

Rocky Mountain Power  
Exhibit RMP\_\_(WJC-1)  
Docket No. 16-035-36  
Witness: William J. Comeau

BEFORE THE PUBLIC SERVICE COMMISSION  
OF THE STATE OF UTAH

ROCKY MOUNTAIN POWER

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Exhibit Accompanying Direct Testimony of William J. Comeau

Utah Battery Demand Response Project

March 2019

# **Utah Battery Demand Response Project – Behind the Meter**

# Rocky Mountain Power

## 1 Executive Summary

As part of the Sustainable Transportation and Energy Plan (STEP), Rocky Mountain Power (the Company) is requesting \$3.27 million to develop a demand response solution utilizing residential behind-the-meter batteries. The project will also examine the viability of daily load shaping through 621 individual apartment batteries, assess their grid-optimized value and inform future rate design.

## 2 Purpose and Opportunity

In January 2018, Wasatch Development approached the Company with a proposal to partner to make an innovative solar and battery solution possible. Wasatch Development is committed to leading the innovation of sustainability in buildings and is in the process of developing a 600 unit multi-family community (Soleil) within the Wasatch Front. This project provides a unique opportunity for the Company to implement an innovative solution for solar and battery storage integration along with demand response and advanced management of the grid through daily peak/off-peak energy load shaping.

The project will include the development of a Company owned utility data and dispatch portal with direct access to 621 8kW Sonnen batteries for a total of 4.8 megawatts of capacity and 12 megawatt hours of energy. In addition to the cost savings with leveraging the Soleil community partnership, the project creates opportunity in the following areas:

- **Demand Response** – This partnership project will enable the Company to have full access and control of the batteries for demand response and load shaping 24 hours a day throughout the year. The intent will be to develop an optimized solution for daily load management and demand response based upon the actual performance of the system.
- **Load Shaping** – The Company will examine the value of having behind-the-meter grid-optimized solar and battery storage communities interconnected to the Company's electrical system. The Company typically has limited behind-the-meter data, so this gained experience will help the Company prepare in advance of large scale integration of such technology/projects that are becoming available options for customers as battery prices decline.
- **Rate Design** – The Company's current rates are not optimized for battery storage applications. Evaluating behind-the-meter battery behavior will help guide and inform future rate design for customers with batteries.

### **3 Benefits and Innovation**

- Provides a renewable and battery grid management solution behind the meter that can be used to help design micro-grid type solutions and customer rates in the future.
- Enables the Company to get first-hand experience with behind-the-meter energy storage combined with solar. This gained experience will help the Company prepare in advance of large scale integration of such technology/projects that are becoming available options for customers as price declines.
- Currently do not have customer rate options that are optimized for behind-the-meter battery applications. The data from the partnership will help inform future rate designs for customers with batteries.
- Development of a behind-the-meter battery demand response solution that has the potential to offset all of the grid loads from the apartment complex. The project will also determine the feasibility of discharging excess battery capacity into the grid as a utility controlled option and, if possible, implement that solution.
- Provides for the ability to determine financial benefits and feasibility of battery demand response technology, including frequency response.
- Enables the Company to become familiar with and utilize innovative technologies to provide customers with solutions they are starting to ask for, such as batteries and micro-grids.
- Allows evaluation of customer network reliability for demand response solutions.
- Ability to manage load on the electric system due to the Sonnen battery control technology optimizing for daily peak load shifting.
- The batteries will provide back-up power during grid power outages for each individual apartment. The Sonnen batteries will continue to be charged from the on-site solar and provide backup power during grid outages, allowing RMP to test this type of solution for future applications.
- If proven successful, provides a utility dispatch platform solution that can be utilized for all Sonnen batteries in the Companies service territory.

### **4 Public Interest Justification**

- The Company is exploring options to expand renewable energy and innovative technology options to improve service to customers.
- The Company is taking steps to prepare for future deployments of micro-grids and innovative customer options.
- Allows for testing the feasibility and economic benefits of customer owned behind-the-meter battery demand response solutions.
- A “partnership” approach allows the Company to test and study behind-the-meter battery solutions on a larger scale at a much lower cost.

- Better utilization of the grid through daily peak usage reductions considering the energy storage device is expected to recharge with solar during off-peak hours and discharge during peak periods.
- Improved utilization of grid assets.
- Reduction in transmission congestion during summer peak loading periods.

## **5 Legislative Compliance with SB115**

The proposed solution for the Soleil partnership meets the legislative intent of SB115 54-20-105-1(h) that pertains to “any other technology program” in the best interest of the customers in the state of Utah. This project falls under the STEP’s discretionary allotment of funds as part of the Utah Innovative Technology category.

## **6 Alternatives Considered**

**Alternatives considered that resolve the customer’s and demand response needs:**

Alternative – Company build and maintain a 5 MW solar and 4.8 MW battery solution behind-the-meter for Soleil

### Description

The developer of the Soleil project originally approached the Company to build them an on-site solar and battery solution to meet their air quality goals.

### Advantages

- 1) Developer could focus on their building while having the utility provide the solar and battery solution
- 2) Allow the Company to provide a behind-the-meter solution, as requested from the customer

### Disadvantages

- 1) More expensive than proposed solution. Due to the short-term tax benefits it was determined the project was more economic for the developer to build and own during the first 5 years for accelerated depreciation.
- 2) Due to customer’s needs there would not be enough time to develop a regulatory solution for rates and utility ownership.

### Block estimate

\$34,300,000

## **7 Purpose and Necessity – Risk Analysis**

Company impacts without this project/solution:

- In the absence of the proposed solution, the Company will need to deploy higher cost options to obtain the benefits of a behind-the-meter battery demand project.
- Delays the opportunity to study actual impacts of a behind-the-meter battery solution on the grid. The data learned from this project can help determine value of batteries and future rate designs.
- The partnership limits project solar and battery construction risks for the Company as those costs are born by the developer.

## **8 Major Project Milestones**

- June 2019 – Finalize agreements with Wasatch and Sonnen
- July 2019 – Battery installations start
- September 2019 - First building completed
- February 2020 – Utility demand response portal complete
- Jul 2020 – Demand response solution ready for dispatch
- September 2020 – Last building completed
- December 2020 – Full 4.8MW available for control

## **9 Reporting and Decommissioning**

The Company will evaluate lessons learned and provide recommendations based upon data collected and intends to use a 3<sup>rd</sup> party to perform the analysis. If it is necessary to report more often to comply with the STEP statute or other reporting requirement, the Company will comply with those requirements.

The Company will hire a third party consultant to assist in quantifying the benefits achieved from the energy storage system for both the host customer and the company. In addition to project reporting the selected consultant will assist in developing a cost-benefit computation methodology. This methodology will attempt to compare achieved benefits realized through the operation of the storage facility, with projected benefits for Soleil, customers and the Company.

For this project and a condition of the partnership, decommissioning of the solar and batteries will be the responsibility of the facility (Soleil) as opposed to utility-owned assets which are typically the responsibility of the Company.

## 10 Project Delivery Risk Factors

A few project risk factors have been identified that will need special attention through implementation. There are risks associated with:

- Construction and integration of the solar and battery solution within the Soleil project. This will be one of the first projects of its kind and will be subject to the potential risks with the implementation of new technologies. To minimize the financial risk, payments to Soleil will be contingent upon successful commissioning of the solar and batteries at the buildings.
- The software solution for data analysis and demand response needs to be tested and integrated within the Companies systems.
- The Company has limited prior experience of integrating a customer owned battery project of this size into the grid.

## 11 Project Costs

The total cost of this partnership project is estimated to be \$34.3 million, of which approximately \$12 million is for the purchase of the batteries. The \$3.27 million contribution through STEP funds provides full access and control of the batteries for the life of the project, approximately 20 years, and is necessary for Wasatch Development to make the battery component of the project economically viable. Without the partnership and funding, Wasatch does not intend to move forward with the installation of the batteries. A breakdown of how the \$3.27 million will be allocated is provided in the table below.

<b>Cost Estimates</b>	<b>2019</b>	<b>2020</b>	<b>2021</b>	<b>Total</b>
RMP Energy Management System (EMS) integration	\$100,000	\$100,000	N/A	\$100,000
Battery hardware and integration - Soleil	\$1,250,000	\$1,250,000	N/A	\$2,500,000
Utility portal software integration and license fees - Sonnen	\$100,000	\$150,000	N/A	\$250,000
3 <sup>rd</sup> party analysis	N/A	N/A	\$150,000	\$150,000
Internal labor costs	\$20,000	\$20,000	\$30,000	\$70,000
Contingency:	N/A	\$50,000	\$50,000	\$100,000
<b>Total:</b>	<b>\$1,470,000</b>	<b>\$1,570,000</b>	<b>\$230,000</b>	<b>\$3,270,000</b>

## **12 Regulatory Recovery**

Expenses towards this project will be recovered through the accounting workflow setup for the Utah Innovative Technologies under the Sustainable Transportation and Energy Plan.

## **13 Recommendation**

- Partner with Wasatch to evaluate the benefits of behind-the-meter battery solutions and implement a pilot battery demand response project as part of the Soleil project.
- Leverage the \$34.3 million solar and battery project at Soleil to study and develop a battery demand response solution.
- Provide \$3.27 million in STEP funds to cover the hardware and integration costs of the batteries and for the Company to have full control for demand response through the life of the project.

## **APPENDICES**

- Appendix A – Wasatch Group Information
- Appendix B – Soleil Lofts Overview
- Appendix C – Sonnen Batteries Information



## **APPENDIX A – Wasatch Group Information**

### **The Wasatch Group**

The Wasatch Group partners with cities, lenders, investors and innovators in envisioning, developing and rehabilitating real estate properties that enhance communities through innovation. Our experience, knowledge, reputation and proven track record in combination with our financial strength makes us the safe and recognized choice for innovative real estate development.

The Development and Construction Division has a mandate to meet the growing need for both market-rate and affordable rental housing communities throughout the western United States. Our vision is to participate in real estate transactions which enhance and add value to the surrounding communities where we are active. We also seek out opportunities for other special projects that augment and complete the company's vision to develop sustainable communities for the future.

The Wasatch Group includes several sub-entities such as: Wasatch Property Management which currently manages 16,050 apartment units across five western states – California, Utah, Arizona, Colorado, and Washington; Wasatch Commercial Management manages 2,559,220 sq. ft. of office buildings, 226,534 sq. ft. of retail developments, 1,129,580 sq. ft. of industrial buildings, and 777,627 sq. ft. of parking, in several states; Wasatch Acquisitions & Capital, Inc. which was organized to evaluate, capitalize, and complete the acquisition of undervalued multifamily and commercial real estate; and Wasatch Guaranty Capital who's primary function is to source and administer debt guaranties and to deploy capital investments in numerous areas of real estate and business. Wasatch Group currently has 2,750 acres of land ready for development.

## APPENDIX B – Soleil Lofts Overview

Soleil Lofts is a state-of-the-art innovative community featuring a 5.2 Megawatt solar system that will deliver 75% of the energy needed for the community. Every home has a state-of-the-art battery that is charged from the solar in coordination with the local utility provider, Rocky Mountain Power.



With a commitment to a clean environment Soleil Lofts will install 104 EV chargers and more coming online as needed. Soleil will also have a near Zero Waste program using valet trash service to pick up trash with a sorting operation including food waste diversion reducing impact on the landfill up to 85%.

Additionally, Soleil Lofts is a smart community. Each apartment includes smart mobile controls including the ability to unlock doors while on vacation or control the thermostat.

Each apartment is equipped with air conditioning & central heating with Energy Recovery Ventilators for further efficiency that allows almost no unfiltered air coming from outside the unit. As well as new energy-efficient appliances (including a personal washer and dryer).

### **Energy Efficiency**

57% more energy efficient than baseline energy efficient homes, reducing energy use and costs

100% Electric-grid tied community with 75% onsite energy generation

Sonnen State-of-the-Art Battery Storage and Back-up Power in each unit

## **Green Construction**

Near Passive Home Building Envelope Tightness

LED lights

Heat Pump HVAC with Energy Recovery Ventilators

Hybrid heat pump hot water heaters

## **Green Lifestyle**

Significantly healthier living environment

- Innovative building design that is part of the solution to improve air quality along the Wasatch Front.
- Soleil Lofts features an onsite 5.2 Megawatt system that delivers 75% of the energy needs to the community.
- Every home has a state-of-the-art battery that provides nearly all the energy and power needed each day and is monitored 24 hours a day.
- Each battery has a 25-year life expectancy
- The community is equipped with smart thermostats with web enabled remote control to maximize efficiency.
- The community has high efficiency heat pump heat and cooling up to 24 SEER and install Energy Recovery Ventilators for further efficiency and a much healthier internal environment for the tenants.
- The building envelope is near passive in its tightness test, meaning a 40% electricity savings, less outside noise transmission, and almost no unfiltered air coming from outside the unit.
- Each unit has the most efficient hot water heater available on the market.
- Whirlpool energy star appliances used in every apartment.
- The community has 104 EV Chargers, and more coming online as needed.
- Committed to a clean environment, Soleil Lofts has a near Zero Waste program using valet trash service to pick up your trash outside your door and a sorting operation including food waste diversion reducing impact on the landfill up to 85%.

## APPENDIX C – Sonnen Batteries



## Tech Specs - sonnen ecoLinx

The sonnen ecoLinx is an intelligent energy storage solution that seamlessly integrates with leading smart home automation systems, including Crestron and Control4, to power your home with clean energy – managing your energy usage throughout the day, providing smart configurable backup power during a grid outages and powering smart homes with solar energy, day and night.

	ecoLinx 10	ecoLinx 12	ecoLinx 14	ecoLinx 16	ecoLinx 18	ecoLinx 20
Usable Capacity 100% DOD)	10 kWh	12 kWh	14 kWh	16 kWh	18 kWh	20 kWh
Nominal power rating (off-grid output at 25 deg C)	7 kW	8 kW	8 kW	8 kW	8 kW	8 kW
Nominal power rating (grid-tied output at 25 deg C)	7 kW	7 kW	7 kW	7 kW	7 kW	7 kW
Weight (approximate)	622 lbs	683 lbs	741 lbs	800 lbs	850 lbs	900 lbs
Dimensions W"/H"/D" (approximate)	26/84/16					

### Off-grid specification

Continuous AC output current	29 A	33.33 A	33.33 A	33.33 A	33.33 A	33.33 A
Max power	100ms – 17 KVA 5 s – 12 KVA 30 m – 9 KVA					
Max AC current (charge/discharge)	1 ms – 100 A 100 ms – 70.7 A 5 s – 50 A 30 m – 37.5 A					

### General specification

<b>Grid integration</b>	AC coupled
<b>Applications</b>	Smart configurable backup power, time-of-use management, solar self-consumption, home automation integration
<b>Transfer switch</b>	Automatic, integrated
<b>Backup capacity</b>	2 kilowatt-hours per battery module, up to 20kWh
<b>Listed and recognized components</b>	Certified to UL 9540, UL 1741 (inverter) and UL 1973 (batteries) standards**
<b>Warranty*</b>	15 year or 15,000 cycle system warranty - includes inverter, battery modules, cabinet and components
<b>Inverter efficiency</b>	92.5% CEC weighted, 95.0% peak
<b>Roundtrip efficiency % (Grid&lt;&gt;Battery)</b>	>= 86%
<b>Temperature Range</b>	41 °F - 113 °F
<b>Ventilation</b>	Forced Air
<b>Comm. ports</b>	Ethernet
<b>Communication and control standards</b>	SunSpec Alliance Integrates with Control4 and Crestron drivers
<b>EMC / EMI protection</b>	FCC Part 15B

### AC specification

<b>AC grid voltage</b>	120/240 volts
<b>Max AC grid current</b>	amps
<b>Nominal frequency</b>	60 Hz
<b>Adjustable frequency range</b>	+/- 0.7 Hz from nominal
<b>Metering capability</b>	Power meter for load and PV production (not revenue grade)
<b>Tare losses (W)</b>	60 watts
<b>Transient protection</b>	IEEE C62.41 Class B

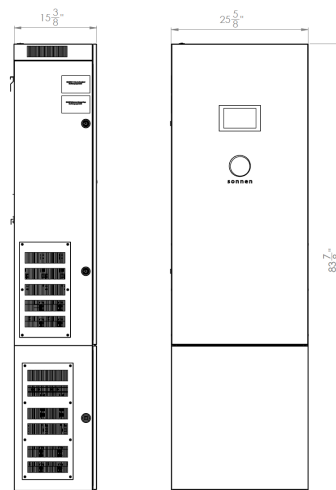
### Transfer switch specification

<b>Current rating</b>	200 amps switching and overcurrent protection
<b>Voltage rating</b>	120/240 VAC
<b>Certification</b>	UL Recognized Component
<b>Transfer Time</b>	< 100 ms
<b>Nominal frequency</b>	60 Hz

### Battery Specification

<b>DC battery input voltage</b>	48-56 VDC
<b>Max charge current</b>	40 A per module
<b>Nominal charge current</b>	30 A per module
<b>Cell discharge</b>	95% DoD
<b>Overcharge Protection</b>	Fuse protection

### Measurements



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We reserve the right to make technical changes. The values, outputs, other technical data, images, and diagrams in this prospectus and in data sheets, advertisements, and other promotional documents are approximate guidelines in all cases where they have not been identified as binding.

\*Please observe our applicable warranty conditions.

\*\*The sonnenBatterie system is certified by ETL to UL 9540 standards and employs UL 1973 Recognized Batteries (Murata/Sony UL file MH48699/model number IJ1001M) and an inverter certified by ETL to UL 1741 standards.

sonnen Form TS-ecolinx-0820-001