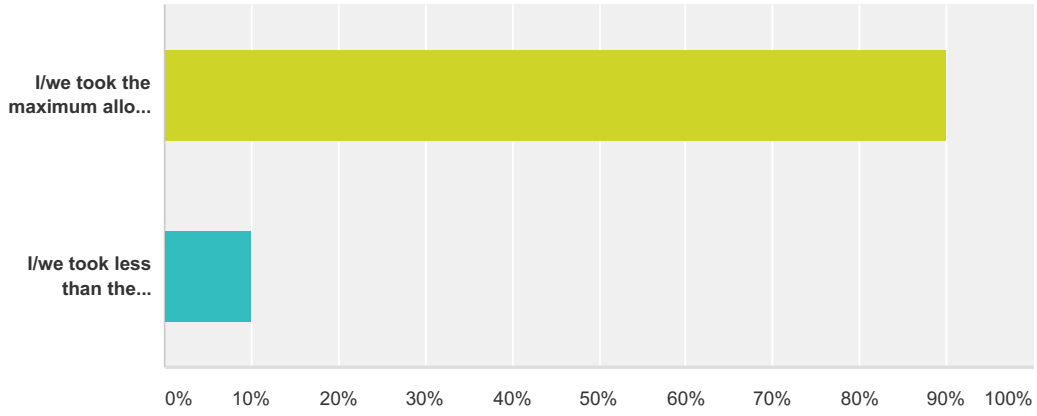
Answered: 485 Skipped: 8



Answer Choices	Responses	
Very important- I wouldn't have installed a system without it	**50.52%**	245
Important- It was a large and important factor in my decision	**32.37%**	157
Helpful- the state income tax credit helped but I might have proceeded without it	**11.34%**	55
Not needed- I would have installed a solar system regardless of the tax credit.	**5.77%**	28
Total		**485**

Q3 Did you claim the maximum credit allowed or did you install a less expensive system and therefore took less of a credit?

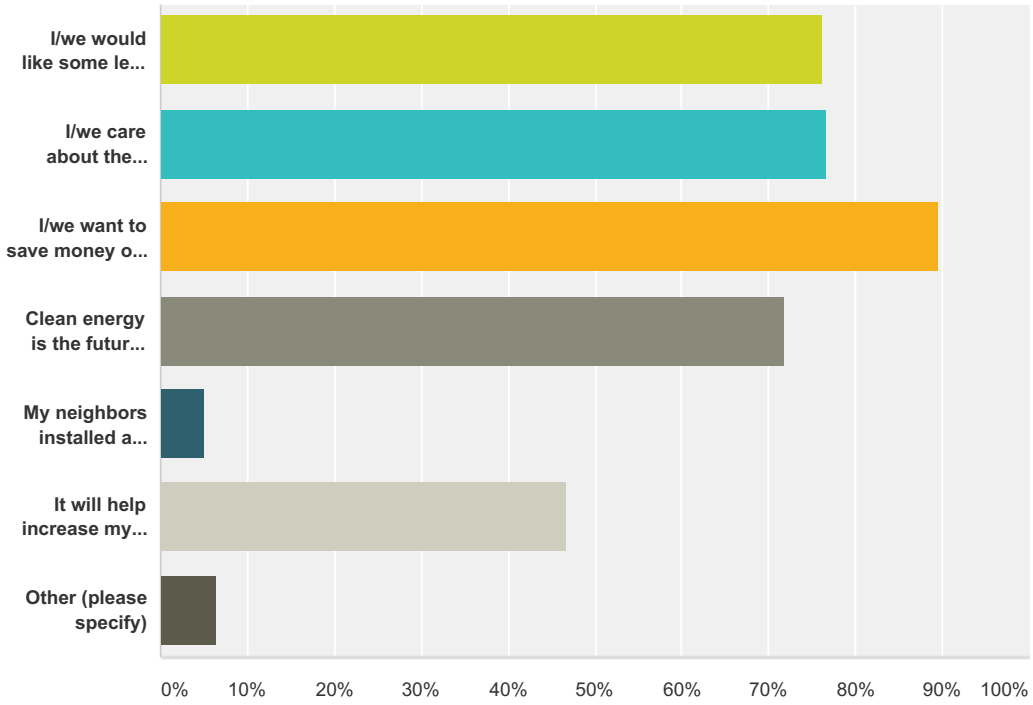
Answered: 467 Skipped: 26



Answer Choices	Responses	
I/we took the maximum allowed credit	**89.94%**	420
I/we took less than the maximum allowed credit	**10.06%**	47
Total		**467**

Q4 What factors were the drivers in your decision to install a pv system? (check all that apply)

Answered: 493 Skipped: 0



Answer Choices	Responses	
I/we would like some level of energy independence	**76.27%**	376
I/we care about the environment and/or want to reduce mycarbon footprint	**76.67%**	378
I/we want to save money on electric bills	**89.66%**	442
Clean energy is the future and I want to support its growth	**71.81%**	354
My neighbors installed a solar system	**5.07%**	25
It will help increase my home's value	**46.86%**	231
Other (please specify)	**6.49%**	32
Total Respondents: 493		

Q5 Optional: Name

Answered: 160 Skipped: 333

Q6 Optional: Email address

Answered: 146 Skipped: 347

Q7 Optional: Zip code

Answered: 227 Skipped: 266

Q8 Optional: Phone number

Answered: 72 Skipped: 421

ATTACHMENT 3

Dan Jones & ASSOCIATES

Utah Rooftop Solar Public Opinion Survey

November 30, 2016

Objectives and Methodology

Research Objectives:

Dan Jones & Associates was commissioned by the Utah Solar Energy Association to survey public opinion in Utah regarding solar energy and other energy issues facing the state.

Methodology:

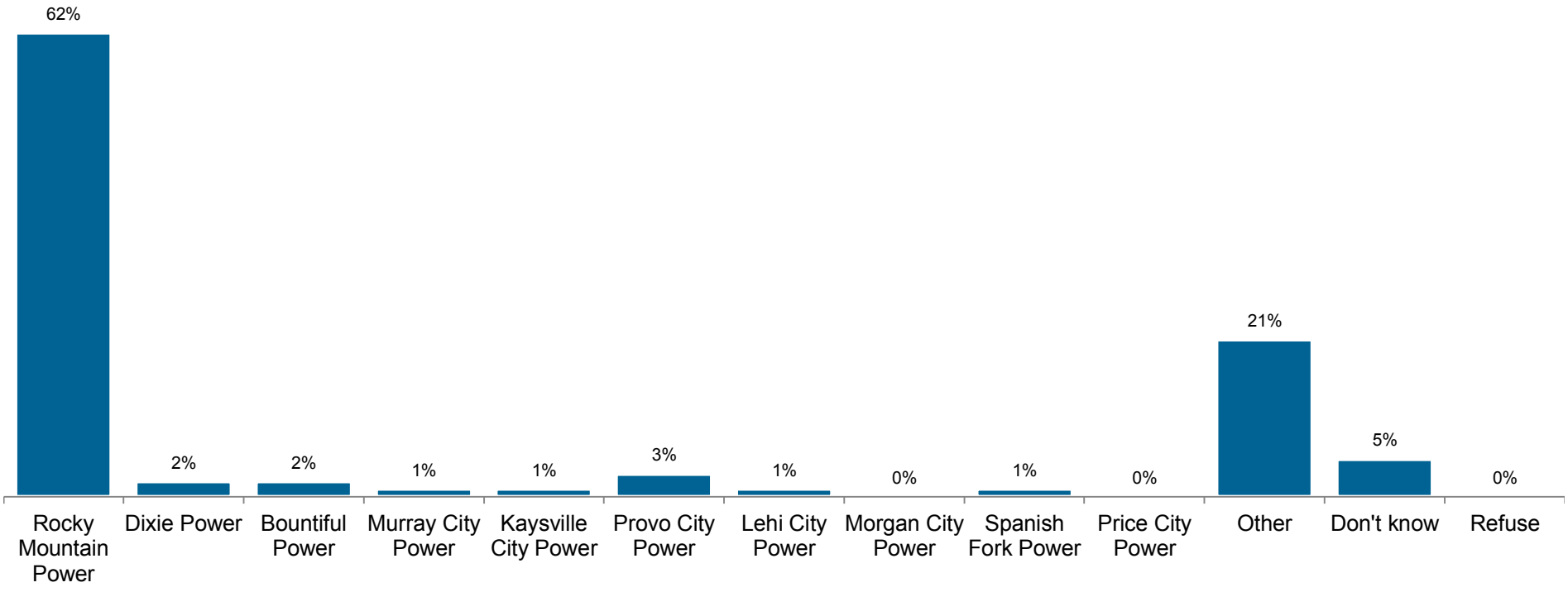
Dan Jones & Associates conducted a study of 834 registered voters throughout Utah from November 21st – November 29th, 2016.

A blended sample methodology was employed with a split of landline, cellphone, and internet-based surveys.

The state-wide margin of error is +/-3.39 percent.

Rocky Mountain Power provides electricity to over 60 percent of respondents, while others receive electricity from municipal providers.

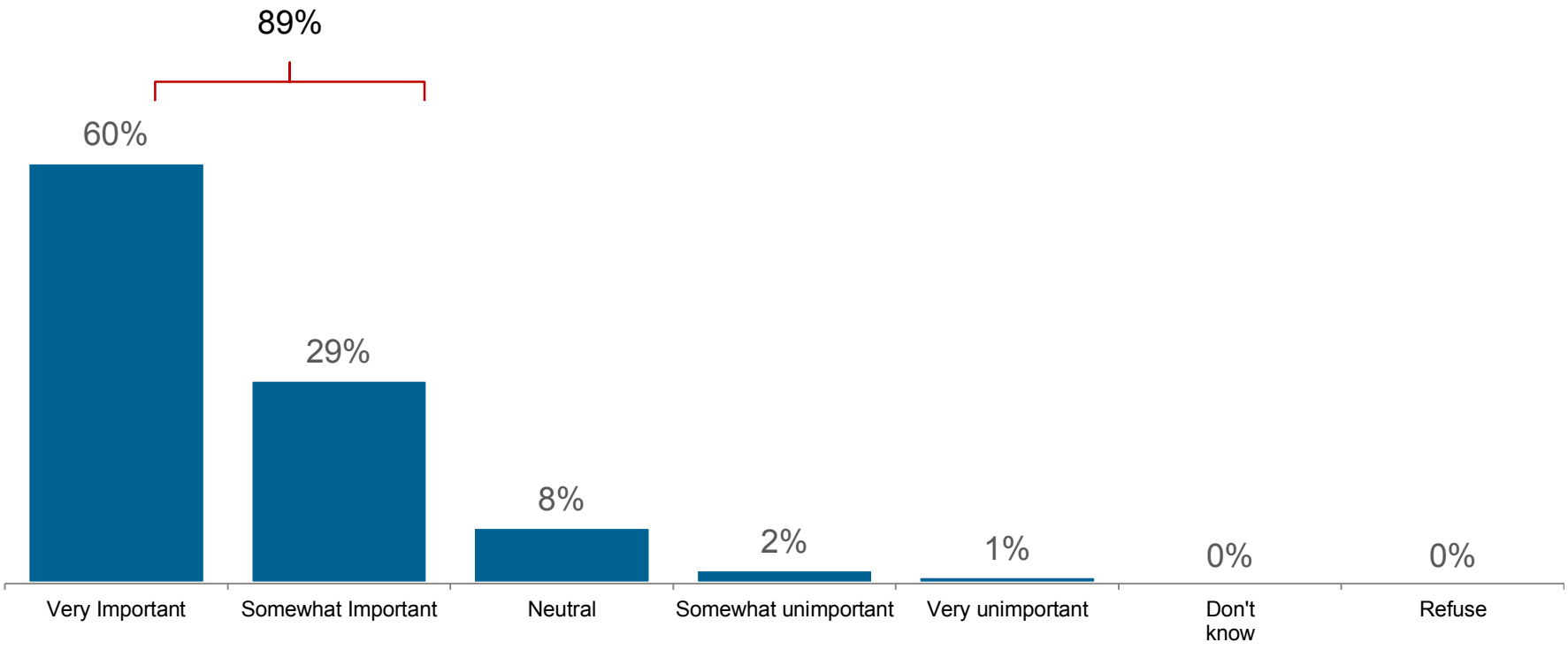
Electricity Provider



Question: What is the name of the electricity utility provider at your home? n=834

Utahns are concerned about air quality, with nearly nine out of ten believing it to be an important issue.

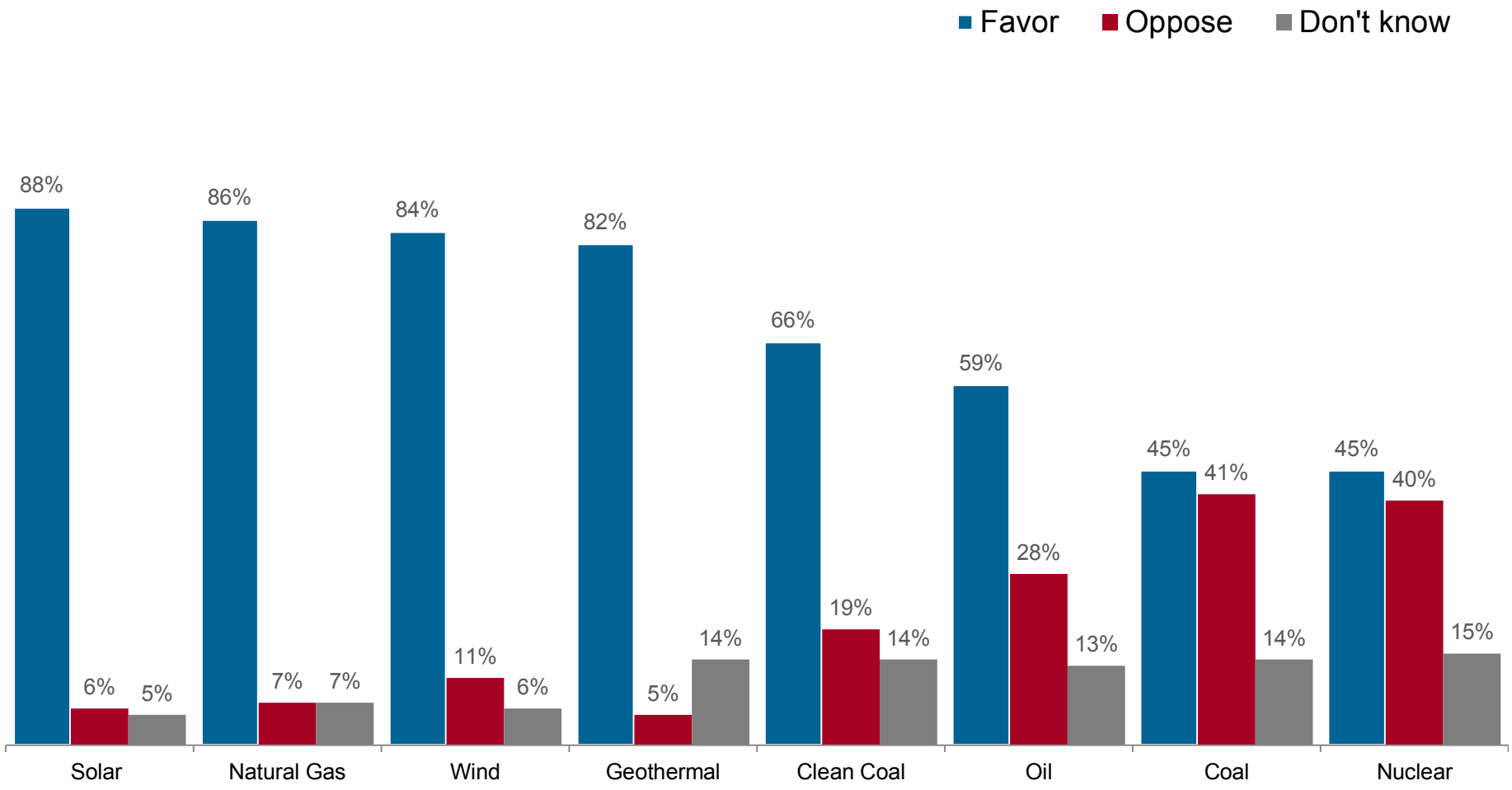
Importance of air quality in Utah



Question: In your opinion, how important is the issue of air quality in Utah? n=834

Utahns support developing solar energy in Utah more than any other energy source.

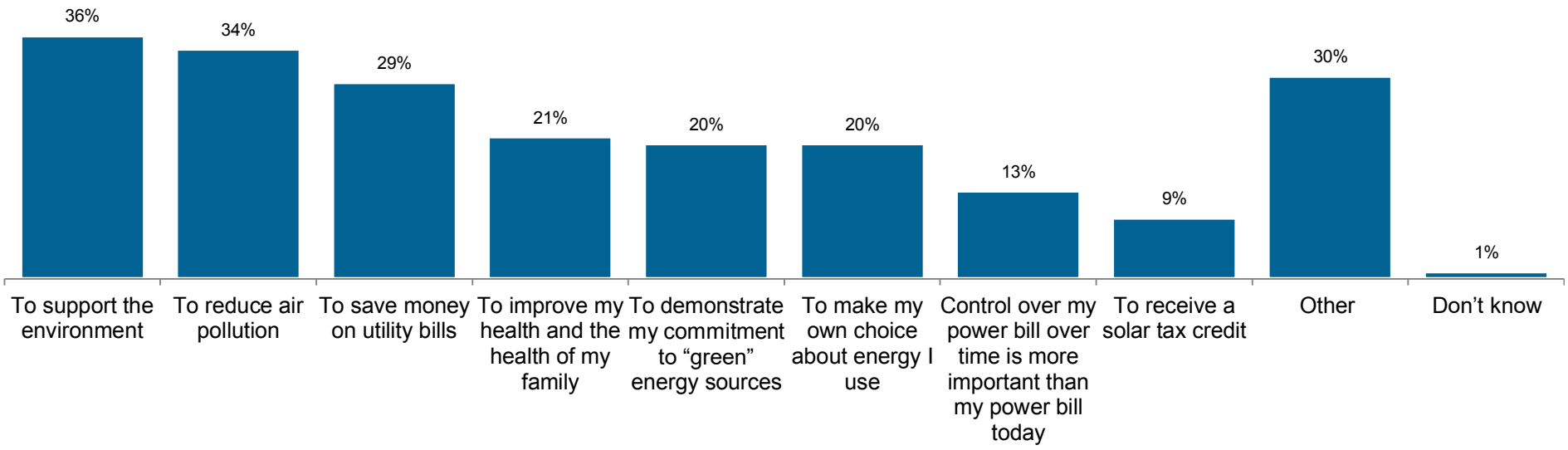
Developing more of the following energy in Utah



Question: Do you favor or oppose developing more of the following sources of energy in Utah? n=834

Supporting the environment and reducing air pollution are the top reasons for favoring solar development, while saving money is popular as well.

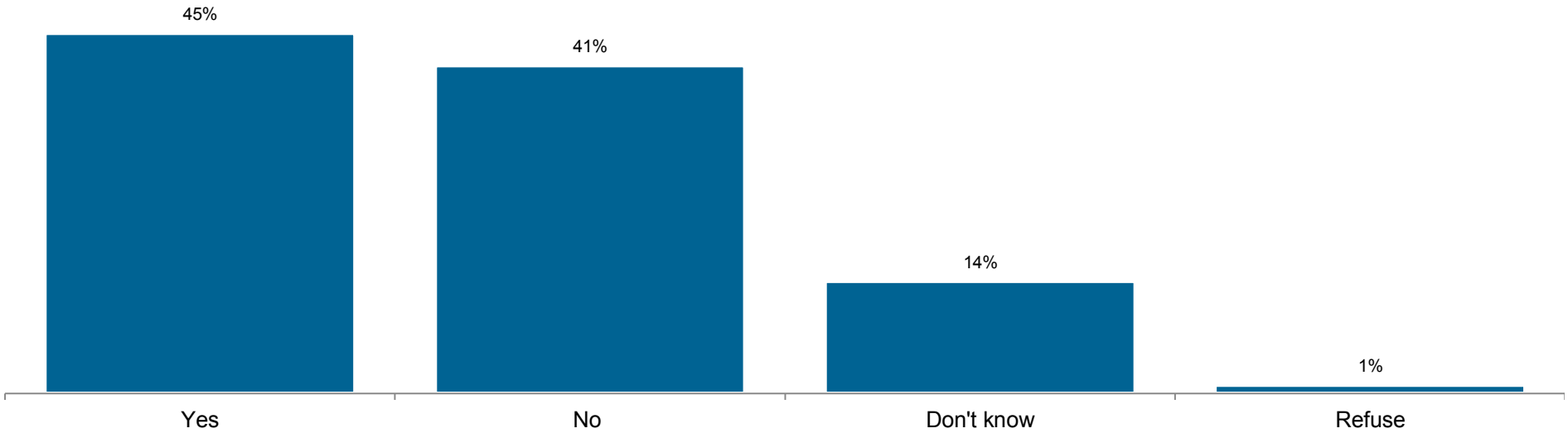
Reasons for favoring solar energy development



Question (Asked for those who favored solar development on prior question):
On the previous question you indicated that you favor the development of Solar in Utah. Why do you support the development of Solar energy? n=738

Approximately half of respondents indicated that Solar is a factor when considering a candidate for public office.

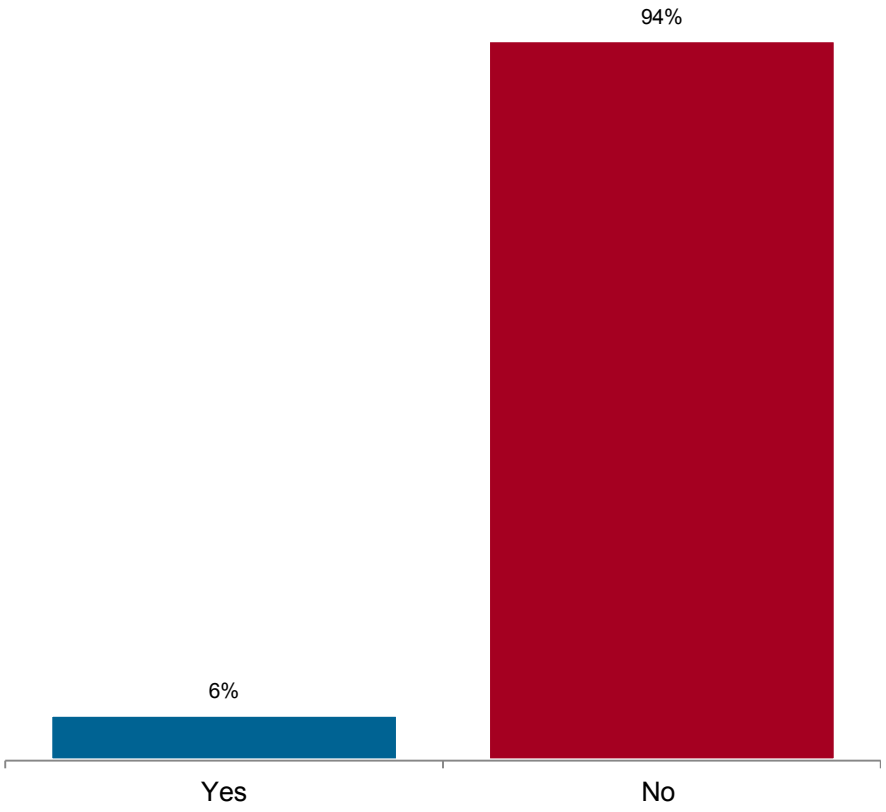
Solar energy as a factor when supporting candidates for office



Question: If a candidate is running for public office, would their position on solar energy be a factor in your decision to vote for them? n=834

Few respondents indicated having a solar system on their home, but close to half are considering installing one in the future.

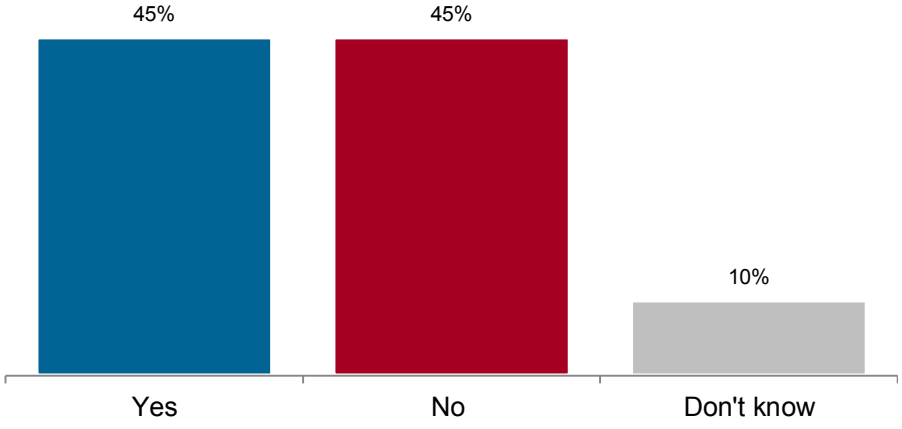
Currently has solar system on home



Question: Do you have a solar energy system on your home? *n=834*

Considering a solar system in the future

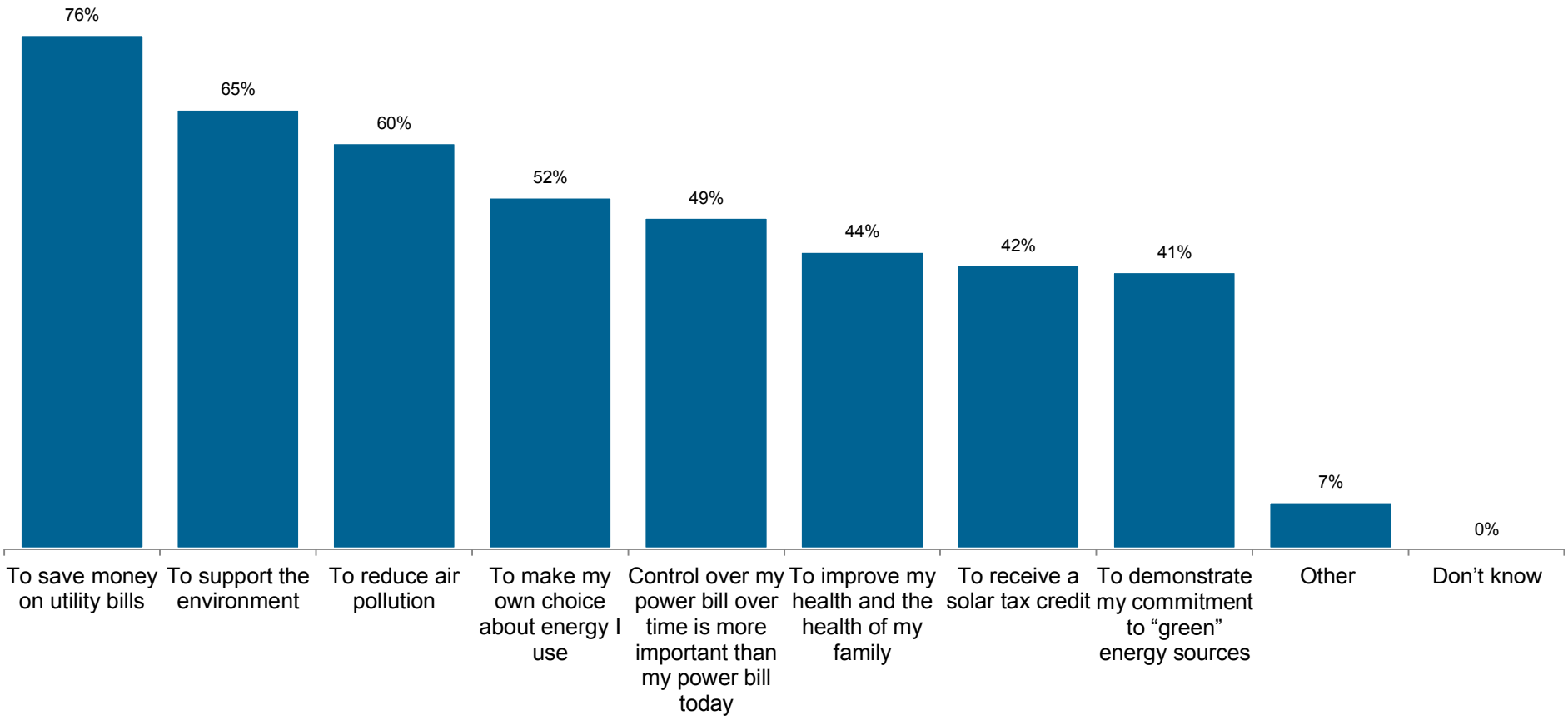
[If do not currently have solar system]



Question: Are you considering installing a solar system on your home in the future? [If "No" or "Don't know" on prior question] *n=782*

Three quarters of those who either have or are considering solar installation cite saving money on utility bills as the top reason driving solar installation.

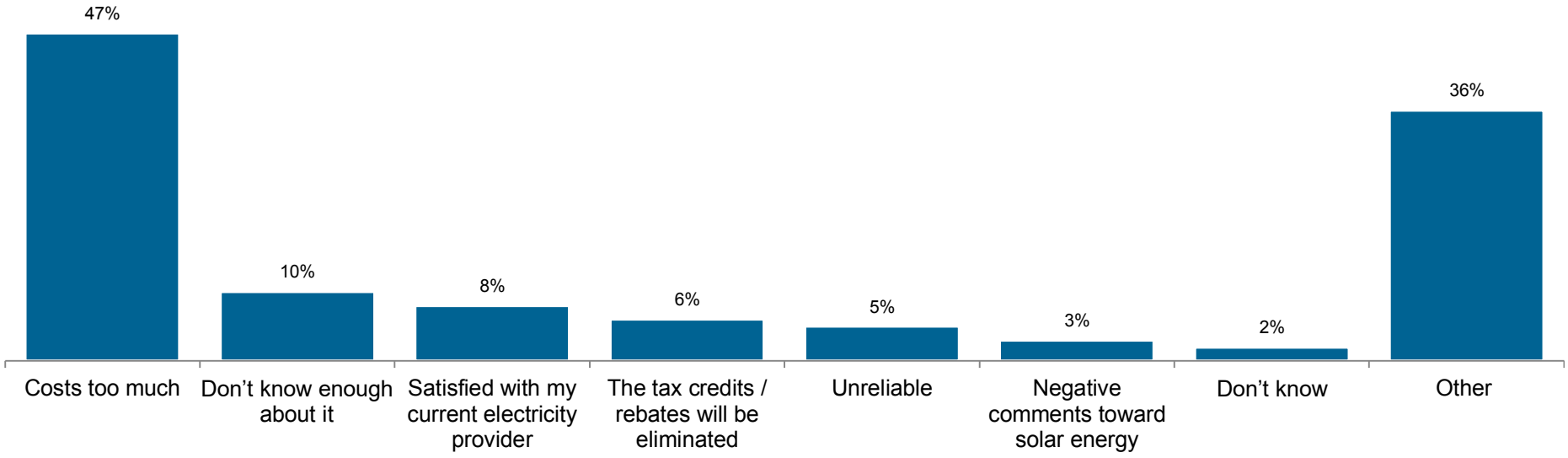
Reasons driving solar installation or considering installation



Question: Which of the following reasons have driven your decision to install or consider solar at your home? [If currently has solar system or is considering solar system in the future] n=403

Cost is the biggest barrier to Utahns who are not considering solar systems for their home.

Reasons for not considering solar system for home

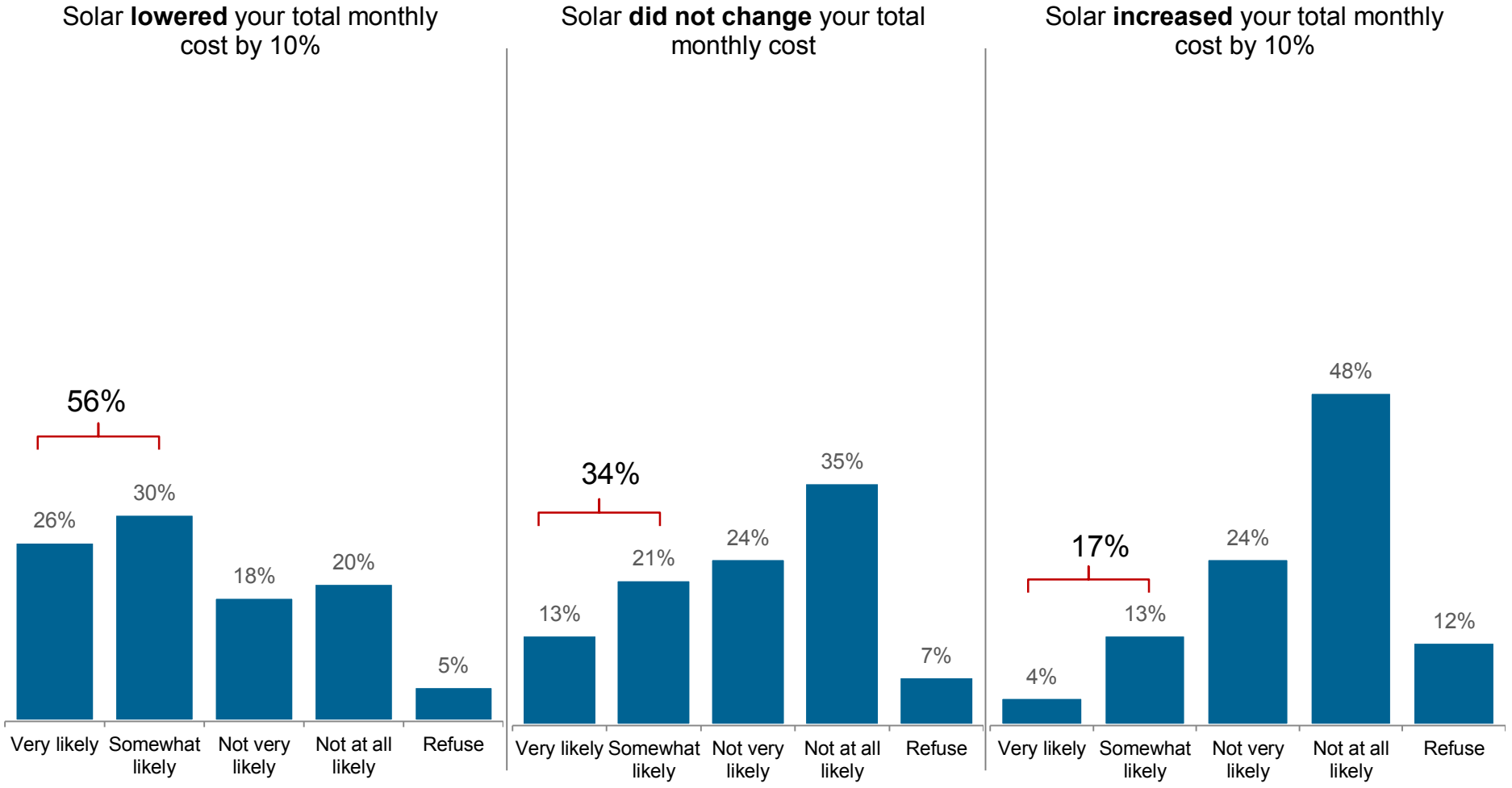


Question: Why are you not considering a solar energy system for your home? [Only asked if not considering a solar system on earlier consideration question]

n=429

While 56 percent of respondents are likely to consider solar install if it lowered costs, only 17 percent are likely to consider install if monthly costs increase.

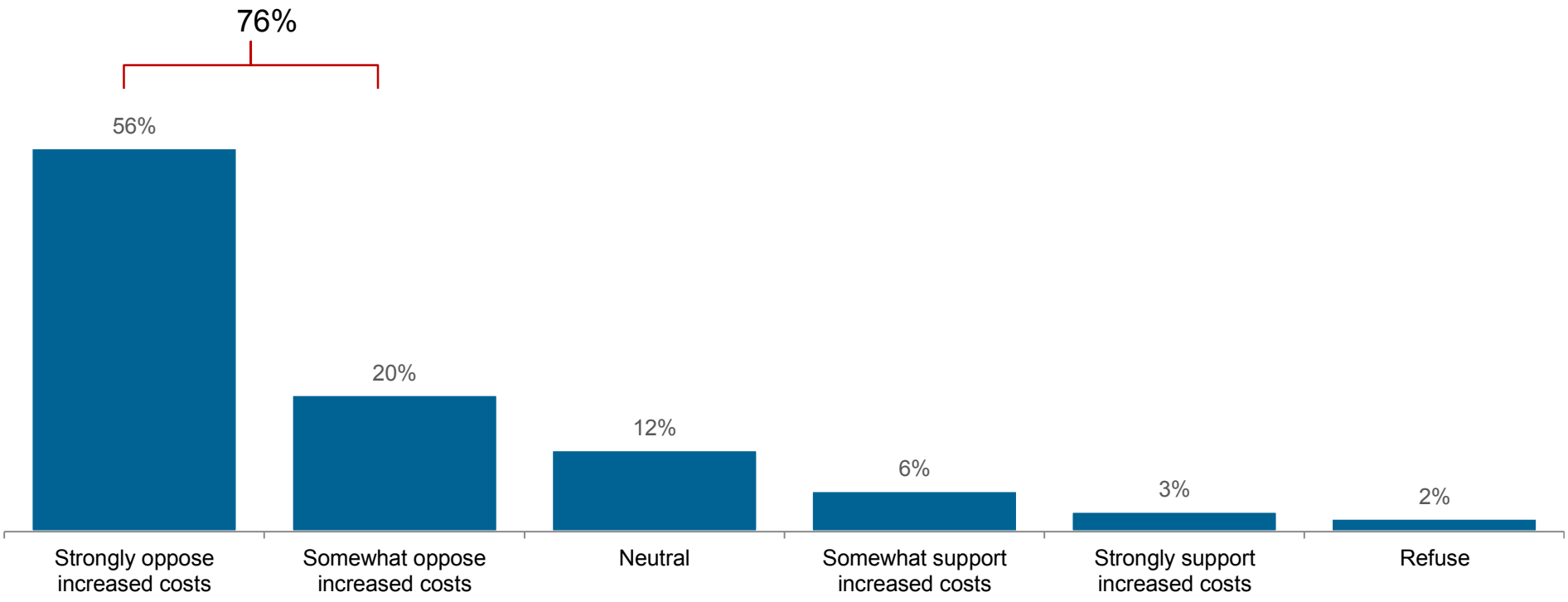
Likeliness to consider installing solar system on residence if monthly electricity cost changed



Question: How likely would you be to consider installing a rooftop solar system on your residence if your monthly electricity cost changed by the following amounts? n=834

Approximately three quarters of respondents oppose an increase in electricity costs for customers with solar.

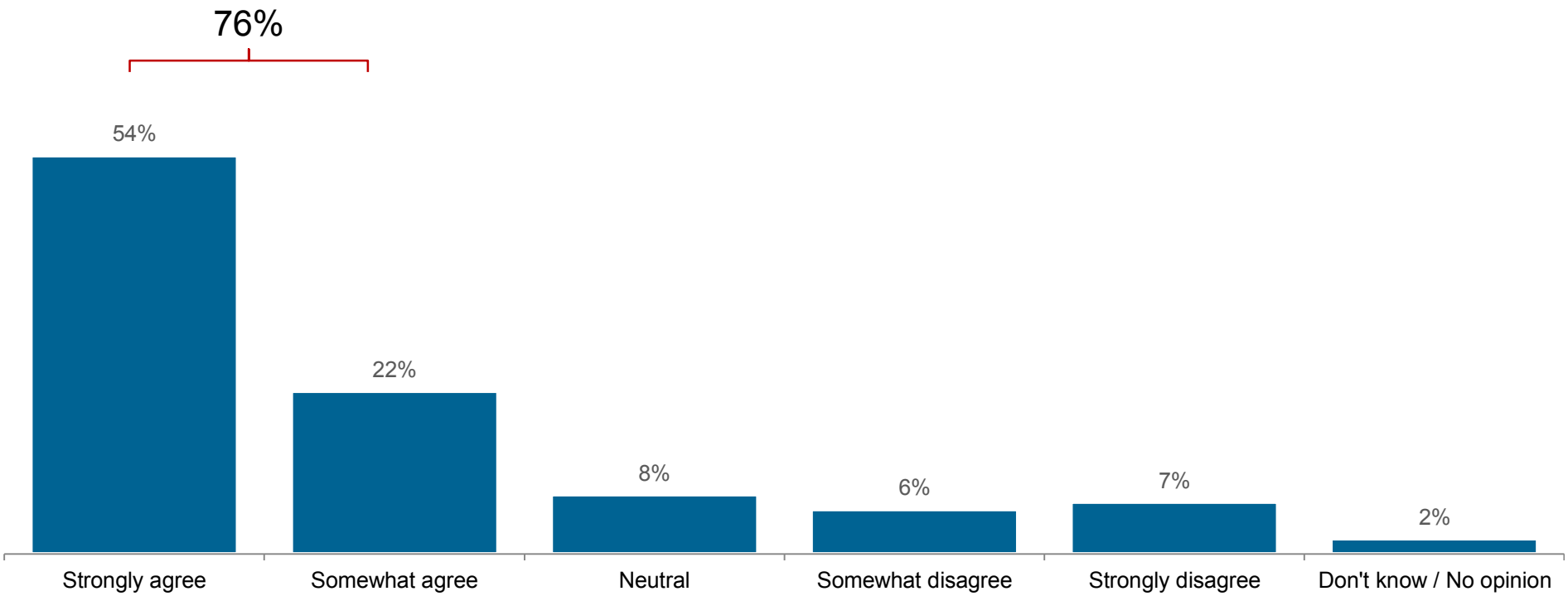
Question: Would you support or oppose an increase in electricity costs for customers with Solar on their homes?



n=834

Three quarters of respondents believe the Rocky Mountain Power proposal increase unfairly discriminates against customers.

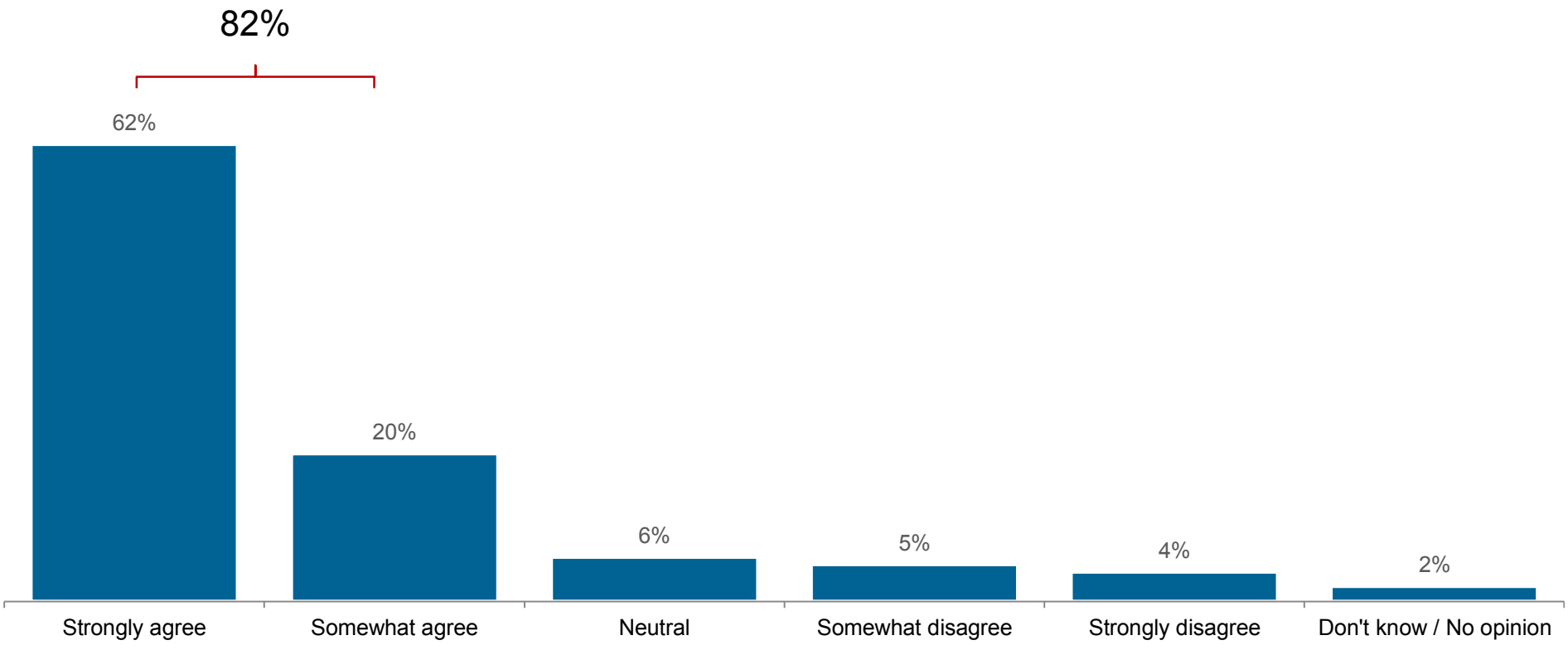
Question: Do you agree or disagree with the following statement: The proposal to increase the cost for rooftop solar customers unfairly discriminates against customers who are trying to reduce their reliance on energy from Rocky Mountain Power.



n=834

More than 80 percent of respondents believe solar customers should have a right to reduce their electricity usage without paying additional fees.

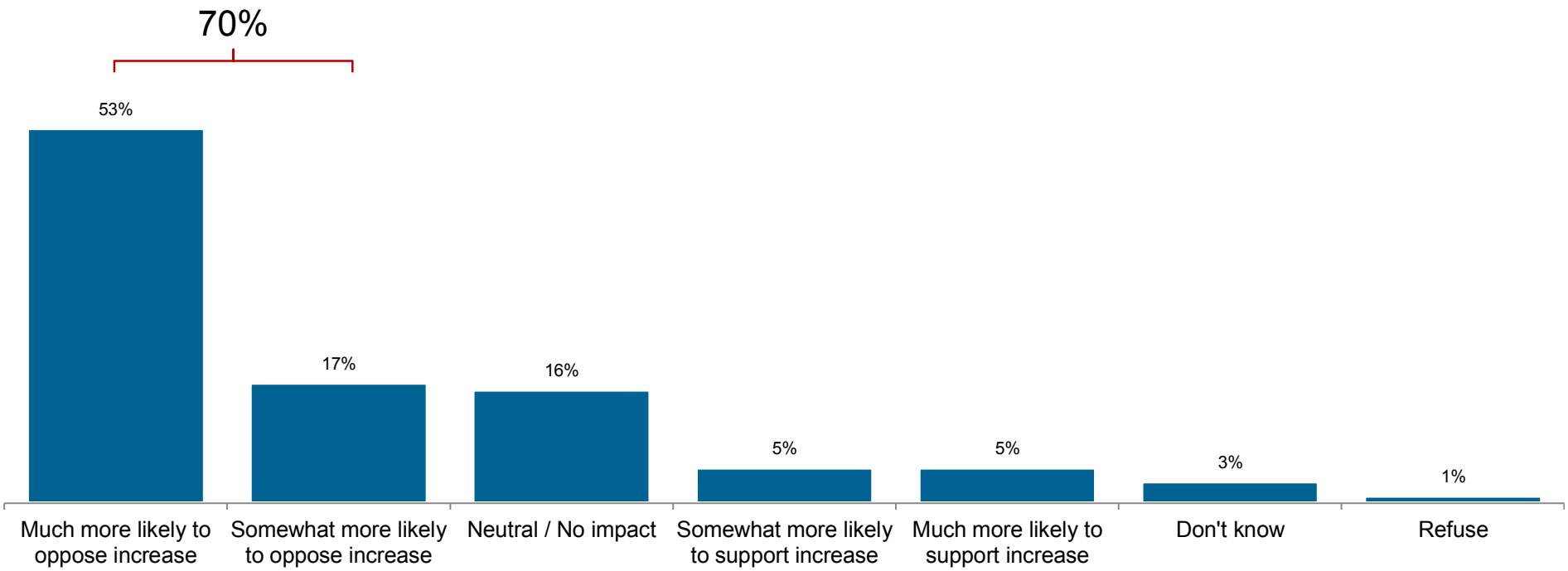
Question: Do you agree or disagree with the following statement: Solar customers should have a right to reduce their electricity usage without having to pay additional fees when compared to those without solar.



n=834

Seventy percent of respondents are more likely to oppose the proposed increase when told that the increased fees will eliminate Utah's rooftop solar industry.

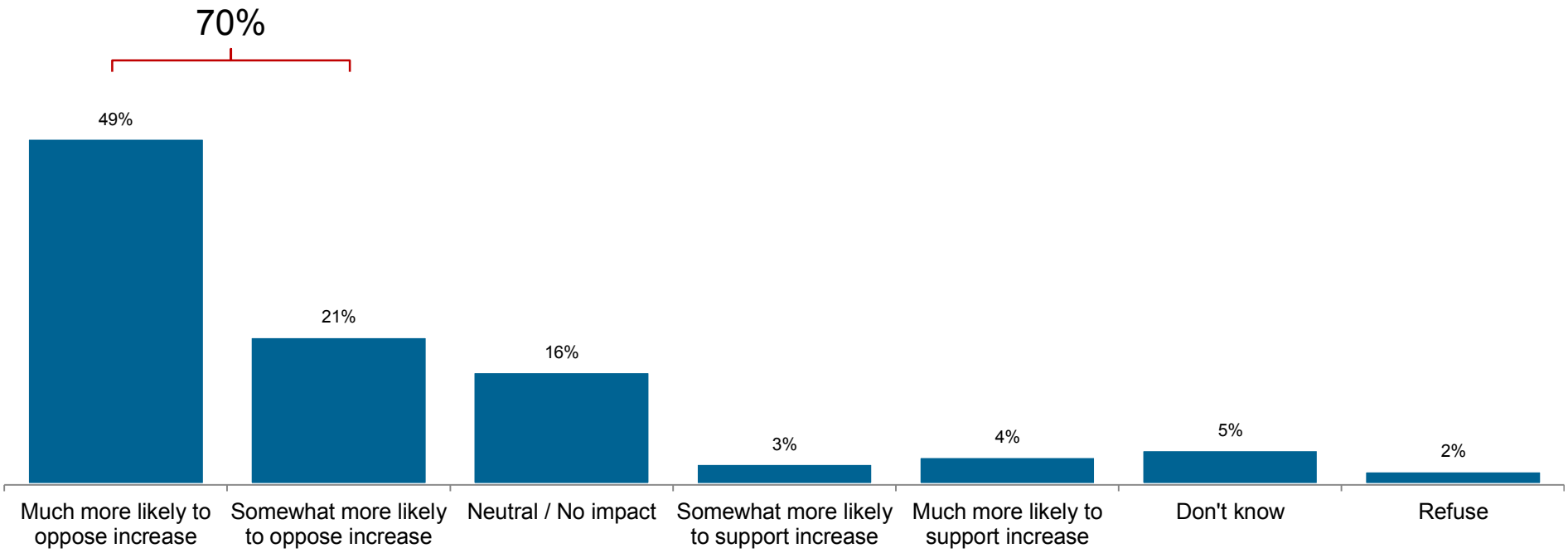
Statement: ***"The increased fees will effectively eliminate the rooftop solar industry in Utah, one of Utah's fastest growing industries."***



Question: How do the following statements affect your likelihood to support or oppose increased costs for customers with Solar panels on their rooftop? Please answer on a scale of one to five, where one is much more likely to oppose the increase and five is much more likely to support the increase. n=834

Forty-nine percent of Utahns are much more likely to oppose the proposed increase when they are informed of job losses in the state.

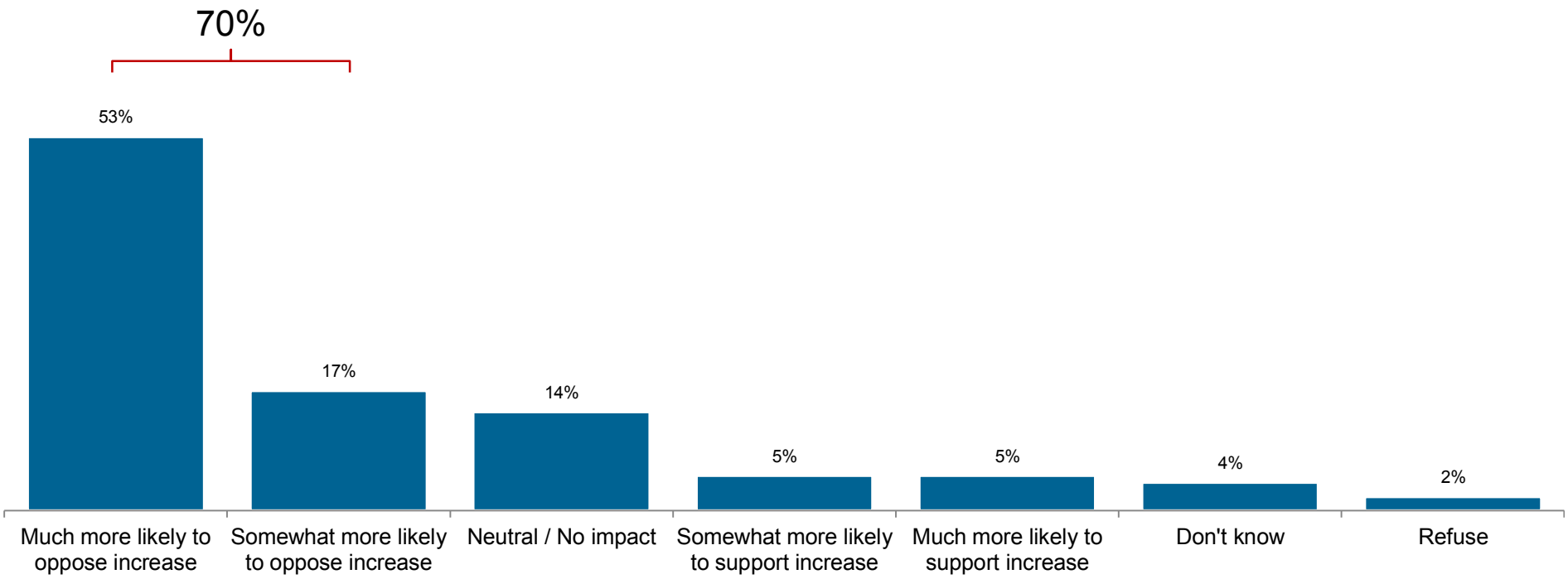
Statement: ***"The proposed increase would eliminate hundreds or thousands of jobs in Utah."***



Question: How do the following statements affect your likelihood to support or oppose increased costs for customers with Solar panels on their rooftop? Please answer on a scale of one to five, where one is much more likely to oppose the increase and five is much more likely to support the increase. n=834

Seventy percent of respondents are more likely to oppose the proposed increase when they know about the total added cost over the lifetime of the system.

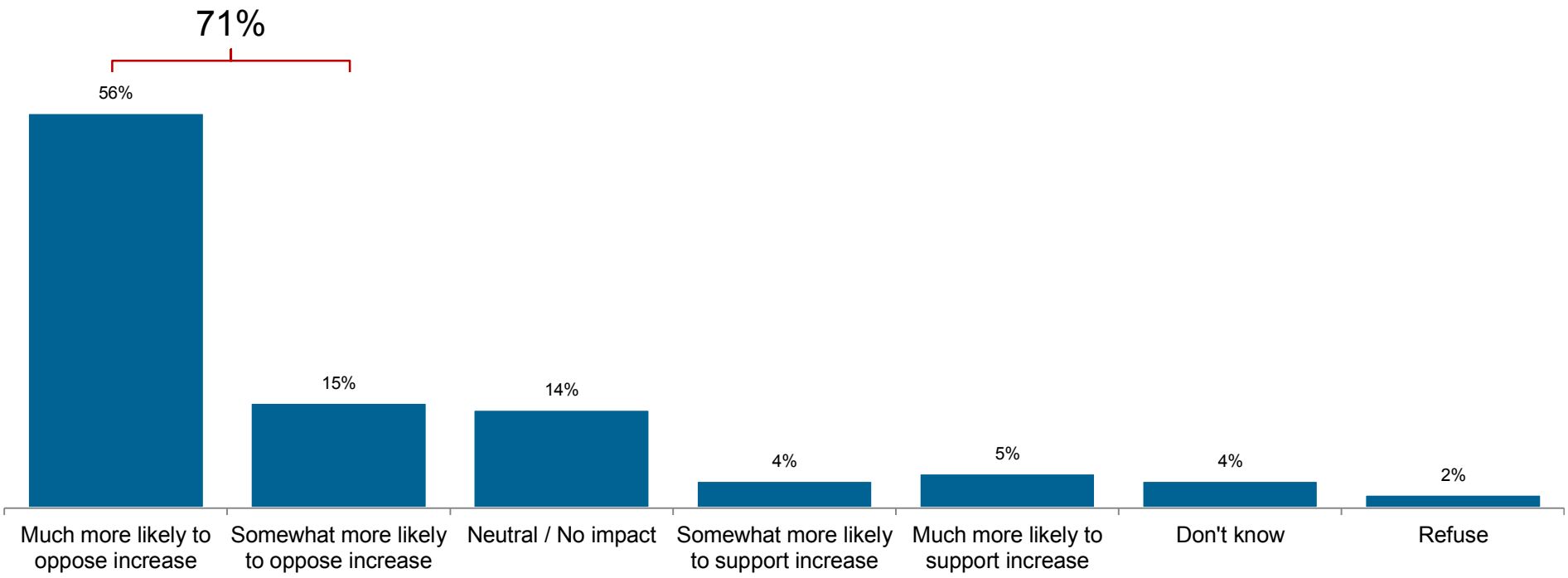
Statement: ***"A typical solar customer would end up paying between $25-$30 more per month resulting in $10,000-$15,000 of added cost over the lifetime of the system."***



Question: How do the following statements affect your likelihood to support or oppose increased costs for customers with Solar panels on their rooftop? Please answer on a scale of one to five, where one is much more likely to oppose the increase and five is much more likely to support the increase. n=834

Fifty-six percent are much more likely to oppose when knowing the payback timeline for a solar system would increase from 13 to over 30 years.

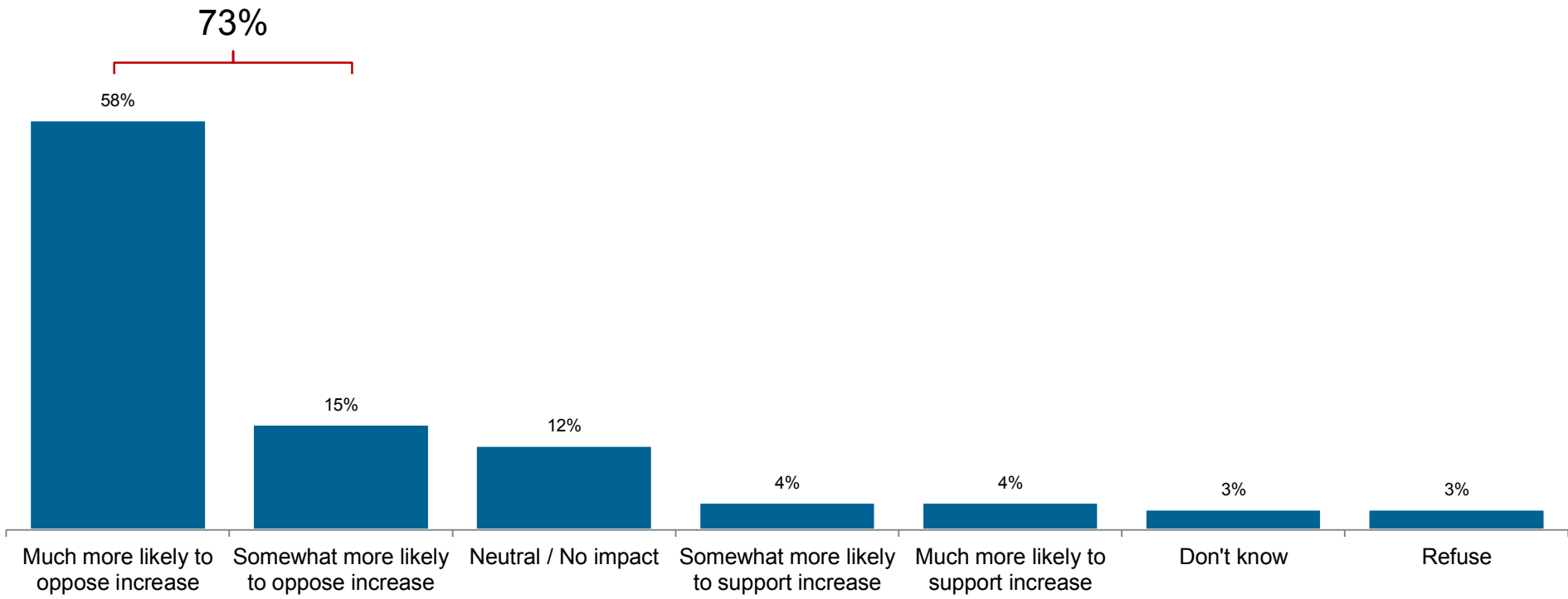
Statement: "The typical payback timeline for a solar energy system would increase from up to 13 years to over 30 years."



Question: How do the following statements affect your likelihood to support or oppose increased costs for customers with Solar panels on their rooftop? Please answer on a scale of one to five, where one is much more likely to oppose the increase and five is much more likely to support the increase. n=834

Seventy three percent of respondents are more likely to oppose the increase when made aware of Nevada's experience with a similar proposal.

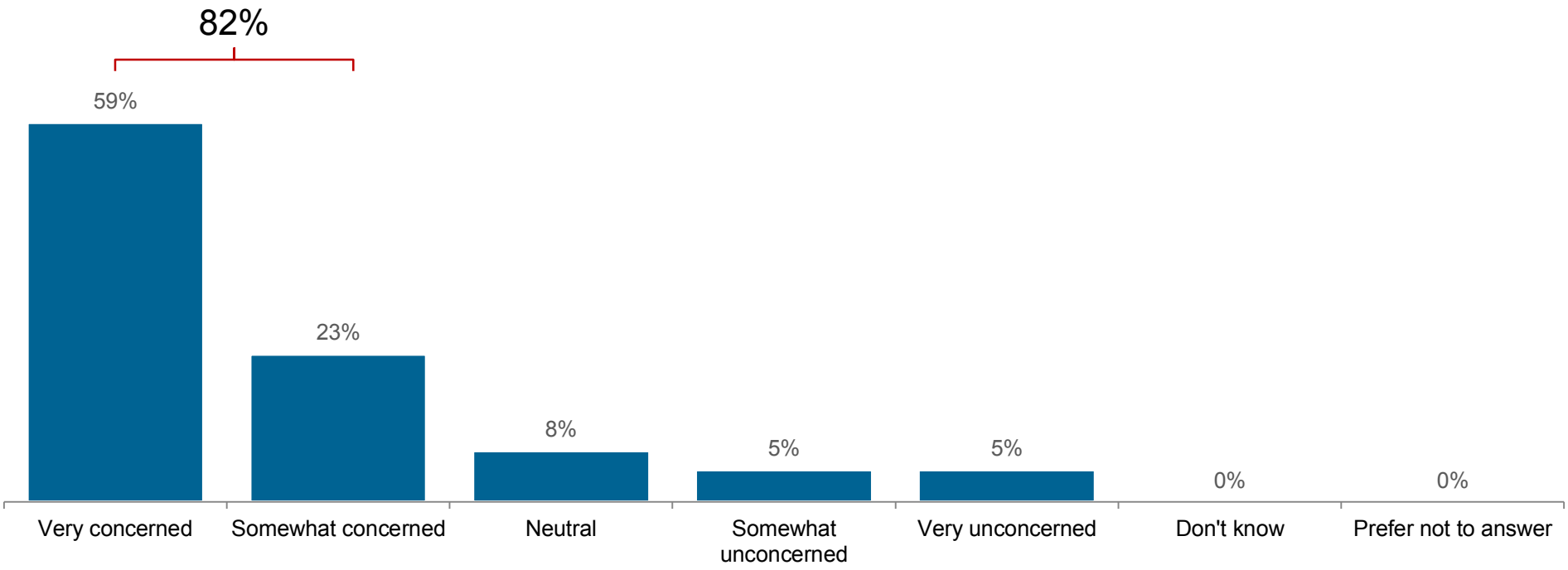
Statement: "Nevada implemented a similar proposal resulting in:
- 99% reduction in solar applications
- Thousands of lost jobs.
Utah may experience similar impacts if the proposed increase is implemented."



Question: How do the following statements affect your likelihood to support or oppose increased costs for customers with Solar panels on their rooftop? Please answer on a scale of one to five, where one is much more likely to oppose the increase and five is much more likely to support the increase. n=834

Approximately 80 percent of respondents are concerned that the requested rate increase shows Rocky Mountain Power may be trying to limit competition.

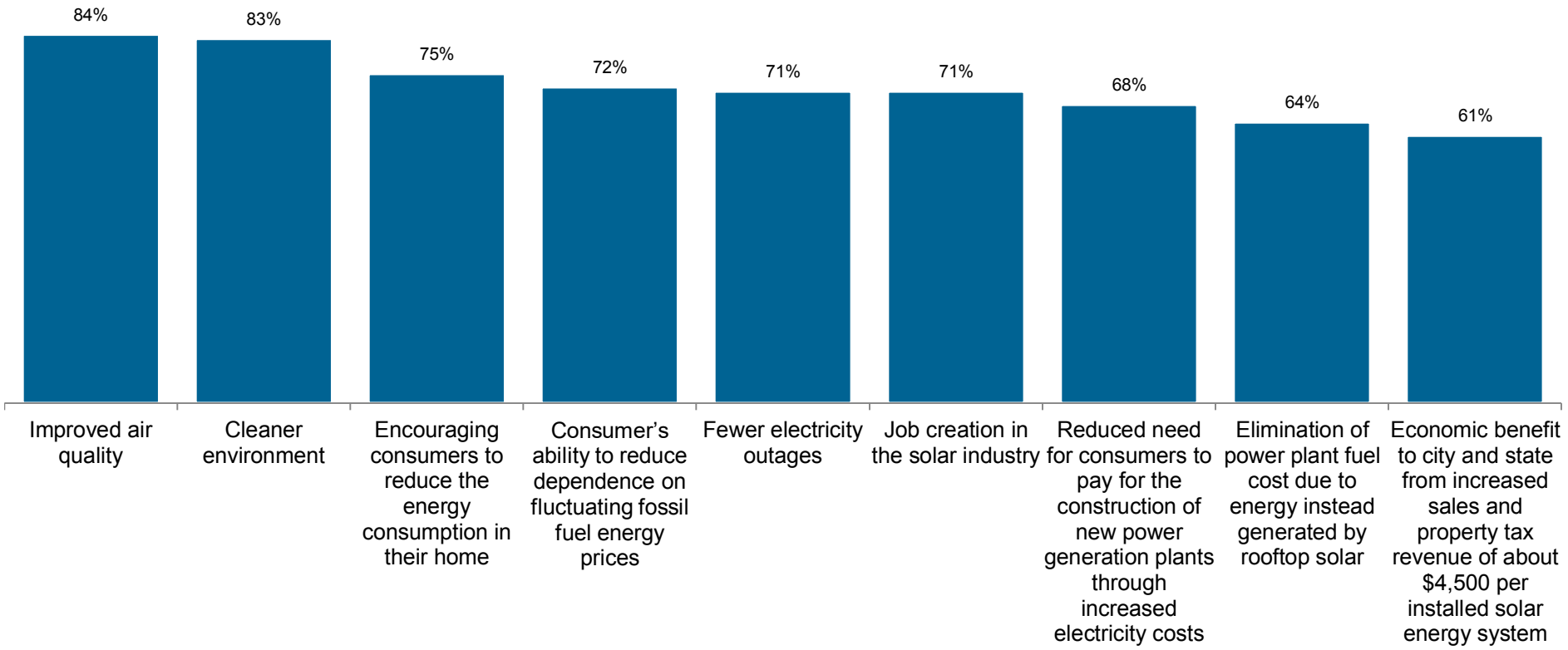
Concern that RMP may be trying to limit competition



Question: Rocky Mountain Power is the sole monopoly provider of electricity for many people in Utah. They are proposing increases in rates for customers who install their own solar panels on their rooftops. Rooftop solar panels reduce the amount of electricity that is purchased from Rocky Mountain Power. Are you concerned that Rocky Mountain Power, by requesting increased rates on solar, may be trying to limit competition? n=834

Respondents believe improved air quality and cleaner environment are the most important factors to be included in the analysis when considering solar rates.

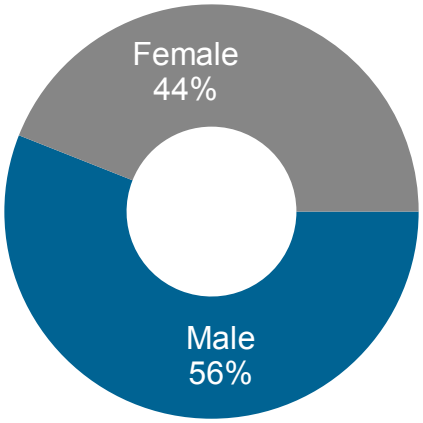
Very or Somewhat Important to be Included in Solar and Electricity rate decisions



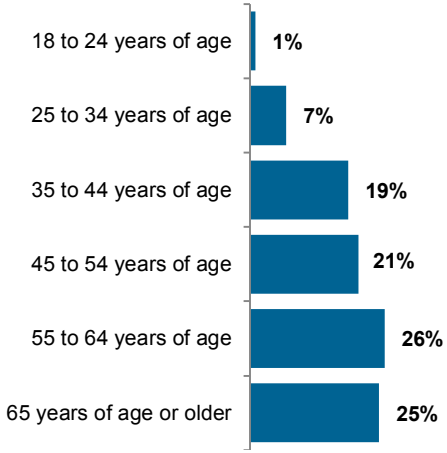
Question: Utah has a state agency that regulates public utilities and protects consumer interests. When this agency makes decisions related to solar and electricity rates for consumers, how important is it that they include the following potential benefits from solar in their analysis. Please answer on a scale of 1 to 5 where one is very important and five is very unimportant. n=834

Demographics

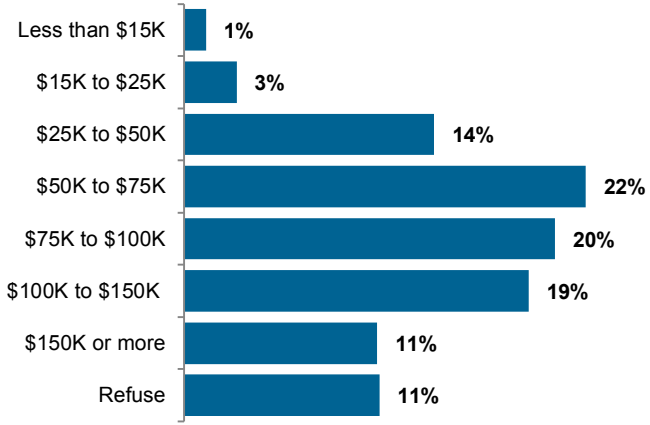
GENDER



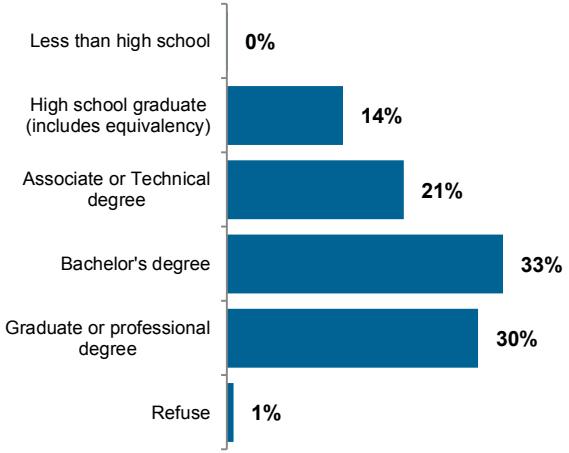
AGE



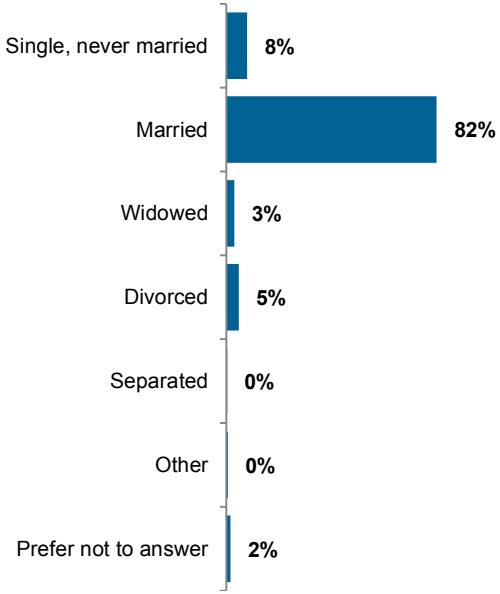
INCOME



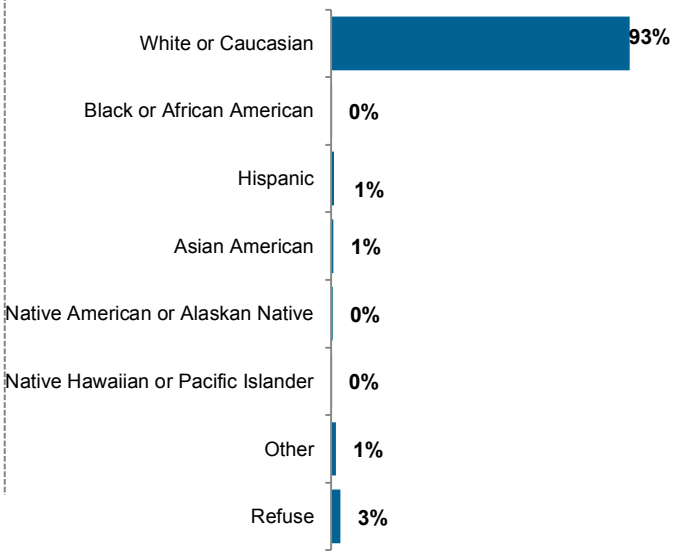
EDUCATION



MARITAL STATUS

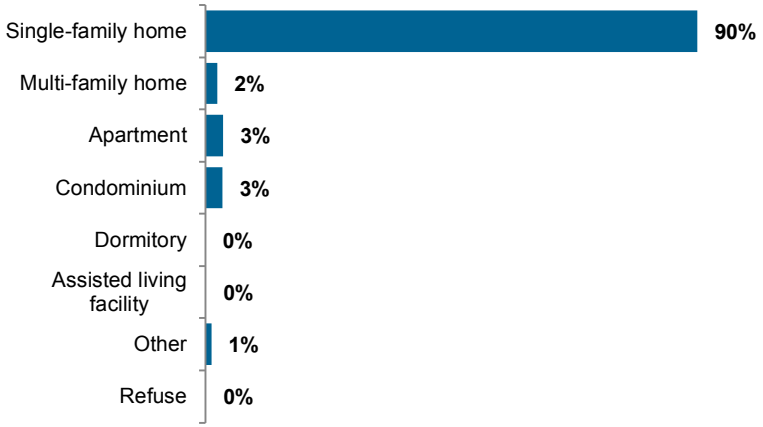


ETHNICITY

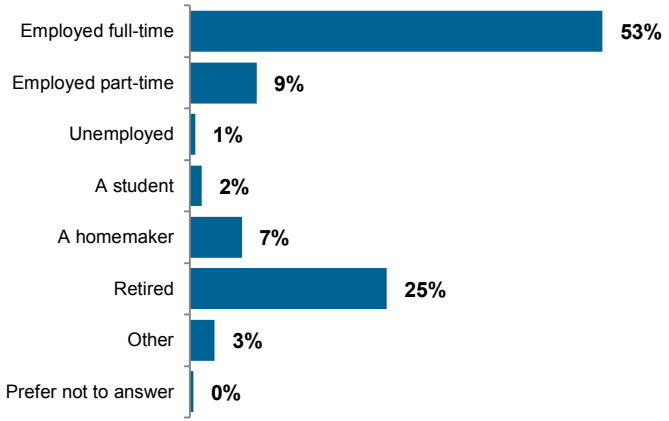


Demographics

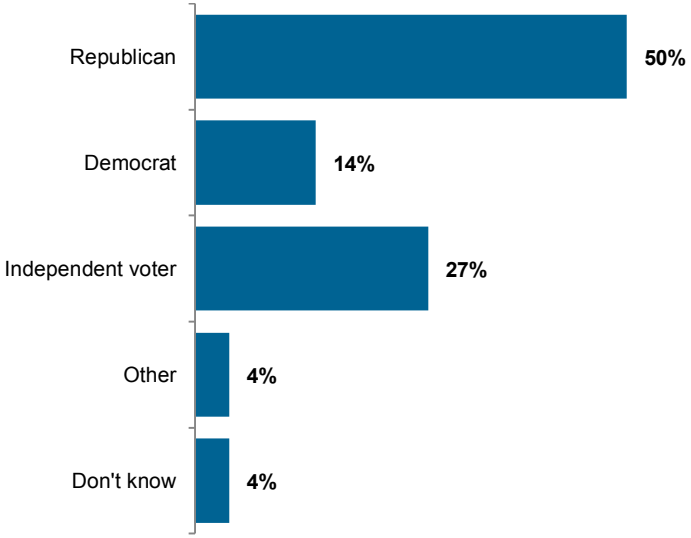
RESIDENCE



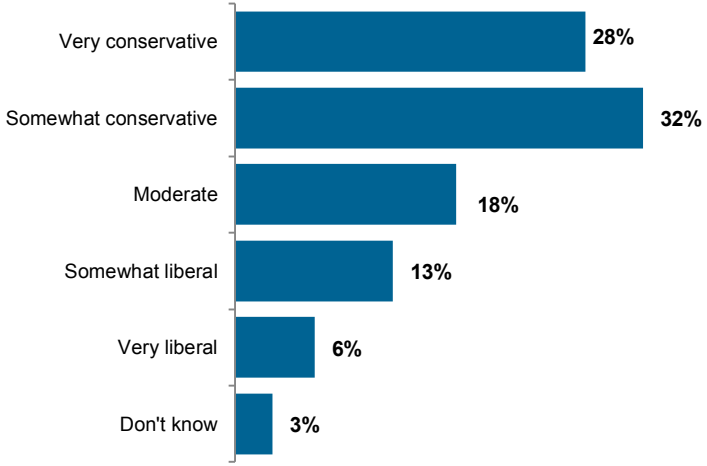
EMPLOYEMENT



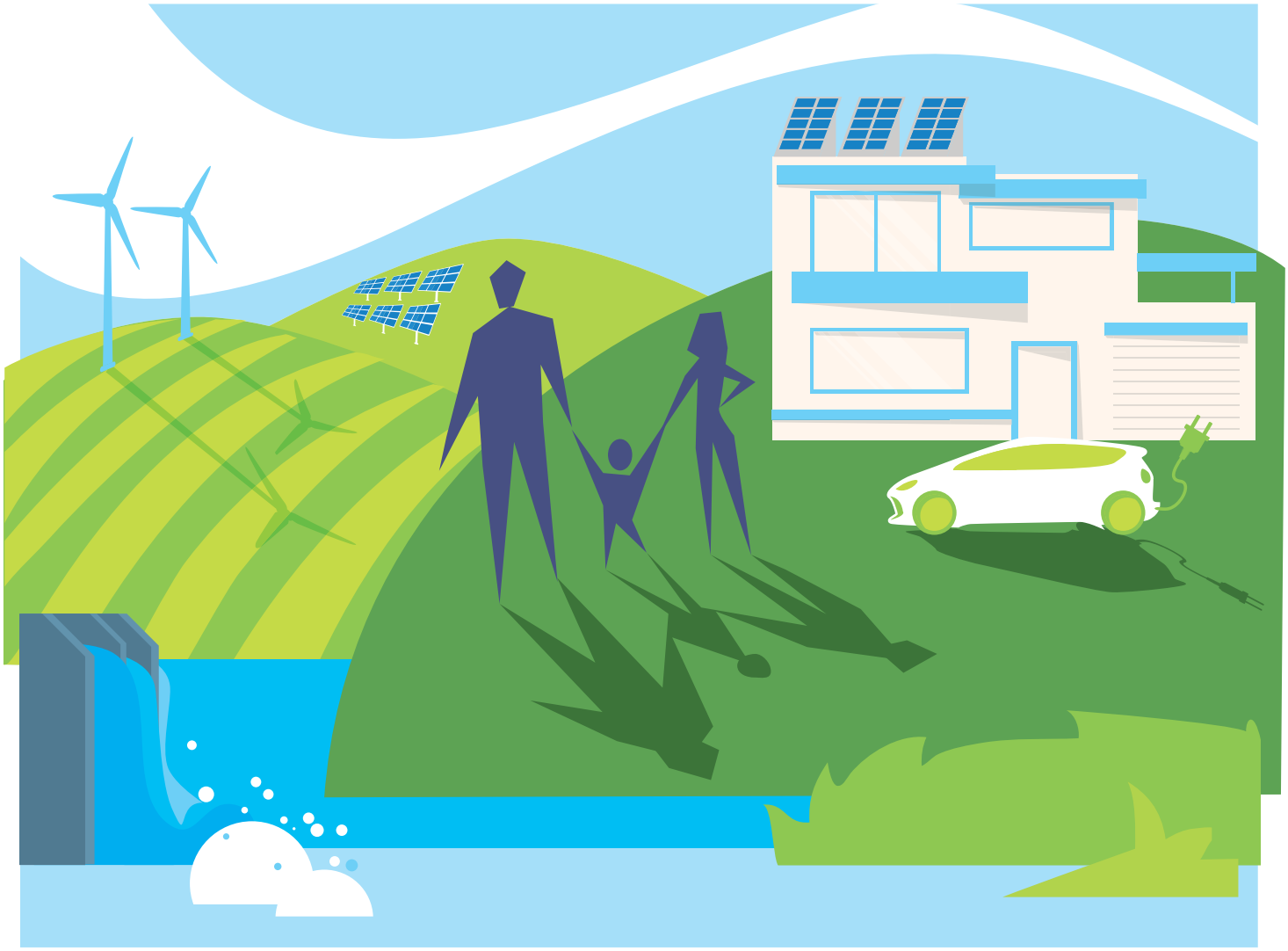
POLITICAL AFFILIATION



POLITICAL IDEOLOGY



ATTACHMENT 4



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listen, educate, collaborate

CONSUMER DRIVEN TECHNOLOGIES

EXECUTIVE SUMMARY FOR NON-SGCC MEMBERS

EXECUTIVE SUMMARY FOR NON-SGCC MEMBERS

A full report with detailed findings is available free to SGCC members.

Please contact us to discuss membership at membership@smartgridcc.org or visit our website at www.SmartGridCC.org.

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DNV·GL

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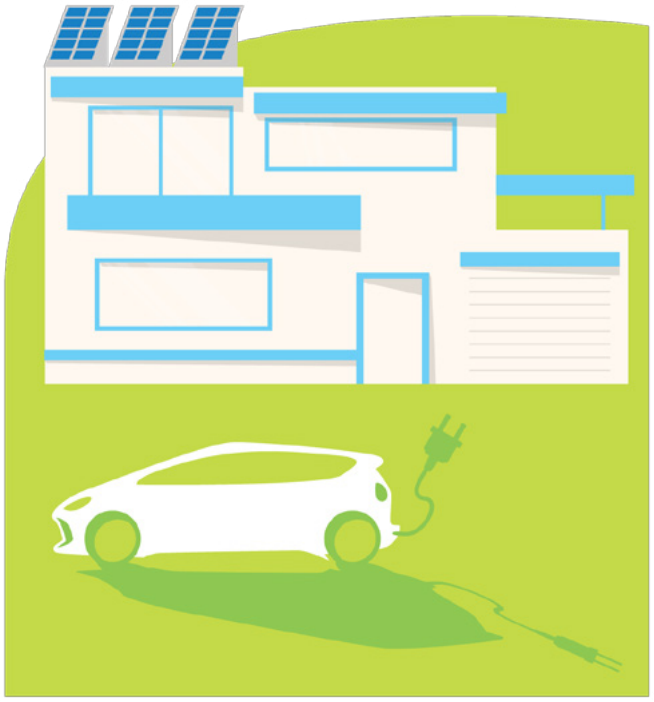
1 EXECUTIVE SUMMARY

The electricity grid is evolving from one designed for unidirectional flows of electricity to the consumer to one that also integrates intermittent generation from the consumer into the grid. Gaining an understanding of consumer adoption of solar and electric vehicles is essential as these and other distributed energy resources introduce increased variability in the supply and demand relationship for energy. SGCC's Consumer Driven Technologies (CDT) study examines consumer adoption of solar photovoltaic (PV) and electric vehicle (EV) technologies. The CDT study equips interested stakeholders with actionable insight on the consumer producers or "prosumers" to help this transition to the future grid.

The CDT research was conducted as an online survey of 1,571 respondents from across the nation that addressed four distinct technologies and services: residential solar, community solar, green power plans and electric vehicles. The CDT survey results support analysis of the overall patterns of solar PV and EV technology adoption. Through oversampling of adopters of residential solar PV and EV technologies, the survey supports in-depth analysis of the motivations, concerns and experience of consumers who have recently made decisions regarding their purchase and use. The sample size of this study satisfies overall confidence and precision of 95% ± 2.5%, and minimum of 95% ± 10% within each of the segments and state groups.

The research set out to answer the following questions:

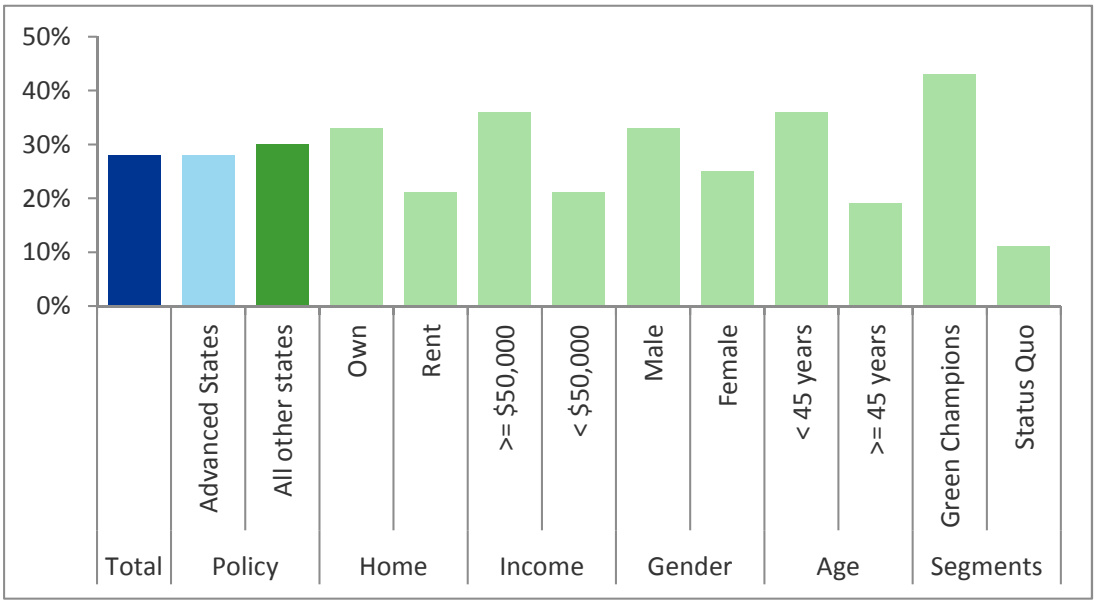
- To what extent are residential consumers aware of and interested in solar and electric vehicle technologies?
- What benefits from adoption of these technologies do consumers recognize and value?
- What barriers to adoption do consumers perceive?
- What do consumers expect in terms of technology performance and investment return?
- Which entities (utility and non-utility) do consumers rely upon for accurate information on technologies such as solar and EVs?
- What roles do consumers expect their utility company to play in the solar and EV marketplace (for installation, ownership, connection to the grid and backup supply)?
- Does utility involvement in solar and EV markets boost or deter adoption of those technologies?
- How do the answers to the questions above vary, if at all, by the five SGCC consumer segments, by key demographics and by policy environment?



1.1 Key Findings

1. **Demographics and segmentation drive interest in solar PV and EVs.** Consistent with previous research, we found that consumer demographics and segmentation had a much stronger statistical association with interest in solar PV and EVs than other potential influences such as the level of policy and program support available in the consumer's state. Demographic characteristics of homeownership, income and age have the strongest effect on level of consumer interest. Residence in a state with policies supportive of renewable energy and smart grid technologies had no consistent effect on consumers' interest in or self-assessed understanding of those technologies.

Figure 1: Consumers very interested in residential solar PV



2. **Barriers exist, but the market is moving towards reducing dominant consumer concerns.** Fewer than 22% of all consumers claim to have a fairly complete understanding of PV or EVs which is a barrier to engagement. The combination of lack of knowledge concerning technology benefits with perceptions of high initial cost constitutes the major barrier to adoption for the majority of consumers. Broader market trends towards alternative acquisition models and falling prices are helping to mitigate cost concerns.
3. **There is growing interest in alternative acquisition models** for solar PV and EVs towards alternatives such as power purchase agreements (PPAs), shared ownership arrangements like community solar and leases for solar PV and EVs. This reflects broader market trends away from sole ownership and towards the burgeoning shared economy and "as-a-service" models — a promising market trend in an environment where initial adoption costs are a barrier.
4. **Roughly one-half of consumers who have solar or EV technology have both[1].** Similarly, consumers who are interested in one of those technologies have interest in the other. This finding has implications for utility planners looking to forecast load as adoption of these technologies ramps up. It also points to opportunities for targeted marketing and service bundling for companies who offer those technologies.
5. **When using solar, consumers are interested in connecting to the grid as a source of backup power and are willing to pay for it.** This finding suggests that there is potential to offer backup power services for a fee.

[1] The findings presented here are based strictly on the sample for this study. The sample includes an oversample of residential solar PV and EV adopters who comprise 453 and 378 of the total sample of 1,571 respondents respectively. Co-adoption based on the CDT sample is estimated as follows — 45% (204 out of 453) of residential solar PV adopters stated they also had an EV and 54% (204 out of 378) of EV adopters stated that they also had residential solar PV.

6. **Utilities have a role as an information provider and market booster, but less so as a provider of ancillary services for solar PV and EVs.** Consumers indicate that they seek to eliminate middlemen and streamline their transactions. When consumers are making purchases, 70% would prefer to deal directly with the supplier of solar PV and EVs for services such as technical advice, installation and hardware.

1.2 Implications for Utility Programs and Related Policies

The implications of findings from this CDT study for interested stakeholders for solar PV and EV technologies are summarized below.

Promotion of solar electricity for residential consumers. As discussed above, lack of consumer understanding of the benefits of solar power and high initial investment costs remain the most important barriers to more widespread adoption of solar PV technology. The market has consistently addressed the latter barrier of initial cost: installed costs per kW of PV systems have decreased by over 50% in the past 10 years[2]. The average levelized per kWh of residential solar electricity is now $0.122[3], roughly equal to the average retail residential electric rate[4]. PV installation services are widely available throughout the country and leasing services further reduce initial costs.

Public sector-supported programs can be leveraged to address the lack of consumer understanding of the practical workings and benefits of PV technology. Consumer education and outreach reduces information search and other transaction costs for the consumer. Moreover, this kind of activity and consumer protection is an uncontroversial role for the public sector. Facilitation of interconnections and convenient operation through net metering represent the "last mile" in enabling consumers to access solar energy. Most of the respondents reported being willing to pay for back-up service and grid connections to facilitate that back-up. Finally, community solar and green power represent channels to access solar power for renters and homeowners who face physical constraints to owning solar PV systems. However, the complexity of these transactions will require even greater consumer education and promotional efforts to achieve scale.

Promotion of electric vehicles. A key tool on the path to decarbonization of the transport sector is widespread adoption of electric vehicles; this has additional benefits of much cleaner air quality and reduced dependence on oil. As in the case of solar, the EV market has begun to provide products priced to be accessible to a relatively broad range of new car buyers.

Improvements in battery technologies and the resultant advances in electric vehicles indicate that the market is poised for growth in the next decade with some estimates at 22% EV penetration by 2025 from less than 3% today[5]. The CDT research indicates that around one-third of EV adopters/potential adopters would value benefits such as special/preferred access to carpool/high occupancy vehicle lanes and parking spaces, a desire that is addressed to policymakers and the public sector. Service providers can facilitate convenient operation with improvements to charging infrastructure. Utilities can educate consumers regarding setup and offer tariffs designed for EV users.

A members-only full report with additional findings and details for the Consumer Driven Technologies study is available for download on our website at www.SmartGridCC.org. This report provides insights on consumer adoption of solar PV and EVs for a wide variety of stakeholders including policy makers, technology vendors, utilities and consumer organizations.

[2] http://www.seia.org/sites/default/files/Tracking%20the%20Sun%20VIII.pdf Source: Lawrence Berkeley National Laboratories

[3] https://about.bnef.com/press-releases/wind-solar-boost-cost-competitiveness-versus-fossil-fuels/ Source: Bloomberg New Energy Finance

[4] https://www.eia.gov/electricity/monthly/epm_table_grapher.cfm?t=epmt_5_6_a Source: U.S. Energy Information Administration

[5] http://www.goldmansachs.com/our-thinking/pages/macroeconomic-insights-folder/what-if-i-told-you/report.pdf Source: Goldman Sachs Research

2 BACKGROUND

SGCC commissioned the Consumer Driven Technologies (CDT) study to help its members understand consumer awareness of and willingness to adopt solar photovoltaic (PV) and electric vehicle (EV) technologies, investigate the prevalence, if any, of co-adoption and to characterize what consumers see as the primary barriers to adoption. The survey sought to understand consumer experiences and attitudes towards solar PV and EV technologies in two types of policy environments: states with net-metering and interconnection policies favorable to the adoption of such technologies and those with less favorable policies.

The Research Approach

The CDT research was conducted as an online survey with 1,571 respondents from across the nation. To increase resolution on current solar PV and EV adopters, these adopters were oversampled because a truly random sample would yield samples that are too small for making inferences regarding these groups. Statistical weighting techniques were used to balance the sample to reflect the overall US population based on a range of socio-demographic characteristics. A detailed explanation of the sampling and weighting approach is provided in Appendix A. The sample size of this study satisfies overall confidence and precision of 95% ± 2.5%, and minimum of 95% ± 10% within each of the segments and state groups.

The topics explored consumer adoption of four distinct technologies and services: residential solar, community solar, green power plans that include utility solar and electric vehicles.

The survey collected information on the following topics:

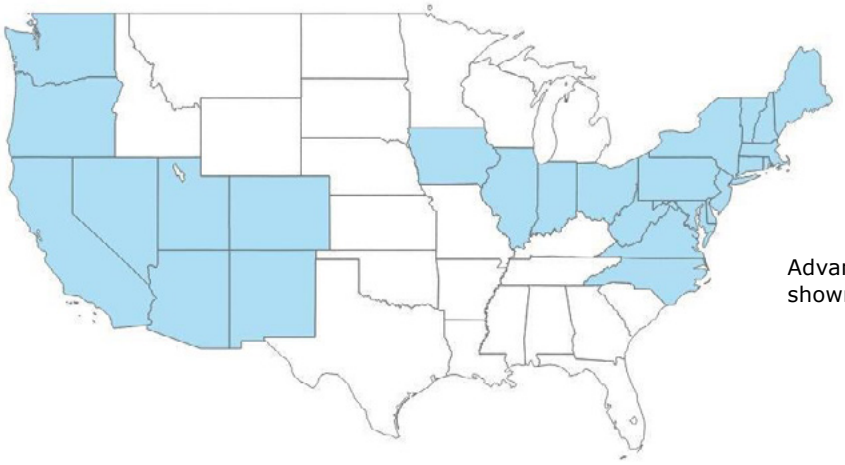
- Awareness of the technology/service
- Perception of technology performance – adopters only
- Interest in adopting the technology/service – non-adopters
- Importance of various benefits when considering adoption of the technology/service
- Level of agreement with perceived barriers/misconceptions for each technology/service
- Preferred entity to provide ancillary services related to the technology
- Most preferred type of solar among residential, community and green power plans
- Value ascribed to grid services in this technology/service market

The CDT study was structured to detect the potential effects, if any, of the policy environment on consumer awareness of and interest in PV and EV technologies. To assess the favorability of states' policy environments for consumers, we used an annual state-by-state report card, *Freeing the Grid 2015* generated by the Interstate Renewable Energy Council (IREC) and Vote Solar[6]. This report card assigns states a letter grade both for interconnection and net metering policies with respect to distributed generation such as solar. Net metering rules and interconnection policies that more effectively smooth the road to allow energy consumers to generate their own electricity earn states a higher grade. Using the report card, we partitioned states into two groups – the "advanced" states comprising those receiving a relatively higher grade and the remainder comprising states that received a relatively lower grade. The advanced states are highlighted in blue in the map below[7]. *(Figure 2)*

[6] http://www.irecusa.org/2016/01/irec-and-vote-solar-release-2015-freeing-the-grid/

[7] Appendix B lists the states that are included in each group.

Figure 2: State classification by net metering and interconnection policies



Advanced states are shown in blue

CDT also examined consumers' responses within a framework of five previously-determined SGCC segments: Green Champions, Savings Seekers, Status Quo, Technology Cautious and Movers & Shakers. As shown in Table 1, and previously described in SGCC's Consumer Pulse and Market Segmentation Wave 5 Study[8], these segments exhibit distinct levels of awareness, interest and values around solar and EV technologies that prove true to type.

Table 1: Characteristics of SGCC segments

SEGMENTS	PERSPECTIVES	KEY DEMOGRAPHICS	AWARENESS AND INTEREST IN SOLAR/EV
Green Champions	*"Smart energy technologies fit our environmentally aware, high-tech lifestyle."*	Youngest, more likely to be college-educated	Relatively highest levels of awareness and interest in all types of solar and EV, nearly four times the interest level of Status Quo
Savings Seekers	*"How can smart energy programs help us save money?"*	Younger, more likely to be college-educated	Lower levels of awareness and interest in all types of solar and EV
Status Quo	*"We're okay; you can leave us alone."*	More likely middle age, lower income renters, living in non-single family dwellings, less likely to be educated	Relatively lowest level of awareness and interest in all types of solar and EV
Technology Cautious	*"We want to use energy wisely, but we don't see how technologies can help."*	More likely homeowners who are older in age, less likely to be college-educated	Marginally higher than Savings Seekers on awareness and moderate interest in solar and EV
Movers & Shakers	*"Impress us with smart energy technology and maybe we will start to like the utility more."*	More likely middle age, higher income, single-family homeowners, college-educated	High levels of awareness comparable to Green Champions on average, but moderate interest levels in solar and EV

[8] http://smartgridcc.org/research/sgcc-research/sgccs-wave-5-consumer-pulse-and-market-segmentation-study-summary/

The CDT study provides original and actionable insights for interested stakeholders to engage consumers in solar and EV services and technologies. This study will also be beneficial to organizations working to adapt existing business models to accommodate consumer-driven technologies. These insights are summarized as follows:

- **Demographics and segmentation drive interest in solar PV and EVs.** Consistent with previous research, we found that consumer demographics and segmentation had a much stronger statistical association with interest in solar PV and EVs than other potential influences such as the level of policy and program support available in the consumer's state. Homeownership, income and age have the strongest effect on level of consumer interest. Residence in a state with policies supportive of renewable energy and smart grid technologies had no consistent effect on consumers' interest in or self-assessed understanding of those technologies.
- **Barriers exist, but the market is moving towards reducing dominant consumer concerns.** Fewer than 22% of all consumers claim to have a fairly complete understanding of PV or EVs which is a barrier to engagement. The combination of lack of knowledge concerning technology benefits with perceptions of high initial cost constitutes the major barrier to adoption for the majority of consumers. Broader market trends towards alternative acquisition models and falling prices are helping to mitigate cost concerns.
- **There is growing consumer interest in alternative acquisition models** such as power purchase agreements (PPAs), shared ownership arrangements like community solar and leases for solar PV and EVs. This reflects broader market trends away from sole ownership and towards the burgeoning shared economy and "as-a-service" models - a promising market trend in an environment where initial adoption costs are a barrier.
- **Roughly one-half of consumers who have solar or EV technologies have both.** Similarly, consumers who are interested in one of those technologies have interest in the other. This finding has implications for utility planners looking to forecast load as adoption of these technologies ramps up. It also points to opportunities for targeted marketing and service bundling for companies who offer those technologies.
- **When using solar, consumers are interested in connecting to the grid as a source of backup power and are willing to pay for it.** This finding suggests that there is potential to offer backup power services for a fee.
- **Utilities have a role as an information provider and market booster, but less so as a provider of ancillary services for solar PV and EVs.** Consumers indicate that they seek to eliminate middlemen and streamline their transactions. When consumers are making purchases, 70% would prefer to deal directly with the supplier of solar PV and EVs for services such as technical advice, installation and hardware.

Working for a consumer-friendly, consumer-safe smart grid

SGCC's mission is to serve as a trusted source of information for industry stakeholders seeking a broad understanding of consumers' views about grid modernization, electricity delivery, and energy usage, and for consumers seeking an understanding of the value and experience of a modern grid.

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