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BEFORE THE PUBLIC SERVICE COMMISSION OF UTAH

IN THE MATTER OF THE APPLICATION OF ROCKY MOUNTAIN POWER TO IMPLEMENT PROGRAMS AUTHORIZED BY THE SUSTAINABLE TRANSPORTATION AND ENERGY PLAN ACT	Docket No. 16-035-36

WRA EXHIBIT 2.0

PHASE 3 DIRECT TESTIMONY OF KENNETH L. WILSON

ON BEHALF OF

WESTERN RESOURCE ADVOCATES

April 6, 2017

I. INTRODUCTION AND SUMMARY

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

A. My name is Kenneth L. Wilson. I am employed by Western Resource Advocates (WRA) as an Engineering Fellow with the Clean Energy Program. My business address is 2260 Baseline Road, Suite 200, Boulder, Colorado 80302.

Q. Did you previously submit testimony in this proceeding?

A. Yes, I submitted Phase 1 Direct Testimony on behalf of WRA. A description of my qualifications is included with that testimony.

Q. What is the purpose of this testimony?

A. The purpose of my testimony is to support the Plug-in Electric Vehicle Incentive Pilot Program ("PEV Program") proposed by Rocky Mountain Power ("Company"). The program is described in their Application and in the testimonies of William J. Comeau and Robert M. Meredith and their accompanying exhibits.

Q. Please summarize your testimony.

A. I support the PEV rate design pilot and associated incentives for PEV owners to participate in the pilot. I believe the proposed pilot will achieve the desired result of developing a body of useful information regarding PEV owners' charging behavior when presented with a Time of Use ("TOU") rate structure that is designed to incentivize off-peak charging. The Company has proposed a one-year load study of three groups of customers who are selected randomly from among many PEV owners for the pilot. The criteria for the sampling plan are well thought out, and the overall design of the study

should result in scientifically accurate results. However, I recommend continuing the load study for a second year, collecting additional data to improve the analysis and conclusions. This would not change the details of the load study, or extend the pilot beyond the planned period. It would merely allow an additional year of data to be collected.

Q. Please provide your recommendation.

A. I recommend that the Commission approve the Application for the pilot, as proposed, with the addition of a second year of detailed data collection for the load study.

II. DISCUSSION

Q. What is the purpose of the PEV rate pilot?

A. PEVs are the future of transportation, and their large-scale acceptance by the public will create a new and very large load for electric utilities. If PEV charging is not managed well, it could create peak energy costs at all levels of the energy system. Charging of PEVs by residential customers at their homes should be done at off-peak times when the system can adequately manage the load without the addition of expensive peaking resources. While this is not an issue today, with relatively few PEVs in service, it could become an issue in the future if not managed properly. The PEV rate pilot is designed to test the charging behavior of PEV owners and how their behavior changes when they are incentivized by a TOU rate structure to charge during off-peak hours.

Q. Why is it important to gain information on customers' charging habits and how those habits will change with TOU rates?

A. The tendency of many PEV owners is to drive home from work, plug in their PEVs, and immediately start charging. This creates a problem for the Company's distribution grid, their transmission grid, and their generation fleet as this charging behavior creates a new load right when the system is peaking. This would create the need for additional peaking facilities that are expensive to build and operate, increasing costs for all customers. We first need to understand how common this type of charging behavior is for customers on standard, traditional electric rates without a TOU component and second, to see how their charging behavior changes when they are placed on TOU rates. It is our hope that customers will delay charging their PEV batteries until later in the day, when system loads are less. The PEV Rate Pilot will show us, in a scientific way, how charging behavior actually changes when customers are moved to TOU rates.

Q. Did you participate in the EV Pilot workshops?

A. Yes, I did. The workshops included all the interested parties. They were well managed and a wide range of opinions were voiced and considered. The discussions on various proposals were thoughtful and thorough. The Company initially proposed that one of the rate structures that should be tested include a TOU demand charge that would assess customers a fixed fee for each kilowatt of peak power that they used during the peak time of day in a month. Most of the organizations participating in the workshop, including WRA, opposed this idea.

Q. Why are you opposed to demand charges for PEV customers?

A. At this time, I am generally opposed to mandatory demand charges for residential customers as I believe they are less effective than TOU rates at lowering overall energy use. I also think that mandatory demand charges for all residential customers will tend to shift costs to lower income customers and away from higher income customers. With respect to the specific case of customers with PEVs, I do not believe that demand charges are as effective at shifting charging to off-peak hours as TOU rates will be. With a demand charge that is applied during peak hours, if a customer must charge their PEV during peak hours even once in the month, they will know that they have already incurred the demand charge and may be more inclined to charge again during peak hours since there will be little or no additional penalty. With straight TOU rates, any charging during peak hours will incur the higher price.

Q. What rate structures did the group agree to support?

A. The group coalesced on a pilot with two TOU rate structures, one "moderate" and one that is more "aggressive." By moderate I mean a TOU rate structure where the difference between on-peak and off-peak is significant, but not dramatic, meaning a ratio of less than 4 to1. By aggressive I mean a TOU rate structure that is greater than a ratio of 8 to 1.

Q. Did the Company abide by the consensus of the group with respect to the rate structures that would be used in the pilot?

A. Yes, the Company's proposal appears to correctly represent the consensus in the workshops.

Q. Was there a discussion by the group of whether customers with distributed generation should be allowed to participate in the pilot?

A. Yes. Several parties during the workshops thought that customers with distributed generation should be allowed to participate in the pilot.

Q. What is your opinion on the inclusion of customers with distributed generation in the pilot?

A. It would be interesting to know how the charging behavior of PEV customers with distributed generation differs from customers who do not have distributed generation. However, this would add a level of complexity that would at least double the number of participants needed and add corresponding costs to the project. We would need to add at least three additional groups of randomized customers, duplicating each current group with a second group that has distributed generation. Then there are additional factors, such as how large the distributed generation system is in relation to the customer's energy use, the compass orientation of the distributed generation system, etc. For these reasons, I do not recommend that the pilot be expanded to include customers with EVs and distributed generation.

Q. Will the pilot as proposed be a scientifically valid experiment?

A. Yes, it should be. Three random groups of customers will be picked from a large set of volunteers to participate in the load study. The three groups will have three different rate structures: Moderate TOU, Aggressive TOU, and a Control Group. It is important that the pilot have all three of these groups. The Control Group will show when customers charge under the current rate structure. The two TOU rate structures will show how

charging behavior differs when customers are moved to TOU. The "Draft Utah Electric Vehicle Time of Use Pilot Program and Analysis" document included as Attachment RMM-1 and the "Load Research Sampling Procedures" included as Attachment RMM-2 appear adequate to achieving statistically valid results, though additional details will need to be developed and the pilot and analysis implemented in a professional manner. However, as I suggest below, I think that the load pilot should be extended to two years.

Q. Do you have experience in the design and implementation of sampling plans and studies?

A. Yes. For five years, during my time at Bell Labs, I was in charge of a group that conducted testing of telecommunications services. I had several PhD statisticians and experimental psychologists in my group at that time who designed sampling plans and conducted analysis after tests had been completed. The results were used in advertising on national networks by AT&T and had to meet stringent requirements for scientific validity. I personally worked with my employees on these tests and reviewed the results.

Q. What is the rationale for one TOU rate with a moderate spread between peak and off-peak rates and a second that has a large spread between peak and off-peak rates?

A. We need to find out if customers change when they charge based on TOU rates and how dramatic that change is. The moderate TOU rate has a difference between the peak price and the off-peak price of approximately 3 to 1. The aggressive TOU rate has a difference between the peak price and the off-peak price of approximately 10 to 1. Based on data from general TOU trials in other states, we would expect a modest change in behavior

with the moderate TOU rates and a stronger change in behavior with the aggressive rates. But this is speculation until we obtain the actual data. We need the Control Group (which will stay on existing rates that are not TOU based) as a measuring stick against which we can compare the effectiveness of the moderate and aggressive TOU rates.

Q. Are you concerned with cost shifting as a result of the pilot?

A. No. This issue was raised by some parties during the workshops, but it is not a problem. The pilot is very small with respect to the total number of the Company's customers. The maximum number of participants will be less than 1,200 customers, compared to a total customer base in Utah of more than 850,000. The impact of a cost shift due to the pilot, if there is a cost shift, would be very small.

Q. Are you concerned with the duration of the formal load study that is part of the pilot?

A. Yes. The Company has proposed that the formal load study utilize data collection for a period of one year. While this may be adequate, I would prefer having the Company collect data for a second year as well. Given that the Company is asking for the tariffed rates to remain in place until January 1, 2022, there should be adequate time to collect a second year of detailed load data.

Q. What would be the timeline if this change is adopted?

A. The Company is proposing to recruit participants beginning July 1, 2017 (assuming approval by the Commission) and to complete recruitment by December 31, 2017. Data collection could begin as soon as meters are installed and tested, say by May 1, 2018. Load data could then be collected for the first year from May 1, 2018 until April 30,

2019. The second year of data could be collected from May 1, 2019 until April 30, 2020. Analysis of the data and a full report could be completed on the load study by the end of 2020. A final, full report could be prepared in 2021 as proposed by the Company.

Q. What is the advantage of a two-year load study over a one-year load study?

A. First, there will be twice as much data for analysis, providing the potential for more accuracy and better conclusions. There does not seem to be a problem fitting a second year of data collection into the pilot, and doubling the amount of data collected will be very beneficial in the long run. Second, having two years of data may allow for the pilot to see variations in charging behavior under different weather conditions. Weather can impact both driving patterns and charging patterns. For example, a heavy snow year could be quite different from a light snow year. Therefore, having two sets of seasonal data to analyze could be very informative.

Q. Does this conclude your testimony?

A. Yes.