Jennifer E. Gardner (15503)
Western Resource Advocates
150 South 600 East, Suite 2A
Salt Lake City UT 84102
801-413-7355
jennifer.gardner@westernresources.org

Attorney for Western Resource Advocates

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 1.0

DIRECT TESTIMONY OF KENNETH L. WILSON

ON BEHALF OF

WESTERN RESOURCE ADVOCATES

November 9, 2016

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. Please describe WRA.

A. WRA is a nonprofit conservation organization dedicated to protecting the land, air and water of the Interior West. WRA's Clean Energy Program develops and implements policies to reduce the environmental impacts of the electric power industry by advocating for a western electric system that provides affordable and reliable energy, reduces economic risks, and protects the environment through the expanded use of energy efficiency, renewable energy resources, and other clean energy technologies. WRA has offices in Salt Lake City, Utah; Boulder, Colorado; Carson City, Nevada; and Santa Fe, New Mexico.

Q. Please describe your current work duties, professional experience, and educational background.

A. I am an Engineering Fellow at WRA, specializing in grid infrastructure, renewable energy and utility rate structures. I have provided testimony and comments on these and other issues for WRA in Arizona, Colorado, Nevada and Utah. I am an electrical engineer with over 40 years of experience. I worked at Bell Labs as a systems engineer for 18 years and was subsequently a consulting engineer with my own consulting firm for 15 years. I have Master's and Bachelor's degrees in Electrical Engineering from the

University of Illinois and Oklahoma State University, respectively. My qualifications are included as WRA Exhibit 1.1.

Q. What is the purpose of your testimony?

A. The purpose of my testimony is to provide WRA's policy position and recommendation regarding the Solar and Energy Storage Program proposed by Rocky Mountain Power (RMP) and its use of STEP funding and Blue Sky community funds. WRA supports demonstration projects for battery storage developed by utilities in our region (Arizona, Colorado, Nevada, and now Utah). We believe battery storage is a technically feasible and economical way to solve multiple challenges that utilities face. As the costs of storage continue to decline, I believe it will become more attractive than traditional solutions such as building more transmission lines and more fossil fuel generation. The project RMP is proposing is an excellent example of the type of project that WRA is recommending in other states. We support the proposed project on technical, economic, and policy grounds.

Q. Please summarize your testimony.

A. My testimony supports RMP's proposal to use $5.05 million of STEP funding to install a stationary battery storage system in combination with an additional $1.95 million from Blue Sky community funds to install a large-scale, company-owned solar project intended to address an existing transmission voltage problem. RMP has demonstrated this solution is less expensive than other, more traditional solutions to the voltage problem. More importantly, the project will give RMP valuable experience and information on how to effectively operate a combined battery storage/solar system on

their grid. This will help advance other advantageous non-wires alternatives in the future.

Q. Please provide your recommendation.

A. WRA recommends that the Commission approve the Solar and Energy Storage Program as proposed by RMP, including the funding amounts and sources as proposed.

II. DISCUSSION

Q. What is RMP proposing in this docket?

A. RMP has identified a seasonal, low-voltage problem on a particular transmission line that is being caused by high loads from one substation during particular times of the year. The high loads from the substation are predicted to cause the transmission line to have voltages outside of required ranges by 2019. RMP is proposing to solve the low-voltage problem with a 5 MWh battery storage system in combination with a 650 kW solar system. The combination of battery storage and solar will act to keep voltage levels on the transmission line within the required range. The solar resource provides energy during part of the peak load period when voltages would otherwise be low. The battery storage system can be charged during off peak hours and discharged into the grid during peak hours to further reduce the possibility of low voltages.

Q. Did RMP consider other alternatives?

A. Yes. The Company considered three other alternatives: 1) rebuilding the transmission line using a low impedance conductor; 2) building a new transmission substation; or 3) installing an 8 MWh battery storage system.

Q. Is this type of solution technically feasible?

A. Yes. The RMP proposal is a good, innovative non-wires solution to a transmission/distribution voltage problem.

Q. What is a "non-wires" solution?

A. Traditionally, voltage problems on the grid are solved by focusing on conventional infrastructure – i.e., by building more or larger transmission lines or by building more or larger distribution facilities. These are solutions that essentially beef up the "wires" of the grid and, while effective, are costly. Non-wires alternatives can offer more cost-effective solutions to the same voltage problems, but utilize targeted demand side management, demand response, battery storage and distributed generation. Utilities across the country are implementing non-wires solutions for distribution and transmission capacity and reliability problems where they make sense.

Q. **Why are non-wires solutions good policy choices?**

A. Non-wires solutions to grid congestion and reliability problems give utilities alternatives that can be efficient, cost effective, and in some cases much faster in providing relief. In addition, most non-wires solutions provide more flexibility in siting. Building new feeders, transmission lines, or substations generally requires land, or rights of way, in specific locations at or adjacent to existing facilities. Battery storage solutions can be located in a variety of places along existing feeders or at existing substations. Non-wires solutions that only need energy efficiency require no construction. In addition to these locational advantages, non-wires solutions can provide other advantages such as long-

term reduction in overall energy use or long-term reduction of load during peak hours. For these and other reasons, non-wires solutions are good policy choices.

Q. Is the proposed solution cost effective?

A. Yes. The financial analysis provided by RMP shows that the proposed solution, at $7.0 million, is a more cost effective solution than the other three. Specifically, it is expected to cost $1 million less than rebuilding the transmission line, $7 million less than installing a new transmission substation, and nearly $500,000 less than installing a larger 8 MWh battery storage system.

Q. Is the proposed project a permanent solution to the low voltage condition?

A. No solution is permanent. Load growth could make any of the four alternatives insufficient in 20 years. RMP has stated its proposed solution is still economically attractive over a 15-year period. At that time, the Company and the Commission may wish to consider new alternatives. Notably, a solution involving battery storage can be easily augmented in the future with a larger battery system. Thus, approving this project at this time will facilitate effective "scaling up" in the future, as necessary.

Q. Is there value in the proposed project beyond the economics of solving the transmission voltage problem?

A. Yes, the proposed project will provide RMP with a good operational test of how battery storage can be used to solve distribution and transmission capacity and reliability problems and how battery storage can be used to integrate distributed solar generation into the grid. This operational knowledge will be valuable in the future when battery storage will be economically viable in many other situations on the RMP grid.

Q. What storage technology should RMP consider for this project?

A. I refer to battery storage in this testimony because, for the size of the project being proposed, batteries are really the only suitable technology. Pumped-hydro storage and pumped-air storage are larger scale technologies that require siting near an appropriate resource. Flywheels and super capacitors can provide high levels of current for short periods of time, but cannot accommodate the hours of storage needed for this project. On the other hand, there are several battery storage technologies that could be used for this project. The most likely technology for projects of this size is lithium ion batteries. Many companies provide lithium ion battery solutions, and there are many existing commercial installations across the country. Another technology of interest is "flow batteries," which use two chemical components dissolved in liquids that are pumped past a membrane. When RMP issues an RFP for the proposed project, they will no doubt receive multiple technical solutions proposed by various vendors. RMP can choose the best vendor with the best technology to meet the project's needs.

Q. Will RMP be able to capture additional value from the battery storage system, above and beyond solving the voltage problem as proposed?

A. Yes. When the battery storage system is not needed for voltage support, it can be used for other services, such as energy arbitrage (energy shifting), peak shaving, and frequency regulation. These services can give the battery system year-round value. RMP will have the opportunity to test the use of the battery storage system to capture additional value for customers with these additional services. This will be important for the future when battery storage is more cost effective and has a higher utilization rate.

Q. Please describe the value of these other services (i.e., energy arbitrage, peak shaving, and frequency regulation) provided by battery storage.

A. Peak shaving is the ability of energy storage to reduce the impact of peak energy demand on the grid. This minimizes the need for generators to ramp up production when power prices are high. Energy arbitrage is the ability of batteries to "fill up" with cheap power (either from nighttime power sources or renewables like wind and solar) and use that stored energy to provide power to customers at a lower price during periods of high load when energy is expensive. This has the benefit of lowering customers' bills. Frequency regulation is an ancillary service necessary for grid reliability that involves balancing instantaneous electric supply and demand. Energy storage can provide this service by charging or discharging into the grid as needed when supply and demand are not in balance. In total, the battery system will no doubt be able to provide additional benefits, both economic and operational, that have not been included in the analysis, making the proposed project even more beneficial in the long run.

Q. Is production from the proposed solar facility valuable when not needed for voltage support on the project?

A. Yes. The proposed 650 kW solar facility will produce energy year round that can be used by the grid to save fuel costs.

Q. Is the use of STEP funds appropriate for purchasing the battery storage system proposed in this project?

A. Yes. The Sustainable Transportation and Energy Plan Act, or STEP, was signed into law (U.C.A. § 54-20-101, *et seq.*) on March 29, 2016. STEP allows the Public Service

Commission to authorize RMP to implement tariffs to provide funding for a number of programs, one of which is the battery storage system proposed in this project. Specifically, § 54-20-105(1)(h) permits the Commission to authorize RMP to implement "innovative utility programs" in the interest of the utility's customers, including "a *battery storage* or electric grid related project" (emphasis added).

Q. Is the use of Blue Sky funds appropriate for the purchase of the solar installation for this project?

A. Yes. STEP allows the Commission to authorize RMP to implement tariffs to provide funding for a number of programs, one of which is the purchase of the solar installation proposed in this project. That statutory provision allows RMP to invest in "electric grid related project[s]." Rocky Mountain Power proposes to use Blue Sky community project funds – specifically, the Utah Blue Sky tariff Schedule 70 – to pay for the solar installation included in this project. The "Qualifying Initiatives" section of Schedule 70, item 2, provides that Blue Sky funding can be used "for research and development projects encouraging Renewable Energy in order to accelerate marketability of Renewable Technologies." Therefore, the use of Blue Sky funds is appropriate and aligns with the goals of the STEP program to support the greater use of renewable energy.

Q. Does this conclude your testimony?

A. Yes.