ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

1407 W North Temple, Suite 330
Salt Lake City, Utah 84114

April 29, 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**

In accordance with Docket No. 16-035-36, Rocky Mountain Power (the "Company") hereby submits for filing its fourth Annual Sustainable Transportation and Energy Plan Act ("STEP") Program Status Report ("STEP Report"). The STEP Report contains the overall calendar year 2020 monthly accounting detail for the STEP program as well as information on the individual STEP programs, using the reporting template that was approved in a letter from the Utah Public Service Commission ("the Commission") dated October 12, 2017 ("Reporting Template").

The Reporting Template was designed to inform stakeholders of the STEP program's progress and funding, and the Company continues to modify and supplement the report based on feedback and recommendations from interested parties through various proceedings. A complete list of these changes is provided on pages 1.2 through 1.6 along with a reference to where the additional information can be found in the STEP Report, if applicable. The Company appreciates the feedback received so far on the STEP Report and looks forward to continued collaboration with interested parties to ensure the STEP Report is as useful as possible.

Also, the Feasibility Assessment of Solar Thermal (Hunter Plant) project, Page 9.0, and the Microgrid project, Page 14.0 are complete and final reports are included in this filing.

The Company respectfully requests that all formal correspondence and requests for additional information regarding this filing be addressed to the following:

By E-mail (preferred): datarequest@pacificorp.com
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Jana.saba@pacificorp.com
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By regular mail: Data Request Response Center
PacifiCorp
825 NE Multnomah, Suite 2000
Portland, OR 97232

Informal inquiries may be directed to Jana Saba at (801) 220-2823.

Sincerely,

Joelle Steward
Vice President, Regulation

CERTIFICATE OF SERVICE

Docket No. 21-035-29

I hereby certify that on April 29, 2021, a true and correct copy of the foregoing was served by electronic mail to the following:

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ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

STEP PROGRAM STATUS REPORT

For Period Ended
December 31, 2020

2020 ANNUAL STEP STATUS REPORT

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Page No.		CY 2017	CY 2018	CY 2019	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	CY 2020 Total	2017-2020 Cummulative Total*
					CY 2020													
	STEP Account Beginning Balance	(15,850,031)	(19,861,068)	(23,946,249)	(21,486,154)	(21,428,030)	(21,662,002)	(21,763,070)	(20,939,635)	(21,993,236)	(21,788,111)	(20,360,977)	(20,863,831)	(20,849,807)	(19,695,850)	(19,428,136)	(21,486,154)	(15,850,031)
	Spending by Project																	
2.0	EV Charge Infrastructure	487,502	1,881,703	1,824,139	305,624	116,974	185,792	251,174	50,159	92,557	67,204	185,600	142,014	418,712	579,261	110,386	2,505,456	6,698,801
3.0	Woody-waste Co-Fire Biomass at Hunter Unit :	-	262,837	588,943	165	-	-	-	-	-	-	-	14,937	-	61,973	2,231	79,307	931,088
4.0	NOx Neural Network Implementatio	457,767	207,616	231,621	(3,008)	(14,465)	-	-	-	32,000	-	-	-	-	-	-	14,527	911,531
5.0	Alternative NOx Reductior	131,405	26,010	-	-	-	-	-	-	-	-	-	-	-	-	-	-	157,415
6.0	CO2 Enhanced Coal Bed Methane (CO2 Reductior	-	73,041	42,133	11,529	-	-	-	-	-	11,529	11,333	27,500	2,805	-	-	64,696	179,870
7.0	Cryogenic Carbon Capture (Emerging CO2 Capture	160,451	530,289	711,750	2,696	113,000	6,993	9,776	110	15,611	55	14,756	25,264	-	-	4,550	192,809	1,595,299
8.0	CARBONsafe (CO2 Sequestration Site Characterizatior	150,239	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	150,239
9.0	Solar Thermal Assessment (Grid Performance	-	-	83,057	-	17,305	-	-	-	-	11,021	1,545	22,437	134	-	51,339	103,781	186,838
10.0	Circuit Performance Meters (Substation Metering	13,676	427,349	451,777	15,606	6,824	14,750	78,252	3,496	1,530	(5,438)	693	(3,916)	2,712	2,641	1,111	118,262	1,011,063
11.0	Commercial Line Extensior	-	69,340	81,743	-	-	-	36,049	-	-	-	21,829	-	-	52,766	-	110,645	261,728
12.0	Gadsby Emissions Curtailmen	-	-	7,067	-	-	-	-	-	-	-	-	-	-	-	-	-	7,067
13.0	Panguitch Solar and Energy Storage Proje	331,995	75,474	6,373,549	9,896	100,414	9,246	27,435	(19,201)	3,297	2,936	4,046	22,721	9,756	5,878	5,713	182,138	6,963,157
14.0	Microgrid Project	-	90,713	77,717	-	-	27,773	306	73	88	76	76	-	-	-	-	28,393	196,823
15.0	Smart Inverter Projec	-	383,859	-	-	-	-	-	-	-	-	-	-	-	-	-	-	383,859
16.0	Battery Demand Response	-	-	4,270	9,397	7,459	3,127	3,011	101,848	3,302	1,000,069	4,209	243,948	64,644	4,796	285,483	1,731,293	1,735,562
17.0	Intermodal Hub	-	-	802,510	-	-	968	1,761	1,452	352	877,746	8,674	-	-	-	-	890,953	1,693,463
18.0	Advance Resiliency Management Syster	-	-	39,931	13,011	23,489	57,035	60,517	65,881	756,216	86,514	147,944	112,767	1,270,671	66,873	213,706	2,874,624	2,914,555
19.0	Utah Solar Incentive Progran	4,762,182	3,486,811	2,173,740	170,977	27,084	189,447	192,730	35,940	19,799	220,583	86,847	309,155	56,413	239,520	41,164	1,589,659	12,012,392
	Total Spending	6,495,218	7,515,042	13,493,946	535,894	398,083	495,132	661,012	239,758	924,752	2,272,294	487,552	916,828	1,825,847	1,013,708	715,683	10,486,543	37,990,748
	Surcharge Collections	(9,756,984)	(10,725,962)	(10,007,474)	(399,596)	(552,713)	(517,098)	179,301	(1,169,421)	(648,802)	(776,978)	(923,437)	(835,334)	(606,595)	(682,704)	(668,249)	(7,601,627)	(38,092,048)
	Ending Monthly Balance before Carrying Charg	(19,111,798)	(23,071,989)	(20,459,778)	(21,349,856)	(21,582,660)	(21,683,968)	(20,922,757)	(21,869,299)	(21,717,286)	(20,292,795)	(20,796,862)	(20,782,337)	(19,630,555)	(19,364,846)	(19,380,702)	(18,601,238)	(15,951,331)
	Carrying Charge	(749,270)	(874,261)	(1,026,377)	(78,173)	(79,342)	(79,102)	(16,878)	(123,937)	(70,825)	(68,182)	(66,969)	(67,470)	(65,295)	(63,290)	(63,211)	(842,675)	(3,492,582)
	Ending Monthly Balance	(19,861,068)	(23,946,249)	(21,486,154)	(21,428,030)	(21,662,002)	(21,763,070)	(20,939,635)	(21,993,236)	(21,788,111)	(20,360,977)	(20,863,831)	(20,849,807)	(19,695,850)	(19,428,136)	(19,443,913)	(19,443,913)	(19,443,913)

*the STEP Account Begninning Balance of ($15,850,031) is the begninng balance as of January 20

2020 Annual STEP Status Report
STEP/DSM Assets/Liabilities
(Based on STEP Legislation)

CY 2017

	Program Expenditures	Accrued Program Expenditures	Amortization of Expense (over 10 years)	Unused DSM Revenue Collections	Carrying Charge	End Balance	Cash Basic Accumulated Balance
					10.65%		
FY16	-	2,693,388	-	(7,097,889)		(4,404,501)	(7,097,889)
1	2,648,142	262,689	(11,010)	(5,596,470)	(76,126)	(7,177,276)	(10,133,354)
2	3,754,612	348,093	(37,611)	(5,851,627)	(99,406)	(9,063,215)	(12,367,385)
3	3,478,015	(117,206)	(67,973)	(4,670,909)	(115,356)	(10,556,644)	(13,743,608)
4	4,355,254	586,848	(100,399)	(4,668,416)	(123,810)	(10,507,168)	(14,280,980)
5	3,686,017	(291,172)	(134,079)	(4,563,595)	(131,233)	(11,941,231)	(15,423,870)
6	3,848,077	669,594	(164,408)	(5,989,272)	(147,118)	(13,724,357)	(17,876,590)
7	3,924,229	1,047,010	(197,648)	(7,728,712)	(176,414)	(16,855,892)	(22,055,136)
8	4,036,553	(195,749)	(231,059)	(4,577,217)	(199,164)	(18,022,529)	(23,026,024)
9	2,972,860	924,940	(260,144)	269,800	(191,121)	(14,306,194)	(20,234,629)
10	4,678,938	39,552	(292,027)	269,150	(158,921)	(9,769,503)	(15,737,489)
11	6,803,166	(694,191)	(339,869)	345,359	(109,457)	(3,764,495)	(9,038,290)
12	9,380,581	(1,204,040)	(407,301)	407,396	(38,588)	4,373,553	303,797
Estimate	-	-	-	4,322	(8,859)	4,369,016	299,260
Total	53,566,445	4,069,756	(2,243,529)	(49,448,082)	(1,566,714)		
			55,392,672		(51,014,796)	4,377,875	
			Total Asset		Total Liabilities		

CY 2018

	Program Expenditures	Accrued Program Expenditures	Amortization of Expense (over 10 years)	Unused DSM Revenue Collections	Carrying Charge	End Balance	Cash Basic Accumulated Balance
					9.21%		
FY17	-	4,069,756	-	299,260		4,369,016	299,260
1	3,568,395	522,546	(461,232)	(2,054,799)	6,335	5,950,261	1,357,959
2	3,374,756	(255,983)	(490,143)	(4,171,129)	5,485	4,413,248	76,929
3	4,020,585	(809,314)	(521,052)	(4,312,160)	(2,528)	2,788,779	(738,226)
4	3,506,710	(239,128)	(552,362)	(4,393,042)	(11,187)	1,099,771	(2,188,106)
5	3,627,311	581,878	(582,102)	(4,227,927)	(21,332)	477,599	(3,392,156)
6	4,220,629	699,578	(614,788)	(5,526,489)	(33,405)	(776,876)	(5,346,209)
7	5,022,885	384,297	(653,261)	(7,346,126)	(52,454)	(3,421,535)	(8,375,165)
8	4,164,510	868,008	(691,624)	(7,635,830)	(80,255)	(6,796,726)	(12,618,364)
9	2,671,925	454,900	(720,025)	(6,662,806)	(114,924)	(11,167,655)	(17,444,193)
10	4,757,938	(305,047)	(751,069)	(4,673,096)	(136,441)	(12,275,370)	(18,246,861)
11	6,769,886	(2,282,310)	(799,057)	(4,176,547)	(133,159)	(12,896,557)	(16,585,738)
12	5,518,134	134,805	(850,260)	(4,836,366)	(127,942)	(13,058,187)	(16,882,172)
Estimate	-	-	-		877	(13,057,310)	(16,881,295)
Total	51,223,665	3,823,986	(7,686,975)	(59,717,055)	(700,930)		
				-			
			47,360,676		(60,417,985)	(13,057,310)	
			Total Asset		Total Liabilities		

CY 2019

	Program Expenditures	Accrued Program Expenditures	Amortization of Expense (over 10 years)	Unused DSM Revenue Collections	Carrying Charge	End Balance	Cash Basic Accumulated Balance
					9.21%		
FY18	-	3,823,986	-	(16,881,295)		(13,057,310)	(16,881,295)
1	2,226,187	409,558	(882,851)	(4,647,371)	(142,243)	(16,094,030)	(20,327,574)
2	3,125,236	(851,191)	(905,431)	9,742,037	(110,111)	(5,093,489)	(8,475,842)
3	3,363,644	929,979	(932,571)	(3,986,014)	(71,019)	(5,789,470)	(10,101,802)
4	4,141,721	(298,685)	(963,923)	(3,566,324)	(79,022)	(6,555,703)	(10,569,350)
5	3,750,564	(389,337)	(996,702)	(3,546,409)	(84,161)	(7,821,747)	(11,446,057)
6	3,030,543	1,099,368	(1,025,077)	(4,533,002)	(97,548)	(9,347,465)	(14,071,142)
7	4,107,773	377,100	(1,055,307)	(5,916,482)	(118,987)	(11,953,367)	(17,054,144)
8	4,296,799	101,144	(1,090,082)	(6,793,244)	(144,654)	(15,583,403)	(20,785,325)
9	5,468,058	(705,972)	(1,130,583)	(6,211,505)	(166,719)	(18,330,125)	(22,826,074)
10	4,265,394	757,369	(1,171,487)	(3,787,195)	(177,851)	(18,443,895)	(23,697,214)
11	5,000,367	360,815	(1,209,461)	(3,584,184)	(181,083)	(18,057,442)	(23,671,575)
12	8,872,512	276,491	(1,267,099)	(4,176,107)	(168,519)	(14,520,163)	(20,410,787)
Estimate	-	-	-		9,874	(14,510,289)	(20,400,913)
Total	51,648,796	5,890,625	(12,630,573)	(57,887,094)	(1,532,043)		
				-			
			44,908,848		(59,419,137)	(14,510,289)	
			Total Asset		Total Liabilities		

CY 2020

	Program Expenditures	Accrued Program Expenditures	Amortization of Expense (over 10 years)	Unused DSM Revenue Collections	Carrying Charge	End Balance	Cash Basic Accumulated Balance
					9.21%		
FY19	-	5,890,625	-	(20,400,913)		(14,520,163)	(20,400,913)
1	5,050,648	(416,692)	(1,324,631)	(4,163,485)	(158,256)	(15,532,580)	(20,996,638)
2	3,830,604	(1,569,622)	(1,361,505)	17,305,963	(85,262)	2,587,598	(1,306,838)
3	3,302,574	187,720	(1,391,316)	(3,417,988)	(15,812)	1,252,775	(2,829,381)
4	5,425,669	(1,610,843)	(1,427,677)	(2,883,294)	(17,438)	739,193	(1,732,121)
5	3,598,514	(270,598)	(1,465,269)	(3,237,527)	(17,532)	(653,219)	(2,853,934)
6	4,440,689	878,389	(1,498,725)	(4,417,827)	(27,568)	(1,278,262)	(4,357,366)
7	3,151,498	363,235	(1,530,324)	(5,562,804)	(48,569)	(4,905,226)	(8,347,565)
8	4,700,877	1,155,026	(1,562,971)	(6,857,008)	(78,340)	(7,547,643)	(12,145,008)
9	9,597,929	(1,239,796)	(1,622,690)	(5,928,274)	(85,358)	(6,825,832)	(10,183,401)
10	5,435,204	749,559	(1,685,325)	(3,810,913)	(78,392)	(6,215,700)	(10,322,828)
11	5,955,573	361,160	(1,732,629)	(3,239,331)	(75,453)	(4,946,379)	(9,414,667)
12	9,600,549	573,155	(1,797,725)	(3,787,584)	(56,849)	(414,834)	(5,456,276)
Estimate	-	-	-		(1,233)	(416,067)	(5,457,509)
Total	64,090,327	5,051,317	(18,400,788)	(50,400,986)	(746,062)		
				-			
			50,740,855		(51,147,048)	(406,193)	
			Total Asset		Total Liabilities		

STEP Project Report

Period Ending December 31, 2020[1]

STEP Project Name:

Electric Vehicle ("EV") Charging Infrastructure:

1. EV Time of Use ("TOU") Pilot – Schedule 2E;
2. Plug-in EV Pilot Incentive Program – Schedule 120; and
3. Plug-in EV Load Research Study Program – Schedule 121.

Project Objectives:

- Offer a time of use rate schedule option for residential customers who own a plug-in electric vehicle;
- Promote plug-in electric vehicle charging infrastructure and time of use rates; and
- To study the load profiles of customers who have plug-in electric vehicles.

2020 EV PROGRAM BUDGET ACCOUNTING

Table 1 below is an accounting of how the $2 million 2020 EV Program budget was allocated. Prescriptive incentives represent measures that follow a program fiscal year of October 1st through September 30th, while custom incentives for committed funds follow the calendar year. Prescriptive incentives in Table 1 were completed during the EV Program's fiscal year. Custom incentives in Table 1 were committed to custom projects that the Company approved through the customer application process. Incentives for custom projects will be paid to customers upon the actual completion of their projects. Additional details and support for Table 1 prescriptive incentives can be found in Exhibit 2-A.

Table 1 – 2020 EV Program Budget Accounting

2020 EV Program Budget Costs/Commitments				
Category	**Prescriptive Incentives**	**Committed Custom Incentives**	**Program Management**	**Total**
Time of Use Rate Sign-up	$30,400	-	-	$30,400
Time of Use Load Research Study	$100	-	-	$100
Time of Use Meters	-	-	$341.06	$341.06
Residential AC Level 2 Chargers	$22,811.33	-	-	$22,811.33
Non-Residential AC Level 2 Chargers – Single Port	$228,573.06	-	-	$228,573.06
Non-Residential AC Level 2 Chargers – Multi-Port	$472,956.43	-	-	$472,956.43
Non-Residential & Multi-Family DC Fast Chargers	$219,582.24	-	-	$219,582.24
Custom Projects	-	$604,418.79	-	$604,418.79
Administrative Costs	-	-	$93,512.91	$93,512.91
Outreach & Awareness	-	-	$327,304.18	$327,304.18
Total	$974,423.06	$604,418.79	$421,158.15	**$2,000,000**

[1] Incentive payments for the Time of Use Pilot, Residential AC Level 2 Chargers, Non-Residential AC Level 2 Chargers, and Non-Residential & Multi-Family DC Fast Chargers (prescriptive incentives) from October 1, 2020, through December 31, 2020, used 2021 incentive funds, consistent with the program's fiscal year structure approved in Docket No. 16-035-36, and will be included in the reporting period for the 2021 EV Program budget.

2020 PRESCRIPTIVE INCENTIVE LOCATIONS

Table 2 below is a breakout by city for prescriptive incentive equipment installations and TOU sign-ups from the 2020 EV Program fiscal year occurred (October 1, 2019 through September 30, 2020). There was a total of 940 charging ports installed, of which 116 were Residential AC Level 2 charging ports, 815 were Non-Residential AC Level 2 charging ports, and 9 were DC Fast charging ports. A total of 824 ports were installed for public and/or workplace use. With respect to the 824 Non-Residential ports installed, 723 ports were installed across 136 employers and 101 ports were installed across 5 multi-family properties.

Table 2 – EV Charger Installations and Time-of-Use Sign-ups by City

City (UT)	DC Fast Charger Single Port	AC Level 2 Chargers			TOU Rate Sign-ups	
		Multi-Port	Single Port	Residential	Option 1	Option 2
Alpine				2		4
American Fork		3		2		3
Bluffdale			3	1		1
Brighton				1		
Cedar City			2	1		1
Cedar Hills			2		1	
Centerville				2		3
Clearfield	1	9				2
Cottonwood Heights		9		3	1	2
Draper		31	62	4	1	8
Eagle Mountain		3	1			
Eden					1	1
Erda						1
Farmington				1	2	
Farr West						1
Grantsville				1	2	
Heber City				1		1
Herriman				4	1	4
Highland				1		2
Hill Air Force Base		2	8			
Holladay		1		5		4
Hooper					1	
Hyde Park			2	2		1
Ivins				1		1
Kamas			2			
La Verkin		1				
Lake Point				1		
Layton				5	3	7
Lindon		1	2			
Logan			2			
Magna			1	1		
Mapleton				1	1	
Midvale			5		2	1
Millcreek		1		10	1	5
Moab		5	2			
Murray		1	1	2		
Nibley						1

City (UT)	DC Fast Charger Single Port	AC Level 2 Chargers			TOU Rate Sign-ups	
		Multi-Port	Single Port	Residential	Option 1	Option 2
North Logan				1	1	
North Odgen				1		1
North Salt Lake			2			3
Ogden		19	15	3	2	2
Orem		3	2	3		2
Park City		4	7	2		6
Perry						1
Pleasant Grove		9		3		1
Pleasant View				1		
Providence				1		1
Provo		1	2			
Riverton				1		3
Rockville					1	
Roy				1	1	
Salt Lake City	6	128	51	13	3	12
Sandy	2	9	2	8	5	4
Santaquin				1		
Saratoga Springs				2	1	2
Snyderville				1		1
South Jordan		11	4	3	2	8
South Ogden						1
South Salt Lake		1	34	1	1	
South Weber				1	1	1
Spanish Fork			2			
Stansbury Park				1		
Sterling				1		
Syracuse			2			
Taylorsville		10	2	1		
Tooele		2	8			
Toquerville				1		
Termonton		1		1		
Vernal			4			
Vineyard				1		2
Wasatch County			8			
Wellsville				1		
West Bountiful						1
West Haven				3		
West Jordan		1	26	4	2	6
West Valley City		5	6	1	1	1
Willard				1		
Woods Cross			1	1	1	
Total	**9**	**271 (542 Ports)**	**273**	**116**	**39**	**113**

CUSTOM PROJECTS

Custom Projects 17 and 18 are listed in Table 3 below, which includes a description, incentive amount, and equipment to be installed from customer applications that were approved by the Company and committed from the 2020 EV Program budget during the 2020 calendar year. A summary of the 2020 EV Program budget committed funds for custom projects can be found in Exhibit 2-B. Incentives for custom projects will actually be paid to customers upon the completion of their projects, and may be adjusted based on the actual equipment that gets installed and actual equipment costs. All pending custom projects are expected to be completed and paid in 2021.

Custom Projects 1 through 9 were reported in the 2017 Annual STEP report representing $1,359,874 of committed funds from the 2017 EV Program budget. Custom Projects 10 through 13 were reported in the 2018 Annual STEP report representing $998,500 of committed funds from the 2018 EV Program budget. Custom Projects 14 through 16 were reported in the 2019 Annual STEP report respresenting $669,439 of committed funds from the 2019 EV Program budget. Exhibits 2-B and 2-C provide updated information on committed custom projects. There were a total of 102 AC Level 2 and 6 DC Fast charging ports installed for workplace/public use and two 500 kW electric bus chargers from completed custom projects in 2020.

Table 3 – 2020 EV Program Budget Custom Project Commitments[2]

Custom Projects	Incentive	Description	Equipment Type
Project 17 Accepted December 2020	$100,000	A business along I-80 is planning to install a 120 kW DC Fast Charger to accommodate interstate travel for electric vehicles. The charger will be paired with solar and batteries for an innovative EV charging project.	1 DC Fast Charging Port
Project 18 Accepted December 2020	$504,418.79	A public transit group will be transitioining to electric buses. The chargers will be used for battery charging while parked in bus depots.	16 DC Fast Charger Ports
Total 2020 EV Budget Commitments	**$604,418.79**	---	**17 DC Fast Charging Ports**

2020 CALENDAR YEAR ACCOUNTING

Table 4 below provides an accounting of how the EV Program costs for calendar year 2020 are posted to SAP (the Company's accounting system), and reconciles to the STEP accounting. The amount of funds that actually post to SAP in a calendar year is dependent upon when projects complete. For example, if custom projects that were committed in 2019 from the 2019 EV Program budget completed in 2020, the funds associated with those custom projects posted to SAP in 2020. So while SAP accounting reflects those costs in 2020, they were, in fact, counted towards the $2 million 2019 EV Program budget. Additionally, prescriptive incentives follow a fiscal year of

[2] Custom projects listed in Table 3 may evolve and are expected be completed during 2021. Actual incentive amounts and installed equipment will be included in subsequent reports for completed custom projects.

October 1st through September 30th. As such, prescriptive incentives for the 2020 EV Program budget include the timeframe of October 1, 2019 through September 30, 2020, with Q4 2020 prescriptive incentive costs being counted as part of the 2021 EV Program budget. So even though SAP accounting includes prescriptive incentive costs from October 1, 2020, through December 31, 2020, as part of the calendar year, costs during that timeframe for prescriptive incentives are counted towards the $2 million 2021 EV Program budget. Likewise, the prescriptive incentive costs during the timeframe of October 1, 2019, through December 31, 2019, are captured in SAP for that calendar year, but were counted towards the $2 million 2020 EV Program budget, consistent with the fiscal year of the EV Program for prescriptive incentives. Exhibit 2-D provides SAP year over year accounting for each calendar year, which reconciles to the STEP accounting, and Exhibit 2-E provides a year over year accounting for how each $2 million EV Program year budget was allocated.

Table 4 – 2020 Calendar Year Actual SAP Postings

EV Program Actual Postings in SAP by Calendar Year	
Category	**CY 2020**
Time of Use Rate Sign-up	$30,600
Time of Use Load Research Study	$100
Time of Use Meters	$341.06
Residential AC Level 2 Chargers	$34,660.58
Non-Residential AC Level 2 Chargers – Single Port	$223,421.85
Non-Residential AC Level 2 Chargers – Multi-Port	$482,235.98
Non-Residential & Multi-Family DC Fast Chargers	$245,779.61
Custom Projects	$1,067,500
Administrative Costs	$93,512.91
Outreach & Awareness	$327,304.18
Total	**$2,505,456.17**

2020 ELECTRIC VEHICLE INCENTIVE PROGRAM KEY FINDINGS

Time of Use and Load Research Study

By the end of the 2020 calendar year, 468 customers were enrolled in the Time of Use program. As a reminder, the time-of-use program requires a 12-month minimum enrollment term. Given that the program is set to expire December 31, 2021, the time-of-use offering was no longer available to new customers after December 31, 2020.

EV Program Changes

Starting January 1, 2020, Rocky Mountain Power offered incentives for AC Level 2 Chargers for residential customers. This new offering was approved in the Commission’s order issued December 31, 2019, in Docket No. 19-035-T16. During 2020, Rocky Mountain Power provided incentives for 116 Level 2 electric vehicle chargers installed at residential customers’ homes.

Attachments:

- Exhibit 2-A: 2020 EV Program Budget Prescriptive Incentives
- Exhibit 2-B: EV Program Custom Project Committed Funds and Expenditures
- Exhibit 2-C: EV Program Custom Project Details Year Over Year
- Exhibit 2-D: EV Program Actual SAP Postings by Calendar Year
- Exhibit 2-E: EV Program Budget Allocations Year Over Year

Exhibit 2-A

2020 EV Program Budget Prescriptive Incentives

EV Program Prescriptive Incentives (2020 Budget Funds)

Project Name	Measure Name	Quantity	Number of Ports	Customer Incentive	Measure Cost	Creation Date	City	Zip Code
EVUT_295871	EV DC Fast Charger (single port)	4	4	$ 75,000.00	$ 102,464.00	11/5/19	SALT LAKE CITY	84111
EVUT_314214	EV DC Fast Charger (single port)	1	1	$ 17,500.00	$ 34,995.00	2/20/20	CLEARFIELD	84015
EVUT_315947	EV DC Fast Charger (single port)	2	2	$ 26,158.49	$ 34,877.99	3/12/20	SALT LAKE CITY	84111
EVUT_310697	EV DC Fast Charger (single port)	2	2	$ 60,000.00	$ 118,942.56	4/14/20	SANDY	84070
EVUT_281146	EV DC Fast Charger (single port)	4	4	$ 40,923.75	$ 154,565.00	4/21/20	LINDON	84042
EVUT_289750	EV Level 2 Charger (multi port)	1	2	$ 3,500.00	$ 4,700.00	10/2/19	SOUTH JORDAN	84095
EVUT_290050	EV Level 2 Charger (multi port)	1	2	$ 3,500.00	$ 8,689.00	10/4/19	MILLCREEK	84109
EVUT_290052	EV Level 2 Charger (multi port)	1	2	$ 3,500.00	$ 4,700.00	10/4/19	SALT LAKE CITY	84111
EVUT_286013	EV Level 2 Charger (multi port)	2	4	$ 4,227.45	$ 5,636.60	10/4/19	PLEASANT GROVE	84062
EVUT_290370	EV Level 2 Charger (multi port)	3	6	$ 3,485.25	$ 4,647.00	10/8/19	SANDY	84070
EVUT_290542	EV Level 2 Charger (multi port)	1	2	$ 2,008.43	$ 2,677.90	10/14/19	SOUTH SALT LAKE	84119
EVUT_293376	EV Level 2 Charger (multi port)	1	2	$ 2,008.43	$ 2,677.90	10/21/19	SALT LAKE CITY	84102
EVUT_293389	EV Level 2 Charger (multi port)	2	4	$ 1,821.15	$ 2,428.20	10/22/19	Park City	84060
EVUT_299619	EV Level 2 Charger (multi port)	1	2	$ 2,008.43	$ 2,677.90	11/11/19	DRAPER	84020
EVUT_300204	EV Level 2 Charger (multi port)	1	2	$ 1,039.43	$ 1,385.90	11/18/19	PROVO	84606
EVUT_300454	EV Level 2 Charger (multi port)	1	2	$ 1,287.82	$ 1,717.10	11/20/19	Moab	84532
EVUT_302964	EV Level 2 Charger (multi port)	1	2	$ 1,144.72	$ 1,526.30	12/6/19	WEST VALLEY CITY	84120
EVUT_304688	EV Level 2 Charger (multi port)	4	8	$ 8,454.90	$ 11,273.20	12/12/19	PLEASANT GROVE	84062
EVUT_304970	EV Level 2 Charger (multi port)	2	4	$ 2,078.85	$ 2,771.80	12/17/19	SOUTH JORDAN	84095
EVUT_304990	EV Level 2 Charger (multi port)	6	12	$ 21,000.00	$ 52,937.85	12/17/19	SANDY	84070
EVUT_305105	EV Level 2 Charger (multi port)	1	2	$ 3,500.00	$ 5,256.00	12/17/19	MURRAY	84121
EVUT_308335	EV Level 2 Charger (multi port)	1	2	$ 2,097.82	$ 2,797.10	1/6/20	SALT LAKE CITY	84122
EVUT_300662	EV Level 2 Charger (multi port)	5	10	$ 17,500.00	$ 43,774.10	1/8/20	COTTONWOOD HEIGHTS	84121
EVUT_287249	EV Level 2 Charger (multi port)	5	10	$ 17,500.00	$ 43,774.10	1/8/20	SALT LAKE CITY	84116
EVUT_284862	EV Level 2 Charger (multi port)	1	2	$ 1,500.00	$ 4,700.00	1/8/20	LINDON	84042
EVUT_309862	EV Level 2 Charger (multi port)	14	28	$ 21,000.00	$ 74,984.00	1/9/20	SALT LAKE CITY	84122
EVUT_309862	EV Level 2 Charger (multi port)	14	28	$ 21,000.00	$ 80,752.00	1/9/20	SALT LAKE CITY	84122
EVUT_309864	EV Level 2 Charger (multi port)	1	2	$ 1,500.00	$ 5,400.00	1/15/20	WEST VALLEY CITY	84120
EVUT_309864	EV Level 2 Charger (multi port)	1	2	$ 1,500.00	$ 5,000.00	1/15/20	WEST VALLEY CITY	84120
EVUT_310694	EV Level 2 Charger (multi port)	1	2	$ 910.57	$ 1,214.10	1/17/20	Draper	84020
EVUT_310973	EV Level 2 Charger (multi port)	2	4	$ 3,000.00	$ 16,355.96	1/21/20	Cottonwood Heights	84047
EVUT_312959	EV Level 2 Charger (multi port)	1	2	$ 1,011.75	$ 1,349.00	2/4/20	La Verkin	84745
EVUT_314394	EV Level 2 Charger (multi port)	6	12	$ 20,389.50	$ 27,186.00	2/24/20	OGDEN	84401
EVUT_314732	EV Level 2 Charger (multi port)	4	8	$ 14,000.00	$ 19,308.00	2/24/20	CLEARFIELD	84015
EVUT_314733	EV Level 2 Charger (multi port)	6	12	$ 21,000.00	$ 28,962.00	2/24/20	OGDEN	84401
EVUT_314734	EV Level 2 Charger (multi port)	2	4	$ 7,000.00	$ 9,654.00	2/24/20	SALT LAKE CITY	84111
EVUT_314735	EV Level 2 Charger (multi port)	3	6	$ 10,500.00	$ 14,481.00	2/24/20	CLEARFIELD	84015
EVUT_314736	EV Level 2 Charger (multi port)	5	10	$ 16,991.25	$ 22,655.00	2/24/20	SALT LAKE CITY	84104
EVUT_314737	EV Level 2 Charger (multi port)	2	4	$ 6,796.50	$ 9,062.00	2/24/20	OREM	84097
EVUT_314738	EV Level 2 Charger (multi port)	1	2	$ 3,398.25	$ 4,531.00	2/24/20	AMERICAN FORK	84003
EVUT_314738	EV Level 2 Charger (multi port)	2	4	$ 7,000.00	$ 9,654.00	2/24/20	AMERICAN FORK	84003
EVUT_314740	EV Level 2 Charger (multi port)	5	10	$ 17,500.00	$ 24,135.00	2/24/20	OGDEN	84404
EVUT_314756	EV Level 2 Charger (multi port)	1	2	$ 1,500.00	$ 3,395.00	2/24/20	SALT LAKE CITY	84101
EVUT_314792	EV Level 2 Charger (multi port)	4	8	$ 6,000.00	$ 18,800.00	2/26/20	SOUTH JORDAN	84009
EVUT_315084	EV Level 2 Charger (multi port)	1	2	$ 966.60	$ 1,288.80	3/2/20	SALT LAKE CITY	84104
EVUT_315198	EV Level 2 Charger (multi port)	1	2	$ 1,287.82	$ 1,717.10	3/4/20	SALT LAKE CITY	84104
EVUT_315306	EV Level 2 Charger (multi port)	1	2	$ 1,039.43	$ 1,385.90	3/4/20	OREM	84058
EVUT_317501	EV Level 2 Charger (multi port)	5	10	$ 7,500.00	$ 13,985.50	4/2/20	Salt Lake City	84116
EVUT_317501	EV Level 2 Charger (multi port)	4	8	$ 1,525.50	$ 2,034.00	4/2/20	Salt Lake City	84116
EVUT_317500	EV Level 2 Charger (multi port)	19	38	$ 17,300.93	$ 23,067.90	4/2/20	Salt Lake City	84116

EV Program Prescriptive Incentives (2020 Budget Funds)

Project Name	Measure Name	Quantity	Number of Ports	Customer Incentive	Measure Cost	Creation Date	City	Zip Code
EVUT_317861	EV Level 2 Charger (multi port)	2	4	$ 2,078.85	$ 2,771.80	4/7/20	TOOELE	84074
EVUT_319150	EV Level 2 Charger (multi port)	3	6	$ 4,500.00	$ 8,454.90	4/17/20	PLEASANT GROVE	84062
EVUT_319179	EV Level 2 Charger (multi port)	16	32	$ 17,000.00	$ 77,232.00	4/22/20	SALT LAKE CITY	84111
EVUT_320478	EV Level 2 Charger (multi port)	4	8	$ 6,000.00	$ 28,840.00	5/8/20	DRAPER	84020
EVUT_320511	EV Level 2 Charger (multi port)	3	6	$ 4,500.00	$ 8,033.70	5/12/20	Eagle Mountain	84005
EVUT_322370	EV Level 2 Charger (multi port)	1	2	$ 1,144.72	$ 1,526.30	5/29/20	CLEARFIELD	84015
EVUT_322374	EV Level 2 Charger (multi port)	10	20	$ 15,000.00	$ 51,910.00	6/10/20	TAYLORSVILLE	84129
EVUT_324620	EV Level 2 Charger (multi port)	3	6	$ 3,118.27	$ 4,157.70	6/10/20	MOAB	84532
EVUT_324636	EV Level 2 Charger (multi port)	1	2	$ 1,187.25	$ 1,583.00	6/10/20	SOUTH JORDAN	84095
EVUT_325163	EV Level 2 Charger (multi port)	1	2	$ 1,314.75	$ 1,753.00	6/15/20	COTTONWOOD HEIGHTS	84121
EVUT_325456	EV Level 2 Charger (multi port)	1	2	$ 950.32	$ 1,267.10	6/17/20	West Jordan	84081
EVUT_326036	EV Level 2 Charger (multi port)	8	16	$ 8,315.40	$ 11,087.20	6/23/20	Salt Lake CIty	84116
EVUT_326466	EV Level 2 Charger (multi port)	7	14	$ 6,374.03	$ 8,498.70	6/29/20	Salt Lake City	84101
EVUT_326603	EV Level 2 Charger (multi port)	2	4	$ 3,000.00	$ 10,670.00	7/1/20	SOUTH JORDAN	84095
EVUT_327958	EV Level 2 Charger (multi port)	10	20	$ 11,872.50	$ 15,830.00	7/13/20	SALT LAKE CITY	84122
EVUT_328081	EV Level 2 Charger (multi port)	1	2	$ 1,187.25	$ 1,583.00	7/13/20	Salt Lake City	84101
EVUT_329454	EV Level 2 Charger (multi port)	1	2	$ 1,500.00	$ 4,065.00	7/22/20	COTTONWOOD HEIGHTS	84121
EVUT_329802	EV Level 2 Charger (multi port)	2	4	$ 2,078.85	$ 2,771.80	7/27/20	WEST VALLEY CITY	84119
EVUT_330449	EV Level 2 Charger (multi port)	1	2	$ 1,144.73	$ 1,526.30	7/29/20	Clearfield	84015
EVUT_330450	EV Level 2 Charger (multi port)	1	2	$ 1,039.43	$ 1,385.90	7/29/20	TREMONTON	84337
EVUT_330857	EV Level 2 Charger (multi port)	1	2	$ 1,314.75	$ 1,753.00	8/5/20	HOLLADAY	84117
EVUT_331648	EV Level 2 Charger (multi port)	1	2	$ 950.32	$ 1,267.10	8/17/20	MOAB	84532
EVUT_331956	EV Level 2 Charger (multi port)	1	2	$ 1,187.25	$ 1,583.00	8/19/20	OGDEN	84404
EVUT_332090	EV Level 2 Charger (multi port)	2	4	$ 2,374.50	$ 3,166.00	8/24/20	HILL AIR FORCE BASE	84401
EVUT_332092	EV Level 2 Charger (multi port)	10	20	$ 15,000.00	$ 28,750.00	8/24/20	SALT LAKE CITY	84116
EVUT_332094	EV Level 2 Charger (multi port)	17	34	$ 25,500.00	$ 110,092.00	8/24/20	DRAPER	84020
EVUT_332823	EV Level 2 Charger (multi port)	1	2	$ 1,039.43	$ 1,385.90	8/27/20	Ogden	84401
EVUT_334909	EV Level 2 Charger (multi port)	8	16	$ 12,000.00	$ 40,000.00	9/2/20	DRAPER	84020
EVUT_335774	EV Level 2 Charger (multi port)	2	4	$ 1,003.05	$ 1,337.40	9/10/20	PARK CITY	84098
EVUT_337820	EV Level 2 Charger (multi port)	2	4	$ 3,000.00	$ 11,996.00	9/24/20	SALT LAKE CITY	84111
EVUT_337570	EV Level 2 Charger (multi port)	1	2	$ 1,500.00	$ 5,408.00	9/30/20	South Jordan	84095
EVUT_311589	EV Level 2 Charger (Residential)	1	1	$ 131.25	$ 175.00	1/27/20	STANSBURY PARK	84074
EVUT_311290	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	1/27/20	SARATOGA SPRINGS	84045
EVUT_311288	EV Level 2 Charger (Residential)	1	1	$ 164.25	$ 219.00	1/27/20	TREMONTON	84337
EVUT_311287	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	1/27/20	PROVIDENCE	84332
EVUT_311808	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 275.00	1/29/20	GRANTSVILLE	84029
EVUT_311758	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 329.00	1/30/20	SOUTH JORDAN	84095
EVUT_311748	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 279.00	1/30/20	ROY	84067
EVUT_312020	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 515.00	1/31/20	WEST JORDAN	84081
EVUT_313391	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	2/12/20	SOUTH SALT LAKE	84115
EVUT_313377	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	2/12/20	SOUTH WEBER	84405
EVUT_313693	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 359.00	2/17/20	AMERICAN FORK	84003
EVUT_313638	EV Level 2 Charger (Residential)	1	1	$ 115.84	$ 154.45	2/17/20	OREM	84059
EVUT_314222	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 699.00	2/21/20	BRIGHTON	84121
EVUT_314386	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	2/24/20	WEST JORDAN	84081
EVUT_315059	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 1,310.00	3/6/20	OGDEN	84403
EVUT_315015	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 559.00	3/6/20	TAYLORSVILLE	84129
EVUT_315630	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 512.05	3/9/20	SANDY	84093
EVUT_315648	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	3/11/20	WILLARD	84340
EVUT_315722	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 359.00	3/12/20	PLEASANT VIEW	84414

EV Program Prescriptive Incentives (2020 Budget Funds)

Project Name	Measure Name	Quantity	Number of Ports	Customer Incentive	Measure Cost	Creation Date	City	Zip Code
EVUT_315724	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 649.00	3/12/20	COTTONWOOD HEIGHTS	84121
EVUT_315953	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	3/13/20	SANTAQUIN	84655
EVUT_316383	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	3/16/20	SALT LAKE CITY	84115
EVUT_316389	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 1,207.68	3/16/20	DRAPER	84020
EVUT_316593	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 393.99	3/20/20	STERLING	84665
EVUT_316573	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	3/20/20	HOLLADAY	84117
EVUT_316600	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 520.00	3/23/20	LAYTON	84040
EVUT_317236	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	3/30/20	WELLSVILLE	84339
EVUT_317235	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	3/30/20	MILLCREEK	84109
EVUT_317498	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 289.00	4/2/20	OREM	84057
EVUT_318015	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 395.00	4/9/20	COTTONWOOD HEIGHTS	84121
EVUT_318312	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	4/14/20	CEDAR CITY	84720
EVUT_318907	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	4/16/20	SANDY	84093
EVUT_318816	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 349.00	4/16/20	LAYTON	84041
EVUT_319144	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 579.00	4/17/20	HYDE PARK	84318
EVUT_319427	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 429.00	4/24/20	SANDY	84092
EVUT_319517	EV Level 2 Charger (Residential)	1	1	$ 112.49	$ 149.99	4/28/20	MILLCREEK	84107
EVUT_319521	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 429.99	4/28/20	SALT LAKE CITY	84103
EVUT_320762	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 699.00	5/15/20	LAKE POINT	84074
EVUT_320758	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 699.00	5/15/20	NORTH LOGAN	84341
EVUT_321045	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 279.00	5/19/20	NORTH OGDEN	84414
EVUT_321297	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	5/20/20	Alpine	84004
EVUT_321562	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ -	5/21/20	Salt Lake City	84106
EVUT_321707	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 279.50	5/22/20	SNYDERVILLE	84098
EVUT_321699	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 699.30	5/26/20	SALT LAKE CITY	84103
EVUT_322378	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 460.00	6/1/20	SANDY	84092
EVUT_322645	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	6/2/20	MILLCREEK	84124
EVUT_323422	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	6/5/20	SANDY	84070
EVUT_323414	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	6/5/20	LAYTON	84041
EVUT_324177	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	6/8/20	HERRIMAN	84096
EVUT_324862	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 599.00	6/12/20	CENTERVILLE	84014
EVUT_324861	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	6/12/20	SALT LAKE CITY	84103
EVUT_325157	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ -	6/15/20	WEST JORDAN	84081
EVUT_325142	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ -	6/15/20	Layton	84041
EVUT_325201	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 699.00	6/17/20	HERRIMAN	84096
EVUT_325465	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	6/19/20	HOLLADAY	84124
EVUT_325934	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	6/22/20	SOUTH JORDAN	84009
EVUT_325939	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 275.00	6/22/20	LAYTON	84041
EVUT_326038	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 699.00	6/24/20	MILLCREEK	84106
EVUT_326041	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 2,180.00	6/24/20	WEST VALLEY CITY	84128
EVUT_326150	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	6/24/20	WEST JORDAN	84081
EVUT_326240	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 599.00	6/26/20	WEST HAVEN	84401
EVUT_326462	EV Level 2 Charger (Residential)	1	1	$ 150.00	$ 200.00	6/29/20	RIVERTON	84096
EVUT_326739	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 449.99	7/2/20	WEST HAVEN	84401
EVUT_326803	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 475.00	7/2/20	DRAPER	84020
EVUT_327247	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 1,178.00	7/6/20	MURRAY	84117
EVUT_328358	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	7/17/20	OREM	84097
EVUT_328333	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	7/17/20	CENTERVILLE	84014
EVUT_328331	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 279.00	7/17/20	SANDY	84092
EVUT_328325	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	7/17/20	SALT LAKE CITY	84103

EV Program Prescriptive Incentives (2020 Budget Funds)

Project Name	Measure Name	Quantity	Number of Ports	Customer Incentive	Measure Cost	Creation Date	City	Zip Code
EVUT_328309	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	7/17/20	ALPINE	84004
EVUT_328083	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 300.00	7/17/20	AMERICAN FORK	84003
EVUT_328079	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	7/17/20	MILLCREEK	84109
EVUT_328396	EV Level 2 Charger (Residential)	1	1	$ 157.50	$ 210.00	7/20/20	SANDY	84070
EVUT_328520	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	7/22/20	SALT LAKE CITY	84102
EVUT_329804	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 310.00	7/27/20	TOQUERVILLE	84774
EVUT_329725	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 375.00	7/27/20	HIGHLAND	84003
EVUT_329476	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 699.30	7/27/20	HERRIMAN	84096
EVUT_329817	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 459.99	7/28/20	PLEASANT GROVE	84062
EVUT_330486	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	7/30/20	MAPLETON	84664
EVUT_330541	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 569.00	8/3/20	SARATOGA SPRINGS	84045
EVUT_330824	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 531.98	8/5/20	MAGNA	84044
EVUT_330814	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 699.00	8/5/20	VINEYARD	84059
EVUT_330811	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	8/5/20	MILLCREEK	84107
EVUT_330931	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 628.13	8/10/20	OGDEN	84403
EVUT_330917	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	8/10/20	DRAPER	84020
EVUT_330886	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 539.00	8/10/20	SALT LAKE CITY	84103
EVUT_331032	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	8/10/20	BLUFFDALE	84065
EVUT_331036	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 649.00	8/10/20	SALT LAKE CITY	84105
EVUT_331039	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	8/10/20	SOUTH JORDAN	84095
EVUT_331519	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 628.13	8/14/20	OGDEN	84403
EVUT_331639	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	8/14/20	MILLCREEK	84109
EVUT_331619	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 649.00	8/14/20	SALT LAKE CITY	84105
EVUT_331643	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 400.00	8/17/20	SALT LAKE CITY	84105
EVUT_331510	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 329.00	8/17/20	HYDE PARK	84318
EVUT_331669	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	8/19/20	MURRAY	84121
EVUT_331674	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 599.00	8/19/20	Salt Lake City	84105
EVUT_331987	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 1,233.00	8/20/20	PLEASANT GROVE	84062
EVUT_332032	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	8/24/20	HOLLADAY	84117
EVUT_332031	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	8/24/20	HOLLADAY	84117
EVUT_332284	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	8/26/20	Ivins	84738
EVUT_332283	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 295.00	8/26/20	WEST HAVEN	84401
EVUT_332807	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 499.00	8/27/20	SANDY	84092
EVUT_332889	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 730.00	8/31/20	PLEASANT GROVE	84062
EVUT_332884	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 599.00	8/31/20	HERRIMAN	84065
EVUT_334939	EV Level 2 Charger (Residential)	1	1	$ 180.00	$ 240.00	9/4/20	MILLCREEK	84109
EVUT_335217	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 599.00	9/8/20	PARK CITY	84060
EVUT_335252	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 387.45	9/10/20	PARK CITY	84098
EVUT_335770	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 1,268.90	9/10/20	HEBER CITY	84032
EVUT_335978	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 699.00	9/14/20	DRAPER	84020
EVUT_337279	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	9/21/20	HOLLADAY	84117
EVUT_337337	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 1,002.30	9/21/20	COTTONWOOD HEIGHTS	84121
EVUT_337330	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 387.45	9/21/20	SALT LAKE CITY	84105
EVUT_337550	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 459.99	9/22/20	MILLCREEK	84124
EVUT_337756	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 500.00	9/24/20	MILLCREEK	84124
EVUT_339206	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 565.00	9/28/20	WOODS CROSS	84087
EVUT_339293	EV Level 2 Charger (Residential)	1	1	$ 200.00	$ 699.00	9/30/20	FARMINGTON	84025
EVUT_290373	EV Level 2 Charger (single port)	2	2	$ 2,411.63	$ 3,215.50	10/8/19	OGDEN	84401
EVUT_292005	EV Level 2 Charger (single port)	2	2	$ 762.75	$ 1,017.00	10/16/19	SALT LAKE CITY	84102
EVUT_292008	EV Level 2 Charger (single port)	60	60	$ 139,500.00	$ 186,000.00	10/16/19	DRAPER	84020

EV Program Prescriptive Incentives (2020 Budget Funds)

Project Name	Measure Name	Quantity	Number of Ports	Customer Incentive	Measure Cost	Creation Date	City	Zip Code
EVUT_293376	EV Level 2 Charger (single port)	2	2	$ 1,240.88	$ 1,654.50	10/21/19	SALT LAKE CITY	84102
EVUT_293384	EV Level 2 Charger (single port)	1	1	$ 375.00	$ 500.00	10/21/19	SALT LAKE CITY	84101
EVUT_294610	EV Level 2 Charger (single port)	10	10	$ 2,842.50	$ 3,790.00	10/24/19	SALT LAKE CITY	84116
EVUT_294610	EV Level 2 Charger (single port)	5	5	$ 1,481.25	$ 1,975.00	10/24/19	SALT LAKE CITY	84116
EVUT_294611	EV Level 2 Charger (single port)	3	3	$ 1,010.47	$ 1,347.30	10/29/19	SALT LAKE CITY	84106
EVUT_299619	EV Level 2 Charger (single port)	1	1	$ 381.38	$ 508.50	11/11/19	DRAPER	84020
EVUT_287251	EV Level 2 Charger (single port)	1	1	$ 336.83	$ 449.10	11/14/19	SOUTH SALT LAKE	84115
EVUT_300204	EV Level 2 Charger (single port)	1	1	$ 381.38	$ 508.50	11/18/19	PROVO	84606
EVUT_300204	EV Level 2 Charger (single port)	1	1	$ 620.44	$ 827.25	11/18/19	PROVO	84606
EVUT_300207	EV Level 2 Charger (single port)	2	2	$ 1,240.88	$ 1,654.50	11/18/19	PARK CITY	84060
EVUT_283851	EV Level 2 Charger (single port)	4	4	$ 1,347.30	$ 1,796.40	11/21/19	Salt Lake City	84122
EVUT_300941	EV Level 2 Charger (single port)	1	1	$ 381.38	$ 508.50	11/26/19	Midvale	84047
EVUT_302231	EV Level 2 Charger (single port)	1	1	$ 381.38	$ 508.50	12/2/19	PARK CITY	84060
EVUT_302390	EV Level 2 Charger (single port)	3	3	$ 1,010.47	$ 1,347.30	12/3/19	OGDEN	84404
EVUT_303164	EV Level 2 Charger (single port)	4	4	$ 1,736.10	$ 2,314.80	12/9/19	SALT LAKE CITY	84106
EVUT_304970	EV Level 2 Charger (single port)	3	3	$ 1,144.13	$ 1,525.50	12/17/19	SOUTH JORDAN	84095
EVUT_310657	EV Level 2 Charger (single port)	2	2	$ 1,818.27	$ 2,424.36	1/15/20	HYDE PARK	84318
EVUT_310694	EV Level 2 Charger (single port)	1	1	$ 374.33	$ 499.10	1/17/20	Draper	84020
EVUT_310958	EV Level 2 Charger (single port)	6	6	$ 2,020.95	$ 2,694.60	1/21/20	Ogden	84401
EVUT_310990	EV Level 2 Charger (single port)	2	2	$ 1,942.50	$ 2,590.00	1/22/20	Taylorsville	84123
EVUT_311590	EV Level 2 Charger (single port)	1	1	$ 403.37	$ 537.82	1/27/20	MIDVALE	84047
EVUT_311618	EV Level 2 Charger (single port)	1	1	$ 654.08	$ 872.10	1/28/20	SOUTH SALT LAKE	84119
EVUT_312957	EV Level 2 Charger (single port)	1	1	$ 344.99	$ 459.99	2/4/20	Salt Lake City	84104
EVUT_312973	EV Level 2 Charger (single port)	1	1	$ 375.00	$ 500.00	2/5/20	WOODS CROSS	84087
EVUT_313240	EV Level 2 Charger (single port)	4	4	$ 1,525.50	$ 2,034.00	2/5/20	SALT LAKE CITY	84116
EVUT_313246	EV Level 2 Charger (single port)	2	2	$ 762.75	$ 1,017.00	2/6/20	NORTH SALT LAKE	84054
EVUT_313388	EV Level 2 Charger (single port)	4	4	$ 1,525.50	$ 2,034.00	2/11/20	PARK CITY	84060
EVUT_314741	EV Level 2 Charger (single port)	2	2	$ 1,818.27	$ 2,424.36	2/24/20	Logan	84321
EVUT_314763	EV Level 2 Charger (single port)	1	1	$ 336.83	$ 449.10	2/24/20	SALT LAKE CITY	84103
EVUT_315010	EV Level 2 Charger (single port)	1	1	$ 336.83	$ 449.10	2/27/20	WEST VALLEY CITY	84119
EVUT_315064	EV Level 2 Charger (single port)	2	2	$ 1,287.70	$ 1,716.94	3/2/20	OREM	84057
EVUT_315069	EV Level 2 Charger (single port)	25	25	$ 8,690.63	$ 11,587.50	3/2/20	West Jordan	84081
EVUT_315312	EV Level 2 Charger (single port)	2	2	$ 762.75	$ 1,017.00	3/5/20	SYRACUSE	84075
EVUT_315314	EV Level 2 Charger (single port)	1	1	$ 381.15	$ 508.20	3/5/20	SALT LAKE CITY	84102
EVUT_315613	EV Level 2 Charger (single port)	8	8	$ 4,748.40	$ 6,331.20	3/6/20	SOUTH SALT LAKE	84115
EVUT_317211	EV Level 2 Charger (single port)	3	3	$ 1,125.00	$ 1,500.00	3/30/20	SALT LAKE CITY	84106
EVUT_317512	EV Level 2 Charger (single port)	2	2	$ 962.55	$ 1,283.40	4/3/20	SOUTH SALT LAKE	84115
EVUT_317861	EV Level 2 Charger (single port)	4	4	$ 1,185.00	$ 1,580.00	4/7/20	TOOELE	84074
EVUT_317864	EV Level 2 Charger (single port)	2	2	$ 695.25	$ 927.00	4/8/20	Cedar City	84721
EVUT_318010	EV Level 2 Charger (single port)	2	2	$ 2,000.00	$ 6,247.50	4/9/20	LINDON	84042
EVUT_318089	EV Level 2 Charger (single port)	1	1	$ 347.63	$ 463.50	4/10/20	South Jordan	84009
EVUT_318090	EV Level 2 Charger (single port)	2	2	$ 695.25	$ 927.00	4/10/20	CEDAR HILLS	84062
EVUT_318796	EV Level 2 Charger (single port)	3	3	$ 1,428.75	$ 1,905.00	4/21/20	MIDVALE	84047
EVUT_319429	EV Level 2 Charger (single port)	4	4	$ 1,526.04	$ 2,034.72	4/24/20	WASATCH COUNTY	84060
EVUT_319815	EV Level 2 Charger (single port)	18	18	$ 6,062.85	$ 8,083.80	5/1/20	SOUTH SALT LAKE	84119
EVUT_319816	EV Level 2 Charger (single port)	4	4	$ 1,525.50	$ 2,034.00	5/1/20	SOUTH SALT LAKE	84115
EVUT_319820	EV Level 2 Charger (single port)	1	1	$ 1,137.00	$ 1,516.00	5/1/20	MAGNA	84044
EVUT_319830	EV Level 2 Charger (single port)	2	2	$ 712.50	$ 950.00	5/5/20	TOOELE	84074
EVUT_319830	EV Level 2 Charger (single port)	2	2	$ 750.00	$ 1,000.00	5/5/20	TOOELE	84074
EVUT_320480	EV Level 2 Charger (single port)	1	1	$ 444.83	$ 593.10	5/12/20	WEST JORDAN	84081

EV Program Prescriptive Incentives (2020 Budget Funds)

Project Name	Measure Name	Quantity	Number of Ports	Customer Incentive	Measure Cost	Creation Date	City	Zip Code
EVUT_320732	EV Level 2 Charger (single port)	2	2	$ 673.65	$ 898.20	5/14/20	VERNAL	84078
EVUT_320734	EV Level 2 Charger (single port)	2	2	$ 673.65	$ 898.20	5/14/20	VERNAL	84078
EVUT_324637	EV Level 2 Charger (single port)	1	1	$ 673.65	$ 898.20	6/10/20	MURRAY	84121
EVUT_325457	EV Level 2 Charger (single port)	4	4	$ 1,347.30	$ 1,796.40	6/17/20	SALT LAKE CITY	84111
EVUT_325459	EV Level 2 Charger (single port)	2	2	$ 673.65	$ 898.20	6/17/20	SANDY	84070
EVUT_326649	EV Level 2 Charger (single port)	1	1	$ 347.63	$ 463.50	7/1/20	EAGLE MOUNTAIN	84005
EVUT_326650	EV Level 2 Charger (single port)	2	2	$ 673.65	$ 898.20	7/1/20	SPANISH FORK	84660
EVUT_327262	EV Level 2 Charger (single port)	1	1	$ 441.75	$ 589.00	7/7/20	WEST VALLEY CITY	84119
EVUT_327263	EV Level 2 Charger (single port)	4	4	$ 1,525.50	$ 2,034.00	7/7/20	WASATCH COUNTY	84060
EVUT_328081	EV Level 2 Charger (single port)	1	1	$ 658.05	$ 877.40	7/13/20	Salt Lake City	84101
EVUT_330548	EV Level 2 Charger (single port)	1	1	$ 543.75	$ 725.00	8/3/20	SALT LAKE CITY	84104
EVUT_331509	EV Level 2 Charger (single port)	1	1	$ 434.03	$ 578.70	8/13/20	Salt Lake City	84105
EVUT_331648	EV Level 2 Charger (single port)	2	2	$ 712.50	$ 950.00	8/17/20	MOAB	84532
EVUT_331956	EV Level 2 Charger (single port)	4	4	$ 1,347.30	$ 1,796.40	8/19/20	OGDEN	84404
EVUT_332090	EV Level 2 Charger (single port)	4	4	$ 1,525.50	$ 2,034.00	8/24/20	HILL AIR FORCE BASE	84401
EVUT_332090	EV Level 2 Charger (single port)	4	4	$ 1,347.30	$ 1,796.40	8/24/20	HILL AIR FORCE BASE	84401
EVUT_332281	EV Level 2 Charger (single port)	4	4	$ 1,525.50	$ 2,034.00	8/25/20	WEST VALLEY CITY	84120
EVUT_332676	EV Level 2 Charger (single port)	2	2	$ 2,000.00	$ 8,560.00	8/26/20	Kamas	84036
EVUT_332825	EV Level 2 Charger (single port)	3	3	$ 1,010.47	$ 1,347.30	8/27/20	BLUFFDALE	84065
EVUT_334840	EV Level 2 Charger (single port)	3	3	$ 1,144.13	$ 1,525.50	9/1/20	Salt Lake City	84111
N/A	EV Time of Use Load Research Study	1	-	$ 100.00	$ -	Q4 2019 - Q3 2020	N/A	N/A
EVUT_288471	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	10/1/19	MILLCREEK	84107
EVUT_290064	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	10/4/19	SANDY	84092
EVUT_290374	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	10/9/19	WEST JORDAN	84081
EVUT_290386	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	10/9/19	DRAPER	84020
EVUT_290377	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	10/9/19	ROCKVILLE	84763
EVUT_290380	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	10/9/19	LAYTON	84041
EVUT_294901	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	10/31/19	GRANTSVILLE	84029
EVUT_295050	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	10/31/19	GRANTSVILLE	84029
EVUT_300415	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	11/19/19	SANDY	84070
EVUT_304959	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	12/17/19	OGDEN	84404
EVUT_308161	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	12/30/19	WEST VALLEY CITY	84128
EVUT_309861	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	1/9/20	SALT LAKE CITY	84103
EVUT_309947	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	1/13/20	SANDY	84093
EVUT_311139	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	1/23/20	SOUTH WEBER	84405
EVUT_311992	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	1/31/20	SOUTH JORDAN	84095
EVUT_313273	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	2/10/20	HOOPER	84315
EVUT_313392	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	2/12/20	SOUTH SALT LAKE	84115
EVUT_315020	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	3/6/20	NORTH LOGAN	84341
EVUT_315943	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	3/12/20	MAPLETON	84664
EVUT_316565	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	3/20/20	SOUTH JORDAN	84009
EVUT_319520	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	4/28/20	SARATOGA SPRINGS	84043
EVUT_320486	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	5/11/20	OGDEN	84404
EVUT_323423	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	6/5/20	SANDY	84070
EVUT_325152	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	6/15/20	FARMINGTON	84025
EVUT_325198	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	6/17/20	Midvale	84047
EVUT_326241	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	6/26/20	LAYTON	84041
EVUT_326827	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	7/6/20	MIDVALE	84070
EVUT_328077	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	7/17/20	FARMINGTON	84025
EVUT_327947	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	7/17/20	LAYTON	84041

EV Program Prescriptive Incentives (2020 Budget Funds)

Project Name	Measure Name	Quantity	Number of Ports	Customer Incentive	Measure Cost	Creation Date	City	Zip Code
EVUT_329751	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	7/27/20	WEST JORDAN	84088
EVUT_329726	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	7/27/20	HERRIMAN	84096
EVUT_330542	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	8/3/20	COTTONWOOD HEIGHTS	84121
EVUT_331038	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	8/10/20	SANDY	84093
EVUT_332879	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	8/28/20	ROY	84067
EVUT_337804	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	9/24/20	EDEN	84310
EVUT_337757	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	9/24/20	SALT LAKE CITY	84108
EVUT_337698	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	9/24/20	SALT LAKE CITY	84102
EVUT_337576	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	9/24/20	CEDAR HILLS	84062
EVUT_339206	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	1	-	$ 200.00	$ -	9/28/20	WOODS CROSS	84087
EVUT_289827	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	10/2/19	DRAPER	84020
EVUT_289918	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	10/3/19	MILLCREEK	84109
EVUT_290044	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	10/4/19	SOUTH JORDAN	84095
EVUT_290511	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	10/11/19	HIGHLAND	84003
EVUT_290531	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	10/14/19	EDEN	84310
EVUT_291967	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	10/15/19	MILLCREEK	84124
EVUT_291969	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	10/15/19	PARK CITY	84060
EVUT_293229	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	10/18/19	SANDY	84093
EVUT_294655	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	10/28/19	MIDVALE	84047
EVUT_294832	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	10/29/19	SOUTH OGDEN	84403
EVUT_294952	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	10/31/19	CENTERVILLE	84014
EVUT_295585	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	11/4/19	PLEASANT GROVE	84062
EVUT_295609	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	11/5/19	NIBLEY	84321
EVUT_295051	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	11/5/19	HOLLADAY	84121
EVUT_300136	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ 200.00	11/18/19	PARK CITY	84098
EVUT_300149	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	11/18/19	SALT LAKE CITY	84105
EVUT_300921	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	11/26/19	NORTH SALT LAKE	84054
EVUT_303936	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	12/11/19	PERRY	84302
EVUT_304192	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	12/11/19	ERDA	84074
EVUT_304219	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	12/11/19	AMERICAN FORK	84003
EVUT_304569	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	12/12/19	ALPINE	84004
EVUT_304696	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	12/17/19	VINEYARD	84059
EVUT_304914	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	12/17/19	SARATOGA SPRINGS	84045
EVUT_304957	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	12/17/19	CENTERVILLE	84014
EVUT_306076	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	12/24/19	WEST JORDAN	84088
EVUT_306112	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	12/24/19	DRAPER	84020
EVUT_306342	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	12/24/19	DRAPER	84020
EVUT_308157	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	12/30/19	HOLLADAY	84121
EVUT_308234	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	1/3/20	WEST JORDAN	84081
EVUT_308257	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	1/3/20	SALT LAKE CITY	84109
EVUT_308281	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	1/3/20	OREM	84058
EVUT_308334	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	1/6/20	LAYTON	84041
EVUT_309857	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	1/9/20	NORTH OGDEN	84414
EVUT_309944	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	1/13/20	SALT LAKE CITY	84116
EVUT_309872	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	1/13/20	LAYTON	84041
EVUT_310573	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	1/15/20	WEST JORDAN	84081
EVUT_310662	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	1/16/20	DRAPER	84020
EVUT_310693	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	1/17/20	AMERICAN FORK	84003
EVUT_310955	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	1/22/20	SALT LAKE CITY	84108
EVUT_310940	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	1/22/20	CLEARFIELD	84015

EV Program Prescriptive Incentives (2020 Budget Funds)

Project Name	Measure Name	Quantity	Number of Ports	Customer Incentive	Measure Cost	Creation Date	City	Zip Code
EVUT_311130	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	1/23/20	MILLCREEK	84109
EVUT_311760	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	1/30/20	Ogden	84404
EVUT_311758	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	1/30/20	SOUTH JORDAN	84095
EVUT_311597	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	1/30/20	WEST JORDAN	84081
EVUT_313378	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	2/12/20	SOUTH WEBER	84405
EVUT_314221	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	2/21/20	DRAPER	84020
EVUT_314220	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	2/21/20	PROVIDENCE	84332
EVUT_314786	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	2/26/20	SARATOGA SPRINGS	84045
EVUT_314765	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	2/26/20	ALPINE	84004
EVUT_315017	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	3/6/20	MILLCREEK	84106
EVUT_315627	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	3/11/20	LAYTON	84040
EVUT_316604	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	3/23/20	PARK CITY	84098
EVUT_316601	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	3/23/20	LAYTON	84040
EVUT_316943	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	3/26/20	SALT LAKE CITY	84116
EVUT_317060	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	3/26/20	WEST JORDAN	84081
EVUT_317277	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	3/31/20	WEST VALLEY CITY	84118
EVUT_317831	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	4/9/20	SALT LAKE CITY	84108
EVUT_318313	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	4/14/20	CEDAR CITY	84720
EVUT_318817	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ 200.00	4/16/20	HERRIMAN	84096
EVUT_319143	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	4/17/20	HYDE PARK	84318
EVUT_319183	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	4/22/20	SANDY	84070
EVUT_319434	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	4/27/20	HIGHLAND	84003
EVUT_319498	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	4/27/20	SALT LAKE CITY	84103
EVUT_319826	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	5/4/20	COTTONWOOD HEIGHTS	84121
EVUT_320739	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	5/15/20	RIVERTON	84065
EVUT_320964	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	5/18/20	PARK CITY	84060
EVUT_320981	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	5/19/20	LAYTON	84041
EVUT_322376	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	6/1/20	SOUTH JORDAN	84009
EVUT_323359	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	6/5/20	HOLLADAY	84117
EVUT_324197	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	6/8/20	CLEARFIELD	84015
EVUT_324174	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	6/8/20	RIVERTON	84065
EVUT_324148	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	6/8/20	PARK CITY	84098
EVUT_325158	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	6/15/20	WEST JORDAN	84081
EVUT_325165	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	6/15/20	WEST BOUNTIFUL	84087
EVUT_325212	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	6/17/20	HERRIMAN	84096
EVUT_325465	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	6/19/20	HOLLADAY	84124
EVUT_325938	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	6/22/20	LAYTON	84041
EVUT_326239	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	6/26/20	SANDY	84092
EVUT_326462	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	6/29/20	RIVERTON	84096
EVUT_326515	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	7/1/20	DRAPER	84020
EVUT_326802	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	7/6/20	DRAPER	84020
EVUT_327240	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	7/6/20	SOUTH JORDAN	84009
EVUT_328333	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	7/17/20	CENTERVILLE	84014
EVUT_328310	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	7/17/20	ALPINE	84004
EVUT_328242	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	7/17/20	HERRIMAN	84096
EVUT_328083	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	7/17/20	AMERICAN FORK	84003
EVUT_328078	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	7/17/20	DRAPER	84020
EVUT_327928	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	7/17/20	IVINS	84738
EVUT_329718	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	7/27/20	OREM	84097
EVUT_330544	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	8/3/20	BLUFFDALE	84065

EV Program Prescriptive Incentives (2020 Budget Funds)

Project Name	Measure Name	Quantity	Number of Ports	Customer Incentive	Measure Cost	Creation Date	City	Zip Code
EVUT_330543	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	8/3/20	SALT LAKE CITY	84104
EVUT_330814	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	8/5/20	VINEYARD	84059
EVUT_330811	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	8/5/20	MILLCREEK	84107
EVUT_330882	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	8/5/20	SALT LAKE CITY	84106
EVUT_331039	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	8/10/20	SOUTH JORDAN	84095
EVUT_331641	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	8/14/20	OGDEN	84401
EVUT_331957	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	8/19/20	NORTH SALT LAKE	84054
EVUT_332807	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	8/27/20	SANDY	84092
EVUT_332886	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	8/31/20	SALT LAKE CITY	84109
EVUT_332885	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	8/31/20	HERRIMAN	84065
EVUT_334747	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	9/1/20	COTTONWOOD HEIGHTS	84121
EVUT_334867	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	9/1/20	ALPINE	84004
EVUT_334765	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	9/2/20	SOUTH JORDAN	84009
EVUT_334926	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	9/3/20	SALT LAKE CITY	84108
EVUT_334946	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	9/4/20	NORTH SALT LAKE	84054
EVUT_335217	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	9/8/20	PARK CITY	84060
EVUT_335770	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	9/10/20	HEBER CITY	84032
EVUT_336321	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	9/16/20	LAYTON	84041
EVUT_336354	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	9/17/20	SNYDERVILLE	84098
EVUT_337241	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	9/21/20	SALT LAKE CITY	84116
EVUT_337805	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	9/24/20	FARR WEST	84404
EVUT_339244	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	9/28/20	SOUTH JORDAN	84009
EVUT_339066	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	1	-	$ 200.00	$ -	9/28/20	SOUTH JORDAN	84095

Sub-Totals	EV Time of Use Rate option 1 - off peak 7 cents, on peak 22 cents	$ 7,800.00
	EV Time of Use Rate option 2 - off peak 3 cents, on peak 34 cents	$ 22,600.00
	EV Time of Use Load Research Study	$ 100.00
	Residential AC Level 2 Charger Incentive Payments	$ 22,811.33
	Non-Residential AC Level 2 Charger Single Port Incentive Payments	$ 228,573.06
	Non-Residential AC Level 2 Charger Multi-Port Incentive Payments	$ 472,956.43
	Non-Residential & Multi-Family DC Fast Charger Incentive Payments	$ 219,582.24
Grand Total		**$ 974,423.06**

*Includes 2020 EV fiscal year budget incentive payments (October 1, 2019 - September 30, 2020)

Exhibit 2-B

EV Program Custom Project Committed Funds and Expenditures

EV Program Budget Custom Project Expenditures

Year Committed	Custom Projects	Committed Funds	Year Completed	$ Paid	$ Variance
2017	Project 1	$ 250,000	2018	$ 250,000	$ -
	Project 2	$ 8,000	2019	$ 7,998	$ (2)
	Project 3	$ 470,000	2018	$ 456,441	$ (13,559)
	Project 4	$ 153,000		$ 153,000	$ -
	Project 5	$ 237,500	2020	$ 237,500	$ -
	Project 6	$ 50,000	2018	$ 50,000	$ -
	Project 7	$ 57,005		$ 56,963	$ (42)
	Project 8	$ 69,369		$ 69,369	$ -
	Project 9	$ 65,000		$ 58,047	$ (6,953)
	Total	**$ 1,359,874**	--	**$ 1,339,318**	**$ (20,556)**
2018	Project 10	$ 308,000	2019	$ 308,000	$ -
	Project 11	$ 70,000		$ 70,000	$ -
	Project 12	$ 120,500		$ 120,500	$ -
	Project 13	$ 500,000	2020	$ 500,000	$ -
	Total	**$ 998,500**	--	**$ 998,500**	**$ -**
2019	Project 14	$ 330,000	2020	$ 330,000	$ -
	Project 15	$ 170,000	TBD	$ -	$ -
	Project 16	$ 169,439.49	TBD	$ -	$ -
	Total	**$ 669,439.49**	--	**$ 330,000**	**$ -**
2020	Project 17	$ 100,000	TBD	$ -	$ -
	Project 18	$ 504,418.79	TBD	$ -	$ -
	Total	**$ 604,418.79**	--	**$ -**	**$ -**

Exhibit 2-C

EV Program Custom Project Details Year Over Year

Custom EV Projects Year over Year Committed vs. Completed

Committed Information					Completed Information			
Year Committed	Project #	Description	Equipment type	Incentive	Year Completed	Description	Equipment type	Incentive
2017	Project 1	Installation of an electric bus charger for an electric bus that will provide free public transit throughout a community. The electric bus will reduce traffic congestion and improve carbon emissions.	500 kW Electric Bus Charger	$ 250,000	2018	No change from committed.	No change from committed.	$ 250,000
2017	Project 2	Project 2 covers three aspects of installation and monitoring that include: 1) fees for materials associated with installing charging units in snowy, high-alpine environments; 2) two meters to track monthly usage of Tesla and standard chargers (as this would otherwise not be available,); and 3) develop a comprehensive marketing plan to promote electric vehicle chargers and promote electric vehicles at a resort.	4 AC Level 2 Chargers (single port)	$ 8,000	2019	No change from committed.	No change from committed.	$ 7,998.00
2017	Project 3	The goal of this project is to provide EV charging along major traffic corridors in Utah. DC Fast chargers will be strategically placed along interstate corridor to reduce range anxiety among EV drivers.	6 AC Level 2 Chargers & 6 DC Fast Chargers (single port)	$ 470,000	2018	Acutal project costs were less than intial estimates, resulting in a lower incentive payment.	No change from committed.	$ 456,441
2017	Project 4	This project aims to provide electric vehicle charging for the public and employees at a prominent location in down town Salt Lake City by installing 12 AC Level 2 dual port charging stations, and infrastructure for seven future stations.	12 AC Level 2 Chargers (multi-port)	$ 153,000	2018	No change from committed.	No change from committed.	$ 153,000
2017	Project 5	The goal of this project is to significantly expand and enhance the EV charging infrastructure at a major workplace in the Salt Lake Valley. South Parking Lot: • Five dual-port Level 2 EV chargers which will be pay-for-use and available to the public. • Three dual-port Level 2 EV chargers for fleet and enterprise vehicles. • One Level 3 pay-for-use EV charger in the east-side visitor parking area. If unable to support a Level 3 charger, the plan would be to install an additional dual-port Level 2 EV charger at this location. North Parking Lot: • Two dual-port Level 2 pay-for-use EV chargers which will be available to the public. • Tech Center: We are proposing to have two dual-port Level 2 chargers for state vehicles. We are also proposing to add two pay-for-use dual-port Level 2 chargers that would be in front of the Tech Center and be available for public use. • Multiple EV chargers throughout the campus facilities	18 AC Level 2 Chargers & 1 DC Fast Charger (multi-port)	$ 237,500	2020	No change from committed.	No change from committed.	$ 237,500
2017	Project 6	A city plans to collaborate with commercial and industrial businesses to increase the adoption of electric vehicle purchases within the city and county in order to satisfy growing driver demand; increase property value, complement LEED and Green Building Programs, and achieve the city community fuel, carbon and energy goals. The project strives to use innovations, test new ideas, and pursue interesting opportunities to better understand how consumers think about and use PEVs to further increase the market penetration of PEVs and hybrids. Installed on city property for public use.	2 AC Level 2 Chargers and 1 DC Fast Charger (single port)	$ 50,000	2018	No change from committed.	No change from committed.	$ 50,000
2017	Project 7	The site selected for the EVSE installation is an Electric Vehicle & Roadway (EVR) Research Facility and electrified test track. The EVR is a state-of-the-art research facility at the forefront of electric vehicle charging and roadway technology development. The EVR is the most appropriate location in Rocky Mountain Power's service area to conduct high-level EV research, enhance infrastructure, and promote sustainable transportation. This project proposes to install two AC Level II chargers and one DC Fast Charger. All ports will be equipped with an advanced network and innovative data tracking capabilities. The DC Fast Charger as proposed herein will be the first available to all EV drivers in Northern Utah. The customizable data will provide further research, grants, and contracts as well as fortify existing research to help develop industry partnerships.	2 AC Level 2 Chargers and 1 DC Fast Charger (multi-port)	$ 57,005	2018	Acutal project costs were less than intial estimates, resulting in a lower incentive payment.	No change from committed.	$ 56,963
2017	Project 8	This site plans on installing four new Level 2 charging stations and one DC fast charger to increase the amount of chargers available to the public, and staff. This site currently has two Level 2 dual port charging stations. One located at the main entrance to campus for the public, free of charge in the Visitor Lot. The other charging station is located by the Facilities building for fleet vehicles. Three new level 2 charging stations will be located around the entire main grounds with one located at the West grounds. The DC Fast Charger will be located in the visitor lot in the front of campus. This is to serve the growing public facility and will be positioned with good access to I-15.	4 AC Level 2 Chargers and 1 DC Fast Charger (multi-port)	$ 69,369	2018	No change from committed.	No change from committed.	$ 69,369
2017	Project 9	This site intends to install EVSE in the parking lot next to an LEED Platinum certified Building. This project involves installing one DC Fast Charger under the solar canopy in the parking lot, and one dual port AC Level 2 charger.	1 AC Level 2 Charger and 1 DC Fast Charger (multi-port)	$ 65,000	2018	Minor change in project scope	AC Level 2 charger was not installed	$ 58,047
2018	Project 10	A major City will be installing a city-wide system of EV equipment for residents, guests, travelers, and ride-share drivers. The City is in a key strategic position to embark on such a wide-ranging project. The City is centrally located in the Wasatch Front and has notable popular attractions within its borders which attract a considerable amount of vehicles. The city experiences significant air pollution during bad inversion events in the winter and ozone buildup in the summer. To mitigate these effects, the city believes that by providing EV equipment on a city-wide scale, residents will be encouraged to adopt zero-emissions vehicles as a way to improve air quality.	44 AC Level 2 Charging Ports and 2 DC Fast Charging Ports	$ 308,000	2019	No change from committed.	No change from committed.	$ 308,000
2018	Project 11	A City is in the final stages of completing a new 130,000 sq-ft Public Works facility. The City has been evaluating and preparing to transition to electric fleet vehicles and is preparing to install charging stations at the new facility to service residents, employees, and fleet vehicles.	6 AC Level 2 Charging Ports and 1 DC Fast Charging Port	$ 70,000	2019	No change from committed.	No change from committed.	$ 70,000
2018	Project 12	A County is committed to leading sustainability actions that balance their fiduciary responsibility to taxpayers with stewardship of our extraordinary natural surroundings, while aligning with partners who have common goals to serve the public. This custom project provides an opportunity for the County and Rocky Mountain Power to partner together in service to residents, local governments, and businesses by expanding the EV charging infrastructure in the County. A DC Fast charger was selected for installation in to fill the gap in charging stations along the east-west Interstate 80 corridor. Level 2 chargers were selected for their lower cost and ease of installation to serve the County fleet as well as residents. This project will provide EV charging infrastructure in the County where little, if any, EV charging exists. In so doing, the County and other municipal governments will be able to deploy more EVs that eliminate tailpipe emissions and lower annual operating costs; provide charging for County employees as well as residents, and set an example for other businesses to provide charging stations.	12 AC Level 2 Charging Ports and 1 DC Fast Charger Port	$ 120,500	2019	No change from committed.	No change from committed.	$ 120,500
2018	Project 13	A public transit group will be transitioning to electric buses. The chargers will be used for on-route use and battery charging while parked in bus depots.	Two 500 kW Electric Bus Chargers and 5 DC Fast Charging Ports	$ 500,000	2020	No change from committed.	No change from committed.	$ 500,000
2019	Project 14	A major healthcare provider is committed to provide vehicle charging to its customers and caregivers. Its goal is to install EV charging at all of its campuses, clinics and business locations. The business is committed to maintaining a consistent model and technology for ease of our customers, maintenance, and data. The equipment also provides us with the needed billing functionality required for Stark laws regarding our physician population. The project will include 66 AC Level 2 Chargers at 33 different locations.	66 AC Level 2 Charging Ports	$ 330,000	2020	Equipment installed at 23 different locations instead of 33 different locations.	64 AC Level 2 chargers	$ 330,000
2019	Project 15	A city is planning to install 45 AC Level 2 electric vehicle chargers. The city has a goal to promote elecrification and wants charging to convenient for residents and visitors	45 AC Level 2 Charging Ports	$ 170,000	Pending			
2019	Project 16	A government agency will be installing several electric vehicle chargers throughout the state of Utah. Specific sites have been identified in areas where electric vehicle charging is lacking. The intent of this project is to allow EV drivers to be able to charge throughout the state.	18 AC Level 2 Charging Ports and 10 DC Fast Charger Port	$ 169,439.49	Pending			
2020	Project 17	A business along I-80 is planning to install a 120 kW DC Fast charger to accommodate interstate travel for electric vehicles. The charger will paired with solar and batteries for an innovative EV Charging project.	1 DC Fast Charger Port	$ 100,000	Pending			
2020	Project 18	A public transit group will be transitioning to electric buses. The chargers will be used for battery charging while parked in bus depots.	16 DC Fast Charging Ports	$ 504,418.79	Pending			

Exhibit 2-D

EV Program Actual SAP Postings by Calendar Year

Actual SAP Postings by Calendar Year for EV Program

EV Program Actual Postings in SAP by Calendar Year						
Cost Category	**CY 2017**	**CY 2018***	**CY 2019**	**CY 2020**	**CY 2021**	**TOTAL**
Time of Use Rate Sign-up	$ 6,800	$ 24,000	$ 28,600	$ 30,600		**$ 90,000.00**
Time of Use Load Research Study Participation	$ -	$ 10,000	$ 17,000	$ 100		**$ 27,100.00**
Time of Use Meters	$ -	$ 79,393.61	$ 554.48	$ 341.06		**$ 80,289.15**
Residential AC Level 2 Chargers	$ -	$ -	$ -	$ 34,660.58		**$ 34,660.58**
Non-Residential AC Level 2 Chargers – Single Port	$ 116,157	$ 109,990.11	$ 108,565.43	$ 223,421.85		**$ 558,134.39**
Non-Residential AC Level 2 Chargers – Multi-Port	$ -	$ 180,716	$ 507,769.60	$ 482,235.98		**$ 1,170,721.58**
Non-Residential & Multi-Family DC Fast Chargers	$ 54,618	$ 97,877.50	$ 265,678.33	$ 245,779.61		**$ 663,953.44**
Custom Projects	$ -	$ 1,093,820.19	$ 506,497.68	$ 1,067,500		**$ 2,667,817.87**
Administration	$ 176,176	$ 176,426.62	$ 127,958.88	$ 93,512.91		**$ 574,074.41**
Outreach & Awareness	$ 133,751	$ 109,478.83	$ 261,514.66	$ 327,304.18		**$ 832,048.67**
Total	**$ 487,502**	**$ 1,881,702.86**	**$ 1,824,139.06**	**$ 2,505,456.17**		**$ 6,698,800.09**

* Includes transferred (OMAG) costs of program expenditures prior to Commision approval in July 2017.

Exhibit 2-E

EV Program Budget Allocations Year Over Year

EV Program Budget Costs / Committed Funds by Year

	2017 EV Budget Costs / Committed Funds			2018 EV Budget Costs / Committed Funds			2019 EV Budget Costs / Committed Funds			2020 EV Budget Costs / Committed Funds		
	Prescriptive Incentives Completed Q3 2017	**Custom Incentives Committed Q3 - Q4 2017**	**Total 2017**	**Prescriptive Incentives Completed Q4 2017 - Q3 2018**	**Custom Incentives Committed Q1 - Q4 2018**	**Total 2018**	**Prescriptive Incentives Completed Q4 2018 - Q3 2019**	**Custom Incentives Committed Q1 - Q4 2019**	**Total 2019**	**Prescriptive Incentives Completed Q4 2019 - Q3 2020**	**Custom Incentives Committed Q1 - Q4 2020**	**Total 2020**
TOU Incentives	$ 2,800		$ 2,800	$ 22,400		$ 22,400	$ 29,400		$ 29,400	$ 30,400		$ 30,400
TOU Load Research Incentives				$ 10,000		$ 10,000	$ 17,000		$ 17,000	$ 100		$ 100
TOU Meters						$ 79,394			$ 554.48			$ 341.06
AC Level 2 Incentives (Residential)	$ -		$ -	$ -		$ -	$ -		$ -	$ 22,811.33		$ 22,811.33
AC Level 2 Incentives (Single Port)	$ 65,309		$ 65,309	$ 102,907		$ 102,907	$ 108,013.58		$ 108,013.58	$ 228,573.06		$ 228,573.06
AC Level 2 Incentives (Multiple Port)				$ 189,844		$ 189,844	$ 520,440.58		$ 520,440.58	$ 472,956.43		$ 472,956.43
DC Fast Charger Incentives	$ 54,618		$ 54,618	$ 97,878		$ 97,878	$ 265,678.33		$ 265,678.33	$ 219,582.24		$ 219,582.24
Custom Project Incentives		$ 1,359,874	$ 1,359,874		$ 998,500	$ 998,500		$ 669,439.49	$ 669,439.49		$ 604,418.79	$ 604,418.79
Administration			$ 176,176			$ 175,427			$ 127,958.88			$ 93,512.91
Outreach & Awareness			$ 133,751			$ 109,479			$ 261,514.66			$ 327,304.18
		Total	**$ 1,792,528**		**Total**	**$ 1,785,828**		**Total**	**$ 2,000,000**		**Total**	**$ 2,000,000.00**
			TOTAL ALLOCATED BUDGET FOR ALL YEARS			**$ 7,578,356**						

STEP Project Report

Period Ended: December 31, 2020

STEP Project Name: Co-firing Tests of Woody-waste (biomass) Materials in Hunter Unit 3

Project Objective:

This project consists of two co-firing tests of processed woody-waste (biomass) to be fired in the Hunter Unit 3 boiler. The target heat input from woody waste material is between 10% to 20% of the required total fuel input of the Unit 3 boiler, with coal making up the remainder. The processed woody waste will consist of wood resources including scrap and waste material from logging operations and wood processing plants. A torrefied product and a steam exploded product are the two types of processed woody waste that will be tested. The primary objective of these tests will be to determine whether these processed biomass fuels can be effectively used as "drop-in" fuel replacing a portion of the coal that is burned. In addition to displacing coal and its attendant CO_2 and NOx emissions, using these processed woody waste materials will have the benefit of minimizing particulate matter emissions associated with either controlled or uncontrolled burns of collected forest materials. These tests will also be used as a mechanism to further evaluate and demonstrate these processed woody waste technologies. The consultants responsible for planning, conducting, and reporting the results of the tests are engineering professors from the University of Utah's Combustion Laboratory and from Brigham Young University.

In Docket No. 16-035-36, the Commission approved the Company's request to increase the original funding of $789,873 for the Co-Fired Woody Waste project by $748,980, utilizing funds from the canceled Alternative NOx project, for total project funding of $1,538,853. With these additional funds, the Company expanded the scope to substantially increase the amount of processed biomass material from both woody waste providers to extend the number of hours in the test burn and to increase the measurements taken during the test to gain a better understanding of boiler operation during the co-firing.

Project Update:

Amaron provided 724 tons of torrefied biomass material to the Hunter Plant. The test burn of the torrefied material was conducted in Unit 3 of the Hunter Plant on August 22 and August 23 of 2019 and the consultants gave a review of preliminary results of the torrefied test burn on December 5, 2019. The test used a blend of 20% biomass material and 80% coal over a period of 12 hours. The biomass fuel performed as planned in the test and produced lower concentrations of NO_x and SO_2 as expected. Computational fluid dynamic evaluations of the Amaron test burn are being completed by Reaction Engineering International.

AERP, the steam exploded biomass material supplier formerly known as AEG, has moved their production facility to North Carolina. PacifiCorp and AERP re-negotiated the supply contract and set a delivery deadline of June 11, 2021 for up to 900 tons of steam exploded biomass material. The test burn of the steam exploded material in Unit 3 of the Hunter Plant is scheduled to occur the week of June 14, 2021.

Project Accounting:

	2018	**2019**	**2020**	**Total**
Annual Collection (Budget)	$262,837	$588,943	$78,907	$1,538,853
Annual Spend	$262,837*	$588,943	$79,307	$931,088
Committed Funds	$0	$0	$0	$0
Uncommitted Funds	$0	$0	$0	$0
External OMAG Expenses	$0	$0	$0	$0
Subtotal	$262,837	$588,943	$79,307	$931,088

*The 2018 STEP report reported total spend for 2018 as $230,277. However, there was a $32,560 feedstock payment to AEG that was that was made in 2018, but not included in the 2018 STEP report because there was a 2 month period when this payment was backed out of the Company's accounting records and then reposted.

Project Milestones:

Project Milestones	**Delivery Date**	**Status/Progress**
Contracts with PacifiCorp complete	UofU – June 27, 2017 Amaron – February 14, 2018	Complete Complete
Select biomass fuel source	December 1, 2017	Complete
Process first ton of Amaron biomass material	March 9, 2018	Complete
Sign new Amaron supply agreement	May 31, 2019	Complete
Revise schedule for expanded Amaron test burn	July 1, 2019	Complete
All Amaron biomass material delivered to the Hunter plant	August 15, 2019	Complete
Finalize Amaron test burn plan and operating procedures	August 15, 2019	Complete

Test burn monitoring equipment installation complete	August 15, 2019	Complete
Amaron test burn conducted	August 31, 2019	Complete
Sign updated AERP supply agreement	December 21, 2020	Complete
Schedule expanded AERP test burn	December 16, 2020	Complete
All AERP biomass material delivered to the Hunter plant	June 11, 2021	On Track
Finalize AERP test burn plan and operating procedures	May 31, 2021	On Track
Test burn monitoring equipment installation complete	June 15, 2021	On Track
AERP test burn conducted	June 16-18, 2021	On Track
Final report completed	September 30, 2021	On Track

Key Challenges, Findings, Results and Lessons Learned:

Challenges	Anticipated Outcome	Findings	Results	Lessons Learned
Secure raw biomass material	Several biomass sources were researched and priced.	Finding biomass sources that could guarantee sufficient material availability at a specific price was a challenge.	Amaron is using Woodscapes as their biomass supplier.	
Secure supply agreement with AERP	Complete supply agreement with AERP.	After finding no alternative suppliers for steam exploded biomass material, having patience with AERP's business processes eventually led to a successful agreement.	Supply agreement with AERP was finalized December 21, 2020.	Accommodations may be required when there is only a single source for a product.
Design the test burn and monitoring plan	University of Utah developed the project plan.	The test burn and monitoring plan were updated in response to the project expansion approval.	The test burn of the Amaron product went smoothly and met expectations	
Address plant operation or	Worked with Jim Doak to notify the State	The relatively small quantities of biomass	No impact on air permits	

air permit concerns	of Utah about the project.	material do not impact the air permit.		

Program Benefits:

The project has created an option to use forest waste products to generate electricity without requiring construction of new facilities or expensive equipment retrofits at existing coal plants. The 2019 test burn proved torrefied biomass could be burned and the planned 2021 test burn is expected to prove steam exploded biomass could be burned in a utility scale coal plant. The ability of an existing coal plant to supplement its coal fuel with biomass, when biomass is available, eliminates the supply chain problem of needing to have continuous resources available to fuel a biomass-specific generation resource. Burning biomass in a controlled environment also provides air quality benefits compared to open burns of forest material.

Potential future applications for similar projects:

The results of this project could be used in future initiatives to improve forest health and reduce emission from forest fires and open burn piles. The project results could also inform future treatment processes for biomass material and firing parameters if biomass is burned in other coal plants.

STEP Project Report

Period Ending December 31, 2020

STEP Program Name: Huntington Plant Neural Network Optimization Project (NOx Neural Network Implementation) COMPLETE

Program Objective:

The objective of PacifiCorp's study and use of Neural Network Optimization/Optimizers ("NNO") for control optimization is to achieve the best possible unit efficiency with the lowest possible emissions while safely operating our Electrical Generations Units ("EGU"). The goal of control optimization is unit specific; however, optimization efforts should always address the following: safety, environmental constraints, equipment condition, and plant or fleet operating requirements. There are three factors affected by control optimization that must always govern optimization efforts within the PacifiCorp fleet. In order of priority they are:

Safety – Optimization efforts will not jeopardize personnel safety.

Environment - Emissions limits will take precedence over all optimization aspects except safety.

Availability – Emphasis on maintaining unit reliability will take precedence over optimizing the unit for efficiency.

This project is designed to provide a detailed analysis of the implementation of NNO on unit controls. The NNO control optimization will initially be applied to the combustion control system. During this time the available control inputs and outputs will be evaluated relative to their use or weight by the NNO. Combustion optimization targets nitrogen oxides ("NO_X") for improved emissions and carbon monoxide ("CO") for improved emissions and unit efficiency. Once the combustion control phase is underway additional plant systems will be evaluated for control optimization. It is expected that the Flue Gas Desulfurization ("FGD") control systems will be next for control optimization. The experience gained from combustion control optimization will guide those decisions.

Project Accounting:

	2017	**2018**	**2019**	**2020**	**Total**
Annual Collection (Budget)	$547,807	$178,924	$216,718	$0	$943,449
Annual Spend	$457,767	$207,616	$231,621	$14,527	$911,531
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	$0.00	$0.00
Subtotal	$457,767	$207,616	$231,621	$14,527	$911,531

Program Milestones:

Milestones	Target Date	Status/Progress
Project Kick off Meeting	January 26, 2017	Complete
Contracts with PacifiCorp complete	February 15, 2017	Univ. of Utah – Complete Griffin Software – Complete
Instruments upgrades complete	June 5, 2017	Complete
Base Line Data set established. 3 Month Average	April 1 – June 30, 2017	For the 425 – 450 MW range NO_x = 0.23 lbs/mmbtu CO = 348 ppm
Unit base line optimization Manual Boiler tuning	July 27 – August 5, 2017	Complete
Initial installation complete	August 11, 2017	Complete
Neural Network Model and Predictors running	November, 30 2017	Complete
Optimizer turned on	March 31, 2018	Complete
Parametric study on optimization of auxiliary systems complete	August 31, 2018	Cooling Tower Data being analyzed site visit by U of U completed
Annual progress report complete for Year 2	March 31, 2019	Complete
Cooling Tower control systems	June 30, 2019	Complete December 31, 2019 and ongoing.
Exploratory study on dynamic optimization with set point ramping complete	August 31, 2019	Focused on Cooling Tower Optimization
Final study on impact on emissions complete U of U	December 31, 2019	Complete March 11, 2020

Key Program Findings/ Challenges / Lessons Learned:

Challenges	Results/Progress
a. Communications between the Neural Network Server and the Distributed Control System	Problems with process control technology have been identified and resolved. Changed communication protocol to Modbus to prevent further issues in the future. – Complete
b. Supplied Basic Optimization component of software incomplete	Building new optimization algorithm as interim solution. Griffin optimizer is been refined. – Complete
c. Reducing NO_x	Continued model tuning and using predictor at near full load operations is showing positive reduction of NO_X. As seen below of about 9.6%. – Ongoing

d. Reducing CO and unburned coal improvement.	The initial indication for CO reduction is very positive. Initially seen a large improvement with over 50% reduction in CO. – Ongoing
e. Reheat tube temperatures high during load ramping up events forces less than optimal configuration to be used.	Several solutions to this problem have been tried. A solution that allows optimization and controls temperature has not been found yet. Added some rules to minimize this with good results. – Complete
f. Low load NOx reduction very difficult due to minimum air flow requirement.	Air flow monitoring devices have been installed and are currently being added to control system. Should allow reduction of air flow, and improved NOx reduction at low load. – Tuning ongoing and new lows being tried, down to 15% load.
g. FGD control systems	Not started at this time. Changed to Cooling Tower Optimization with the variable frequency drive motors.
h. Cooling Tower Optimization	The cooling Tower Optimization activated August 27, 2019, and has been running since the unit overhaul. Some improvements have been noted. – Ongoing
i. Upgrading Neural Network Server for required Cyber Security controls	This has been a periodic issue when the unit had the DCS controls upgrade the communication between the DCS and the COS was broke temporarily and a new patch from Griffin solved this issue.
j. Unit Load Volatility	The unit load profile has shifted to amore of a short term dispatch mode which means larger and more frequent load changes. This creates additional challenges for optimization. – Ongoing
k. Lower Low Load Operation	With the necessity to get the unit load to as low as possible, the unit is not designed for optimized low load operation. However with learning this new area we are able to get the NO_x and CO lower than where it started. Still this is an area that needs work. – Ongoing

Program Progress and Benefits:

The Griffin system Neural Network is installed and operational. The Combustion Optimizations System ("COS") has been fully implemented on this unit with excellent results. The Company continues to learn while improving the data model and implementing output recommendations. Challenges included windbox pressure excursions, and high reheat tube metal temperatures. The solution to high tube temperatures involved a combination of soot blowing, increased O_2, and manipulation of SOFA tilts. The effort to control tube temperatures is counter to what is needed to control NO_X. Griffin uses a particle swarm optimizer to determine if one damper position is better than another. This should work by using the neural model to predict NO_X at the current damper positions. The optimizer then selects values for several other dampers and performs "what-if scenarios". The neural model then predicts the NO_X at each damper position. Each position is then adjusted to a new position closer to the position with the lowest NO_X. This process is repeated several thousand times, until one is selected as the lowest NO_X.

It has been difficult to have the model numbers converge into a particular area for improvement. This has been addressed by adding more rules for how the control bias are used. These "Expert Rules" have been developed with the knowledge of the operators and combustion tuners. These rules then guide the COS for the control bias to get the resulting improvements. For 2019, the COS was running 67% of the time.

The sootblower control module Knowledgeable Soot Blowing ("KSB") has been installed and operational. This KSB is strictly an "Expert Rules" based system. The rules have also been developed with the significant input of the operators. The number of sootblower operations for the wall blowers has been reduced and seems to reasonably follow coal quality. As expected, when the coal quality deteriorates the operators tend to turn off the KSB.

The reduction in KSB up-time, translated to an improvement in heat rate, although the impact is difficult to quantify. The operators have accepted the KSB system with good results. For 2019, the KSB was on 66% of the time (73% during the first three quarters and only 15% during the last quarter due to overhaul and outages).

For tracking proposes, CO_2 has also been considered, as it is an indicator of Heat Rate. As CO_2 drops it is an indication of improved heat rate. Since the potential for CO_2 reductions was not identified in the original scope of this STEP project, no analysis of CO_2 has been done.

The results of this project are encouraging based on the reduction benefits in both NO_X and CO compared to the three month baseline data as shown below. Since NO_X and CO vary by load, only like loads during the given time period are compared, as can be seen in Chart 1. For comparison purposes, the consistent load range of 425-450 mw was chosen. This is 90 – 95% of full load. Since this three month baseline date was in the spring of 2017, loads were typically low. Looking at 2019 the load has shifted, more time at low load with the P-min at 70 MW and less time in the middle loads and more time at the upper loads. Even though the load profile of the unit has changed, the NO_X at all loads have been reduced through 2019.

	NO_X	*CO*	*CO2*	
Apr to Jun '17	**0.230**	**348**	**11.14%**	**Baseline Charts 1 & 3**
2018	0.199	126	10.47%	
2019	**0.208**	**115**	**9.06%**	**Charts 2 & 4**
% Reduction	9.6%	67.0%	18.67%	2019 vs baseline

The data/charts for these can be seen in charts 1 – 4.

In 2019, new system-wide demand really changed how the unit was operating and the load began to swing significantly throughout the day. This volatility of the unit creates new challenges for the COS in achieving low NO_X. The unit load average has come down with increased load variability. This variability can be measured with a Volatility Factor. The Volatility Factor in this case is the standard deviation over the previous five hours of the percent of load change compared to the previous five minutes. With the Volatility factor tracked it show correlation with NO_X and CO and does play a role in optimizing combustion. When at steady or near steady state combustion optimization works fairly easy but as the load changes and particularly as pulverizers need to come in or out of service to get the new load, this has a significant impact on optimization. This volatility factor for 2019 can be seen in Chart 5.

For 2019, Unit 2's load average was 311 MW, the NO_X average for all loads for the year was 0.185 #/mmbtu's, also seen in Chart 5. For comparison Chart 6 shows the average load for 2017 was 336 MW with an average NO_X of 0.209 #/mmbtu's. The load has been split more, with less time in the mid-range, higher at top and bottom load ranges. In the same Chart 6, for 2019 it shows what the NO_X was with the COS on and with the COS off. With the COS on the average NO_X reduction is 7% from 0.193 to 0.180 #/mmbtu's. The COS was on 60% of the time in 2019. (66% the first three quarters and only 12% the last quarter due to overhaul and outages)

Initially the Company hoped that the NO_X would be reduced 10–20%, which has been in line with the results. CO has seen remarkable improvements. With the continued support from the University of Utah and Griffin, the optimizer is being tweaked and will continue running in the foreseeable future. This project will continue for two more years ending December 2021. The University of Utah and Griffin will continue to be available to support the project as needed, to evaluate additional achievements and continue to monitor the status. This project continues to fund the Griffin license through 2021.

Potential future applications for similar projects:

With the positive result, the Company installed a similar Neural Network Optimization on Huntington Unit 1 and on Hunter Units 1 & 2. There is an open offer to host a post-NOx report workshop to address questions and concerns related to this report.

Results/Appendix:

Chart 1 – NO_X and CO versus load and percent of time at Load. (baseline)

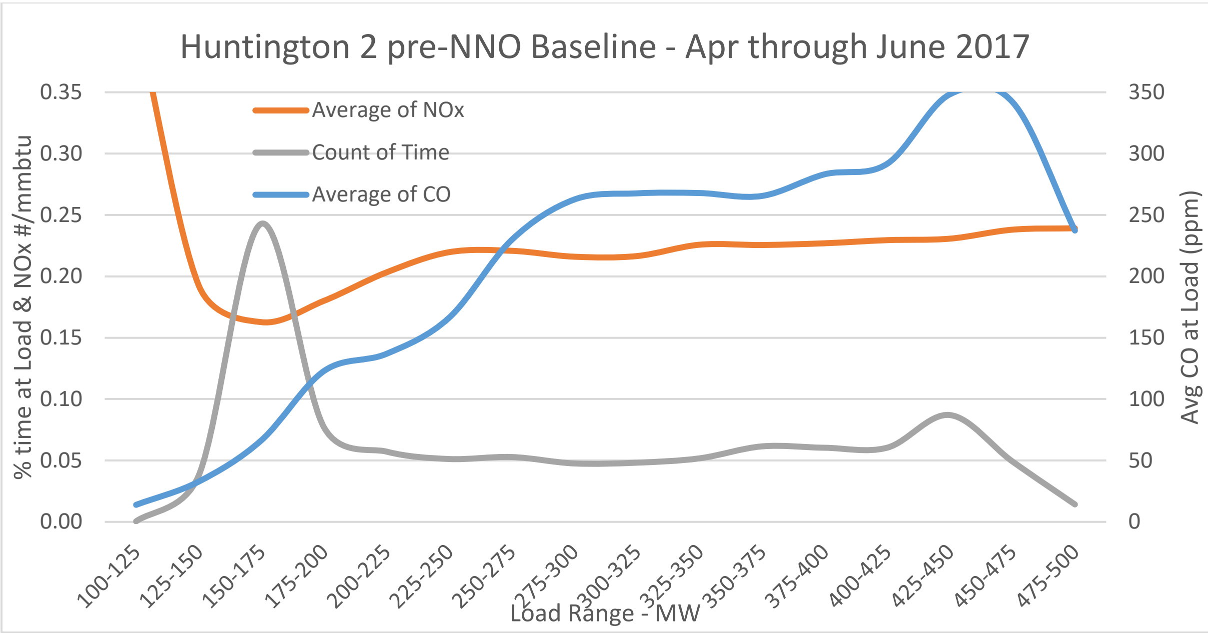


Chart 2 – NO_X and CO versus load and percent of time at Load. 2019

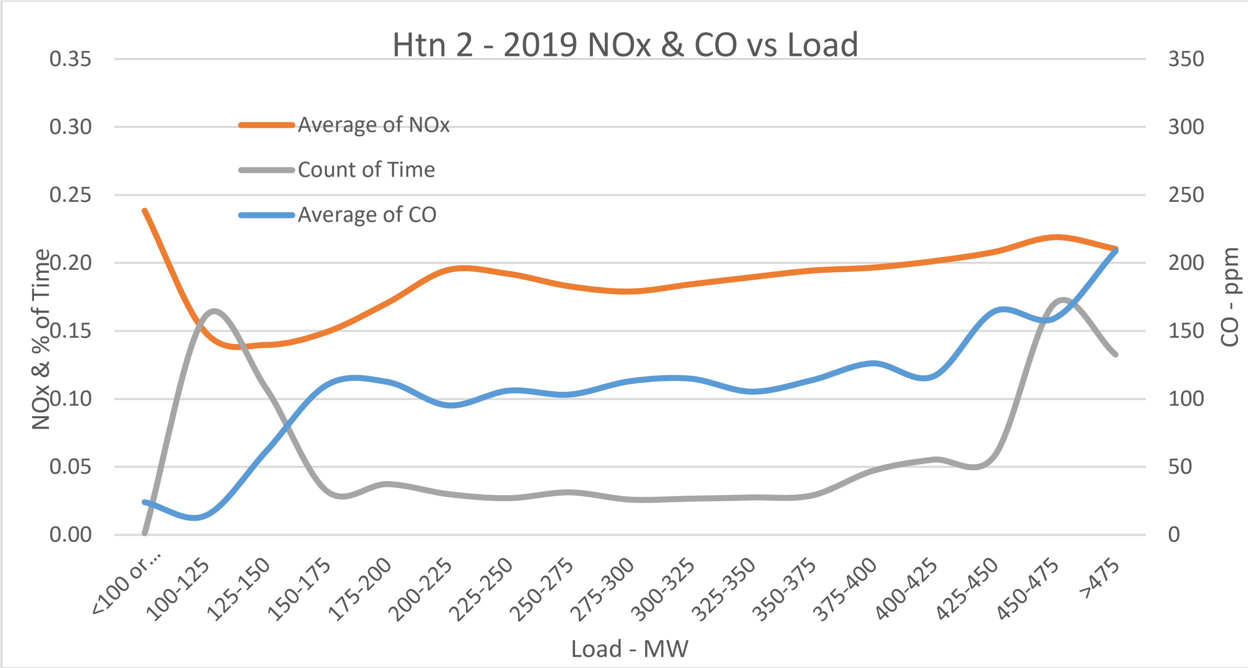


Chart 3 - Three Month data establishing baseline.

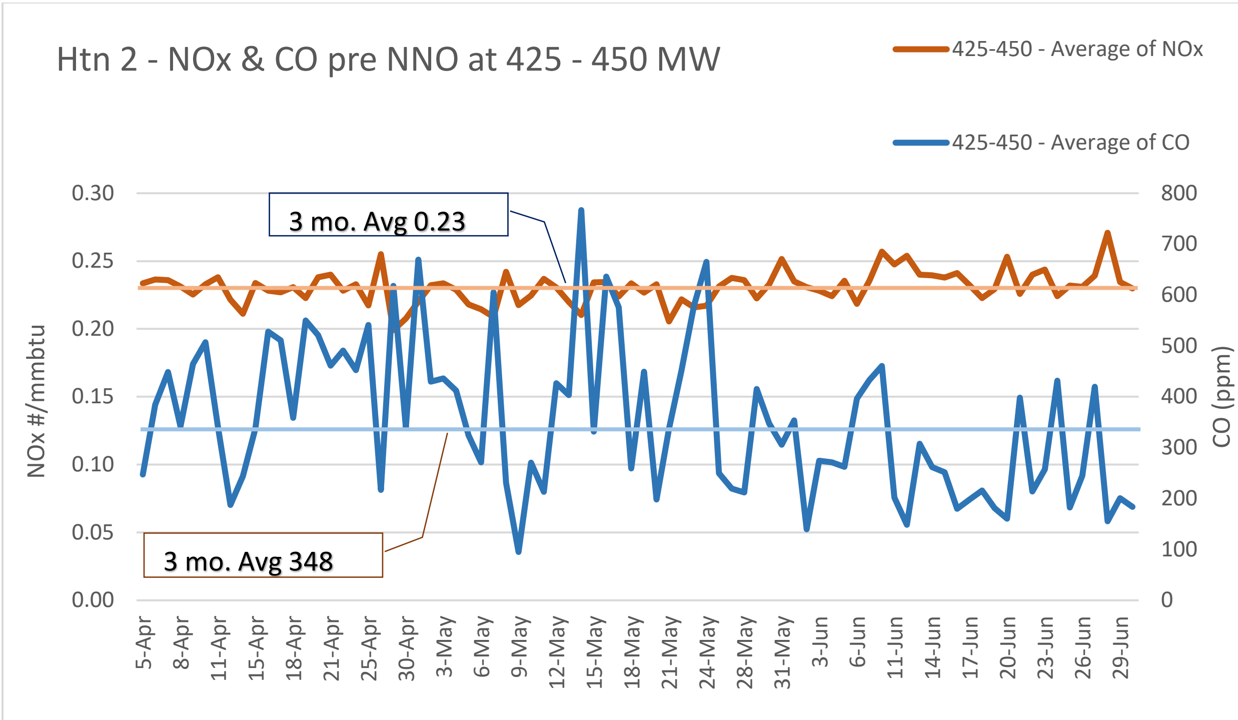


Chart 4 – Daily NOx & CO Average at comparison load

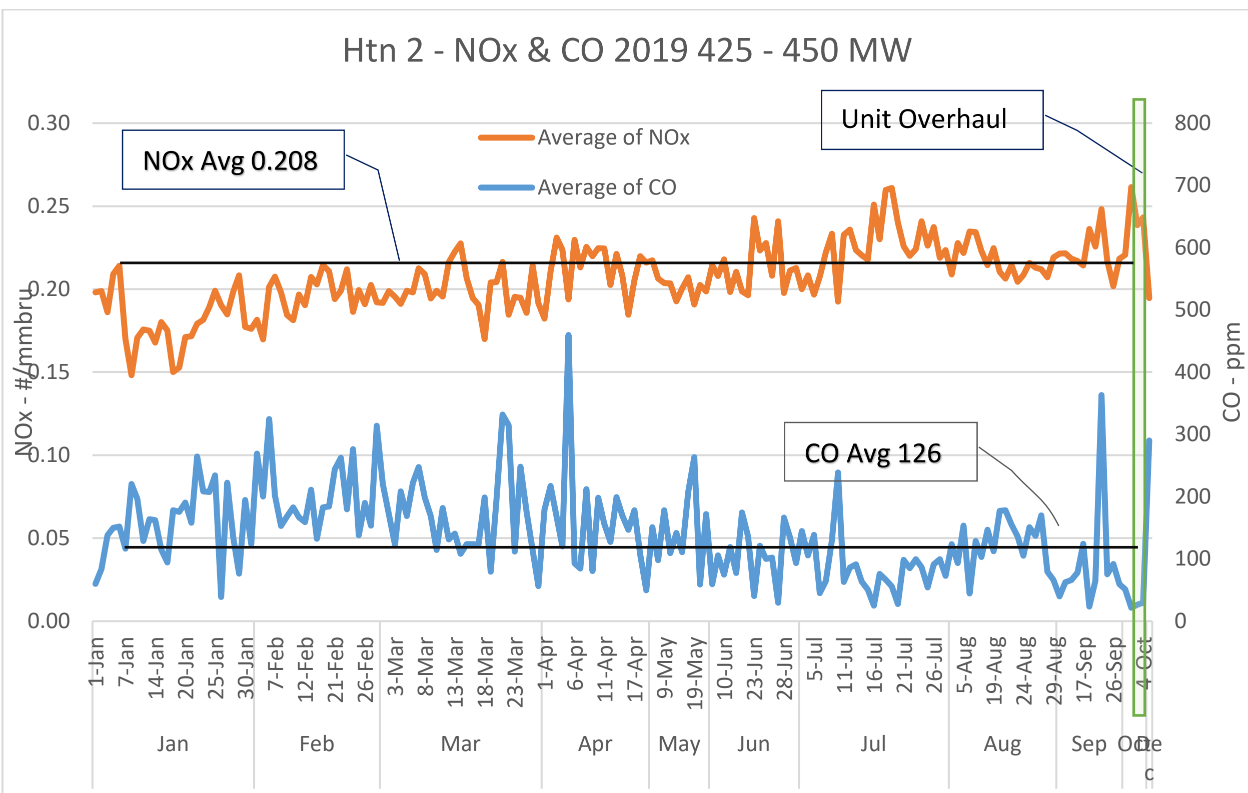


Chart 5 – 2019 Load, Volatility & NOx – Daily Average

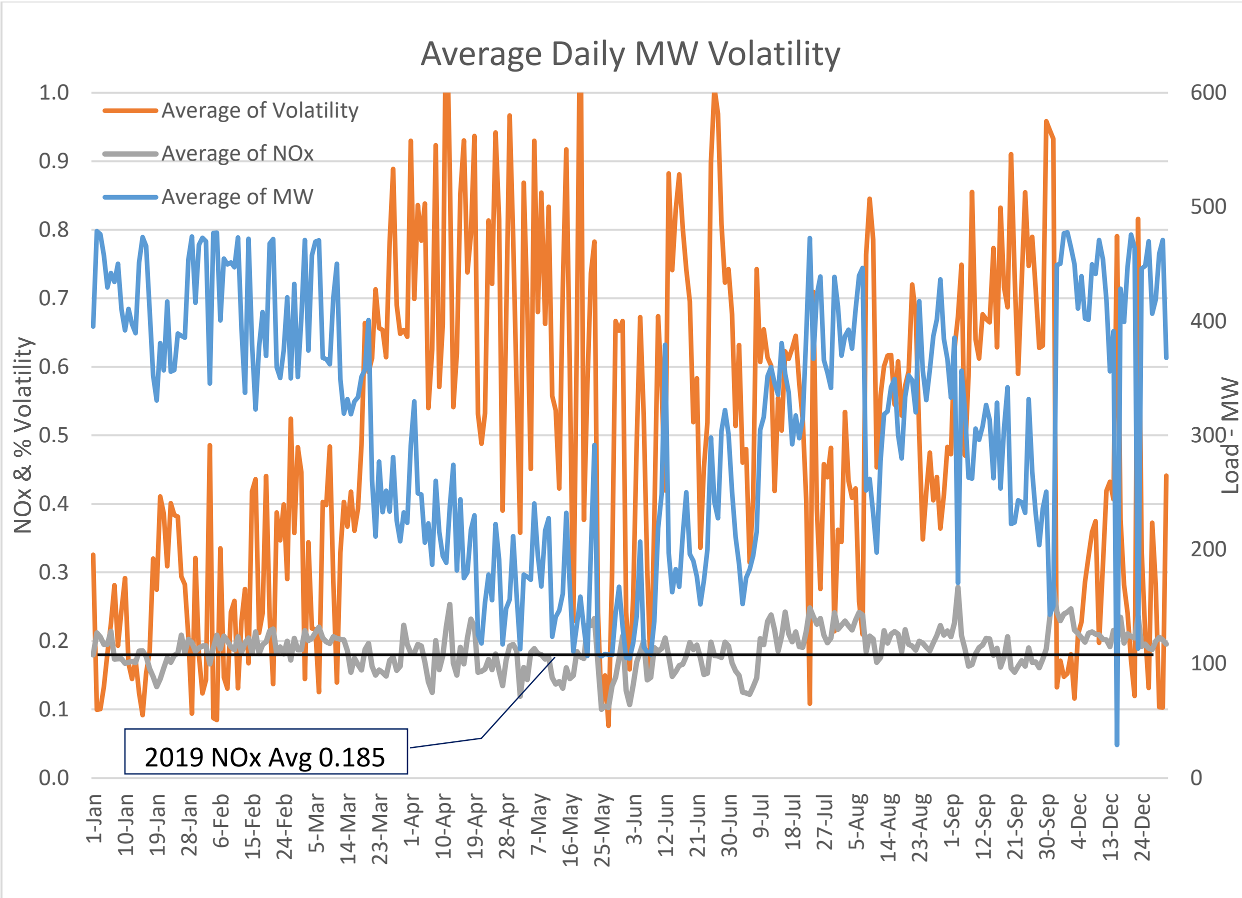
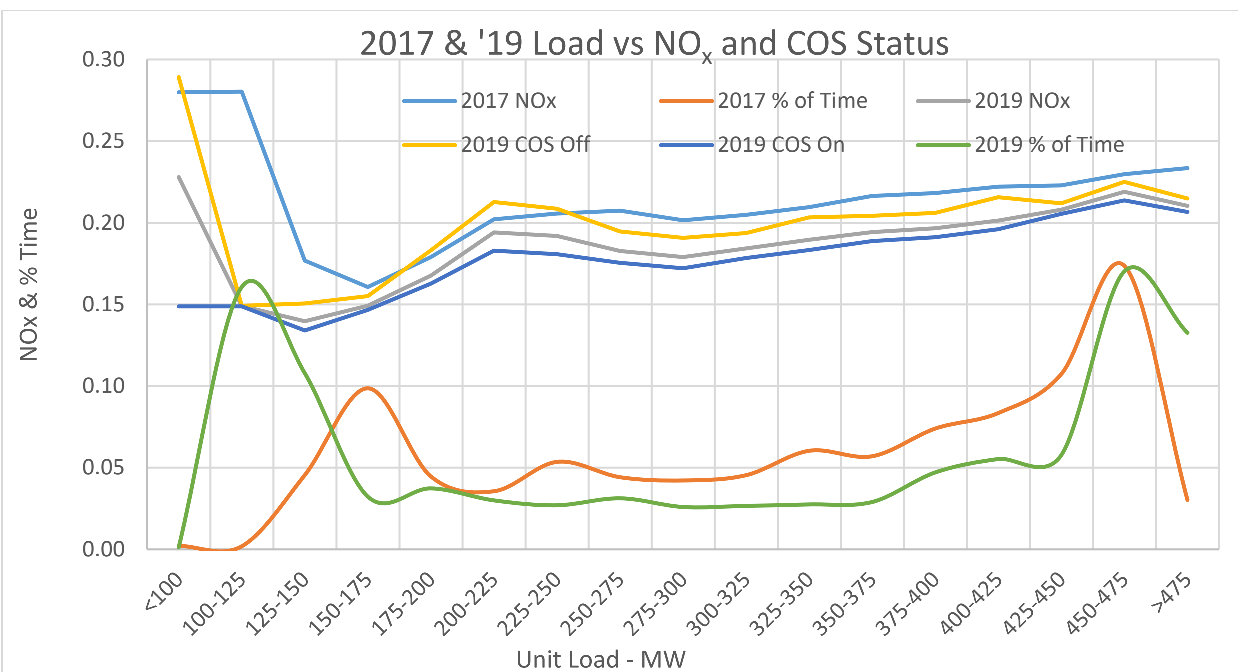


Chart 6 – COS On/Off Comparison and % of Time at unit load



STEP Project Report

Period Ending: December 31, 2020

STEP Project Name: Alternative NO_X Reduction (PROJECT CANCELED)

Project Objective:

The project was designed to perform one or more utility scale demonstration tests of an alternative NO_X emission control technology at the Hunter or Huntington power plants. The objective of the project was to find a cost effective technology, or combination of technologies, that can achieve or approach the NO_X emissions that match a Selective Catalytic Reduction ("SCR").

Project Cancelation:

The Alternative NOx Project, which was approved on May 24, 2017, commenced with issuing a request for information from technology providers. The results of the technical and commercial proposals showed that none of the vendors would be able to meet the project's criteria for a cost-effective and innovative technology for a demonstration test. Each of the vendor proposals were outside the project's budget or proposed a technology that was known and established. Rocky Mountain Power concluded, based on the results of the Request for Proposals ("RFP"), that the STEP funding would be better utilized in furthering other Clean Coal Research projects already approved by the Commission over demonstrating a non-innovative NOx control technology with a known emission reduction capability. The Company communicated the proposal to abandon the project in the March 12, 2018, STEP Project Update meeting, and it was also included in the First STEP Annual Report in Docket No. 18-035-16 ("STEP Report Docket"). On November 13, 2018, the Company requested approval to reallocate the remaining unspent funds, a total of $1,161,501, from the Alternative NOx project to the Co-Firing Test of Woody-waste Materials at Hunter Unit 3 and the Croygenic Carbon Capture projects. The Commission approved the request on February 6, 2019. The Company will continue to submit a project report for the canceled Alternative NOx project, although no additional spend or project milestones will occur beyond what is reported below for 2018. The 2018 funds were spent in early 2018 prior to the project's cancellation on the outside services of an owners engineer as part of the evaluation of the RFP.

Project Accounting:

	2017	**2018**	**2019**	**2020**	**Total**
Annual Collection (Budget)	$125,000	$0	$0.00	$0.00	$125,000
Annual Spend (Capital)	$0.00	$0.00	$0.00	$0.00	$0.00
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	$131,405	$26,010	$0.00	$0.00	$157,415
Subtotal	$131,405	$26,010*	$0.00	$0.00	$157,415

*In the Company's Application to Modify Funding Amounts Previously Authorized by STEP filed on November 13, 2018, in Docket No. 16-035-36, paragraph 19 of the Application stated that a total of $170,356 had been spent on the Alternative NOx project for the RFP and owner's engineer services. This amount included $131,405 in CY 2017 expenses and $38,951 in CY 2018 expenses. The $38,951 in CY 2018 included an accounting accrual of which $12,941 was subsequently reversed. The total for CY 2018 is $26,010. Also in paragraph 19, the Company requested $1,161,501 be transferred to the other clean coal projects, leaving $89,964 unallocated. With the revision in CY 2018 expenses, the unallocated amount is revised as follows:

Original budget for the Alternative NOx Project	$1,415,821
Funds spent on Alternative NOx Project	$157,415
Funds transferred to other clean coal projects	$1,161,501
Unallocated funds	$96,905

Project Milestones:

Project Milestone	**Delivery Date**	**Status**
Kick off meeting	March 30, 2017	Complete
Draft version of RFI for Alternative NO_X Technologies	May 18, 2017	Complete, draft received on May 1, 2017
Issue RFI for Alternative NO_X Technologies	May 29, 2017	Completed
RFI Response Due	June 22, 2017	Completed
Summary of RFI Response	August 6, 2017	Completed
Issue RFP for Alternative NO_X Technologies Demonstration Test	August 20, 2017	Complete, August 24, 2017
RFP Response Due	October 9, 2017	Completed
Selection of Technologies for Demonstration Test	December 27, 2017	Complete
Submit Implementation APR for Demonstration Test	February 20, 2018	Deferred (see key challenges)
Project Cancellation	June 30, 2018	Complete

Funding Reallocation to Other STEP Clean Coal Projects	December 31, 2018	Complete

Key Challenges, Findings, Results and Lessons Learned:

Description of Investment	Anticipated Outcome	Challenges	Findings	Results	Lessons Learned
a. Request for Information	Selected vendors for alternative emission reduction technology	Limited availability implementable technology	Sixteen vendors were approached for their technology	Two vendors provided a substantially different technology for implementation	There is limited number of technologies on the market reach SCR type emission reduction
b. Request for Proposal Cost	A technology supplier capable for performing a demonstration test within the allocated budget	Limited number low cost technology for emission reduction	Only two vendors could meet the target emission reduction rate and neither were within the target budget	No vendor could be sourced that could meet the STEP requirement and were within the allocated budget.	The company should provide more direction to potential vendors before release of the RFP to gain a better understanding as to the cost associated with a demonstration test.

STEP Project Report

Period Ending: December 31, 2020

STEP Project Name: Study Evaluation for CO_2 Enhanced Coal Bed Methane Recovery

Project Objective:

Perform a feasibility study evaluating opportunities to use carbon dioxide (“CO_2”) for beneficial use in enhanced natural gas recovery from coal seams. The focus of the study will be coal seams in the Emery County area. As part of the study, an assessment will be made on the capability of Emery County coal seams to concurrently sequester CO_2.

Project Accounting:

Cost Object	2017	2018	2019	2020	Total
Annual Collection (Budget)	$0.00	$62,500	$42,133	$63,408	$168,041
Annual Spend (Capital)	$0.00	$0.00	$0.00	$0.00	$0.00
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	$73,041**	$42,133	$64,696	$179,870
Subtotal	$0.00	$73,041	$42,133	$64,696	$179,870

* External OMAG for 2018, 2019 and 2020 was for contractual payments to the University of Utah for the feasibility study they provided on the project.

**The amount reported in the 2018 STEP report, $94,029 was the amount of original committed funds, but has been updated to reflect the actual amount spent of $73,041.

Project Milestones:

Project Milestone	Delivery Date	Status
Notice to Proceed Start Date	January 1, 2018	Completed
Contracts with PacifiCorp Complete	January 31, 2018	Completed
Draft Test Program Submitted	January 31, 2018	Completed

Revised Program Submitted	February 15, 2018	Completed
Annual Report 1 Presented and Submitted	January 31, 2019	Completed
Annual Report 2 Presented and Submitted	January 31, 2020	Completed
Annual Report 3 Presented and Submitted	January 30, 2021	Completed
Develop Concept for Future In-situ Pilot Testing	July 1, 2021	On Target
Final Report Presented and Submitted	October 31, 2021	On Target

Program Benefits:

The study will give us more knowledge on the technical, economic, and environmental effects of injecting coal-fired-power-plant-derived CO_2 into underground coal beds for enhanced methane recovery. The study will also determine whether the Emery County coal beds are conducive to enhanced methane recovery using CO_2. Deliverables will include an evaluation of the technologies and strategies for improving CO_2 injection efficiency. The University of Utah will also study the risk of induced seismicity due to CO_2 injection.

Depending on the results of the study, Rocky Mountain Power's customers may ultimately benefit through increased efficiency of energy production with less CO_2 emissions. When the benefits of the study are combined with other studies and work being conducted under the STEP program, applicable real-world knowledge will be gained about the risks, costs, and benefits of carbon sequestration.

Key Challenges, Finding, Results and Lessons Learned:

Key Challenges	Results / Progress
Task 1: Resource Evaluation: Identification and selection of a coal resource to be studied for volumetric CO_2 storage	a) Drill logs have been digitalized for coal resource identification b) Stratigraphic coal units have been identified from well logs. Six coal units have been identified in Emery County's Buzzard Bench Field.

	c) The coal units' geological structure was delineated by identifying the top of the Ferron Sandstone from well logs. d) The data was gathered from the geological structure of the coal units and used to develop a three-dimensional model of the study area. e) The three-dimensonal model was completed and modeling begun to determine CO_2 storage capiability of the field. f) A 20 year CO_2 simulated injection was modeled (March 2019 – Februay 2039). Injection rates of 1 million standard cubic foot per day (mmscf/d), 1.5 mmscf/d and 2.0 mmscf/d were modled to avoid fracturing the coal units. g) At the 1.0 mmscf/d injection rate, 14.36 billion cubic feet of CO_2 was injected and 12.58 bcf of CH_4 produced. At 1.5mmscf/d, 18.18 bcf of CO_2 was injected and 13.50 bcf of CH_4 was produced. At 2.0 mmscf/d, 13.95 bcf of CH_4 produced. CO_2 breakthrough occurred early in the model which is detrimental to CO_2 sequestion. h) Sensitivity analysis was performed as to the injection well locations with no increase in CO_2 stored or CH_4 produced. i) Further analysis of the model found that CO_2 injection into the coals units may not remain within coals units and instead migrate to adjancet sandstone boundry layers. The model was expanded to include the adjacent sandstone and results indicate about 8 to 10% of the CO_2 would be stored in the sandstone. The sandstone forms a conducuitve conduit and storage medium for the CO_2. j) Next stesp will be to conduct further modeling of CO_2 injection into the sandstone and coal units simultaneously.
Task 2: Bench Scale Demonstration:	a) The test apparatus was designed and constructed in 2019. Shake down tests of various materials began in late 2019. b) Labortory testing was limited in 2020 due to the University of Utah campus being shut down for the majority of the year due to the COVID-19 pandemic. Coal sample testing started in summer of 2020. c) When coal sample testing begun, initial focus was on flooding the samples with helimum in unconfind conditions at room temperature to measure the samples density, pore density and grain density.

	d) Further work was perfomed strain gauge calibration to measure coal sample volumentric expansion during testing. e) Following calibration of test equipment, pulse-decay tests were performed on the samples. The pulse decay test involves flooding the sample under confided stress with known pressures and temperature. The tests will result in the obtaining Pore Volume, Pseudo-permeability, Volumetric strain and Poroelastic properties. The test was successful in providing the pore volume, permeability and voluementic strain. f) Pore volume testing demonstrated that initially that CO_2 filled the macro pores in the early stages before diffusing into the coal matrix. Greatly increasing the amount of CO_2 that was stored in the sample when compared to other gases. g) As expected, volumentric strain was recored as the coal sampled swelled during CO_2 injecation and abosrtion into the coal matrix. h) Permability of the coal sample was tested by incjecting super critical CO_2. Swelling was immediately detected when injection supercritical CO_2. As the coal swelled permability decreases of the sample i) The next steps plan for the testing is to integrate the results of the different stages of the pressure decay tests; identify data distribution and patterns related to adsorption and swelling; and to continue to evaluate mechanisms to explain the kinetics seen and adsorptive behavior.

Potential future applications for similar projects:

When combined with the results of the STEP CarbonSAFE project and the STEP Cryogenic Carbon Capture program, Rocky Mountain Power would have sufficient experience with these technologies to perfom further development for carbon sequestration in Utah. Additionally, information gathered from the study can be utilized to develop further understanding of potential enhanced energy recovery in Utah with simultaneous sequestration.

Cryogenic Carbon Capture - STEP Project Report

Period Ending: December 31, 2020

STEP Project Name: Cryogenic Carbon Capture (CCC) Demonstration (Emerging CO_2 Capture)

Project Objective:

The objective of this project is to continue the development and demonstration of promising CCC technology.

The scope of work is divided into two primary phases. The first, called the Development Phase, involves research to be performed by a contractor into specific areas where it is believed efficiency, reliability, or overall performance of the CCC process can be improved. Rocky Mountain Power (RMP) contracted with Sustainable Energy Solutions (SES) to do this work. SES's recommendations and experimental results were used to make changes and enhancements to the skid demonstration unit provided as part of this Scope of Work. On-site preparations by SES and RMP personnel of the testing area at the Hunter Power Plant in central Utah were completed in 2019. The Field Demonstration Phase used the demonstration unit at the site during an extended test run over approximately six months. SES's development work took place during 2017 and early 2018 with the field testing beginning in early 2019.

These phases were conducted by SES in parallel with a proposed DOE project to mature the technology and gather critical information in preparation for a scale-up.

In Docket No. 16-035-36, the Commission approved the Company's request to increase funding for the Cryogenic Carbon Capture project by $412,521, utilizing funds from the cancelled Alternative NOx project. With these additional funds, the Company expanded the scope to plan for the next scale of CCC operation to explore the scalability of these and related unit operations as part of this investigation. This project includes one task for each of three major systems. These systems require major changes to the current skid operation in contrast to the incremental changes supported by the current Department of Energy project. The additional milestones have been added to this report.

The project includes an economic assessment of utility-scale implementation of technology. In 2019 RMP hired Sargent & Lundy to deliver a report assessing the scalability of SES's technology to a size capable of processing all exhaust flue gas from one or more existing coal fueled thermal generation power plants owned by RMP.

Project Accounting:

Cost Object	2017	2018	2019	2020	Total
Annual Collection (Budget)	$356,557	$668,301	$412,521	$150,142	$1,587,521
Annual Spend (Capital)	$0.00	$0.00	$0.00	$0.00	$0.00
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*	$160,451	$530,289	$711,750	$192,809	$1,595,299
Subtotal	$160,451	$530,289	$711,750	$192,809	$1,595,299

*External OMAG consists of contractual payments to Sustainable Energy Solutions for services performed on the project. A description of these services is described in the project milestone section below.

Project Milestones:

Project Milestone	Delivery Date	Status
SES will deliver a report containing the basic designs for both a self-cleaning heat exchanger and the experimental dual solid-liquid separations system. SES will also begin purchasing equipment for these systems.	6/15/2017	Completed
SES will deliver a report containing the following: - The final designs, documentation of parts ordered, and initial tests of the experimental alternate refrigeration system. - The final designs and documentation of parts ordered of the experimental self-cleaning heat exchanger. - The design, documentation of parts ordered and installation of equipment for pre-treatment of real flue gases and dual solid-liquid separations.	8/15/2017	Completed
SES will deliver a report containing the following: - The purchase orders and initial test reports of improved instrumentation such as advanced cryogenic flow measurement and output measurement. - Results of testing for the experimental integrated system with simulated flue gas at minimum 1/4 tonne per day CO2 - Results of testing of the experimental integrated system tested with real flue gas.	11/15/2017	Completed

SES will deliver a report containing the following: - Designs and documentation of parts ordered for permanent skid-scale unit ops, including heat exchangers, dryers, separations.	2/15/2018	Completed
SES will deliver a report containing the following: - Documentation of parts ordered for permanent skid-scale unit ops and skid integration. - Results of testing the permanent skid system with simulated flue gas at 1 tonne/day. - Shakedown testing completed.	11/20/2018	Completed
SES will deliver a report containing the following: - A description of the preparations and modifications at the Hunter PP site. - Documentation of insurance, transport, personnel trailer, and other on-site needs. - A description of the ongoing on-site setup and shakedown of the ECL testing skid.	8/15/2018	Completed
SES will deliver the following: - Finalized setup and operation of the ECL Skid at the Hunter PP. - A full report of the testing to-date under RMP funding, with continued testing occurring under the NETL contract.	2/26/2019	Completed
SES will deliver a report containing the following: **Task A1 –** Finalized integrated dryer design. Results of experiments used to validate design. Equipment sourced. **Task A2 –** Final selection of the solid-liquid system, or other system designed to meet the same requirements, which will be tested. Initial long lead time parts ordered. Assessment of pollutant removal options and modeling of basic design of system.	4/15/2019	Completed
SES will deliver a report containing the following: **Task A1 –** Record of dryer system equipment being ordered. **Task A2 –** Finalized design and record of system ordered. Description of assembled solid-liquid or other separation system. Designs and parts ordered for the pollutant removal system.	7/15/2019	Completed
SES will deliver a report containing the following: **Task A1 –** The receipt of the system and initial results of both assembly and dryer testing. **Task A2 –** Results of initial testing and subsequent iteration on solid-liquid or other separations system. Description of assembled pollutant removal system.	10/15/2019	Completed

SES will deliver a report containing the following: **Task A1 –** Results of further test results including using real flue gas and initial integration with skid system. Final Reporting. **Task A2 –** Results of testing the finalized designs. Final Reporting. **Task A3 –** Assessment of scale-up potential of innovative unit ops including dryer and solid-liquid separations.	1/15/2020	Completed
Sargent & Lundy scalability study assessing the scalability of the technology for complete processing of flue gas at utility power plants.	7/1/2020	Completed

Program Benefits:

This program will help us determine the economic feasibility of CCC technology. The technology shows promise in being able to reduce CO_2 emissions. The demonstration test proved largely successful instilling confidence in the ability of SES's CCC technology to meet these goals.

The added milestones provide for modifications which improved the reliability and in some cases, decreased the energy and economic costs of the process.

Potential Future Applications:

SES was awarded U. S. Department of Energy ARPA-e funding for additional work including adding energy storage capability to the CCC technology and scale up to a larger pilot project capable of over 30 tons/day of CO_2 capture. Utah State funding had been approved for a larger SES CCC scale-up project which may be hosted at one of PacifiCorp's plants; however that funding was eliminated in 2020 due to the COVID-19 pandemic. In 2020 SES was acquired by Chart Industries. Chart Industries intends to continue with the a larger scale pilot project between 30 and 100 tons per day of CO_2 capture.

STEP Project Report

Period Ending: December 31, 2020

STEP Project Name: CarbonSAFE Pre-Feasibility Study – Phase 1 (Sequestration Site Characterization) COMPLETE

Project Objective:

The Company co-funded participation in a University of Utah pre-feasibility study to evaluate the development of commercial scale carbon capture and sequestration ("CCS") storage in Utah. The pre-feasibility study is being performed under Funding Opportunity Announcement (FOA Number DE-FOA-00001584) and is known as the Carbon Storage Assurance Facility Enterprise ("CarbonSAFE").

Project Accounting:

Cost Object	2017	2018	2019	2020	Total
Annual Collection (Budget)	$150,000	$0.00	$0.00	$0.00	$150,239
Annual Spend (Capital)	$0.00	$0.00	$0.00	$0.00	$0.00
Committed Funds	$0.00	$0.00	$0.00	$0.00	$0.00
Uncommitted Funds	$0.00		$0.00	$0.00	$0.00
External OMAG Expenses	$150,239	$0.00	$0.00	$0.00	$150,239
Subtotal	$150,239	$0.00	$0.00	$0.00	$150,239

Project Milestones:

Project Milestone	Delivery Date	Status
Project Kick-off	July 10, 2017	Completed
Quarterly Report	December 31, 2017	Completed
Technology Assessment Completed	December 31, 2017	Completed
Phase II – Application Submission	February 28, 2018	Completed
Quarterly Report	April 31, 2018	Completed

Final Report Presented and Submitted	May 2019	Completed

Key Challenges, Findings, Results and Lessons Learned:

Description of Investment

STEP funding for this project was used to support a pre-feasibility study of carbon dioxide (CO_2) capture and sequestration capabilities in the intermountain west. The CarbonSAFE STEP funding was part of a larger funding initiative from the Department of Energy of $1.2 million for conducting a pre-feasibility study into a developing a commercial scale CO_2 storage reservoir. The summary provided below is taken from the Carbonsafe Rocky Mountain Phase I: Ensuring Safe Subsurface Storage Of Carbon Dioxide In The Intermountain West Final Report (Attachment A).

Anticipated Outcome

- Determine if central Utah's geological formations were suitable for storing up to 50 million metric tons (tonnes) of CO_2 in a saline aquifer.
- Identify a study area that could be utilized by Utah's existing coal-fired facilities.
- Identify the commercial and non-techncial challenges in developing a CO_2 storage aquifer.
- Provide a template protocol for future and existing coal-fired and gas-fired facilities that could be utilized for further development of a CO_2 storage aquifer.

Challenges

- Four key challenges were identified in pre-feasiblity study. These challenges are:
  - Cost and cost recovery of construction and operation CO_2 capture and sequestration (CCS) infrastructure;
  - the lack of price signal or financial incentive for developing, construction and operation of a CCS;
  - liability risks associated with the storage aquifer, including legacy liability; and
  - an overall lack of a comprehensive CCS regulation.
- Additional challenges recognized were:
  - Overall lack of CCS regulatory framework; and
  - lack of historical cost information to implement and operated CCS.

Findings / Results

- Capture assessments were performed using both commercial and emerging technologies to capture approximately 2.75 million tonnes per year for one of the boiler units at the Hunter Power Plant. The estimates showed that the:
  - Amine based (commercial technology) system cost of capture was estimated of 45.50/tonne.
  - The cryogenic based (emerging technology) cost of capture was estimated at $37.75/tonne.

- Compression of the captured CO_2 and transportation, via high pressure pipeline, would increase the cost per tonne. The cost would be highly dependent on the specific injection location and rights of way and therefore not estimated in the pre-feasibility study.
- The area around the Hunter and Huntington Power Plants were subject of a high-level technical sub-basinal evaluation to verify CO_2 storage capacity and integrity. The result of the evaluation showed potential injection sites might be available, into the high permeability (~200 mD) and high porosity (20%) Navajo sandstone in the Buzzards Bench area of central Utah.
- A comprehensive analysis of the proposed reservoir and seals was conducted and a 3-dimensional model was created. Simulation and risk assessment on the proposed site were conducted. The findings showed that the CO_2 capacity estimates for the Navajo Sandstone, approximately 18 kilometers from the Hunter plant, are well in excess of the 50 million tonnes goal of the project.
- Non-technical assessments for a commercial-scale CO_2 storage facility in central Utah was conducted. The Environmental Protection Agency's Underground Injection Control Class VI and National Environmental Policy Act permitting present particular challenges in developing a saline aquifer for CO_2 storage. Surface and subsurface ownership and rights are also not straight forward and would need to be resolved if any storage facility would be constructed. Most critically is the legacy ownership and risk of a CO_2 storage facility.

Lessons Learned

- Some critical lessons learned and challenges that were identified in the study were:
    - Lack of clarity of pore space ownership – Utah does not have a clear precedent on who would own the subsurface pore space for CO_2 storage.
    - Commercial operation capital cost, operations and maintenance cost and regulatory recovery – Further work is needed to determine if regulatory approval for PacifiCorp could be obtained to construct and CCS facility. Challenges identified include PacifiCorp's six state operations and differing regulatory requirements.
    - Permitting a CO_2 capture and storage facility – There is not a clear process in which an entity could permit a CO_2 capture and storage facility. History of previously permitted facilities were reviewed and each faced numerous challenges, environmental approvals and public comments.
    - Brine and waste disposal – Since brine would be created from the saline aquifer and cannot be used for enhanced oil recovery another method must be used for disposal. Methods such as evaporation face their own environmental challenges and would increase cost and risk of a storage facility

Program Benefits

The participation into the study has resulted in a high level cost estimate as to the cost to construct a CO_2 capture facility at one of the existing Utah coal fired power plants. The pre-feasibility study along with the high level cost estimate provides information to the Company to determine if CO_2 capture is feasible in Utah. The University of Utah to the Department of Energy final report is provies a detail insight as to the challenges in constructing a CCS facility.

STEP Project Report

Period Ending: December 31, 2020

STEP Project Name: Feasibility Assessment of Solar Thermal Integration – Hunter Plant (COMPLETE)

Project Objective:

This project will investigate the potential of integrating solar thermal collection to provide steam and/or feedwater heating into the Hunter 3 boiler/feedwater cycle. Integration of a solar thermal collection system would minimize coal consumption and the attendant emissions associated with reduced coal use. The study will focus on the application of parabolic solar troughs and will also consider power tower collections systems. The project is on schedule and began in February 2019.

Factors that will be evaluated in the study are:

- Site specific costs and benefits of solar thermal integration at the Hunter Plant;
- Steam/feedwater injection points in the boiler feedwater cycle and those impacts on performance;
- Impact on coal consumption and associated emissions; and
- Land requirements.

Project Accounting:

Cost Object	2017	2018	2019	2020	Total
Annual Collection (Budget)	$0.00	$0.00	$187,000	$0.00	$187,000
Annual Spend (Capital)	$0.00	$0.00	$0.00	$0.00	$0.00
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	$83,057*	$103,781*	$186,838
Subtotal	$0.00	$0.00	$83,057	$103,781	$186,838

*All OMAG expenses were paid to Brigham Young University for the completion of the milestones listed below.

Project Milestones:

Project Milestones	Delivery Date	Status
Contract between BYU and PacifiCorp complete	2/5/2019	Completed
Kickoff Meeting	2/12/2019	Completed
Report 1 to include literature review and representative model development	4/30/2019	Completed
Report 2, baseline plant model comparison to operational data	8/31/2019	Completed
Report 3, solar resource data, solar integration point, CSP characterization for modeling	12/31/2019	Completed
Report 4, preliminary estimates of fuel reduction, estimates for land use, capital cost, and impact on power generation	4/30/2020	Completed
Report 5, refine the plant model, parametric variations and optimization analyses	12/31/2020	Completed
Final report submitted, update and compilation of previous reports, and recommendation for implementation	Extended from 12/31/2020 to 3/31/2020*	Completed

* BYU identified an opportunity for additional optimization specific to the Hunter plant and was granted a no-cost extension to March 31, 2021, to include the optimization in the final report.

Program Benefits:

Thermal energy collected from a Concentrated Solar Power ("CSP") plant can be integrated into a traditional power plant (coal, natural gas, etc.) to offset the amount of fossil fuel required for heating. With CSP contributing to the heating load, less fuel is required, resulting in a decrease in fossil fuel cost and emissions. This study will address the viability of integrating CSP with coal-fired power plants including the Hunter Plant in Castle Dale, Utah. To aid in future evaluations, this study will include identifying a general plant model that can be used to determine hybrid feasibility and the optimization of solar integration into a general hybrid plant model. This statement of work outlines the milestones to be achieved during each period.

Potential future applications for similar projects: As we learn more about the technology, we will have a better understanding of potential future applications. It is possible that this technology could be deployed at several traditional power plants.

Exhibit 9-A

PacifiCorp Final Report

THIS EXHIBIT IS PROVIDED AS A SEPARATE DOCUMENT

Exhibit 9-B

Optimization of Solar

THIS EXHIBIT IS PROVIDED AS A SEPARATE DOCUMENT

Exhibit 9-C

Aaron Bame Thesis

THIS EXHIBIT IS PROVIDED AS A SEPARATE DOCUMENT

STEP Project Report

Period Ending December 31, 2020

STEP Project Name: Circuit Performance Meters (Substation Metering). COMPLETE.

Project Objective:

Deploy an advanced substation metering program that includes installing advanced metering infrastructure on approximately fifty circuits connected to distribution substations in Utah where limited or no existing communications exist. This project will enable higher data visibility on the distribution system by providing for the installation of advanced meters. The scope of the project involves setting up remote communication paths with all installed meters and the purchase of a data management and analytics tool to analyze, interpret and report on the collected data.

Project Accounting:

	2017	2018	2019	2020	Total
Annual Collection (Budget)	$110,000	$550,000	$440,000	$0	$1,100,000
Annual Spend (Capital)	$13,676	$427,349	$451,777	$118,262	$1,011,064
External OMAG Expenses	$0	$0	$0	$0	$0
Subtotal	$13,676	$427,349	$451,777	$118,262	$1,011,064

Project Milestones:

Milestones	Delivery Date	Status/Progress
Complete two pilot sites in 2017	December 31, 2017	The two pilot sites were completed by December 31, 2017.
Execute contract for data analytics software	December 31, 2017	A vendor was selected in December 2017 but due to a delay caused by contract negotiations, contract was awarded in March 2018.
Install metering on twenty five circuits in 2018	December 31, 2018	Meter installations on twenty circuits were completed in 2018. All installed meters are operating and sending data to the Company's data collection system.

Install metering on 23 circuits in 2019	December 31, 2019	Meter installations on thirty four circuits were completed in 2019. All installed meters are operating and sending data to the Company's data collection system.

Program Benefits

- Enable increasing levels of distributed energy resources on the power grid by economically providing increased visibility on loading levels, load shape, and event information. Information gained will be used to develop interconnection studies and hosting capacities for customers while determining safe switching procedures and cost effective capital improvement plans.
- Assist in preventing load imbalance on a distribution circuit caused by single phase distributed energy resources which can result in three phase voltage imbalance issues and increased potential for unintended circuit breaker operations from elevated neutral currents.
- Understand harmonic issues caused by distributed energy resources and take appropriate steps to resolve issues, if any, in a proactive way.
- Improve optimization opportunities for capital costs and system losses by providing measurements of per-phase vector quantities for voltage and current.
- Identify service quality issues early and allow timely development and implementation of cost effective mitigation.
- Enhance understanding of intermittent generation resources and their impact on the power grid.
- Reduce distributed generation interconnection customer approval delays.
- Provide customers with circuit information with a higher level of accuracy.
- Identify and control risks associated with the integration of significant penetration of distributed energy resources. This includes controlling claims from power quality issues, customer equipment failure, utility/customer equipment damage or impact on customer generation levels.

Potential future applications for similar projects:

There is the potential to install advanced metering devices on all circuits with limited or no communications regardless of the existence of distributed energy resources on those circuits. The Company is also looking into the possibility of integrating the smart meter with remote terminal units.

STEP Project Report

Period Ending December 31, 2020

STEP Project Name: Commercial Line Extension Pilot Program

Project Objective:

Incentivize developers of commercial/industrial property to install electrical backbone within their developments, and provide for Plug-in Electrical Vehicle charging stations.

Project Accounting:

Table 1 gives the budgeted amounts through 2020. Funds are considered committed when the Company has determined the qualifying job costs and the STEP incentive amount. This is the Approved Date in **Table 3**. When funds are transferred into the job they are included in the Annual Spend (Capital). These correspond to the Paid items in the Status column in **Table 3**.

Table 1					
	2017	**2018**	**2019**	**2020**	**Total**
Annual Collection (Budget)	$500,000	$500,000	$500,000	$500,000	$2,000,000
Annual Spend (Capital)*	$0.00	$69,340	$81,743	$110,645	$261,728
Committed Funds	$0.00	$0.00	$9,608	$76,355	$85,963
Uncommitted Funds	$0.00	$0.00	$0.00	$0.00	$0.00
External OMAG Expenses	$0.00	$0.00	$0.00	$0.00	$0.00
Subtotal	$0.00	$69,340	$91,351	$186,999	$347,691

*****The annual spend figures correlate to the numbers shown on the accounting information provided on page 1.0.

Applications Received:

The request for primary voltage facilities also serves as the application for the Commercial Line Extension Pilot Program. When a line extension work request is received, the Company meets with the applicant and determines the nature of the project. The Company receives a wide range of line extension requests. For a request to qualify for the commercial line extension pilot program, the project must include installation of backbone infrastructure, and also not have enough electric service revenue allowances to cover the cost of that backbone. None of the developments receiving STEP funds are additional phases of the same development that had previously received STEP funds under a different phase.

Applications – Table 2					
	2017	**2018**	**2019**	**2020**	**Total**
Applications Received	2	12	10	8	32
Applications Approved	2	12	10	8	32
Recipients Receiving Multiple Rewards	0	0	0	0	0

Table 3 – Individual Project Details:

In Docket No. 16-035-36, the Commission issued an order on February 6, 2019 approving the Company's request to increase the per-project incentive payment limit to $250,000 from the previously approved amount of $50,000. The intention of this change was to incentivize larger projects that could benefit from the funds to participate in the program. Larger projects have been more complex, with longer timelines, selling tracts of land for individual larger customers one at a time rather than platting an entire development. The total program budget is $2.5 million over the five-year pilot program period.

As of December 31, 2020, most developments receiving STEP funds were still under construction. At the time of this report no PV charging stations have been installed. Some developments only include road and utility infrastructure. These developments have no buildings or parking established by the initial developer. No charging station locations have been established at developments without buildings or parking.

Other developments have plans for specific business or buildings as part of the initial development. For those developments where parking is established, charging station locations have been provided as defined by the the STEP program. However no independent charging stations have been established. Some individual customers may have charging for their own use.

Individual Project Details – Table 3									
	Status (paid or committed)	Approved Date	Gross Project Cost	Internal Backbone Cost	STEP 20% Incentive	Number of lots in Develop-ment	Parking installed (Y or N)	Number of charging locations (Conduit Extensions)	Number of individual PV charging stations
1	Paid in 2018	7/7/2017	$ 38,253	$ 36,611	$ 7,322	7	Y	1	TBD
2	Paid in 2018	9/18/2017	$ 40,069	$ 37,606	$ 7,521	5	N	--	--
				2017 Total	**$ 14,843**				
3	Paid in 2018	1/16/2018	$ 43,685	$ 39,783	$ 7,957	7	Y	1	TBD
4	Paid in 2018	3/14/2018	$ 102,804	$ 102,670	$ 20,534	7	Y	1	TBD
5	Paid in 2019	3/19/2018	$ 80,183	$ 80,183	$ 16,037	9	N	--	--
6	Paid in 2019	3/20/2018	$ 102,360	$ 100,714	$ 20,143	3	Y	1	TBD
7	Paid in 2019	3/29/2018	$ 25,141	$ 24,218	$ 4,844	5	Y	1	TBD
8	Paid in 2019	5/29/2018	$ 68,720	$ 30,669	$ 6,134	6	N	1	--
9	Paid in 2019	7/13/2018	$ 30,957	$ 29,315	$ 5,863	4	Y	2	TBD
10	Paid in 2020	7/26/2018	$ 58,410	$ 58,410	$ 11,682	1	Y	1	TBD
11	Paid in 2019	11/1/2018	$ 52,789	$ 13,035	$ 2,607	5	N	2	--
12	Paid in 2019	11/7/2018	$ 37,081	$ 33,803	$ 6,761	6	N	--	--
13	Paid in 2019	11/12/2018	$ 19,192	$ 19,192	$ 3,838	8	Y	1	TBD
14	Paid in 2019	12/6/2018	$ 248,411	$ 118,107	$ 23,621	1	N	--	--
				2018 Total	**$ 130,020**				
15	Committed	2/6/2019	$ 51,316	$ 48,038	$ 9,608	6	N	--	--
16	Paid in 2020	3/4/2019	$ 28,080	$ 22,827	$ 4,565	8	N	--	--
17	Paid in 2019	3/8/2019	$ 12,246	$ 11,794	$ 2,359	5	Y	1	TBD
18	Paid in 2020	4/10/2019	$ 56,807	$ 51,889	$ 10,378	8	N	--	--
19	Paid in 2020	4/10/2019	$ 57,078	$ 52,160	$ 10,432	8	Y	1	TBD
20	Paid in 2019	4/11/2019	$ 111,259	$ 77,709	$ 15,542	9	N	--	--
21	Paid in 2020	5/29/2019	$ 209,393	$ 133,897	$ 26,779	10	N	--	--
22	Paid in 2020	10/4/2019	$ 36,628	$ 34,160	$ 6,832	5	N	--	--
23	Paid in 2020	10/9/2019	$ 81,901	$ 77,787	$ 15,557	10	Y	1	TBD
24	Paid in 2020	11/6/2019	$ 50,570	$ 50,570	$ 10,114	4	N	1	--
				2019 Total	**$ 112,166**				
25	Committed	5/6/2020	$ 63,958	$ 58,183	$ 11,637	12	N	--	--
26	Committed	5/7/2020	$ 55,181	$ 51,062	$ 10,212	6	Y	--	--
27	Committed	5/7/2020	$ 9,835	$ 9,010	$ 1,802	2	N	--	--
28	Paid in 2020	7/15/2020	$ 74,067	$ 71,523	$ 14,305	13	N	--	--
29	Committed	8/4/2020	$ 174,834	$ 26,772	$ 5,354	2	N	2	--
30	Committed	8/18/2020	$ 99,893	$ 93,890	$ 18,778	TBD	N	--	--
31	Committed	10/1/2020	$ 86,420	$ 79,692	$ 15,938	11	N	--	--
32	Committed	12/21/2020	$ 88,885	$ 63,168	$ 12,634	3	N	--	--
				2020 Total	**$ 90,660**				

Project Milestones:

The Commercial Line Extension Pilot Program review is applied each time a commercial or industrial developer requests installation of primary voltage backbone facilities within their development. Each development is independent, and is evaluated when the developer makes the request for service. Funds are transferred to the individual job upon the developer paying its share of the cost of the development.

Key Challenges, Findings, Results and Lessons Learned:

The Commercial Line Extension Program was designed to encourage developers to install a full electrical backbone within their developments. This allows the Company to better engineer the electrical grid serving the area, leading to cost savings, greater reliability, and fewer future upgrade investments.

To the extent developers build within their developments, sites for PV charging will be identified and power made available to those locations. This will encourage adoption of EVs and contribute to the environmental benefits of EV use.

Potential future applications for similar projects:

This program will give the Company experience in incentivizing proper infrastructure planning to developers. This understanding will allow for more efficient upfront design of commercial and industrial developments and siting of electrical infrastructure supporting such areas.

STEP Project Report

Period Ending: December 31, 2020

STEP Project Name: Gadsby Emissions Curtailment

Project Objective:

To help improve air quality, the Gadsby Emissions Curtailment program allows the Gadsby Power Plant to curtail its emissions during winter inversion air quality events as defined by the Utah Division of Air Quality ("UDAQ"). The UDAQ issues action alerts when pollution is approaching unhealthy levels. These alerts proactively notify residents and businesses before pollution build-up so they can begin to reduce their emissions. When pollution levels reach 15 μg/m3 for PM2.5, UDAQ issues a 'yellow' or voluntary action day, urging Utah residents to drive less and take other pollution reduction measures. At 25 μg/m3, 10 μg/m3 below the EPA health standard, UDAQ issues a "red" or mandatory advisory prohibiting burning of wood and coal stoves or fireplaces. It is at the 25 μg/m3 level when RMP will take action to curtail the Gadsby Steam units.

Project Accounting:

Cost Object	2017	2018	2019	2020	Total
Annual Collection (Budget)	$100,000	$100,000	$100,000	$100,000	$400,000
Annual Spend	$0.00	$0.00	$7,067	$0.00	$7,067
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	$0.00	$0.00
Subtotal	$0.00	$0.00	$7,067	$0.00	$7,067

Program Benefits:

Many of the company's customers live in communities that are located within the non-attainment areas, including Salt Lake City, which is where the Gadsby Power Plant is located. The primary benefit of curtailing Gadsby is the potential reduction of NOx emissions which contribute to the formation of PM 2.5. According to UDAQ (see Appendix 1), the Gadsby Power Plant may emit 0.437 tons of NOx per day during a typical winter inversion day, which makes Gadsby the 10th largest emitter of NOx in the Salt Lake non-attainment area. This program would ensure that those emissions would not occur during periods of unhealthy air quality and not contribute pollutants to air sheds of non-attainment areas.

STEP Project Report

Period Ending December 31, 2020

STEP Project Name: Panguitch Solar and Storage Technology Project

Project Objective:
Rocky Mountain Power will install a five (5) megawatt-hours battery energy storage system to resolve voltage issues on the Sevier–Panguitch 69 kilovolt transmission line. Panguitch substation is fed radially from Sevier, and all capacitive voltage correction factors have been exhausted.

To correct the voltage issues experienced during peak loading conditions, a stationary battery system will be connected to the 12.47 kilovolt distribution circuits that are connected to the Panguitch substation. This reduces the loading on the power transformer and improves voltage conditions. The system will be sized to handle the voltage corrections as load grows in the area.

In Docket No. 16-035-36, the Commission approved the Company's request to increase funding for the Solar and Storage Technology Project by $1.75 million due to the response to the Company's Request for Proposals ("RFP"). Commercial operation commenced on March 9, 2020, and final completion occurred on August 7, 2020. Due to the COVID-19 pandemic, the solar portion of training is still pending.

Project Accounting:

	2017	2018	2019	2020	Total
Annual Collection (Budget)	$500,000	$2,350,000	$5,900,000	$0.00	$8,750,000
Annual Spend (Capital)*	$331,995	$75,474	$6,373,549	$168,404	$6,949,422
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	$6,373,549	$182,138	$6,963,157

*The information provided includes funds charged to the STEP account and does not include funds from the Blue Sky program that were allocated to this project.

Project Milestones:

Milestones	Delivery Date	Status/Progress
Prairie Dog Permit	July 30, 2018	Complete

Small Generation Interconnection Agreement – Finalized	June 4, 2018	Complete
Award an engineering, procurement and construction (EPC) contract.	February 22, 2019	Complete
EPC Design Complete	August 1, 2019	Complete
EPC Major Equipment Delivered	September 3, 2019	Complete
Construction Complete	November 1, 2019	Complete
Commercial Operation Begins	March 9, 2020	Complete
Final Completion	August 7, 2020	Complete

Key Challenges, Findings, Results and Lessons Learned:

Description of Investment	Anticipated Outcome	Challenges	Findings	Results	Lessons Learned
a. 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 was 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
b. 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 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.

c. Issues with fencing and grounding	Repaired in field	Issues with project construction quality	Multiple issues were identified that raised concerns regarding construction quality.	Fencing and grounding issues were corrected during the commission ing stage.	Establish clear fencing and grounding standards in the contract; conduct both design and field reviews during commissio ning
d. Consider providing temporary diesel generators for battery back-ups	More reliable and robust system	Cost of generators, permitting, 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
e. Network connection (internal) for data transfer	Data transfer and troubleshoot ing	Cost and resources for data connect	Facilitate data transfer and trending	Include in this and future projects	Needed annually at a minimum for ITC reporting

Project Benefits

- The loading on the 69–12.47 kilovolt power transformer at Panguitch substation will be reduced thereby ensuring the line voltage on the Sevier–Panguitch 69 kilovolt transmission line does not drop below 90% and will defer the traditional capacity increase capital investment beyond fifteen years when using present growth rates in this area.
- Enables the Company to get first-hand operational experience with control algorithms and efficiency levels associated with energy storage combined with solar. This gained experience will prepare the company in advance of large scale integration of such technology that are now becoming options for customers as energy storage price declines.
- Enables the Company to become familiar with and utilize innovative technologies to provide customers with solutions to power quality issues.
- Provides battery and solar training for Company personnel at both the office and field levels including the operation and maintenance on similar facilities and equipment.

Potential future applications for similar projects:

Depending on the outcome, there could be a number of applications across Rocky Mountain Power's system on long radial feeds similar to Panguitch. These applications would provide economic deferrals for major transmission rebuilds.

STEP Project Report
Period Ending December 31, 2020

STEP Project Name:

Microgrid Project (COMPLETE)

Project Objective:

Deploy a microgrid demonstration project at the Utah State University Electric Vehicle Roadway (USUEVR) research facility and test track to demonstrate and understand the ability to integrate generation, energy storage, and controls to create a microgrid.

Project Accounting:

	2017	**2018**	**2019**	**2020**	**Total**
Annual Collection (Budget)	$0.00	$70,000	$110,000	$70,000	$250,000
Annual Spend (Capital)	$0.00	$90,713	$77,717	$28,392	$196,822
Committed Funds	$0.00	$0.00	$0.00	$0.00	$0.00
Internal OMAG Expenses	$0.00	$0.00	$0.00	$0.00	$0.00
External OMAG Expenses	$0.00	$0.00	$0.00	$0.00	$0.00
Subtotal	$0.00	$90,713	$77,717	$28,392	$196,822

Project Milestones:

Milestones	**Delivery Date**	**Status/Progress**
Data collection and EVR characterization	06/30/2018	COMPLETE - Installed smart meter and started analyzing the EVR load profiles
Preliminary microgrid planning tool	09/30/2018	COMPLETE - Developed a linear programming-based planning tool to determine the size of energy storage.
Microgrid layout and test plan	12/31/2018	COMPLETE - Finalized layout of the EVR microgrid
Deploy microgrid system at EVR	04/30/2020	COMPLETE - A Python & MATLAB based EMS was developed and tuned with the facility’s load data. System observation and streamlining of communication protocol of all microgrid components will continue.

Optimize planning tool for microgrid	08/31/2019	COMPLETE
Apply planning tool to HAFB microgrid	12/31/2019	MILESTONE REMOVED
Create fact sheet for planning tool	4/30/2020	COMPLETE – Authoring sheet to simplify explanation of planning tool and microgrid implementation with economic benefits.
Recommendations to DERs interconnection policy	06/30/2020	COMPLETE – Reviewing current proposed redlines to policy 138 and evaluating implementation of recommendations.

Key Challenges, Findings, Results and Lessons Learned:

Description of Investment	Anticipated Outcome	Challenges	Findings	Results	Lessons Learned
a. Microgrid system operational at USU's EVR	Connect microgrid components to the central control system at the EVR for monitoring and control.	1. Establishing a connection interface for all components to get a complete view of the system. Commands from inverters are not the same across vendors. 2. Policy 138 requirement of a grounding transformer. 3. Transformer requirement to be located at point of interconnection of the solar array (policy 138), but the microgrid system required a neutral reference when disconnected from the grid. This requires a neutral reference be located at the service entrance and automatic transfer switch rather than at the solar array POI. 4. Grounding transformer needed to be increased in order to handle the neutral currents of the single-phase loads of the facility when islanded while also meeting the interconnection requirements. 5. Determining the allowable facility ampacity and	1. With revisions to policy 138 and transient overvoltage protection, the need for a grounding transformer for that feature was not required. 2. Plotting of the transformer not a concern. 3. The different system voltage needs of the facility, along with the ampacity usage, resulted in the widespread installation of solar inverters across the facility. 4. Communications for data collection and control of the inverters are vital for microgrid operation. 5. Much equipment is designed for conventional grid and must be revised for microgrid operation.	1. Data / Solar data to be available on EVR server for real-time viewing.	1. The grounding transformer was needed due to the battery inverter not able to establish a neutral reference for the facility when isolated. 2. Smart inverters that adhere to the IEEE 1547-2018 standard have TROV protection. This eliminates the need for grounding transformer TROV. 3. Try to establish the same types of communication protocols. 4. Market share for microgrid equipment is limited. 5. Protection relays are necessary for quick response to grid transients and fast control of equipment. 6. Natural gas generators are limited at the hundreds of kilowatts range. 7. In order to parallel a generator with the utility, the generator has to be prime power rated. This kind of rating is only

		ampere interrupt capacity of the EVR for DER interconnections. 6. Limited market share for microgrid equipment. 7. Designing for facility constraints.	6. Shortage on micro grid equipment in the hundreds of kilowatts range (i.e. automatic transfer switch and natural gas generator).		currently available at higher power levels (thousands of kilowatt levels). 8. Emergency standby generators are only available at the power levels the EVR is operating at.
b. Optimize planning tool for microgrid	Creation of planning tool for use in industry.	1. Quantifying real equipment prices as tool inputs	1. Many different technical, financial, and meteorological components have an effect on the design and economics of a microgrid	1. Optimized planning tool for various customers communica ted.	1. The design and financial benefits of a microgrid can be easily quantified, given accurate pricing, load, and weather data.
c. Create fact sheet for planning tool	Fact sheet to provide explanation for process to implement a microgrid and its benefits.	1. None currently identified.	1. Planning tool is simple to use and quantifies economic benefits of a microgrid to a customer	1. Clear fact sheet describing purpose of tool and value of results.	1. The microgrid planning tool can be applied to various customers to conceptually design a microgrid and detail its load-shaping and cost-saving capability.
d. Policy 138 review and proposed changes	Review of the interconnection policy, and identify areas for possible revision.	1. EVR facility has multiple inverters, policy 138 required a manual disconnect for each inverter within ten feet of the utility meter. Due to space limitations, the AC disconnects are not able to be located next to the meter. 2. Early challenge of grounding transformer for policy 138 compliance. 3. Transformer POI to the EVR facility was significant challenge. 4. Transformer requirement to be located at point of interconnection of the solar array (policy 138), but the microgrid system required a neutral reference when disconnected from the grid. This requires a neutral reference be located at the service entrance and automatic transfer switch rather than at the solar array POI.	1. Changes to policy 138 TROV protection, resulted in grounding transformer not needed. 2. Exceptions to AC disconnect locations can be granted on a per review basis. 3. Protection relays will help ensure that tripping times specified in the policy 138 are met.	1. Submission of proposed rule changes to policy 138.	1. Through software control, energy storage can be controlled similar to PV smart inverters. 2. SEL-751 protection relays have fast response to grid/facility transients. 3. Protection relays can be used to monitor energy storage, and disconnect the energy storage/facility from the grid. 4. A combination of software and hardware controls allows seamless control of energy storage to allow interconnection to utility. 5. The AC and DC disconnects on the inverters themselves are lockable and disable the inverter from operation. 6. The disconnects on the inverters could serve as the utility required disconnects for interconnection.

Program Benefits

- Qualifies the viability of operating a microgrid on the Company's distribution system, and any resultant reliability improvement.
- Assists in understanding the intricacies of microgrid system operation, costs and their ability to address other value streams such as reliability, load shaping and power quality.
- Creates a quantified list of Company distribution system impacts resulting from the interconnection of microgrids.
- Enables the creation of policy and standards for subsequent microgrid interconnection requests, if and when allowed by the Company.
- Enables the potential development of a future microgrid service program.
- Establishes a tool to optimize conceptual design for a microgrid given location, load shape, and rate structure.

Potential future applications for similar projects:

Collaborate with customers to identify and potentially deploy microgrid systems utilizing advanced control systems and Internet of Things (IoT) for optimizing distributed energy resources.

Attachment:

Exhibit 14-A - USU_RMP_Microgrid Final Report_Draft_Jul_2020.pdf

STEP: Microgrid Demonstration Project

2020 Final Report

Acknowledgements

Utah State University (USU) prepared this report in conjunction with Rocky Mountain Power (RMP):

USU Personnel

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STEP: Microgrid Demonstration Project

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Executive Summary

The Microgrid Demonstration Project was funded by Sustainable Transportation Energy Plan (STEP) in January of 2018. Initially the project partners included Rocky Mountain Power (RMP), Utah State University (USU), and Hill Air Force Base. However, during the course of the project the use of Hill Air Force Base load profiles and their participation was not possible. As such, scope shifted to the use of the USU EVR (Electronic Vehicle Roadway) load, characteristic loads for commercial and residential customers provided by RMP, and deployment and evaluation at the USU site.

Because of the growing demands for microgrids in the United States and limited expertise in this field, the focus of this project was to provide appropriate guidance to help align RMP's interconnection policy with the new interconnection standards being proposed by the Institute of Electrical and Electronics Engineers (IEEE) 1547-2018. Furthermore, the utilization of USU's EVR facility, at its rated capacity of 500 kVA, assisted the project to develop design toolkits and demonstrate integration and optimal control of renewable generation and energy storage on RMP's electric distribution system. Throughout the body of this report, additional description of project tasks, as well as accomplishments, is provided. The objectives that were accomplished include:

- Demonstrate the feasibility of operating a microgrid on RMP's system and its effectiveness in automatically transitioning from grid-connected to islanded mode to provide uninterrupted power supply, thereby improving reliability.
- Assess the gap between microgrid system costs and existing value streams.
- Understand impacts on the RMP's distribution system to inform interconnection policy and standards for integrating microgrids.
- Determine the feasibility of microgrids providing ancillary services and further, if necessary, provide recommendations for a microgrid service program.

The schedule for the planned work is shown in Table 1.

Table 1 – Level 2 Schedule

			Year 2018												Year 2019												Year 2020					
1		Optimization modeling	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
	1.1	Data collection and site characteristics																														
	1.2	Microgrid component planning tool																														
	1.3	Modeling of HAFB microgrid																														
	1.4	Review of interconnection standards																														
	1.5	Assess microgrid value streams																														
2		Microgrid deployment and evaluation																														
	2.1	Assess interoperability of components																														
	2.2	Microgrid design optimization																														
	2.3	Deploy microgrid system at USU																														
	2.4	Initial testing and control improvement																														
	2.5	System performance evaluation																														
	2.6	Data collection and model improvement																														
3		Validation, improvements, and reporting																														
	3.1	Planning tool and facts sheet for project																														
	3.2	Recommendations to intercon. policy																														
	3.3	Quantify microgrid value streams																														
	3.4	Submit report to Utah PSC																														

Microgrid Background

As shown in Figure 1, microgrid is defined as a group of interconnected loads and distributed energy resources (DERs), where the group acts as a single controllable entity with respect to the grid. Key attributes of a microgrid are its ability to manage itself, support grid during abnormal grid conditions, operate autonomously, and seamless connection and disconnection from the utility electric grid based on the power demand and supply requirements. With these attributes, microgrids on the RMP infrastructure are bound to improve reliability and quality of power supply.

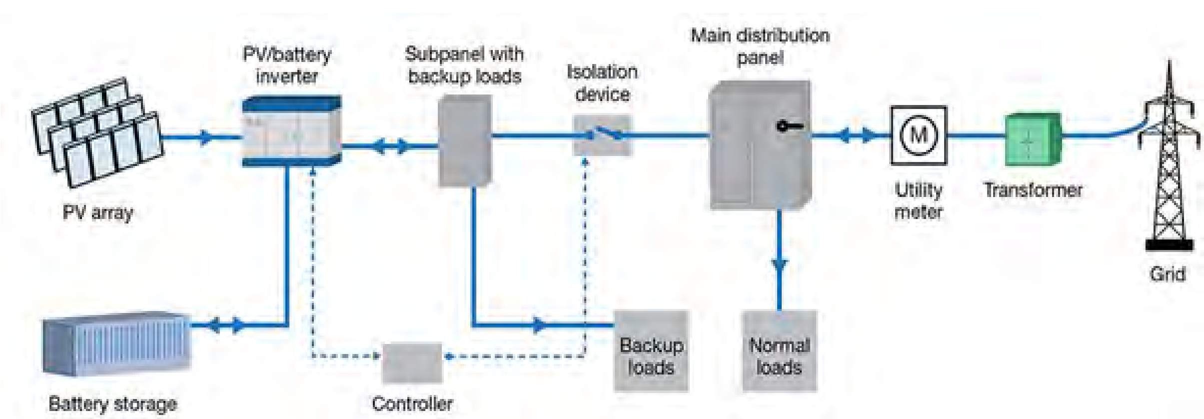


Figure 1. Block diagram of a typical microgrid.

Task 1: Optimization Modeling

T1.1: Analyze load profiles and site characteristics for the USU EVR facility to determine optimal selection of microgrid components

In order to analyze the load and solar generation patterns of the USU EVR, data collection of equipment is necessary. Data collection is an important component of this project because it allows the team to develop a microgrid, by measuring long-term impact and driving system control. USU carried out load profile data collection by establishing a dedicated microgrid server that collects data from microgrid equipment onsite.

Using the data, USU has developed a tool to visualize collected data. Figure 2 below compares how much solar energy is being generated to the meter usage (a negative reading meaning that energy is being pushed back to the RMP distribution grid). The data collected from the point of common coupling with the grid is similar to the load data necessary for the USU Microgrid Design Toolkit described in Task 1.2.

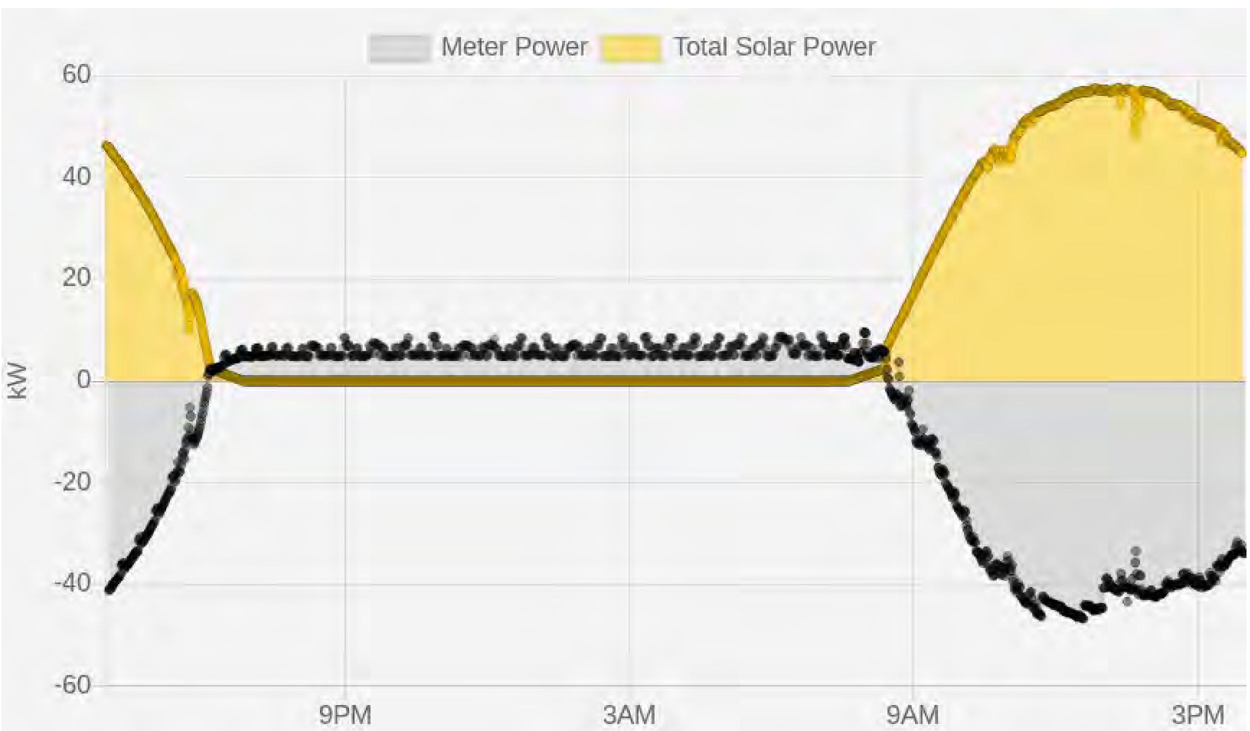


Figure 2. Comparison of EVR meter and solar power over one day.

The collected data indicate that the solar installed at the EVR is usually more than enough to cover its net energy use, however it cannot supply power at nighttime or at certain parts of day when demand is high. The electrical solution to this problem is to continue to use power from the RMP grid when necessary, but the optimal financial solution is a mix of grid connection and energy storage managed by an intelligent energy management system (EMS).

T1.2: Generalize results and develop microgrid component planning tool

The scope of the USU Microgrid Design Toolkit (MDT) is to assess the viability of a microgrid for a customer based on pricing, load profiles, and solar irradiance, appropriately size components for a microgrid, and quantify the effect of the system on the customer's load profile and utility bill. By taking inputs unique to the customer, a unique microgrid can be designed and analyzed for each customer.

The first inputs the tool requests are related to the pricing scheme for the customer. The details of a rate schedule have a major impact on both the optimization of a microgrid system and its financial performance. The MDT considers facility charges, peak demand charges, energy charges, unique rates for PV or battery energy, and recognizes time-of-use and seasonal pricing. For example, a pricing scheme that raises rates during the daytime in summer will necessitate battery storage to charge at night or a large solar array to supply power in the daytime. Additionally, government or utility policy that raises export rates for net-metered customers will give the microgrid better financial performance. The MDT does not currently have a way of implementing a progressive rate scheme.

The second set of inputs for the tool relates to the lifetime and pricing of battery storage and solar PV. The purpose of these inputs is to account for the pricing of equipment purchase and installation when designing and analyzing the microgrid. As the price of storage and solar technology decreases, the net reward of building a new microgrid will increase. The tool requests equipment lifetime, fixed capital (installation) costs, cost per kilowatt of power capacity, and maintenance costs in dollars per kilowatt per year. The tool also asks for battery energy storage cost per kilowatt-hour and for solar panel cell efficiency. Some PV cells may be more efficient but more expensive, so comparing the relative value of different cell types can be performed by running the MDT multiple times with different inputs.

The typical load profile for a customer is necessary to appropriately design and analyze a microgrid system. The load profile is inputted to the MDT as a comma-separated values file representing one year of customer loading. For customers with rate schedules that vary based on time of day or season, having at least hourly load data will be necessary for having a good estimate of microgrid performance. On a rate schedule that uses 15-minute data to calculate peak demand, it would be most useful to have 15-minute data for the load profile, however, the sample time of the MDT can be reduced to 15 minutes or lower, and it will interpolate between points to generate a load estimate for each fifteen minutes.

To appropriately estimate solar power generation, the MDT requires a year of solar irradiance data. The irradiance data is important because sunnier places like St. George, Utah will produce more energy at different times of day compared to cloudier places like Portland, Oregon. The MDT provides a link to download a year of hourly data from NREL containing irradiance data for a customer's nearest metro area.

After receiving the requisite inputs, the MDT first calculates the total energy used by the customer over the course of the year of data. The MDT also calculates the total irradiant energy at the customer's site, and determines the size and rated power of solar panels to meet the total load, thus making the system net-zero energy, although power will still be purchased and sold to the grid.

Having sized the solar array necessary to supply the load's annual energy, the MDT begins work on determining the optimal battery size to maximize the financial benefit for the customer. The MDT uses Matlab's built-in linear programming functionality for solving this problem. For example, if the customer has a pricing scheme that has very high peak energy charges and very low off-peak energy charges, the battery system may be larger. In another case where the customer pays one energy charge regardless of time-of-day and does not pay peak power charges, batteries should not be necessary.

After performing the optimization, the MDT returns the sizing of PV and battery components and returns the estimated financial benefit and payback time for the system to break even (as shown in the figure below). The tool also has an interactive graphic showing the old energy use and new energy use between the new system's components, as shown in Figure 3. The design data and new load shapes can be exported to a .csv file for later use.

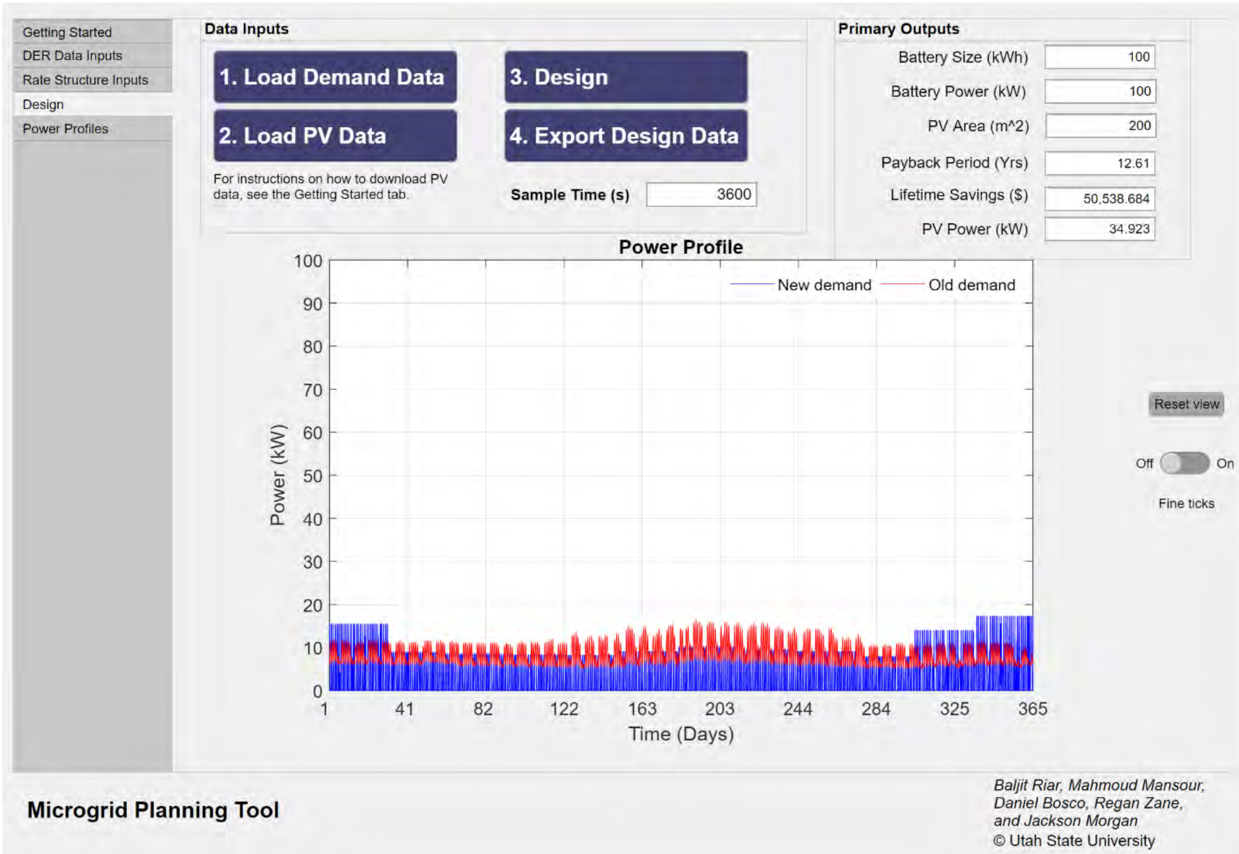


Figure 3. Screenshot from the USU Microgrid Design Toolkit.

Using sample load data from RMP, the MDT performs well for commercial and industrial customers, typically showing a payback period between 5 and 15 years. For single-family homes, energy use is low compared to commercial and industrial customers, and peak demand is typically in the single digit kilowatt range. Due to their small size, single-family homes are difficult for the MDT to find an ideal system due to capital costs. The MDT may be able to find an optimal design if costs decrease. However, multifamily buildings like apartments can be optimized for due to their higher energy usage and peak loads.

T1.3: Apply planning tool to Hill Air Force Base mobile air traffic control area to determine the estimated cost and feasibility of implementing a microgrid at HAFB

This portion of the project was removed from the scope.

T1.4: Determine baseline impacts on the Company's system at the USU EVR point of interconnection

In order to determine impacts of the USU microgrid on the RMP distribution network, distribution simulation software is required. RMP uses Eaton's CYME software for internal simulation of their network. CYME requires a costly license, so USU investigated other tools to use. The best tool USU identified for impact analysis is the Electric Power Research Institute's OpenDSS software. OpenDSS is free and open source, and it has a great degree of documentation available online. CYME files from RMP are being used in OpenDSS after being converted by the National Renewable Energy Laboratory's Distribution Transformation Tool.

OpenDSS can be used with simulated data, or data gathered from the database. USU's simulations in OpenDSS can assess how the microgrid's behavior affects power quality, losses, and reactive power on the RMP distribution network. Using the microgrid data collection process, USU can compare load profiles of the EVR without implementation of the microgrid energy management system against the load profile with EMS implementation. This will allow demonstration of USU's microgrid on the RMP distribution network.

Task 2: Microgrid Deployment and Evaluation

T2.1: Develop simulation models of USU microgrid based on commercially available components, analyze interoperability of components, load, and existing control algorithms

Like most microgrid designs, the USU microgrid at the EVR was designed with solar PV and battery storage. The EVR also has a natural gas generator that can be used as primary power source only if the EVR is islanded from the RMP distribution network.

The EVR has about 120 kW of solar panels onsite. The DC power supplied by the panels is converted into AC power using inverters from several different manufacturers, some of which are single-phase and others which are three-phase. Having several different inverters provides resilience if a single inverter fails for any reason but makes communication with the inverters difficult to streamline.

For energy storage, the EVR has a battery cabinet made by CIE Solutions. The battery pack has 54 kWh of storage capacity and has a maximum power rating of 236 kW. However, in order to interface with the AC power network at the EVR and RMP's network, the battery must be supplied by a power converter. A 100 kW bidirectional Dynapower battery inverter was selected for connecting the batteries to the network.

For emergency islanded power supply capability, a 60 kW/75 kVA natural gas generator made by Kohler is installed at the EVR. The generator is controlled by an SEL 751 relay that activates the generator when the EVR becomes disconnected from RMP's distribution network.

As an electric vehicle research laboratory, the EVR facility sometimes has significant electric loads. USU's connection to the utility is rated at 750 kW, much higher than the solar, generator, and storage combined. As a result, the microgrid equipment is not capable of supplying every load that the utility connection could. The microgrid is designed to reduce peaks and optimize timing of electric power flow with the RMP network and provide short term backup power for necessities at the EVR.

The energy management system controlling the EVR microgrid equipment was originally written in Matlab. Much of the inputs to the EMS rely on Modbus communication with equipment onsite, so the original code was similar to the EVR data collection setup. The data collection system provides a framework for verifying communication with microgrid equipment, and the EMS uses that framework to control the microgrid.

Simulation of the microgrid design can be performed in OpenDSS. By representing the onsite primary power sources (solar, generator) as generators and the battery as an energy storage unit, or more simply as a load or generator, the system can be represented in the context of the RMP network. As described in Task 1.4, real or simulated data can be applied to the OpenDSS model to quantify the effects of the EVR microgrid on RMP's distribution network.

T2.2: Make design modifications necessary for microgrid deployment and evaluation (initial one-line design)

USU has made some modifications to the microgrid setup due to issues with equipment performance. The two most notable changes are the use of a Gustav-Klein power converter in place of the Dynapower unit and the use of Python instead of Matlab for the energy management system.

When attempting to control the microgrid system using Modbus, the Dynapower unit frequently faulted and as a result the EMS was largely full of code trying to reset the unit to get it to function. This was not satisfactory for operation of the microgrid, so USU has been working to get Dynapower to send a new unit. After many months of talks pushing Dynapower for a new unit, USU has still not received one, but Dynapower claims the order is in progress.

While USU awaits a new unit from Dynapower, a similar 250 kW Gustav-Klein unit is being used in its place. The Gustav-Klein is shared for use between several projects at the EVR, so it is not suitable for permanent use, but it does allow USU to continue deployment and testing of the microgrid in the meantime.

Having recognized that Matlab requires a license in most cases, USU has decided to use Python instead of Matlab for the energy management system so that the functionality could be used in future microgrids without licensing costs. A similar change was made for the data collection system, so the transition for the energy management system used much of the same code. The Python port was performed while transitioning from using the Dynapower to the Gustav-Klein, giving USU an opportunity to completely revise the EMS.

T2.3: Procure, deploy and test the microgrid system at the USU EVR facility and evaluate system and component operation

Apart from a replacement Dynapower unit, USU has all the requisite microgrid hardware onsite at the EVR. As described in Task 2.2, USU is working on acquiring a new unit for permanent use as part of the microgrid. In addition to procurement, all the hardware has been installed, although the new Dynapower unit will require installation.

Deployment of the energy management system software for the microgrid is currently in progress. USU will be deploying and testing the EMS incrementally. Communication with microgrid hardware using Python has been established already. The next step is to implement the peak-shaving algorithm that will use the energy storage to flatten the EVR's load profile by discharging when demand is high, as well as charging when demand is low.

After deployment of peak-shaving, USU will continue development of the EMS using predictive analysis and machine learning. The advantage of a more intelligent EMS is that the peak-shaving algorithm is very simplistic and does not factor real-world loading patterns at the EVR, whereas a predictive EMS could better optimize for this particular facility.

T2.4: Update microgrid simulation model based on hardware validated component operation; improve system control algorithm based on observed hardware data

The benefit of using OpenDSS for the simulation model is the ability to plug in real or simulated data. Previously, simulations have occurred using estimates for loading at the EVR, but the data collection system allows the model to be updated with real information. By running the simulation using real data collected from the site, the model more accurately represents the effects of loading at the EVR.

Going further, it is possible to compare the effects of loading at the EVR with and without the microgrid EMS deployment. If both the power flow at EVR-RMP connection and the power flow into or out of the battery are known, then the power that would flow from the RMP network can be calculated. By comparing the two, the electrical impact and financial value streams of the microgrid for the EVR and for RMP can be identified.

As described in Task 2.3, the control algorithm is being modified to perform better than a simple peak-shaver using machine learning reliant on previous data from the microgrid database. There are other factors, like weather or reservation of high-power equipment, that could significantly affect loading at the EVR. Incorporating relevant data will be useful to fine-tune the control algorithm.

T2.5: Investigate the effectiveness of the energy/power management control algorithms utilizing the deployed smart monitoring and smart inverter components

The main source of load monitoring onsite is the Leviton power meter at the point of connection with the RMP distribution network. The Leviton meter measures the secondary side of RMP's 3-phase transformer outside the EVR, including voltages, currents, and powers. Before implementation of the microgrid energy management system, the Leviton meter was the source of load data for the database.

As the microgrid EMS is deployed to use energy storage, the Leviton meter is no longer a representative way to measure the natural loading and solar generation onsite, because some load and generation may be the battery storage. For example, there may be 50 kW of net loading at the EVR, but only appear to the Leviton meter as 10 kW, due to the battery supplying 40 kW of power. This discrepancy necessitates the need to account for the power of the battery when the EMS is running, by measuring the power at the Gustav-Klein unit and eventually a new Dynapower unit.

In order to properly measure the net loading of the site, the power out of the battery has to be added to the power into the Leviton meter from the RMP network, to represent the 50 kW load in the example above. In the case of any arbitrary microgrid, measuring loading patterns on the customer side will necessitate measurement of onsite energy generation and energy storage. However, on the utility side, measuring the "load" patterns of the customer could be done using simply the meter at the point of common coupling, since the relevant information to the utility is the total power into or out of the site, not the specific pieces of equipment responsible for it.

T2.6: Collect microgrid operational data throughout the project

Originally, data was collected through Matlab and the collection was not continuous. Starting in early 2019, the goal was made to have a script running full-time on a dedicated server for data collection. The earlier Matlab code was converted into Python and data collection on that was started July 2019 with one inverter. The meter and three more inverters were added later that year. This has been running essentially continuously since then.

Data is stored in a SQL database on an on-site server. The sample rate for the data is every 10 – 20 seconds, and to date no data has been purged. We initially had concerns that the database would grow very large quickly. This issue has not been as large as we thought so we have been able to hold on to more data than we anticipated, though some amount of down-sampling will need to be implemented for long-term use.

Data collection is ongoing as the microgrid EMS is deployed and modified. The data from before deployment is valuable for comparison with data generated after deployment. Additionally, the database will be valuable for verification that the microgrid EMS is functioning as intended. As described in Task 3.3, the value streams for the customer and the utility can be calculated by comparing the customer's load profile due to the microgrid with the business-as-usual load profile.

74,674 kWh of solar energy has been generated.

The plot below in Figure 4 shows the weekly peak demand at the EVR including solar power. For comparison, an additional plot shows what the peak power would have been without the presence of solar generation.

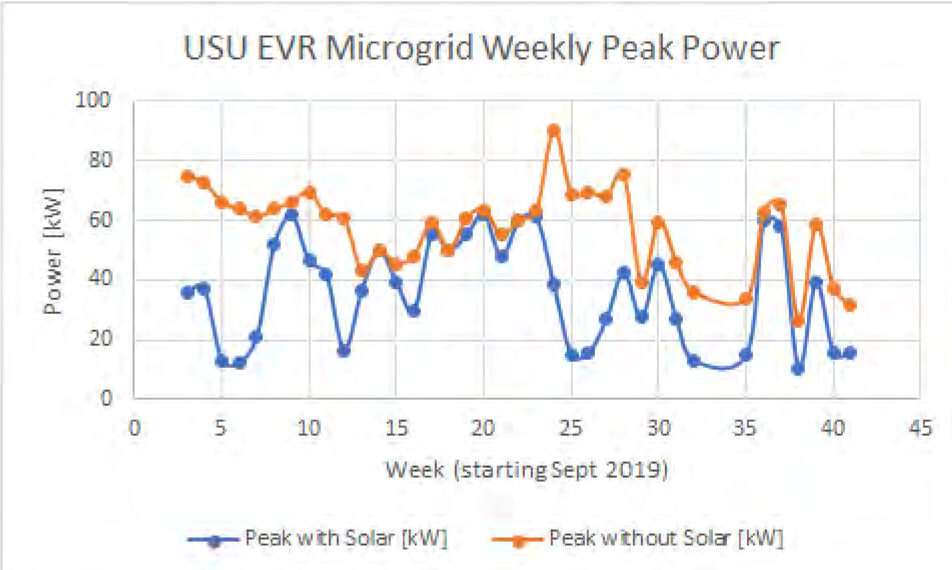


Figure 4. USU EVR microgrid weekly peak power demand with and without solar power.

Task 3: Validation, Improvements, and Reporting

T3.1: Create fact sheets for planning tools and project developments and hardware data

USU has written a fact sheet for its Microgrid Design Toolkit. The fact sheet is intended to show how the MDT can be used to assess microgrid viability for a customer, given inputs about equipment and power costs, load profile, and solar irradiance data. The intended audience is RMP customers interested in microgrids, as well as RMP employees who may have to use the toolkit to design a microgrid for a customer.

USU is also working on a fact sheet describing its microgrid at the EVR in terms of equipment and functionality. USU has enough information about the equipment and intended energy management system but has not yet collected enough information about the performance of the EMS. It would also be valuable to include cost-saving information, which will be calculated as the microgrid is deployed at the EVR.

T3.2: In coordination with the Company, identify existing gaps in the Company's interconnection standards and propose recommendations

The installation of microgrid hardware at the EVR has taken place following standards laid out in RMP's Policy 138 or "DISTRIBUTED ENERGY RESOURCE (DER) INTERCONNECTION POLICY", which is the RMP standard for connecting distributed energy resources. Policy 138 presented some challenges for USU's installation of the microgrid, but changes to the policy have removed some challenges.

One requirement of Policy 138 is to have disconnect switches for each inverter onsite to be visible and located within ten feet of the utility meter. Due to space limitations, the AC disconnects were not able to be located next to the meter.

Another requirement had dictated that there be a grounding transformer as a form of transient overvoltage (TROV) protection on the system. Policy 138 required the transformer to be located at the POI of the solar array, but the microgrid system required a neutral reference when disconnected from the grid. This requires the neutral reference be located at the service entrance and automatic transfer switch rather than the solar array POI. However, with changes to the TROV protection, inverters that adhere to the IEEE 1547-2018 standard are satisfactory and negate the need for a grounding transformer.

Using the EVR microgrid as a test case for the Policy 138 standards, some key lessons were learned. Use of an SEL 751 protection relay demonstrated that relays have a fast response to grid/facility transients and can be used to monitor energy storage and disconnect the energy storage or facility from the grid. AC and DC disconnects on the inverters are lockable, and could serve as the utility-required disconnects for DER interconnection.

T3.3: Analyze and quantify microgrid value streams based on actual data compared to simulated results (from T1.5)

There are multiple value streams for the EVR microgrid, both to the customer or microgrid operator and to the utility. The most apparent value stream is the energy generation from the onsite solar panels. By producing energy onsite, the customer does not need to buy as much total energy from the utilities and will sometimes produce more energy than is used in a given day. The energy generation value stream is not unique to microgrids but exists for any onsite electricity generation from sources like solar, combined heat and power, etc., and the value can be calculated using the established utility rate structure.

The second value stream for the customer is the ability to intelligently reduce peak demand charges. The customer pays peak demand charges for their highest 15-minute power consumption during the month. Even if the customer produces more total energy than they consume in a month, the customer will stay pay a demand charge when drawing power from the utility. The intelligent energy management system can respond to increased onsite loading by discharging the energy storage to reduce peaks. Conversely, the energy storage can be charged to fill in gaps between peaks, in order to maximize the value of the peaks the customer has already reached. The peak-shaving value stream can be calculated by

An additional value stream that is more difficult to quantify is the value of having backup power available to the microgrid operator if the grid is unavailable due to a blackout. The evidence is clear that resilience to continue operations in the event of a blackout gives a microgrid operator a significant advantage compared to typical utility customers, but the value of this feature is unclear.

While a customer with a microgrid may save money on their bills to the utility, electrical distribution is not a zero-sum system, and the utility can still benefit. The most apparent benefit is the ability of intelligent microgrids to reduce peaks. The distribution network is designed to meet a peak condition on the system and must be overbuilt so the loads on the network never exceed the limit. Microgrids demonstrate a capability to reduce peaks on the system, which removes the necessity for some overbuilding of infrastructure. By reducing the need for infrastructure investments to handle peak loading conditions, microgrids allow the utility to allocate capital to more pressing projects.

By reducing peaks, a microgrid can also reduce line losses on the distribution network. Customers pay for the energy and peak power used at their facility, but there are active and reactive power losses along the distribution network due to current flow from the substation to the customer. The line losses must be covered by overgeneration from the utility, as they cannot be easily assigned to any customer. As demand on the network increases, so do currents on the line and line losses as a result. A microgrid that can reduce peaks can reduce the amount of active and reactive power lost on the lines.

While microgrid deployment at the EVR is ongoing, USU has identified the value streams above and is able to quantify the value of energy generation, peak-shaving, and line loss reduction. As the microgrid is deployed and improved, USU will be able to calculate the financial benefits both for the customer (the University) and for RMP.

STEP Project Report

Period Ending December 31, 2020

STEP Project Name:

Smart Inverter Project (COMPLETE)

Project Objective:

To investigate the capabilities of smart inverters and their impact and benefit for the Company's electric distribution system.

Project Accounting:

	2017	2018	2019	2020	Total
Annual Collection (Budget)	$0.00	$450,000	$0.00	$0.00	$450,000
Annual Spend (Capital)	$0.00	$0.00	$0.00	$0.00	$0.00
Committed Funds	$0.00	$0.00	$0.00	$0.00	$0.00
Uncommitted Funds	$0.00	$0.00	$0.00	$0.00	$0.00
Internal OMAG Expenses	$0.00	$33,861	$0.00	$0.00	$33,861
External OMAG Expenses	$0.00	$349,998*	$0.00	$0.00	$349,998
Subtotal	$0.00	$383,859	$0.00	$0.00	$383,859

*External OMAG includes a contractual payment of $250,000 to Electric Power Research Institute and $100,000 to Utah State University for their services on the project.

Project Milestones:

Milestones	Delivery Date	Status/Progress
Hosting Capacity Study of RMP Distribution Circuits	6/31/2018	Complete
Laboratory Evaluation of Smart Inverters	09/30/2018	Complete
Smart Inverter Setting Analysis	8/31/2018	Complete
Review of Interconnection Requirements and Industry Practices	10/31/2018	Complete

Key Challenges, Findings, Results and Lessons Learned:

Description of Investment

STEP funding for this project was used to investigate the capabilities of smart inverters and their positive and negative impacts on RMP's electric distribution system.

Anticipated Outcome

- Evaluate readiness level of smart PV and battery inverters to comply with the new IEEE 1547-2018 standard.
- Performance analysis of smart inverters during both steady state and transient operating conditions.
- Investigate hosting capacity and potential benefit of smart inverters for several Rocky Mountain Power feeders.
- Analyze smart inverter settings in detail for two different feeders, and report on the range, requirements, and benefit of adjustability.
- Summarize current utility practices for voltage/frequency ride-through and communication between inverters and utility.

Challenges

- There are differences in the ability to control the inverters using Modbus communication protocol, and all the settings cannot be programmed using this protocol.

Findings/ Results

- All the tested PV inverters are compliant with the settings listed in category 2 of the IEEE 1547-2018, except Inverter 2, which is only compliant with category 1, and hence can only be used in areas with low distributed energy resources (DER) penetration.
- Three phase PV inverters are capable of injecting 100% and absorbing 95% of rated active power. Single phase PV inverters, however, are capable of injecting and absorbing 45%-65% of rated active power.
- Over the load range of 10%-100%, the efficiency of all the inverters is higher than 95%
- The battery inverter does not comply with most of the tests designed for smart inverter testing.
- The battery inverter ensures a continuous supply to the backup load, and establishes its local voltage within two fundamental cycles.
- Some of the distribution feeders studied showed hosting capacity gains by using smart inverters; however, most saw limited improvement due to already being thermally constrained.
- Because improvements in hosting capacity depended greatly on the connection point, the improvements were smaller for distributed systems than central systems because the locations were less finely controlled.

Lessons Learned

- The performance of all PV smart inverters matches closely to the manufacturer specifications. However, for the same power ratings, the performance of inverters differs among manufacturers.
- All PV inverters are suitable for grid integration in accordance with several of the IEEE 1547-2018 standard requirements, and autonomously support grid during voltage transients.
- In addition to hosting capacity, reactive power from inverters can be used to improve distribution losses and substation power factor.
- With the “best” settings, Volt-VAR control performed better than the fixed power factor function; however, with bad settings the performance was worse than all fixed power factor levels.
- Use of several smart inverter functions (such as Volt-VAR) will require updates to PacifiCorp’s Generator Interconnection Policy (Policy 138).
- IEEE 1547 introduces the requirement for DER to have communications capability over an open protocol, utilities have not converged on an approach to interfacing with these devices.

Program Benefits

- This program will enable a greater understanding of these innovative solutions as the Company continues to make the grid more progressive.
- Provides the Company, Commission, and other stakeholders with information regarding the capabilities of advanced inverters and changes to interconnection standards.
- The findings from this project will assist the Company in updating PacifiCorp Policy 138: Distributed energy resource interconnection policy.
- Enables the Company to gain knowledge on smart inverter operation for solar and battery combined projects.
- Enables the Company to become familiar with and utilize innovative technologies to provide customers with solutions to power quality issues.
- Provides guidance to the Company’s distribution engineers to enhance the distribution planning process.
- The Company continues to experience rapid growth in interconnection requests and considers innovative technologies such as smart inverters a valuable tool to improve service to customers.
- Provides a better understanding of smart inverter settings that will potentially assist in improved utilization of grid assets, leading to cost savings for customers.
- This project aligns with the goals of the program to support the greater use of renewable energy. Through this project, the Company is taking steps to prepare for increased deployment of distributed and renewable energy sources for its customers.

Potential future applications for similar projects:

Develop an automated hosting capacity analysis tool to leverage on smart inverter capabilities and provide enhanced grid support using DER systems connected to the distribution system.

STEP Project Report

Period Ending December 31, 2020

STEP Project Name:

Battery Demand Response

Project Objective:

Rocky Mountain Power has partnered with Wasatch Development on their 600 unit multi-family development in Herriman, Utah. The apartments, known as Soleil Lofts, feature solar panels on the rooftops and a large storage battery within each unit. The batteries are integrated to the grid for system-wide demand response. The Battery Demand Response Project provides Rocky Mountain Power experience in solar and battery integration. The Company will also gain valuable real-world experience in advanced grid management during peak/off-peak energy use.

There are three main objectives we are seeking with this program: 1) better understanding of demand response 2) how behind-the-meter behavior affects load shaping, and 3) insights into creating rate design for customers with batteries.

Demand Response: The partnership with Wasatch Development will allow the company to utilize each battery for demand response at any given time. The Company can draw on this resource during peak grid loads which will reduce the peak load for the entire electric system.

Load Shaping: The Company has historically had limited access to behind-the-meter data. In the future, similar projects will likely be added to the grid and will interact with the grid load in new ways. Information gained in this project will help the Company plan for these future integrations.

Rate Design: By looking at behind-the-meter battery behavior, the Company can better understand how to create rate design pilots for customers with batteries.

Table 1 Project Accounting:

	2017	2018	2019	2020	Total
Annual Collection (Budget)	$0	$0	$0	$0	$0
Annual Spend (Capital)	$0	$0	$4,270	$1,731,293	$1,735,563
Committed Funds	$0	$0	$0	$0	$0
Uncommitted Funds	$0	$0	$0	$0	$0
Internal OMAG Expenses	$0	$0	$0	$0	$0
External OMAG Expenses	$0	$0	$0	$0	$0
Subtotal	$0	$0	$4,270	$1,731,293	$1,735,563

Table 2 Project Milestones:

Milestones	Delivery Date	Status/Progress
Project Approved by Public Service Commission of Utah Docket No. 16-035-36	June 28, 2019	Approved
Battery installations start	July, 2019	Completed
First Building Completed	September, 2019	Completed
Soleil Lofts become available for occupancy	Third quarter 2019	Completed
Project Kickoff meeting with PacifiCorp and Sonnen	December 1, 2019	Completed
Develop preliminary system communication design	December 15, 2019	Completed
RTU Configuration	March 31, 2020	Completed
Establish VPN setup and establish security protocol	March 31, 2020	Completed
Battery Demand Response (DR) test event	May 2020	Completed
Battery dashboard developed	October 2020	Completed
Frequency response capability complete	February 2021	Completed
Enhancements to Battery Portal	Continual 2020/2021	Ongoing
Last building completed.	June, 2021	Scheduled
Full 4.8 MW available for control	June/July, 2021	Scheduled

Project Progress:

- ✓ 2019 – Five buildings completed (125 units)
- ✓ 2020 – Thirteen buildings completed (318 units)
- ✓ 2021 – Estimated facility completion June – twenty-two buildings (600 units)

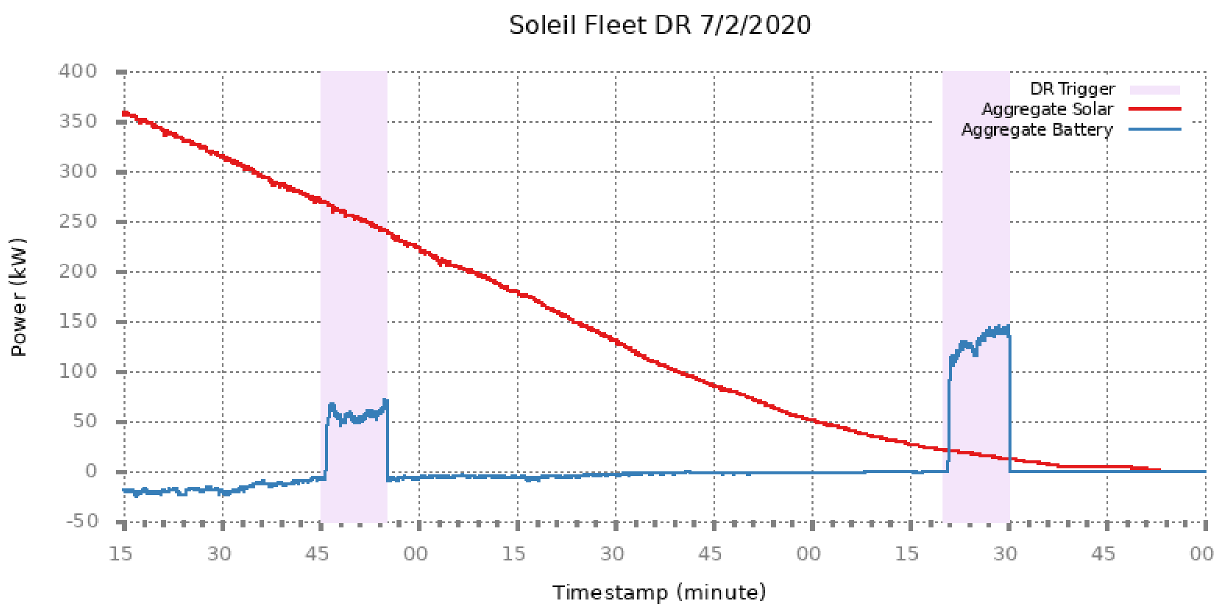
System Security:

During quarter one and two of 2020, the project team from Rocky Mountain Power and Sonnen collaborated to develop a secure communication platform. The goal of the platform was to develop direct real-time communication from PacifiCorp's Energy Management System to Sonnen's battery management system. The design was approved by PacifiCorp's corporate security in compliance with industry best practices for Information Technology (IT) and cyber security. The system was tested and verified to meet requirements before battery demand response test events could occur.

Battery Demand Response Events:

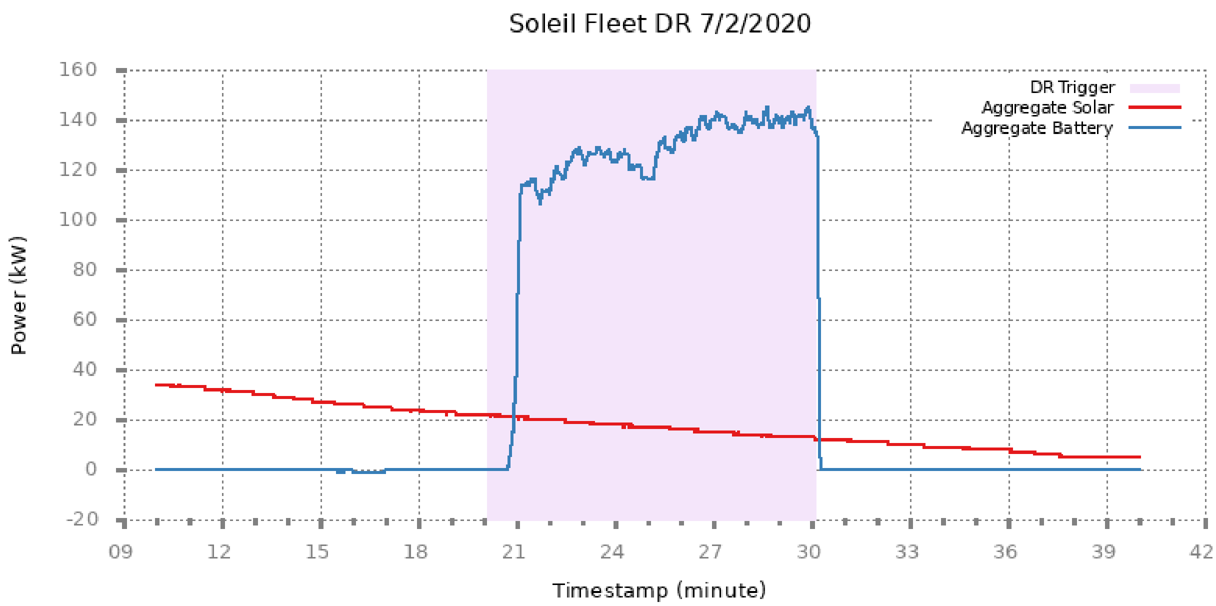
After a secure platform was developed, battery demand response testing could occur. The use case for Soleil batteries, was to utilize batteries to provide energy for the individual Soleil apartments, instead of relying on grid power to supply that energy. The question was, can batteries be used to provide power to a Soleil unit during a grid outage? Another objective of the project was to determine if batteries can reduce load during peak periods at Soleil? The data and information contained throughout this report provides detail and insight on the interactions between solar, batteries, load, and grid power during different conditions and seasonal periods. The below figures represent data from an early demand response test event. This test scenario represents a typical summer day. As noted in the graph below, the solar production decreases significantly in the evening. During a typical summer day load/demand remains constant and demand for energy remains high during evening hours when solar production stops. Figure 1 shows a use case that batteries can provide renewable energy during peak periods when solar production is decreasing or not available. This example is a proof of concept that batteries can be utilized to reduce load on the electrical grid.

Figure 1: Battery Demand Response (DR) Event July 2, 2020



- During the first demand response event the batteries (blue line) only needed to assist with roughly 60 kW to meet the overall power demand from Soleil, most of the energy still came from solar (red line)
- During the second event it was a different scenario: Soleil batteries provided up to 140 kW, with minor assistance from solar to meet power requirements for Soleil.

Figure 2: Detailed view of the second DR event, July 2, 2020



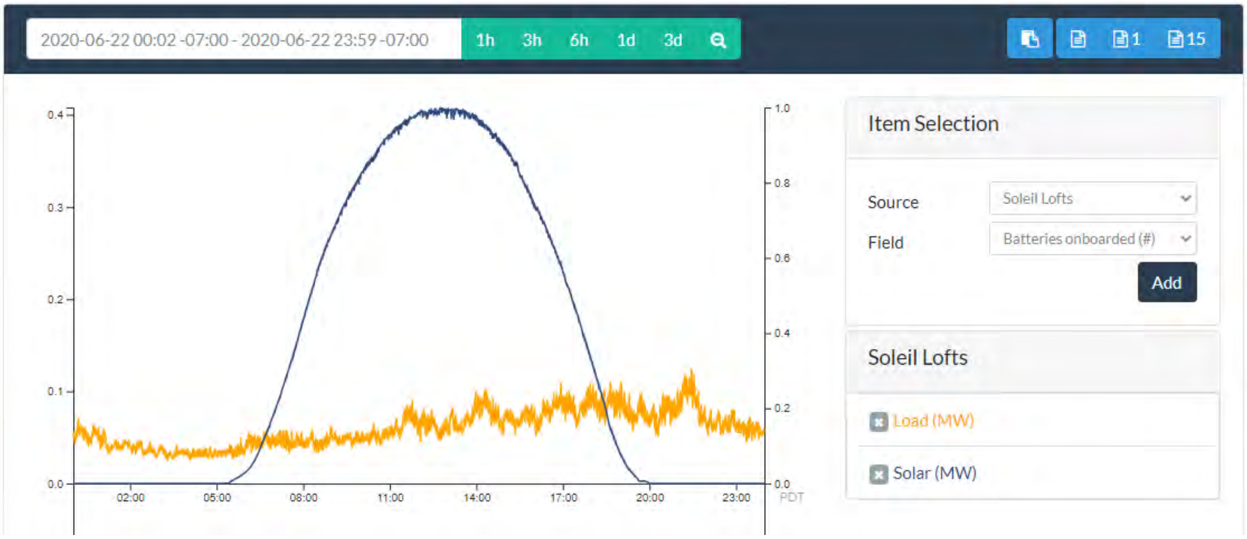
Note: Soleil solar fading out and batteries compensating for that with rising output.

Once the functionality was developed and proven effective in dispatching batteries for demand response events. Rocky Mountain Power was actively using batteries to offset grid load from Soleil. Generally, demand response battery events occurred daily during the second half of 2020.

Solar load shape for Soleil:

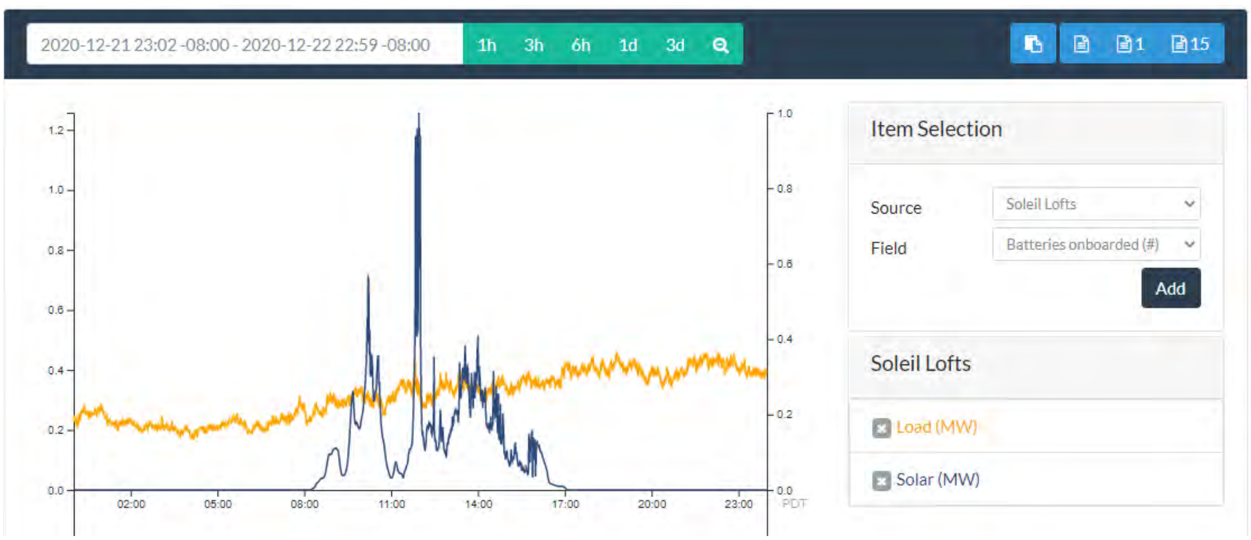
Each unit at Soleil Lofts in Herriman, Utah has dedicated solar panels to provide solar power to supply units with energy. Excess solar generation can be used to recharge Soleil batteries. During a normal sunny day during the spring, summer and fall months as indicated below in figure 3, the overall solar production exceeds the overall load from Soleil. In general, solar generation is providing energy for the complex during the day light hours. Excess solar generation is used to charge the batteries and then exported to the grid.

Figure 3: June 22, 2020; sample solar and load profile



Note: Yellow line represents the aggregate load for Soleil, blue line represents the overall solar production. When blue line exceeds yellow line, solar is supplying power to Soleil and exporting excess to the grid.

Figure 4: December 22, 2020; sample solar and load profile

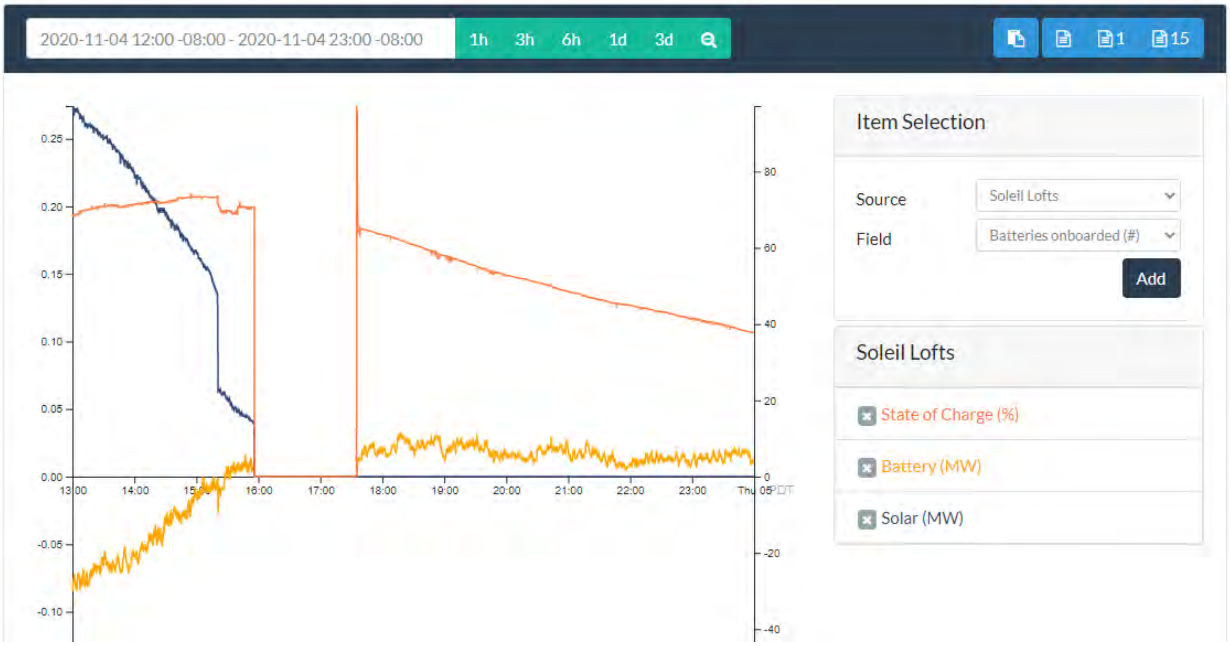


Note: As indicated in figure 4; yellow line represents Soleil load in aggregate which is relatively consistent month over month. Blue line represents solar production during the winter. On this date, solar production was low and fluctuated hour by hour due to changing weather conditions. Under this scenario, there was not sufficient solar to offset the load requirements at Soleil.

Grid Outages:

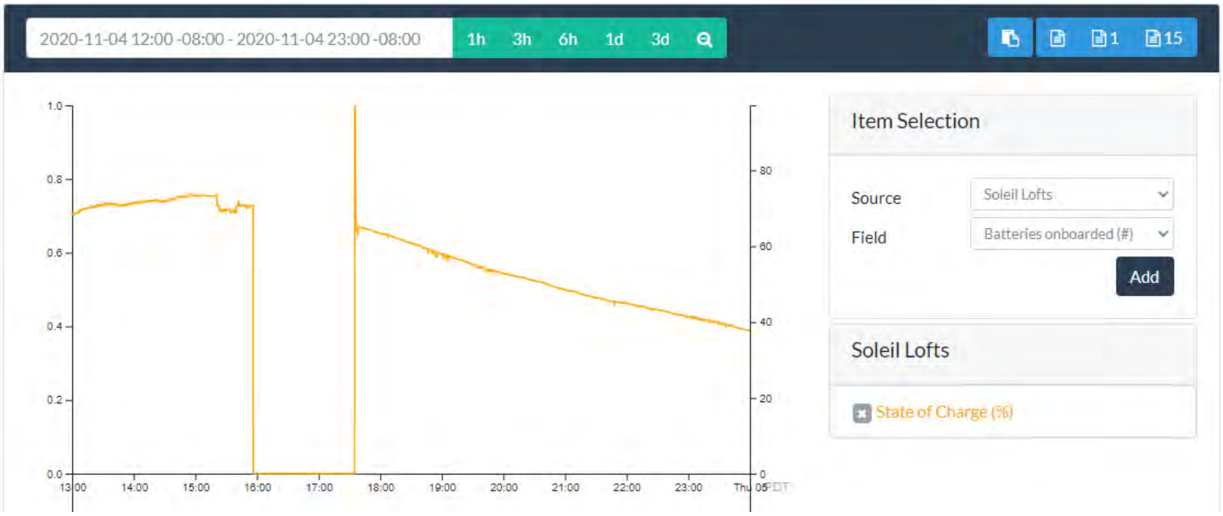
One of the most important questions regarding this project from a participating customer's perspective was, how would batteries respond during an actual grid outage? Would the batteries provide sufficient backup power to meet the needs of the consumer? On November 4, 2020 an actual grid outage occurred at Soleil lofts. Figure 5 provides insights on how the outage impacted Soleil Lofts.

Figure 5: Nov 4, 2020: Soleil power outage; impact of batteries and solar



Note: Figure 5 shows the impact of batteries and solar during an outage. Solar (blue line) had significantly dropped off at this point in the day and provided little to no energy during the power outage. Batteries (yellow) provided full power for the units during the 90-minute outage. The grid outage did not cause a power disruption to tenants at Soleil.

Figure 6: Nov 4, 2020; Soleil power outage

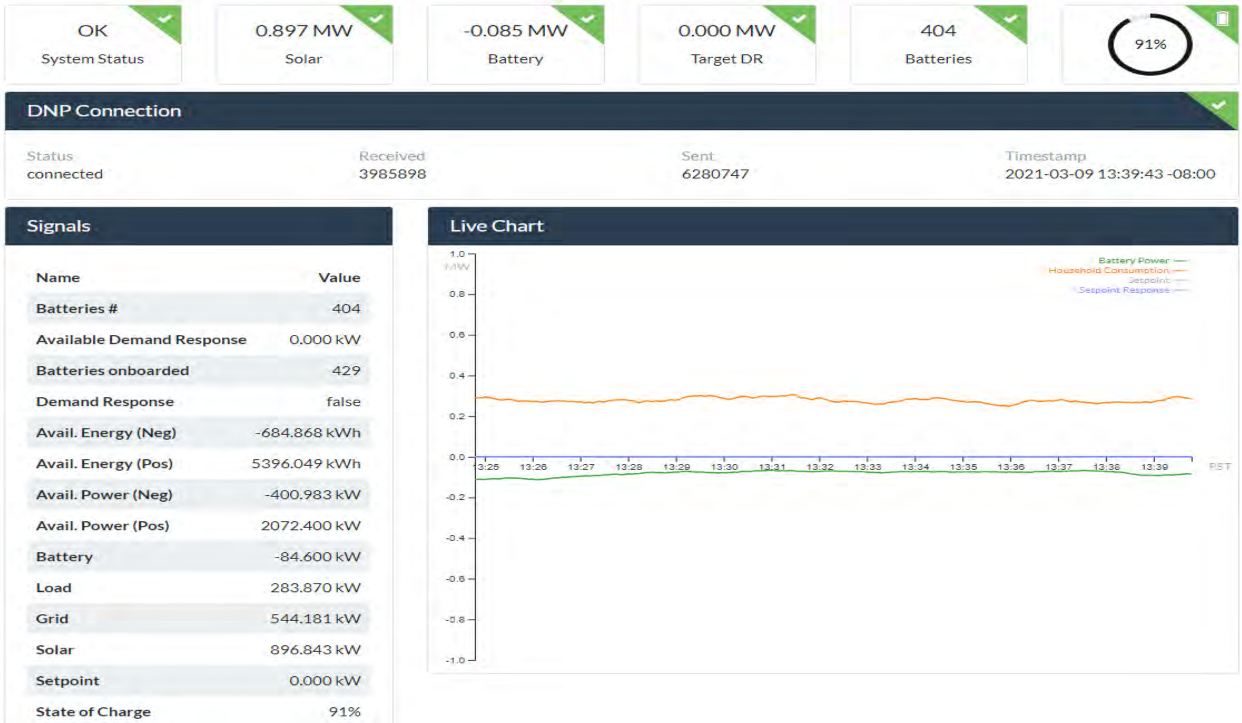


Note: Yellow line represent the batteries state of charge. Soleil batteries in aggregate were at 70% prior to the outage and after a 90-minute outage the batteries state of charge was 65%.

Project Enhancements:

The development of the Soleil behind-the-meter battery storage project is providing valuable data to understand how renewable energy through batteries and solar can transform the modern grid. As part of the Soleil project and in coordination with Sonnen, a battery dashboard was developed during 2020 which provides real-time data. These data points include solar, battery power, load, grid power, available kWh, available kW and other data points which are archived at 1-2 second intervals. Below is a real-time snapshot of the battery dashboard showing the Soleil facility in aggregate.

Figure 7 – Battery dashboard Soleil Complex



Next Steps 2021:

The Soleil complex is on schedule to be completed in June 2021. At completion, the complex will have twenty-two building and 600 units available for lease in Herriman, Utah. During 2021, Rocky Mountain Power will continue to develop and expand the use cases for behind-the-meter battery storage. In development, during 2021 is enhance to the communication platform between PacifiCorp's Energy Management System and Sonnen's battery management system. These enhancements will allow more flexibility to utilize battery demand response for greater smart grid applications such as frequency response, contingency reserves, and peak load management.

Using batteries for demand response at Soleil have not negatively impacted battery efficiency. Battery efficiency will continue to be monitored throughout 2021, to determine if daily use of Soleil batteries in negative impacting efficiency and/or performance.

STEP Project Report

Period Ending December 31, 2020

STEP Project Name:

Intermodal Hub

Project Objective:

The Intermodal Hub Project will develop a power balance and demand management system for multi modal vehicle charging at sites with high peak power demand. The Intermodal Hub Project is designed to address the high cost of grid infrastructure needed for high output chargers by researching methods to adaptively manage power flow between the grid and various electric charging needs. The project will combine a diversity of electric charging needs (light rail, bus, passenger, truck, and ride hailing services) at an intermodal transit center to create a multi-megawatt, co-located, coordinated, and managed charging system.

Project Accounting:

	2017	2018	2019	2020	Total
Annual Collection (Budget)	$0.00	$0.00	$0.00	$0.00	$0.00
Annual Spend	$0.00	$0.00	$802,510	$890,953	$1,693,463
Uncommitted Funds	$0.00	$0.00	$0.00	$0.00	$0.00
Internal OMAG Expenses	$0.00	$0.00	$0.00	$0.00	$0.00
External OMAG Expenses	$0.00	$0.00	$0.00	$0.00	$0.00
Subtotal	$0.00	$0.00	$802,510	$890,953	$1,693,463

Project Schedule:

Project Task	2019		2020				2021			
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Analysis and Planning	■	■	■							
Simulation Planning/Validation			■	■	■	■	■			
Testbed for Software/Hardware				■	■	■	■	■		
Deployment and Evaluation						■	■	■	■	■

Project Milestones:

Milestones	Delivery Date	Status/Progress
Task 1 Analysis and Planning: Multi modal charging analysis (power levels, vehicle types)	3/31/2020	Complete – Consideration of current e-buses and charge equipment requirements have been accounted in learning model. Priority meters across the UTA site have been identified. Coordination with both UTA and RMP to obtain meter history for input to learning algorithms and load modeling. Continued development of model to simulate site dynamics and load optimization.
Task 1 Analysis and Planning: Distribution capacity/needs/impact analysis	3/31/2020	Complete – Ongoing development of Open DSS model to evaluate electric distribution loading. Conversion of CYME files to model input format. Required meter information received for model implementation – source UTA monthly metering reports.
Task 1 Analysis and Planning: City and suburban level planning of grid and transportation charging integration	3/31/2021	Complete – Site walk/review and CYME files of grid. Open DSS modeling to identify capacities and optimization potentials for charging equipment.
Task 1 Analysis and Planning: Confirm study participants in addition to UTA (e.g., fleet, including delivery and ride hailing participant vehicles)	3/31/2020	Complete – Determination with site (UTA) of current electric bus status and future planning. Site review for feasibility of EV public access and control. Discussions with EV charging equipment vendors (ABB) and third-party EV

		managers (Greenlots, EV Connect) to understand limitations of current management software and identify requirements for active control through USU developed algorithms.
<u>Task 2 – Distribution System Simulation Planning and Validation</u> Design initial intelligent prediction algorithms and demand response concepts	3/31/2021	Complete – Algorithm development in Python. Integration of learning algorithm with agent model. Identification of rewards (e.g. pricing, battery SOC, load optimization, etc).
<u>Task 2 – Distribution System Simulation Planning and Validation:</u> Develop system simulation models for charging network and agent-based vehicle response	3/31/2021	Complete – Initial agent-based models developed through Open AI Gym and Python. Reward identification and coding in process. Continued inputs and improvements as data inputs are received (both historical and real-time when available).
<u>Task 2 – Distribution System Simulation Planning and Validation:</u> Collect data from TRAX power feed and TRAX light rail cars; e-bus fleet; all charging equipment; fleet (including delivery and ride hailing participant vehicles) Data used for algorithm development and as machine learning training datasets	3/31/2021	In Progress (pending site installs of TPSS upgrade and CNG station-historical and monthly data are being used for these inputs) –Receipt of historical meter data from RMP for identified priority meters. New Flyer e-bus performance reports and API establishment for real-time input. ABB depot charger data through UTA monthly reports. ABB data at EVR, initial testing, completed through OCPP server development. Planning stages for integration of ABB chargers at UTA station to OCPP server. Siemens upgrade to TPSS in progress, to facilitate real-time data input.

Task 2 – Distribution System Simulation Planning and Validation: Perform systems level simulation analysis for early and broad deployment scenarios, validate benefit of managed approach when compared to worst-case design approach	3/31/2021	Complete – Review of monthly billing and meter data. Modeling of TRAX and e-buses, and the effect of charging on demand response load data/distribution network. Cost-benefit analysis to understand charging optimization and impacts to the grid – future infrastructure upgrades.
Task 3 – Testbed for Software/Hardware Development and Integration: Specify, bid, and procure system hardware	6/30/2021	In Progress – Learning software for EVR testbed complete, along with training of agent. Server for communication to the chargers is complete and tested.
Task 3 – Testbed for Software/Hardware Development and Integration: Anticipate needs for and develop cyber security management Design for compatibility with and security of communication network	6/30/2021	In Progress – Cyber security vulnerabilities are being identified for EVR testbed. Discussion pending with UTA IT department to identify additional security constraints for network.
Task 3 – Testbed for Software/Hardware Development and Integration: Write code and program algorithms on servers Algorithms include energy/load balancing and management Design for compatibility with AMI	6/30/2021	In Progress – Codes written for EVR testbed include energy/load balancing and management (EVR EMS). Test scenario and code development/training for learning agent complete. Scripts in progress to establish communication between models (input/outputs).
Task 3 – Testbed for Software/Hardware Development and Integration: Evaluate hardware system (with integrated software) at the USU EVR	6/30/2021	Not Started
Task 3 – Testbed for Software/Hardware Development and Integration:	6/30/2021	Not Started

Iterate algorithm designs and develop pilot demand response program		
<u>Task 4 – Deployment and Evaluation:</u> Integrate hardware and software systems with UTA and RMP equipment and cyber secure communication network	12/31/2021	Not Started
<u>Task 4 – Deployment and Evaluation:</u> Integrate hardware and software systems with UTA and RMP equipment and cyber secure communication network	12/31/2021	Not Started
<u>Task 4 – Deployment and Evaluation:</u> Integrate hardware and software systems with UTA and RMP equipment and cyber secure communication network	12/31/2021	Not Started
<u>Task 4 – Deployment and Evaluation:</u> Deploy hardware system at the UTA multi-modal hub site through a phased approach in direct coordination with IT and operations at UTA	12/31/2021	Not Started
<u>Task 4 – Deployment and Evaluation:</u> Finalize recruiting, engage work with participants for pilot demand response program	12/31/2021	Not Started
<u>Task 4 – Deployment and Evaluation:</u> Integrate real-time data collection from all partners and participants into the hardware system	12/31/2021	Not Started
<u>Task 4 – Deployment and Evaluation:</u>	12/31/2021	Not Started

Evaluate power control and demand response performance; iterate algorithms; develop best practices and recommendations		

Key Challenges, Findings, Results and Lessons Learned:

Description of Investment	Anticipated Outcome	Challenges	Findings	Results	Lessons Learned
a. Understanding of system and energy requirements to be managed	a. Gather necessary meter inputs from site loads and charging equipment. Develop learning and electrical system models.	1. Charge equipment and meter information in as close to real-time as possible	1. In Progress	1. In Progress	1. Continued efforts in installing required hardware for metering information 2. Determined type of equipment upgrades required at TPSS to enable active data acquisition. 3. Upgrade installation in progress
a. Active control of EV equipment – OCPP communication (Open Charge Point Protocol)	a. Receive inputs in real-time and actively control EV equipment	1. Installation of local communication for real-time data and active control. Limitations/lag through cloud database and current OCPP 2. Debugging of OCPP server, requires ABB assistance. ABB equipment supports OCPP 1.6 – however multiple standard interpretations by ABB requires ABB technicians to support	1. In Progress –	1. In Progress	1. Realtime control anticipated to be accomplished in a laboratory setting and limited communication requirements, with increased complexities and public access, integration with third-party EV managers necessary. Currently these third-party managers are not actively controlling charge capacity to assist with load balancing across a site. 2. Lessons learned documentation for building OCPP for control of ABB units. Will enable better rollout for future applications.
a. Learning algorithm development as it applies to	a. Established more simplistic interpretation	1. Identification of critical elements to the training and application of the	1. In Progress	1. In Progress	1. Identified critical elements to the training

Intermodal Hub problem	of Intermodal Hub problem to initiate agent training. Increased complexity over training iterations	EVR testbed. Scaling application to Intermodal Hub site, with hardware limitations at the EVR (e.g. EVR does not have access to or the same BEBs as UTA – limits in data inputs for training model)			2. Establish data input requirements – frequency, units, time stamping

Potential future applications for similar projects:

A key outcome of this project will be a "roadmap" for high power electric vehicle charging complexes that leverage existing infrastructure from dominant peak loads such as TRAX to support a host of additional multi modal vehicle charging needs at minimal cost. The roadmap guides the confluence of accommodating different vehicle types with combined known loading and scheduling of charging (expected and variable) and peak pricing/surge charging to level peak demand loading on the grid.

The system will serve as a model for deployment of highly efficient and intelligent power management systems to additional UTA and Company sites. It also enables leadership in managing charging demands that can disseminated to other agencies regionally, nationally and globally.

STEP Project Report

Period Ending December 31, 2020

STEP Project Name:

Advanced Resiliency Mangement System

Project Objective:

The ARMS project enables outage notifications from existing ERT[1] electric meters, installation of communication radios on distribution line equipment, and deployment of line sensor technology on distribution circuits. These technologies connect critical customers and enable real-time information exchange with the Company's control center. The Company will also study if there would be benefits of deploying this technology on distribution circuits that have poor reliability.

Project Accounting:

	2017	2018	2019	2020	Total
Annual Collection (Budget)	$0	$0	$1,430,000	$2,874,624	$4,304,624
Annual Spend (Capital)	$0	$0	$39,931	$2,874,624	$2,914,555
Committed Funds	$0	$0	$0	$0	$0
Uncommitted Funds	$0	$0	$0	$0	$0
Internal OMAG Expenses	$0	$0	$0	$0	$0
External OMAG Expenses	$0	$0	$0	$0	$0
Subtotal	$0	$0	$39,931	$2,874,624	$2,914,555

Spend in 2019 was under the budgeted amount due to software license purchases being delayed from 2019 to 2020 and 2021. Overall budget for project has not been changed.

Project Milestones:

Milestones	Delivery Date	Status/Progress
Request for DOE funding	August 2019	Complete
Test cellular communications for distribution protection devices	December 2019	Complete
Develop process to finalize circuit list for fault indicator installation	December 2019	Complete
Finalize Circuit List	February 2020	On Target
IT Cybersecurity clearance	June 2020	On Target
Test fault indicators	June 2020	On Target
Test EGMs	April 2021	On Target

[1] An encoder receiver transmitter (ERT) is a technology that allows manual meter reading to be replaced by a human driving an automobile equipped with a special computer and radio receiver. The meter's consumption data is transmitted through a simple digital radio protocol. This general technique has come to be known as automated meter reading, or AMR.

Procure & Install EGMs	Oct 2021	On Target
EGMs Go Live	Dec 2021	On Target

Project Benefits:

- Reduces manual and mobile metering requirements by removing seven meter reading/collection FTEs and associated overhead.
- Provides meter tampering detection. This ability will improve Rocky Mountain Power's ability to detect and prevent theft.
- Provides interval usage data to Utah customers through the Company's website.
- Provides a platform that can be leveraged for future grid modernization applications including distribution automation, outage management, data analytics and demand-response programs.
- Reduces customer property visits, meter-reading miles, and employee exposure to safety hazards.
- Reduces CO_2 emissions through fewer Rocky Mountain Power vehicles on the road.
- Improves outage response operations by leveraging real-time information from distribution line device. Helps determine safe switching procedures and cost effective capital improvement and maintenance plans.
- Improves reliability metrics such as Sustained Average Interruption Duration Index (SAIDI) and Customer Average Interruption Duration Index (CAIDI).
- Leverages real-time information collected from distribution line equipment to augment predictive capability of existing outage management systems and reduces Company reliance on customer reporting for outage notification.
- Reduces operations and maintenance costs by eliminating the need for manual load reading performed on circuits that do not have sophisticated meters with remote communication capabilities.

Potential future applications for similar projects:

Lessons learned in this project can be used for a wide range of meter and circuit installations in the future. As improvements are made to the system, the Company can upgrade the system using the knowledge and experience gained from this project.

Utah Solar Incentive Program (USIP)

The USIP amounts shown on page 1.0 represent the actual expenditures of the USIP program. When STEP commenced, the Company anticipated that a portion of STEP revenues would be necessary to fund the remainder of the USIP program obligations through 2023. The Company's September 12, 2016, application in Docket No. 16-035-36 assumed funds would be needed for all remaining USIP project applications that had received, or were expected to receive, conditional approvals but had not yet qualified for incentive payments. At that time, the remaining USIP obligations was estimated to be $33.6 million. Since 2016, an estimated $14.2 million of projects that were previously approved for incentives have expired and are no longer eligible to receive USIP funds. Therefore, the revenues collected under the discontinued Electric Service Schedule 107 ("Schedule 107") are sufficient to cover all remaining USIP incentive obligations without the use of any of the $50 million in STEP funds.

Previously, a portion of revenues collected under STEP were credited to the USIP account. On June 28, 2019, the Commission approved the Company's request to use the STEP funds that were previously budgeted for USIP for the Advanced Resiliency Management System project. On August 20, 2019 the Commission approved the Company's request to begin refunding $3.06 million in surplus revenue collected through Schedule 107 through a reduction in Electric Service Schedule No. 196 Sustainable Transportation and Energy Plan ("STEP") Cost Adjustment Pilot Program rates over one year beginning November 1, 2019[1]. For transparency and consistency with prior reports, the company will continue to report USIP expenses in the annual STEP reports.

Table 1 provides the CY 2020 USIP account balance with USIP collections under Schedule 107.

Table 1: USIP Account Summary (With Electric Service Schedule 107 revenues only)

Utah Solar Incentive Program Account - Through 2020												
		Order	Program Total	2012	2013	2014	2015	2016	2017	2018	2019	2020
Program Revenue			(23,261,688)	(961,324)	(6,293,704)	(6,320,828)	(6,317,639)	(6,323,285)	(308,633)	-	227,376	3,036,349
Program Expenditures:												
	Incentive	331190, 338901		-	981,796	2,328,676	3,292,006	4,884,763	4,766,963	3,459,713	2,317,571	1,585,779
	Program Administration	331191; 338902		-	253,665	322,664	173,248	412,866	94,788	27,098	13,807	3,881
	Marketing	331192; 338903		55,905	35,744	25,995	14,515	336	-	-	-	-
	Program Development	331193' 338904		30,748	99,140	577	-	-	-	-	-	-
	Expired Deposits	331194; 338905		-	-	-	(36,821)	(103,963)	(99,568)	-	(157,638)	-
		408641							-	-	-	-
	Cool Keeper program			-	-	-	-	(200,000)	-	-	-	-
Total Expenditures			24,584,253	86,653	1,370,345	2,677,912	3,442,948	4,994,002	4,762,183	3,486,811	2,173,740	1,589,660
Interest			(3,627,377)	(5,995)	(219,165)	(473,909)	(721,712)	(685,628)	(627,425)	(569,938)	(147,937)	(175,669)
USIP Account Balance (Sch. 107 only)			(2,304,812)									

The Total Expenditure amounts showing for CY 2017, 2018, 2019 and 2020 tie to the USIP expenditures on page 1.0 of this report and also tie to Table 15 in the Company's USIP annual reports.

The 2019 and 2020 program revenue of $227,376 and $3,036,349 shown in Table 1 represents the credits back to customers through the reduction in Schedule 196 beginning November 1, 2019. The USIP workpaper provides the forecast program expenditures.

[1] See Docket No. 19-035-T12.