ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

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August 25, 2021

VIA ELECTRONIC FILING

Utah Public Service Commission
Heber M. Wells Building, 4th Floor
160 East 300 South
Salt Lake City, UT 84114

Attention: Gary Widerburg
Commission Administrator

RE: **Docket No. 21-035-29**
Rocky Mountain Power's Fourth Annual Sustainable Transportation and Energy Plan Act ("STEP") Program Status Report
Compliance Filing

On April 29, 2021, Rocky Mountain Power ("Company") filed its Fourth Annual Sustainable Transportation and Energy Plan Act ("STEP") Program Status Report ("Report"). In reply comments filed on June 17, 2021, the Company committed to providing its final report on the Panguitch Solar and Battery Storage Project once completed. Attached herein is the final report for the project.

Questions regarding the attached can be directed to Jana Saba, Manager of Regulatory Affairs at (801) 220-2823.

Sincerely,

Joelle Steward
Vice President, Regulation

CC: Service List - Docket No. 21-035-29

CERTIFICATE OF SERVICE

Docket No. 21-035-29

I hereby certify that on August 25, 2021, a true and correct copy of the foregoing was served by electronic mail to the following:

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PANGUITCH SOLAR + STORAGE
2021 PROJECT REPORT

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PANGUITCH SOLAR + STORAGE
2021 PROJECT REPORT
TABLE OF CONTENTS

PANGUITCH SOLAR + STORAGE 2021 PROJECT REPORT

1 SUMMARY

This report addresses PacifiCorp's Panguitch solar and storage project. The project, approved in 2016 by the Utah Public Service Commission under the Sustainable Transportation and Energy Plan (STEP), became operational March 2020. Project challenges for Rocky Mountain Power have yielded valuable lessons learned that will support adoption of these relevant technologies. This report will address those lessons learned as well as provide project background, initial implementation, a financial summary, the engineer-procure-construct (EPC) process and initial observations.

2 BACKGROUND

PacifiCorp proposed a 650 kilowatt (kW) solar combined with a 1 megawatt (MW) / 5 megawatt-hour (MWh) battery storage project on a distribution circuit out of the Panguitch Substation located in Garfield County (Panguitch City), Utah to correct voltage issues experienced during peak loading conditions on a portion of PacifiCorp's system on the Sevier–Panguitch 69 kilovolt (kV) transmission line. The Panguitch Substation is fed radially from Sevier, and all capacitive voltage correction factors had been exhausted. The solar and battery storage system was intended to alleviate peak loading on the Panguitch power transformer and to improve voltage conditions on this upstream 69 kV sub-transmission line.

The potential project benefits extended beyond alleviating peak load, and included the following:

- Rocky Mountain Power would obtain first-hand operational experience with control algorithms and efficiency levels associated with energy storage combined with solar. This experience would prepare Rocky Mountain Power in advance of large-scale integration of similar technologies/projects that are becoming cost-effective, readily available options for customers.
- Rocky Mountain Power has been striving to make the grid more progressive; this project would enable a greater companywide understanding of these innovative solutions.

Rocky Mountain Power proposed that solution for the Panguitch system met 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 would fall under the STEP discretionary allotment of funds as part of the Utah Innovative Technology category.

The Utah Public Service Commission approved PacifiCorp's Panguitch lithium-ion battery storage project (1 MW / 5 MWh) under the STEP/Utah Innovative Technologies (STEP/UIT) program December 29, 2016. A single-axis tracker, solar photovoltaic component (650 kW) of the project was to be separately funded by the company's Blue Sky program.

3 INITIAL IMPLEMENTATION

As part of the execution process, multiple steps were necessary to successfully implement the project. These steps included:

- Rocky Mountain Power initiated a Request for Qualification (RFQ) and Request for Proposal (RFP) to identify an Owner's Engineer (OE). As part of the process, POWER Engineers was identified as the most qualified vendor and a contract was executed to assign POWER Engineers as the OE. The responsibility of the OE was to provide technical engineering guidance to define the scope of services, identify risks, anticipate challenges and propose technical solutions.
- The OE developed a model to assess the solution proposed by Rocky Mountain Power to resolve the voltage issue. The model validated Rocky Mountain Power's proposal to solve the voltage issue by installing a 650 kW solar and 1 MW / 5 MWh energy storage project.
- The OE developed detailed technical specifications required to be complied with by the project developer.
- Rocky Mountain Power submitted interconnection requests for both the solar and energy storage projects. Both interconnection requests received approvals in April 2018.
- Rocky Mountain Power purchased land for the project installation (see Figure 1). Rocky Mountain Power also engaged with community leaders to help them understand the value of this project for the community.
- Rocky Mountain Power released an RFP to nine preselected vendors with experience in executing EPC contracts for energy storage and/or solar projects. Rocky Mountain Power received an affirmative response from two vendors. Subsequently, both vendors submitted their final bids through the Rocky Mountain Power's e-Auction process, however only one vendor submitted a detailed bid.
- The project EPC contract was awarded to Overland Contracting Inc. (OCI, Black & Veatch's EPC company) in early in 2019 to engineer, procure and construct the project.
- Rocky Mountain Power negotiated with the EPC contractor to determine contract terms and final pricing. As part of this effort, Rocky Mountain Power successfully reduced cost of the overall bid by making modifications to engineering design and material sourcing.

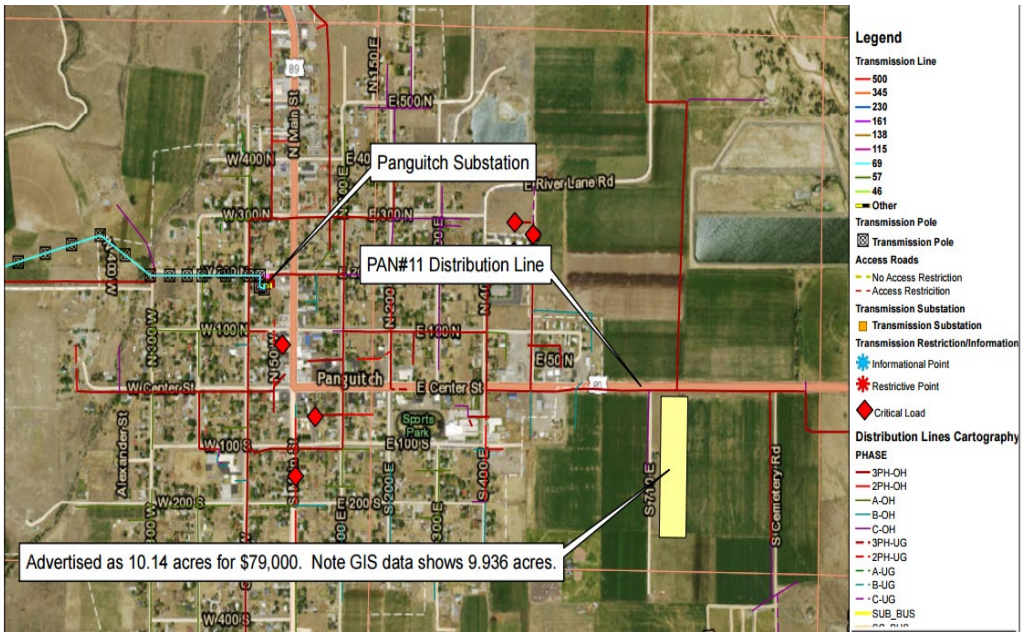

Figure 1—Proposed Project Site

4 FINANCIAL SUMMARY

Financial elements in the Panguitch solar and storage project can be loosely divided into preliminary cost analysis and project funding as it evolved.

4.1 Preliminary Cost Analysis

An initial analysis of the costs involved in addressing the load issues on the Sevier–Panguitch 69 kV transmission line suggested the solar and battery option would be cost effective as compared to traditional approaches: rebuilding the transmission line or rebuilding a new transmission substation. The cost to rebuild the transmission line using a low impedance conductor was estimated at $8m. The cost to rebuild a new transmission substation to connect the Sevier–Panguitch 69 kV transmission line to Sigurd–Parowan 230 kV transmission line was estimated at $14m. By comparison, the preliminary cost analysis suggested that installing an 5 MWh energy storage device would be the least cost at $7.4m.

4.2 Project Funding

When the project was approved by the Utah Public Service Commission in 2016, the agreement included $5m in STEP funds to install the energy storage technology. An additional $2m from Blue Sky community project funds was approved for a company-owned solar project at the same location.

Rocky Mountain Power was able to secure cost savings through reduction in project management and interconnection equipment costs; however, the overall price of procuring and installing the solar and energy storage system was higher than the initial 2016 funding request. Factors that caused the increase in costs included, but were not limited to: impact of trade tariffs on imported energy storage and solar materials, increase in contractor costs for project solar and storage integration and commercial risks, increased cost for battery storage due to high demand and limited supply, and higher construction due to low unemployment and higher labor costs, as well as any other costs that might not have been considered in the previous cost estimate. The budget was revised to an overall project estimate of $8.5m. (The estimated cost of resolving the voltage issue using *traditional* capital investments in the form of poles, wires and/or substations was revised from $8 to $8.75m, based on $2018 current market costs.)

As reported in March of 2020, per Docket No. 16-035-36, the Utah Public Service Commission approved PacifiCorp's request to increase funding for the Solar and Storage Technology Project by $1.75m due to the response to PacifiCorp's request for proposals (RFP). More specific detail on the project accounting appears in Table 1.

Table 1—Project Accounting

	2017	2018	2019	2020	Total
Annual Collection (Budget)	$500,000	$2,350,000	$5,900,000	$0	$8,750,000
Annual Spend (Capital)	$331,995	$75,474	$8,374,822	$168,404	$8,950,695
Committed Funds	$0.00	$0.00	$0.00	$0.00	$0.00
Uncommitted Funds	$0.00	$0.00	$0.00	$0.00	$0.00
External OMAG Expenses	$0.00	$0.00	$0.00	$13,735	$13,735
Subtotal	**$331,995**	**$75,474**	**$8,374,822**	**$182,138**	**$8,964,429**

5 ENGINEER-PROCURE-CONSTRUCT

After the contract was awarded to OCI, construction was completed on November 5, 2019. A timeline appears in Table 2.

Table 2—EPC Milestones

Milestones	Delivery Date	Status/Progress
Award EPC Contract	February 22, 2019	Complete
EPC Design Complete	August 1, 2019	Complete
EPC Major Equipment Procured and Delivered	September 3, 2019	Complete
Construction Complete	November 5, 2019	Complete
Commercial Operation Date	November 15, 2019	March 9, 2020

The OCI EPC design project work consisted first of verification of system design criteria, then primarily of multiple reviews and finalization of engineering drawings (67 total) and included internal coordination with the Rocky Mountain Power interconnection team. Significant drawings included the electrical one-line and site plan. As system and subsystem designs were completed, the associated equipment was procured by OCI. Major project equipment and subsystems (and controls) through all phases of the EPC contract included: electrical; single-axis tracker photovoltaic, lithium-ion battery energy storage; battery and backup power; and control buildings. Electrical systems also included switchgear, transformers and various panels / enclosures. Solar and battery systems included inverters and additional control systems. Other balance of plant systems included communications, fire protection and a meteorological station.

Once design and procurement were nearing completion, OCI site construction began. Most permitting occurred before or concurrent with design and procurement, except for the Stormwater Pollution Prevent Plan permit (SWPPP), which was obtained immediately before site construction commenced. The general sequence of construction commenced with clearing and leveling of the property and installation of fencing including a main access gate. The next stage (civil) consisted of underground electrical, grounding grid, and the placement of 11 concrete foundations including two battery energy storage containers, two transformers and multiple cabinets / panels. Subsequently, most of the large equipment including one control building and two battery energy storage containers were installed, followed by loading of the lithium-ion batteries. Steel posts and other horizontal components, and tracking motors and sensors, for the solar modules and panels were installed shortly thereafter. Rocky Mountain Power installed wooden poles and other equipment for interconnection, and an additional control building. All electrical and control wire (including for the solar modules) were pulled,

terminated, and tested. Rocky Mountain Power provided transformers and metering, final electrical connection, and then backfed and synched the facility.

The post-construction commissioning and testing portion of the project took longer than planned and consisted of correction of punch-list items, programing of the battery management and control system, receipt of spare parts, final project documentation (commissioning / testing documentation, drawings, and operation & maintenance manuals) and training.

OCI's construction workforce peaked at 17 individuals and averaged about eight for the project duration. The number of hours for the construction portion of the EPC contract with OCI totaled slightly more than 13,000 with an additional 1,500 hours for commissioning and testing. Notably, OCI experienced zero recordable or lost-time accidents during the project; there was one near miss. OCI also had zero environmental issues while on-site.

6 OBSERVATIONS

Figure 2 presents a 24-hour load and generation profile at the Panguitch Substation on July 7, 2021. This profile shows that the solar and battery systems reduce the overall load to ensure the loading on Panguitch Substation is maintained at the predetermined level of 2.4 MW. The loading setpoint is determined by the Rocky Mountain Power's transmission engineer to ensure the loading at Panguitch Substation does not violate voltage compliance levels.

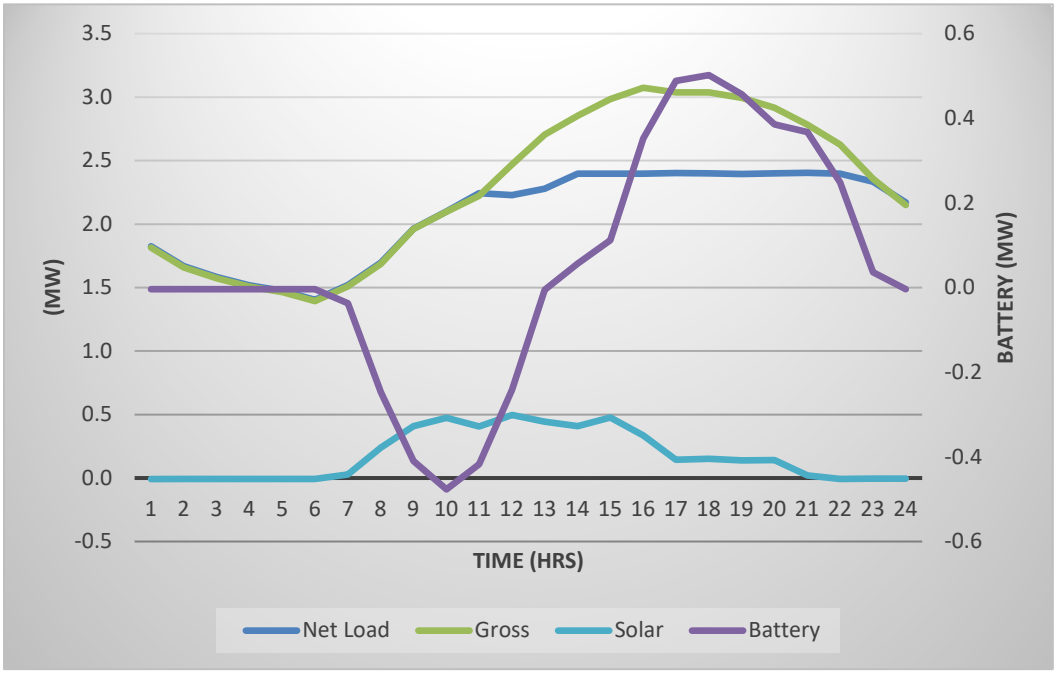

Figure 2— Panguitch Substation Loading—July 7, 2021

7 LESSONS LEARNED

Description of Investment	Anticipated Outcome	Challenges	Findings	Results	Lessons Learned
Enable Investment Tax Credit (ITC)	Utility will operate the solar and battery system to address system issues as well as capture ITC benefits	System not original designed for such capability	The battery and solar control architecture were not initially designed to accommodate ITC requirements	Control architecture changes were implemented on January 21, 2020	During design and setting of design criteria include ITC philosophy in specification and controls
Interconnection cost increases	N/A	Tight labor market for procurement of contractors (and with required schedule); nine poles required replacement from Panguitch Substation to the site	Contractor cost increases: communication costs and labor were higher than originally estimated	Passage of time also impacted estimates; in the end, interconnection costs increased significantly	Detailed loading information and field inspection may be needed to accurately estimate interconnection costs
Issues with fencing and grounding	Repaired in the field	Issues with project construction quality	Multiple issues were identified that raised concerns regarding construction quality	Fencing and grounding issues were corrected during the commissioning stage	Establish clear fencing and grounding standards in the contract; conduct both design and field reviews during commissioning
Consider providing temporary diesel generators for battery backups	More reliable and robust system	Cost of generators, permitting (emissions) and other ancillary electrical	Cost of generators, permitting and other ancillary electrical	Not included, future project if justified	May not be required depending on future project location
Enable SCADA connectivity	Added after project commissioning was completed	No remote control capability for Rocky Mountain Power dispatch operators	N/A	Completed SCADA connectivity	This is a MUST to ensure dispatch operators have complete control on battery dispatchability
Ensure access to battery software system	Remote access to battery control system software to monitor battery and solar activity	Requires field crew to drive from nearest service center to clear alarms/faults on the battery system	Firewalls and cybersecurity protocols for accessing the software should be determined during planning process	Rocky Mountain Power is currently working with the battery supplier to ensure remote accessibility to the software	Required to ensure accurate monitoring and battery control system alarms / faults can be cleared remotely
Data integrity	Battery control system data is aligned with Rocky Mountain Power's SCADA data	Confusion created due to data discrepancy	Discrepancy in data due to various issues such as scaling, data points mismatch, etc.	Battery supplier is investigating the source of the data discrepancy and provide recommendation to address future data integrity issues	Download data logs from the battery system early in the implementation phase to address the issue early in the project
Training	Field crews in the Panguitch area to be well trained on battery control systems	Lack of understanding among field crews on the different battery components and maintenance and operations of the same	N/A	Additional training provided to field crews to ensure all questions on operations are addressed	Have multiple trainings for field crews since they are not well-acquainted with advanced battery control systems