[July 2017]

Executive Summary: A Study of Utah Rooftop Solar Power Owners

Objective

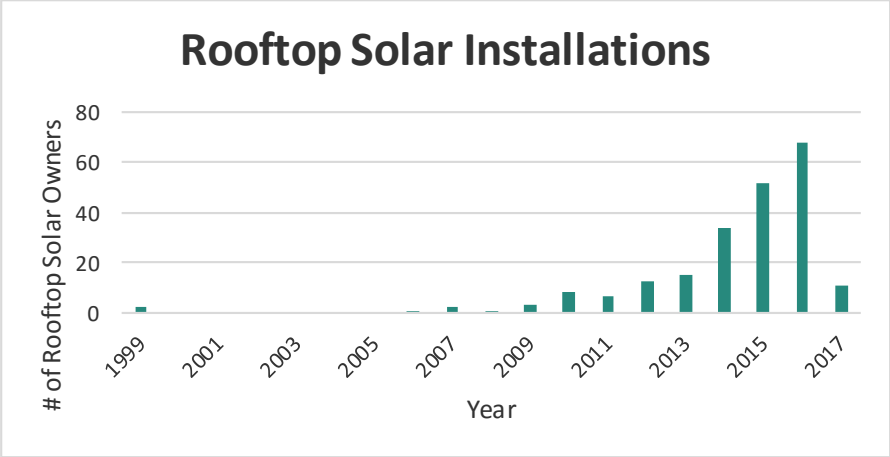
In November 2016, Rocky Mountain Power applied to the Utah Public Service Commission to implement a new rate structure on Utah households that power their homes with rooftop solar. Because the utility's justification for this change was based on limited data, this study aims to provide a broader set of data to contribute to the public conversation – and ultimate PSC decision – on the future of rooftop solar power in Utah. In particular, this study provides data on the history of rooftop solar power adoption in the state, the utility bills of solar power users – both before and after adopting solar – their motivation for adopting solar, and a range of demographic and descriptive data on the community of rooftop solar power owners in Utah. Ultimately, the findings from this study should lead the PSC commissioners to question Rocky Mountain Power's assumptions about rooftop solar owners and their motivation for the proposed rate changes in Utah.

Methodology

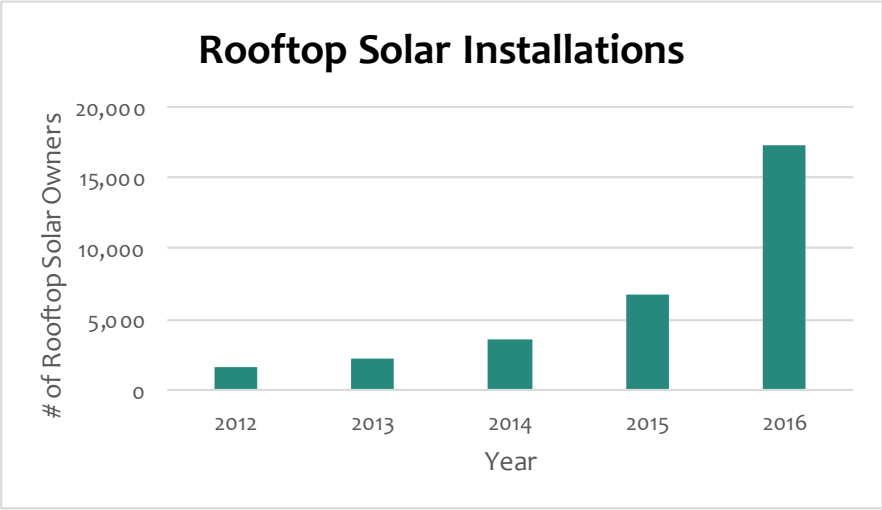
Under the direction of Professor Julie Stewart, six Westminster College students collaborated with HEAL Utah (an environmental advocacy organization) to administer and analyze a survey of Utah rooftop solar power owners in the spring of 2017. The survey seeks to uncover the motivations behind rooftop solar adoption and to better understand the multifaceted economic dimensions of solar power in Utah. HEAL Utah staff member Michael Shea distributed the survey via email to 498 people who had registered with HEAL Utah as a rooftop solar owner. Shea asked the survey recipients to share the survey with additional rooftop solar owners, supplementing the pool of respondents beyond those directly on HEAL Utah's list. We estimate that between 600 and 700 people received the survey. Ultimately, 220 respondents completed and returned the survey, a number that is approximately six times larger than the pool of respondents that RMP surveyed to determine how much rooftop solar owners "cost" the electricity grid. We analyzed the data to create a better understanding of the socioeconomic profile of solar power owners and their motivations for solar adoption. We followed up on this survey by conducting 61 structured telephone interviews with rooftop solar power owners. The interviews helped us better understand why Utahns adopt solar power and contextualize that choice within other sustainability-oriented behaviors.

Survey: Main Findings

Rate of rooftop solar adoption:



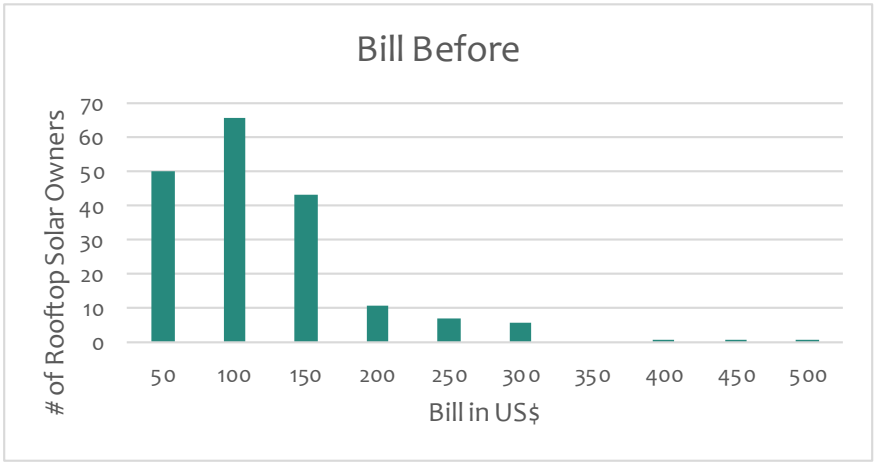
We asked respondents when they installed rooftop solar. The earliest was in 1999; the most recent, 2017. As this table illustrates, Utah experienced a dramatic increase in rooftop solar in the past five years. Because the study ended well before the end of the 2017 calendar year, the 2017 adoption data is incomplete; however, the upward trend is undeniable.



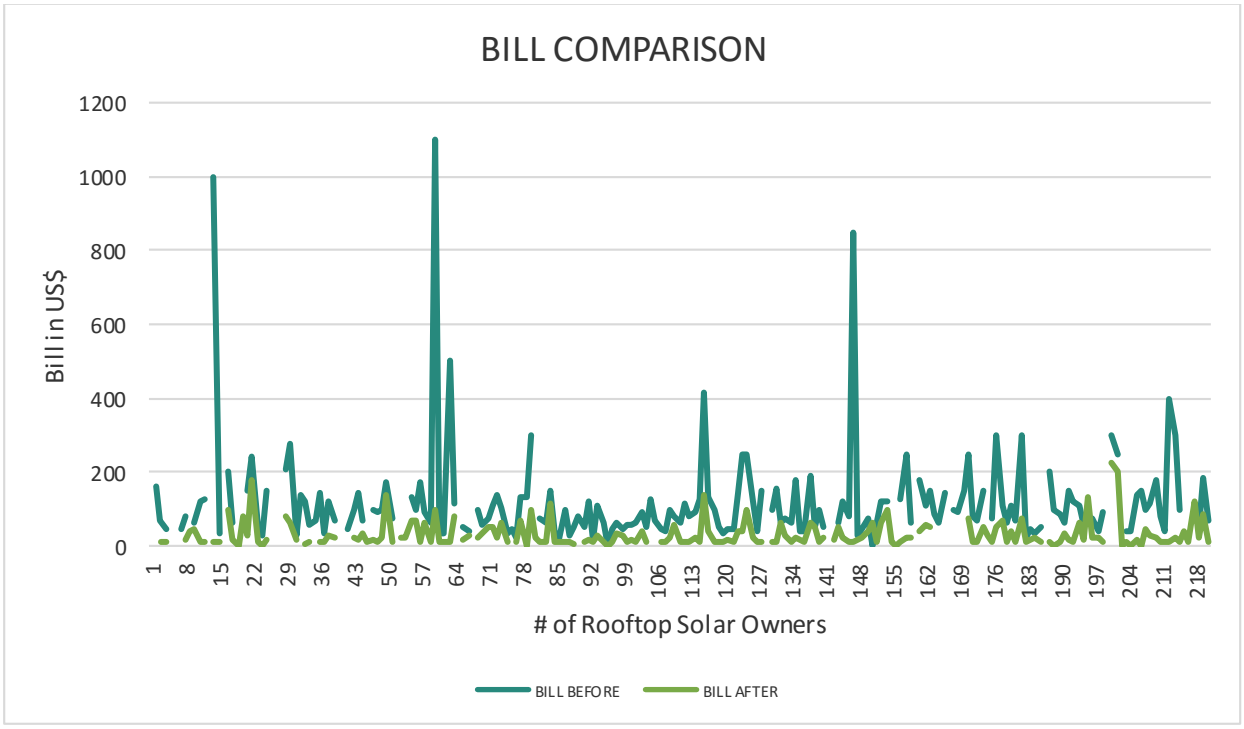
The pace of solar power adoption of participants in the Westminster College study mirrored the more general trend in Utah, giving us confidence regarding the representativeness of our sample. As reported by Rocky Mountain Power[1], the number of rooftop solar adopters grew from 1,548 customers in 2012 to a projection of over 17,000 customers in 2017.

[1] Rocky Mountain Power. 2016. "Study Supports New Rate for Rooftop Solar Customers." November 09. Available at https://www.rockymountainpower.net/about/nr/nr2016/proposed-net-metering-changes.html.

Bill comparison before and after solar installation:



We asked respondents to provide data on their monthly utility bill before installing solar. Approximately 27% of the respondents indicated their bill was less than $50 a month. This is an important finding because RMP estimated that the "typical" solar customer pays a power bill that is 40% greater than their average customer. Assumptions about energy use are central to RMP's estimates of how their proposed rate change will affect solar customers. Because this subset of solar customers had monthly bills of approximately half of the average user, they would be more sharply affected by the rate change. It is not clear that RMP has accounted for this subset of people.



Respondents also provided data on their monthly utility bills after installing their rooftop solar systems. Our analysis indicated that the median utility bill changed from $86 a month to $15 a month after installation. This indicates that the majority of respondents installed

systems that met nearly all of their electricity needs. Because all solar customers are charged a monthly grid maintenance fee, a bill of zero is not possible. The lowest possible bill is approximately $9 per month. This important finding – that a significant majority of solar customers seek to generate enough power to cover virtually all of their usage -- stands in stark contrast to RMP's study, which estimated that the average solar customer covers approximately half their electricity needs with solar. RMP's new pricing proposal would impact the respondents in our study – customers who meet nearly all of their electricity needs with solar – much more drastically than its "hypothetical average customer," leading to a more substantial increase in their monthly bill than RMP has claimed, and much less savings than the utility has claimed. This raises critical questions about RMP's study and whether the PSC has sufficiently accurate and robust data on which to properly rule on the utility's application.

Motivation for solar installation:

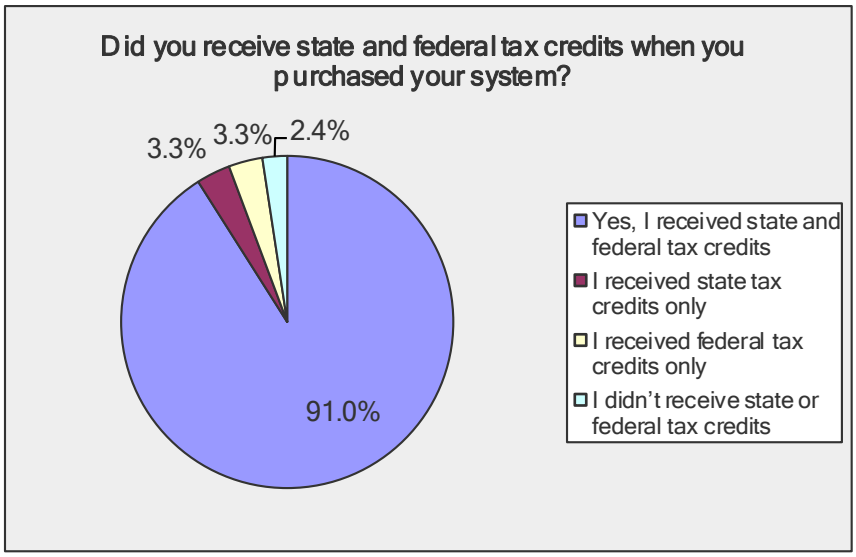
We were curious why people chose to install solar. Were they motivated more by a desire to support the health of their environment, to save money or to gain energy independence? Accordingly, we asked respondents to rank their motivations, ranging from 1 (most important) to 4 (least important).

	1	2	3	4	Total	Weighted Average
To limit my emissions of greenhouse gases	63.38% (135)	16.9% (36)	9.86% (21)	9.86% (21)	213	1.66
To help address air pollution in my community	57.82% (122)	23.22% (49)	10.90% (23)	8.06% (17)	211	1.69
To become more energy independent from the grid	22.49% (47)	22.01% (46)	21.05% (44)	34.45% (72)	209	2.67
To save my family money in the long run	21.7% (46)	24.53% (52)	33.02% (70)	20.75% (44)	212	2.53
Other	63.50% (25)	12.50% (5)	7.50% (3)	17.50% (7)	40	1.8

As this summary table indicates, respondents overwhelming indicated that a desire to limit greenhouse emissions and to address air pollution were the reasons they installed solar. Forty-one respondents chose "other" and provided additional information on their

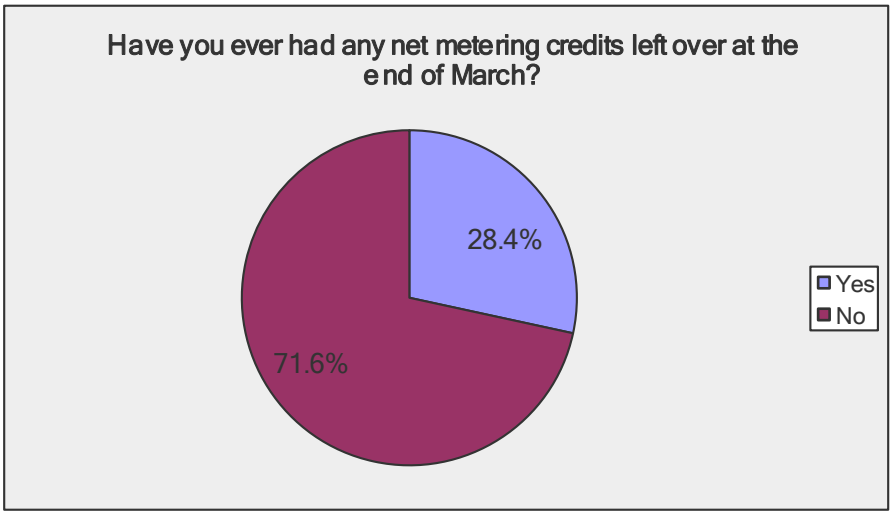
motivation. The two most common "other" explanations revolved around an interest in supporting alternative energy (11 respondents) and a general value orientation that adopting solar is the "right thing to do" (8 respondents). Taken together, we can paint a portrait of the average solar owner as someone whose daily energy choices reflect concerns about the health of their neighbors, neighborhood vitality and global sustainability.

Role of Subsidies in Solar Installation:



We asked respondents if they received state and/or federal subsidies when they purchased their solar system. As this chart illustrates, an overwhelming majority (91%) received both state and federal tax credits. This underscores the centrality of government-provided incentives. They have played a major role in the development of solar power in Utah.

Net Metering Credits:

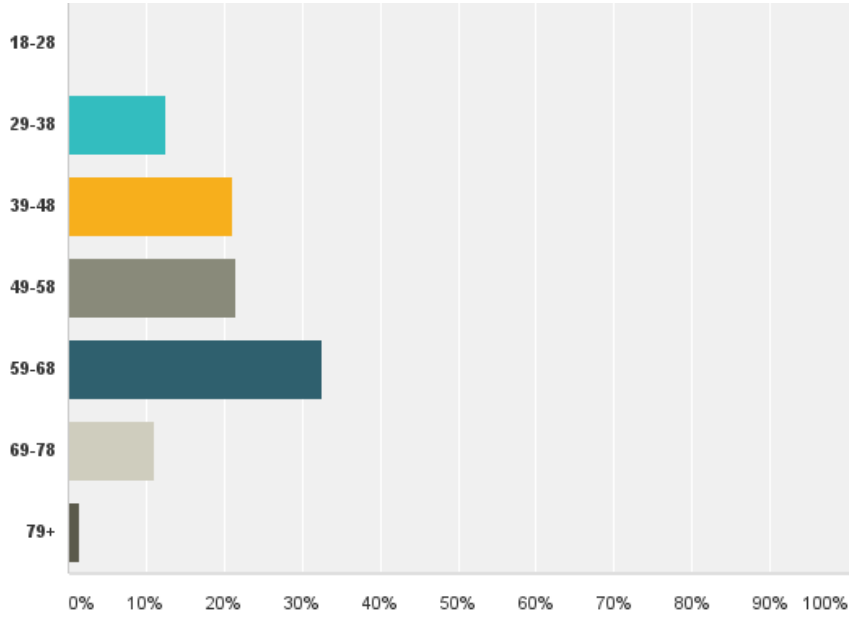


Net metering is the process by which RMP manages the reality that each day there are times when a solar owner produces excess power, which is added to the grid, and times when that same owner uses power from the grid. Under current net metering policies, the solar customer receives a "1:1"" credit for each unit of excess power. However, at the end of the solar year (currently the end of March), if a solar customer has generated more excess power than she needed from the grid, any credits not used by the solar customer are "returned" to RMP. In essence, these energy credits represent free energy for RMP. We were curious to know how many of our respondents had "given" energy to RMP. As this

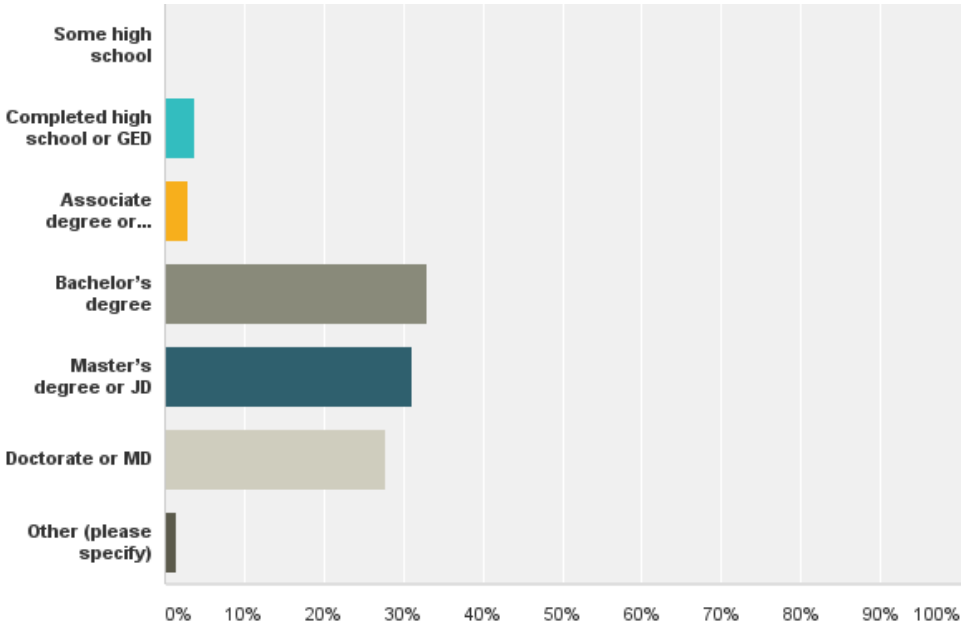
chart indicates, nearly 29% of our respondents indicated that they had. This is important because it is a direct benefit that RMP derives from solar customers and should be included in any calculations about the cost and benefits of rooftop solar for the industry.

Having touched on the motivations for, mechanisms facilitating and outcomes of rooftop solar adoption in Utah, we now provide key data points about the demographics of our sample.

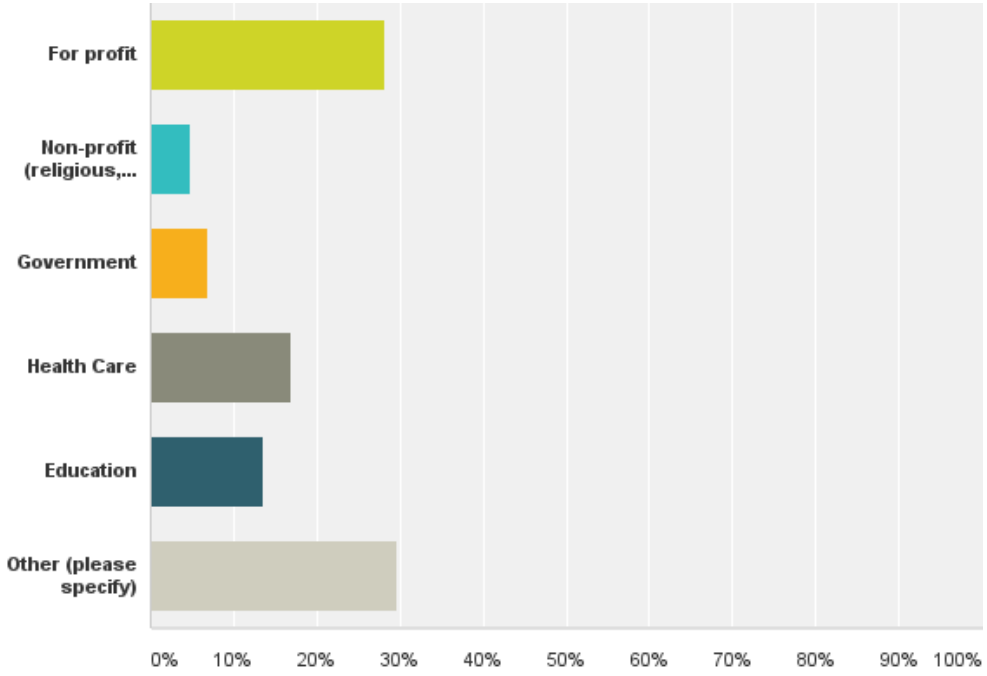
Demographic and Descriptive Data:



Respondents in our study ranged from 29 to more than 79 years old. Nearly 45% of the sample indicated they were 59 or more and the modal household size of our sample was two people.



Our sample of solar owner was extremely well-educated, with nearly 59% of the respondents reporting that they held a Master's degree/JD or Doctorate/MD.



However, there was more variation in terms of employment and income. In response to the question about what type of organization the respondent worked for, there was a range of responses, including for-profit firms, health care, education, government and education.

In answer to our question about which range best reflects the respondent's annual household income, we found a range of responses, from less than $50,000, to a modal response of $100,000 to $250,000 a year.

Answer Options	Response Percent	Response Count
Less than $50,000	7.5%	15
$50,000-$100,000	31.5%	63
$100,000-$250,000	46.5%	93
$250,000-$500,000	12.0%	24
More than $500,000	2.5%	5
answered question		**200**
skipped question		**20**

Finally, we were interested in the political affiliation of our respondents. Not surprisingly, the modal response was Democratic. But, more than 44% of the respondents indicated affiliations other than the Democratic Party, with a plurality (nearly 28%) indicating they were unaffiliated.

Answer Options	Response Percent	Response Count
Democrat	55.8%	115
Republican	9.7%	20
Independent American	2.4%	5
Green	1.9%	4
Libertarian	0.5%	1
Constitution	0.0%	0
Socialist	0.0%	0
Unaffiliated	27.7%	57
I am not registered to vote	1.9%	4
answered question		206
skipped question		14

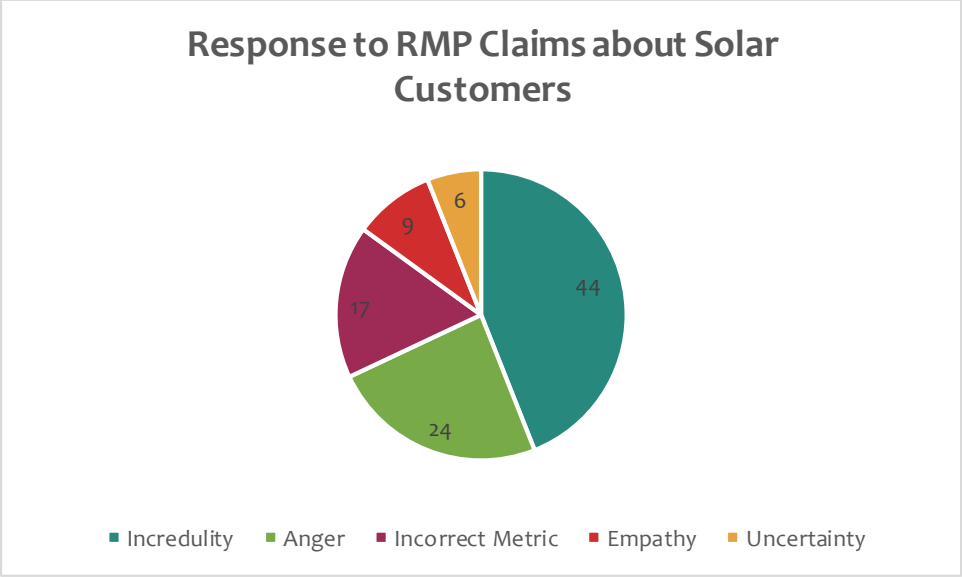
Structured Interviews: Main Findings

Following our survey, we conducted structured, in-depth telephone interviews with 61 respondents, delving into the motivations behind their sustainability choices, the range of their environmentally conscious activities, obstacles blocking those pursuits and current attitudes about Rocky Mountain Power and the rate case before the Public Service Commission. Here, we focus on RMP and the upcoming PSC decision.

Response to RMP Claims

In our interviews, we shared Rocky Mountain Power's contention that solar customers "underpay their actual cost of service"[2] and asked how they would respond to that claim. The responses varied in length from a single declaration to a page of transcribed text; we coded them according to five dominant emotive and/or cognitive responses.

[2] Rocky Mountain Power. 2016. "Study Supports New Rate for Rooftop Solar Customers." November 09. Available at https://www.rockymountainpower.net/about/nr/nr2016/proposed-net-metering-changes.html.



44% of respondents responded with disbelief and/or skepticism. They asserted a lack of confidence in RMP's calculations, noting the many ways they might be invalid, or indicated a lack of trust in the utility in general. Respondents asserted, "it's a bogus claim," "it's just not true," and that they "hadn't seen the proof." One explained, "I'm not convinced, because I haven't seen a lot of data. I think there needs to be an independent study that shows whether that is true." In particular, respondents felt that RMP overlooked specific benefits of solar. For example, one solar owner explained "When I am making more electricity than I need, it goes directly to my neighbor's house. It doesn't have to travel miles and miles, or even enter the grid. It's much more efficient, because I believe that about 30% of the power that is generated is lost over the transmission lines. And I think there are factors like that that are not included."

Because many respondents felt that RMP over-emphasized the costs of solar and underemphasized its benefits, anger and frustration peppered the answers of approximately 24% of our interview pool. Some characterizations of RMP's claims are not fit for polite company, but perhaps we can say that one respondent's claim of "poppycock!" may speak volumes.

Finally, approximately 17% of the respondents felt that in assessing the costs and benefits of solar, RMP was using the wrong metric, overlooking human health, the climate and resource sustainability. As one respondent explained, "I know they're a business, but dirty air, dirty water, contaminated soil, all of these things cost money, too. They're just hidden. Or they're down the road. And sometimes people pay with their lives." Another respondent highlighted that "The cost to society of using electricity is a lot more than I'm paying RMP if you take into account the damage that coal burning is doing to our climate. And since RMP generates most of its power by burning coal, in my mind that's a problem…the less power I use from them, the better I'm serving society." Finally, one respondent challenged RMP to align its practice with its rhetoric: "RMP "claims" to have this green personality as a company but they're not really walking their talk. If they really believed in sustainability, they would promote, support, and subsidize more clean energy; frankly, I think they're hypocrites."

Willingness to Pay

The last question this report covers is how much more current solar customers would be willing to pay on their bills if they were considering adopting solar now. Essentially, we asked people to imagine they were just now considering adopting solar and then to identify what price point they would be willing to pay on a monthly basis. It is worth noting that of the 61 people interviewed, only 33 respondents would answer this question with a specific dollar amount. Twenty-eight people – nearly half of our sample – refused to answer the question, because, in one respondent's words, "I don't want to give Rocky Mountain Power any information they might use against me." This is a telling comment that reflects the hostility many solar customers already feel towards RMP, even without being subject to a new rate structure.

Of the 33 respondents who answered this question, the median response was $10, with a range from 0 to $50/month. Respondents rarely gave just a dollar answer to this question, however. A significant number of them highlighted that a broader framework – one that goes beyond dollars and cents – is necessary to this discussion. As one respondent explained, "We've already produced 23 million watts of clean power. And that translates into 23,000 pounds of coal that we haven't had to burn to power our home. And that's what matters to me." Many others asserted that they might be willing to pay more on the condition that RMP were more transparent. In the words of one respondent, "I understand that Rock Mountain Power as a utility has a cost to maintain their infrastructure, that's absolutely true. I think Rocky Mountain Power should be fair and transparent and determine what that cost is across all their users and we'd be willing to pay a reasonable amount if it is equal to what other users see. I think what they are proposing is clearly an attempt to escalate prices in an attempt to discourage homeowners from buying solar and I think that's unreasonable." The desire for greater transparency from RMP was a clear thread running throughout our interviews.

Finally, respondents indicated that if fees/rates connected to solar continue to rise, their principal priority would be to become independent of the grid and of RMP entirely. Many highlighted that they were avidly following the technological developments and pricing of home energy storage. As one respondent explained, "Soon they will face more people like me, who can't wait to disconnect from the grid … I've looked at alternative ways of getting my energy, like the Tesla wall storage. That's how far I would go to be my own power company."

Conclusions and Recommendations

This research – comprised of 220 surveys and 61 structured interviews with rooftop solar owners in Utah – has highlighted the history and economic outcomes of rooftop solar in our state. Distilling this study into four main findings, we would like to highlight:

- First, contrary to RMP's contention, the average solar customer in our study has installed enough capacity to meet their full household electricity needs, not merely 50%. This means that solar customers would be much more negatively affected by the rate changes than the utility is willing to concede.
- Second, no less than 28.4% of our respondents indicated that they had excess solar credits at the end of the billing year. This equates to "free power" that RMP receives from its rooftop solar customers and it is not clear that benefit has been accurately accounted for.
- Third, respondents in our structured interviews were nearly unanimous in their assessment that Rocky Mountain Power needs to change its practices and become a more transparent and sustainable company. Even without the proposed rate structure in place, any mention of RMP tended to evoke outrage, hostility and ire. Because RMP has a monopoly, customers don't have the freedom to choose a utility that it more in line with their needs and values. But as a regulated monopoly, it is important that RMP take these customer concerns seriously, or that our Public Service Commission compel them to.
- Finally, we found that approximately half of our respondents would be willing to pay – on average - $10 more on their monthly bill to ensure the continuation of solar. But this came heavily conditioned. Perhaps more important was the finding that many respondents distrusted RMP so much that they were unwilling to answer the question. This finding is troubling, indeed.

This public advocacy research suggests that the Public Service Commission should scrutinize Rocky Mountain Power's rate proposal and carefully consider its claims regarding average rooftop solar capacity and net metering. Further, we would urge the PSC to reflect on RMP's image and its customer relationships. Solar customers are already unhappy with RMP and want it to do more – not less – to power a sustainable future. We respectfully submit this report in hopes of encouraging just such a move.