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BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

In the Matter of the Application of Rocky Mountain Power to Implement the Programs Authorized by the Sustainable Transportation and Energy Plan Act	**Docket No. 16-035-36** UCE Exhibit 5.0 – Phase Three Rebuttal Testimony

PHASE THREE (ELECTRIC VEHICLES) REBUTTAL TESTIMONY OF SARAH WRIGHT

ON BEHALF OF

UTAH CLEAN ENERGY

DATED this 27th of April, 2017

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Sophie Hayes
Attorney for Utah Clean Energy

INTRODUCTION

Q: Please state your name, position, and business address.

A: My name is Sarah Wright. I am the executive director of Utah Clean Energy, located at 1014 2nd Avenue, SLC, UT 84013.

Q: On whose behalf are you testifying?

A: I am testifying on behalf of Utah Clean Energy (UCE).

Q: Did you previously file testimony on in Phase three of this docket?

A: Yes, I filed direct testimony in Phase three of this docket on April 6, 2017.

RESPONSE TO OFFICE OF CONSUMER SERVICES

Sample Design for Pilot TOU

Q: In his testimony for the Office of Consumer Services, Mr. Thomas expressed the need the need to change the sample from a single dimensional sample, stratified on energy use alone, to a two-dimensional sample design that is stratified on both energy use and whether the customer has a level 1 and level 2 charger. Do you think that this is an important change?

A: Yes, level 1 and level 2 chargers use the grid very differently. As Mr. Thomas explained, a level 1 charger takes much longer for a full charge (8-16 hours) as compared to a level 2 charger, which has a larger draw on the system, and a full charge typically takes 4-6 hours. While it is important to stratify on monthly consumption it is also important to stratify on the type of charger.

Q. Mr. Thomas also voiced concerns about possible bias toward customers with Level 1 residential chargers (versus Level 2) in the load research study. Do you share this concern?

A: Yes, he makes a good point that the sample could be biased toward level 1 charges. Level 2 chargers are not commonplace in the current EV charging landscape in Utah. This bias toward level 1 chargers could be exacerbated for moderate income families with modest homes and low to moderate energy consumption, who may buy a used EV but not have the resources to install a level 2 charging station. One of Utah Clean Energy's concerns with the Company's infrastructure incentive proposal is that there is no incentive to encourage the installation of new residential Level 2 chargers, which enable a customer to have greater control over shifting the timing of EV charging.

Q: **Why do you think it is important to include a balance of residential Level 2 charger customers in this pilot program?**

A: First and foremost, if we are going to invest ratepayer money in a pilot TOU and load research study, we want to make sure that the results are meaningful and statistically significant and will lead to information that will help us develop and refine a TOU rate that moves beyond the pilot program. And, secondly, the pilot program should be designed to study Level 2 charging, which is where we see the market going in the future. The range and associated battery capacity on electric vehicles continues to increase and takes longer to charge. For example, the recently released Chevy Bolt with a 200 mile range nearly doubles the range of the Nissan Leaf. With increasing battery capacities, Level 1 charging will not be practical over time. This is not to say that we will not have

level 1 at-home charging, but the trend will be toward level 2 charging. Therefore, in order to make the pilot program as meaningful as possible, we need to study at-home Level 2 charging, as that is what we will be seeing more of in the future.

Q: **Does Utah Clean Energy have ideas on how to address Mr. Thomas' concerns that the sample might be biased toward level 1 chargers?**

A: In the testimony of Mr. Kevin Emerson, Utah Clean Energy proposed offering incentives for residential Level 2 charger installations, starting with 100 $500 incentives (a $50,000 budget in the first year to be taken out of the grant-based custom program). Recipients of this residential Level 2 charger incentive should be required to participate in the load research study. By including an incentive for Level 2 chargers in the infrastructure incentive and requiring them to participate in the load research study, we can work to address the likely bias toward Level 1 chargers in the load research study. This pool of additional Level 2 chargers would increase the number of Level 2 chargers participating in the load research study and would help address the bias concern expressed in Mr. Thomas' direct testimony.

TOU Rate Design for Pilot

Q. **After reviewing the direct testimony and proposed rate designs filed by Mr. Daniel for the Office of Consumer Services did your position on the two rate designs for the pilot TOU project change?**

A. While I believe Utah Clean Energy proposed two good and complimentary TOU rate options, I also find merit in rate option 1 proposed by OCS. For purposes of the pilot

program, I think it is reasonable to adopt two similar rate options, one with a tiered inclining block rate and one without. Including at least one tiered rate option will help evaluate whether an inclining block rate will send signals to conserve *and* shift usage to off peak times. I believe OCS rate option 1 and Utah Clean Energy rate option 1 would work very well for the TOU pilot, as they are similar, with the main difference being Utah Clean Energy's two tier inclining block rate. Please see Table 1 below for a side by side comparison of the two rate structures.

Table 1 – OCS proposed EV TOU Pilot rate 1 and UCE Rate Option 1

	OCS Rate Option 1	**Utah Clean Energy Modified Rate Option 1[1]**	**Utah Clean Energy Original Rate Option 1**
Customer Charge – 1 Phase	$6.00	$6.00	$6.00
Customer Charge – 3 Phase	$12.00	$12.00	$12.00
On peak, cents/kWh		**On peak tier 1 (0-700 kWh)**	**On peak tier 1 (0-1,000 kWh)**
	17.1496	[approximately 18-22]	20.1539
		On peak tier 2 (>700 kWh)	**On peak tier 2 (<1,000 kWh)**
		On peak tier 1 + 2.5 [approximately 20.5-24.5]	22.7089
Off peak, cents/kWh		**Off peak tier 1 (0-700 kWh)**	**Off peak tier 1 (0-1,000 kWh)**
	8.2233	[approximately 7.5-8.2]	7.1600
		Off peak tier 2 (>700 kWh)	**Off peak tier 2 (>1,000 kWh)**
		Off Peak Tier 1 +2.5 [approximately 10 to 10.7]	9.7150

Note:

[1] In our direct testimony, we separated the first and second tiers at 1,000 kWh due to the functionality of the Company's workpapers, while noting that it would be better to have a lower threshold (around 700kWh) for the transition to the second tier. Consistent with this, we are proposing to separate the first and second tiers at 700kWh. The numbers in this table represent approximations of what the rates will be until we are able to finalize the calculations based on additional information from Rocky Mountain Power. We are awaiting a data request response from the Company so that we can finalize these calculations using the 700 kWh break point for the tiers.

Q. In your direct testimony you testified that a lower first tier threshold of 700 kWh would be more appropriate. Were you able to recalculate Utah Clean Energy's rate option 1 to reflect this proposal?

A. Unfortunately, no. While Robert Meredith was very helpful in walking us through the spreadsheets, he explained that the change would require a data request. The current workpapers from the Company lack necessary data on the proportion of customers' energy usage greater and less than 700 kWh that would enable us set that as a break point in the rate option. We have filed a data request with the company and will include our updated rate design in surrebuttal testimony. While the exact numbers may change slightly, the differential between on and off peak rates and tiers will be similar. Please see Table 1, above, for approximate ranges.

Q. **Why does Utah Clean Energy support 700 kWh break point for the tiered rate option?**

A. The 1000 kWh break from the company's two tier work papers from the technical workpapers – upon which we calculated our rate proposals – is too high, because a customer has the potential to use 2,000 kWh per month before moving into the second tier (1,000 kWh on peak and 1,000 kWh off peak). Since an average Utah customer uses approximately 700 kWh a month, a 700 kWh break point for the first tier makes sense. Under this proposal a customer can potentially use 1400 kWh in total before they go on a higher rate (700 kWh both in both on peak and off peak time periods). Additionally, the current first tier in Schedule 1 is 400 kWh per month. If you add the kWh it takes to charge an electric vehicle (300 kWh per month), you get 700 kWh/month. Therefore, 700 kWh is a reasonable threshold for the break between the first and second TOU tiers.

Q: What is your recommendation for the TOU pilot program rate designs?

A: I recommend adopting two similar rate designs (specifically OCS 1 and UCE 1), one without tiered rates and one with tiered rates, as an appropriate path for evaluating TOU rates during the pilot program. It is critical to evaluate one rate option with tiered rates in order to assess whether an inclining block rate will send signals to conserve *and* shift usage to off peak times. This is an important metric for determining an appropriate TOU rate after the pilot program concludes.

Importantly, a TOU rate design with inclining block rates address the issue that high energy users (2,500 kWh/month or more) *save over $30 per month merely by going on the TOU option, without shifting any consumption off peak.* This is a perverse result that rewards high usage, even at peak times. In reviewing the green highlighted columns in Tables 2 and 3, below, you'll see that all customers below 1000 kWh pay more than they would have under their standard rate schedule if they are not able to shift usage off peak and all customers that use more than 1000 kWh per month *save money without shifting any peak usage.* Using a TOU rate structure that incorporates tiered rates addresses this concern.

Table 2 - Rocky Mountain Power
UT EV TOU Pilot Rates Monthly Billing Comparison
Schedule 1 vs. Company's proposed TOU rate option 1

		Present	Sch 2E - % of Switching from On-Peak to Off-Peak									
kWh		0%	0%	Saving	10%	Saving	25%	Saving	50%	Saving	75%	Saving
500		$55	$60	-9%	$58	-5%	$56	0%	$51	8%	$47	16%
698	*	$78	$81	-4%	$79	-1%	$75	4%	$69	12%	$63	20%
750		$85	$87	-3%	$84	0%	$80	5%	$73	13%	$67	21%
1,000		$114	$114	0%	$110	3%	$105	8%	$96	16%	$87	24%
1,250		$146	$141	4%	$136	7%	$130	11%	$118	19%	$107	27%
1,500		$179	$168	6%	$162	9%	$154	14%	$141	21%	$127	29%
1,750		$211	$195	8%	$188	11%	$179	15%	$163	23%	$147	30%
2,000		$243	$222	9%	$214	12%	$204	16%	$186	24%	$168	31%
2,500		$308	$275	11%	$266	14%	$253	18%	$230	25%	$208	33%
3,000		$373	$329	12%	$318	15%	$302	19%	$275	26%	$248	33%

* Average monthly usage.

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Table 3 - Rocky Mountain Power
UT EV TOU Pilot Rates Monthly Billing Comparison
Schedule 1 vs. Company's proposed TOU rate option 2

		Present Sch 1	Sch 2E - % of Switching from On-Peak to Off-Peak									
kWh		0%	0%	Saving	10%	Saving	25%	Saving	50%	Saving	75%	Saving
500		$55	$60	-9%	$57	-2%	$51	8%	$42	24%	$33	40%
698	*	$78	$81	-4%	$76	3%	$69	12%	$56	28%	$44	44%
750		$85	$87	-3%	$82	3%	$74	13%	$60	29%	$47	45%
1,000		$114	$114	0%	$107	6%	$96	16%	$78	31%	$60	47%
1,250		$146	$141	4%	$132	10%	$118	19%	$96	34%	$74	50%
1,500		$179	$168	6%	$157	12%	$141	21%	$114	36%	$87	51%
1,750		$211	$195	8%	$182	14%	$163	23%	$132	37%	$101	52%
2,000		$243	$222	9%	$207	15%	$186	24%	$150	38%	$114	53%
2,500		$308	$276	11%	$258	16%	$231	25%	$186	40%	$141	54%
3,000		$373	$330	12%	$308	17%	$276	26%	$222	41%	$168	55%

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Q. Do you support the changes to the on and off peak time periods proposed in the Office of Consumer Services rate option 1?

A. Partially, with some proposed modifications. In my direct testimony, I posed questions about the cost basis for a winter morning peak. Mr. Thomas in his testimony makes the case that if there is going to be morning peak period in the winters, it should be 8:00 am – 9:00 am. We are supportive of this proposal for purposes of the pilot program as it will be less burdensome for rate payers to adjust their usage during a shorter winter morning peak. We still have not seen evidence that a winter morning peak is cost justified, but if the pilot is going to have a winter morning peak, we prefer a shorter time period.

We also support the shorter time period proposed by the office for the evening peak (from 5-8 pm). The Office also proposed shifting the winter peak from 5-8 to 4-7, which I do not support. I believe this change, in addition to the inclusion of a morning winter peak, adds unnecessary complexity and should not be adopted. Unless there is a reasonable cost justification, I am not prepared to support having different on peak periods in the summer and winter as proposed by Mr. Thomas.

Q. **Mr. Daniels' rate option 1 for the Office of Consumer Services provides a 2.1 to 1 differential between on and off peak. Do you think that is a sufficient price differential?**

A: As explained in my direct testimony, a differential of lower than 3:1 will likely be sufficient to incent off-peak charging behavior, as the start time for electric vehicle

charging can be easily programed. If you knew it was going to cost you half as much to charge off peak you would program your vehicle to do so and only override this setting when you needed to.

Q. Does the off-peak rate proposed by the Office still save EV owners money as compared to a gasoline powered car?

A. Yes. The Office's off peak rate of 8.22 cents per kWh is a great deal for EV owners. A Nissan leaf gets 0.3 kWh/mile.[1] If a Leaf owner drives the national average of 1123 miles per month[2], it would cost $27.69 per month to power their vehicle. Alternatively, an efficient gasoline powered vehicle getting 35 miles per gallon will cost $80.21/month even at today's very low gas prices of $2.50/gallon. If the customer was on a tiered rate TOU structure with a second tier priced 2.5 cents per kWh higher, and if half of their vehicle charging was done in the second tier it would still only cost them roughly $32 per for the month.[3] Further, EVs have almost no maintenance costs. So even with only a 2 to one differential there are significant savings for EV owners.

[1] https://www.fueleconomy.gov/feg/noframes/34918.shtml
U.S. EPA rating for the Nissan LEAF is exactly 30 kWh per 100 miles i.e. 0.3kWh/mile.
[2] https://www.fhwa.dot.gov/ohim/onh00/bar8.htm
U.S. Department of Transportation, Federal Highway Administration states that an average American drives 13,476 miles per year i.e. 1123 miles per month.
[3] Calculations based on the assumptions that a customer chargers half of 1123 miles/month i.e. 561.5 miles/month at 8.2 cents/kWh and the remaining half (561.5 miles) at 10.7 cents/kWh. We used 8.2 cents/kWh and 10.7 cents/kWh energy rates as that is the maximum off peak energy price under Tier 1 and Tier 2 in UCE rate option 1. See Table 1.

RESPONSE TO DIVISION PUBLIC UTILITIES

Q: **In his testimony, Mr. Davis' expressed concerns with Company's proposed rate option 2 being punitive if customers cannot significantly change their energy use in other areas. Do you share his concern?**

A: Yes. I agree with Mr. Davis that the rates for this pilot program should not be punitive while encouraging off peak charging. A tiered and non-tiered rate option will provide two distinct yet similar rate designs to be tested in this pilot. Two options within the range of 2-3:1 differential between peak and off peak will not be overly punitive to customers who can't shift a significant portion of their usage during off peak hours. And a tiered option will send the right signals to customers, encouraging them to charge during off peak hours while maintaining a signal to conserve electricity at all times.

ADDITIONAL INFORMATION

Q. In your direct testimony, you discussed that your rate option 2, with a super off peak period was still being developed, pending the data response from the Company. Were you able to calculate a rate option 2?

A: Yes, but due to limitations of the spread sheet, we were not able to calculate it with the 700 kWh first tier. Table 4 shows our tiered rate structure with a super off peak period.

TABLE 4–Tiered Rate option with super off peak period

	Super off peak rate option
Customer Charge – 1 Phase	$6.00
Customer Charge – 3 Phase	$12.00
On peak 0-1000 (cents/kWh)	18.8676
On peak >1000 kwh (cents/kWh)	21.3676
Off peak 0-1000 kWh (cents/kWh)	7.8000
Off peak > 1000 kWh (cents/kWh)	10.4000
Super off peak (cents/kWh)	3.4000

For the super off peak rate option, we used Rocky Mountain Power's on peak periods and proposed a super off peak period to run from 12:00 am – 6:00 am everyday (including weekends). All the remaining hours that aren't on peak and super off peak are classified as off peak in our rate option 2.

Q. If you are supportive of a TOU pilot program that includes two comparable rate structures, one with and one without tiered rates, why did you include this additional option?

A. For completeness and because the Company kindly helped us with the analysis. I still support this rate design, and when we move beyond the pilot program, it will be useful to consider all options.

Q. Does this conclude your testimony?

A. Yes.