



Rocky Mountain Power | Pacific Power

WASHINGTON RESIDENTIAL TIME OF USE PILOT

Program Evaluation

November 2024

Executive Summary

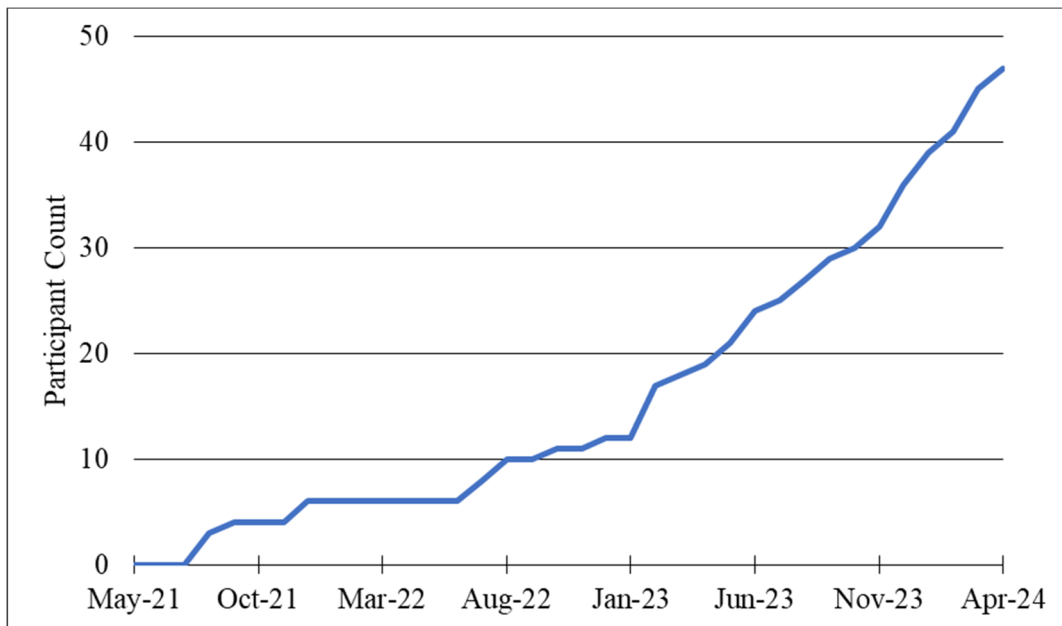
PacifiCorp d/b/a Pacific Power & Light Company (PacifiCorp) conducted a pilot to evaluate a time-of-use option for residential customers (Schedule 19). PacifiCorp studied the program’s customer appeal, customer satisfaction, and cost-effectiveness. The program did not attract many participants, and the customer bill savings results were mixed. Due to the small customer sample size, PacifiCorp considers its study of the program’s cost-effectiveness to be inconclusive.

PacifiCorp recommends closing Schedule 19 to new service. While the pilot has demonstrated that participants can shift load away from on-peak periods, its lack of popularity and its potential to strand the cost of PacifiCorp’s existing metering equipment supports freezing it for the time-being.¹ In the future, after the company has deployed advanced metering infrastructure, PacifiCorp should be able to remotely reprogram meters to different time-of-use periods at very low cost. At that time, PacifiCorp will consider re-designing the program based on newer information and opening the tariff again for new service.

Customer Appeal and Satisfaction

In the 36 months since Schedule 19 became effective, only 47 of the approximately 112,000 eligible customers enrolled. This means that, as of April 2024, enrollment in the pilot is at less than 10 percent of the 500-customer tariff participation limit. Figure 1 shows participation by month.

Figure 1. Schedule 19 Adoption Over Time



¹ With PacifiCorp’s current Washington metering technology, PacifiCorp incurs a significant cost when replacing a residential customer’s existing meter with a time-of-use capable meter.

Schedule 19 is available to residential customers on both standard Residential Service (Schedule 16) and the Low Income Bill Assistance Program (Schedule 17). No Schedule 17 customers have elected to participate in Schedule 19.

Table 1 shows the count of Schedule 19 customers by census tracts.

Table 1. Schedule 19 Customers by Census Tract

Schedule 19 Customers	Census Tract
6	29
5	16.02
3	9209
2	18
2	28.02
2	30.01
2	32
2	34
2	8
2	9202
2	9207.02
2	9208.01
1	11
1	16.01
1	17.01
1	17.02
1	19.01
1	22
1	3
1	6
1	9.01
1	9205
1	9206
1	9207.01
1	9400.01
1	9400.04
1	9703

Of the 47 customers who enrolled in Schedule 19, 21 completed a 12-month period in the 36-month reporting period. For these 21 customers, Table 2 shows first-year savings under the program and any “guarantee payment” that PacifiCorp provided to compensate the customer if energy costs were greater than ten percent over what they would have been on Schedule 16.

Table 2. Schedule 19 First Year Customer Savings and Guarantee Payments

Customer	Savings	12 Month Period Completed	Guarantee Payment
1	\$346.99	August 2022	\$0.00
2	\$239.91	March 2024	\$0.00
3	\$237.65	November 2022	\$0.00
4	\$198.89	April 2024	\$0.00
5	\$185.79	November 2022	\$0.00
6	\$167.85	January 2024	\$0.00
7	\$99.74	September 2023	\$0.00
8	\$83.91	January 2024	\$0.00
9	\$79.01	January 2024	\$0.00
10	\$38.20	July 2023	\$0.00
11	\$29.29	July 2022	\$0.00
12	\$13.32	April 2024	\$0.00
13	\$2.30	June 2023	\$0.00
14	(\$1.33)	January 2024	\$0.00
15	(\$1.36)	January 2024	\$0.00
16	(\$28.20)	July 2022	\$0.00
17	(\$32.97)	July 2023	\$0.00
18	(\$60.82)	July 2022	\$31.22
19	(\$62.19)	June 2023	\$24.69
20	(\$81.85)	November 2023	\$0.00
21	(\$93.76)	February 2024	\$47.41
Total	\$1,360.39		\$103.32
Average	\$64.78		

Nine participants, or about 43 percent, lost money during their first year in the program. Three participants, or about 14 percent, saved less than \$3 per month during their first year in the program. The net average savings for the first year of participation was \$64.78, or about \$5.40 per month. Of the 21 customers, two returned to Schedule 16. It is important to note that these results are based on a very small sample of customers.

PacifiCorp informed each of these customers of their initial 12-month results and provided a link to complete a survey. However, only 5 customers have responded to this survey. Of these, three reported being “very satisfied”, one reported being “somewhat satisfied”, and one reported being “neither satisfied nor dissatisfied”, with the primary reason for this being “did not save enough

money”. This customer also recommended “greater difference in pricing by period, so I can save more.” Another customer recommended “less on-peak hours”.

Of the five customers that completed the survey, three reported pension, retirement, or social security as their primary source of income, and two reported full-time employment.

Each of the five survey respondents reported differently to the question on annual household income:

- One reported “\$25,000 to \$34,999”
- One reported “\$35,000 to \$49,000”
- One reported “\$50,000 to \$74,999”
- One reported “\$75,000 to \$99,999”
- One reported “Prefer not to answer”

All survey respondents reported their race as “White/Caucasian”.

Costs and Benefits

PacifiCorp analyzed costs and benefits under four scenarios. The first scenario assumes PacifiCorp continues to use its existing metering technology and does not consider customer savings to be a cost. The second assumes a counterfactual deployment of advanced metering infrastructure (AMI) under which the additional metering costs associated with Schedule 19 are eliminated. The third scenario makes the same assumptions as the second, but considers customer savings to be a cost. Finally, the fourth scenario includes all potential costs. Table 3 shows the results of the cost/benefit analysis under all four scenarios.

Table 3. Schedule 19 Program Cost/Benefit Analysis Results

Average per Program Participant	Scenario 1. No AMI. Customer Savings is not a Cost.	Scenario 2. AMI. Customer Savings is not a Cost.	Scenario 3. AMI. Customer Savings is a Cost.	Scenario 3. No AMI. Customer Savings is a Cost.
Administration	\$19.25	\$19.25	\$19.25	\$19.25
Marketing	\$11.17	\$11.17	\$11.17	\$11.17
Customer Service	\$7.89	\$7.89	\$7.89	\$7.89
Meter	\$42.25			\$42.25
Customer Savings			\$64.78	\$64.78
Total Cost	\$80.56	\$38.31	\$103.09	\$145.34
Total Benefit	\$39.63	\$39.63	\$39.63	\$39.63
Net Cost/(Benefit)	\$40.93	(\$1.32)	\$63.46	\$105.71

Table 2 shows that the customer savings (revenue loss) associated with Schedule 19 significantly diminishes its cost-effectiveness. It also shows that Schedule 19 would be more likely to become cost-effective in a future when AMI is deployed.

Costs Detail

PacifiCorp estimated the \$19.25 administration cost by assuming a typical Company specialist² spends 0.5 percent of their time administering Schedule 19 for 47 participants. This includes tracking participation, bill savings, and communicating internally about sending letters to customers who have completed 12 program months. This per-customer cost could decline if participation increases.

PacifiCorp estimated the \$11.17 marketing cost by dividing the amount PacifiCorp spends in a typical program year on time-of-use handouts and bill message translations by the current 47-customer Schedule 19 participation. This per-customer cost could decline if participation increases.

PacifiCorp estimated the \$7.89 customer service cost by assuming a typical Company call center agent³ takes 9 minutes per Schedule 19 call.

PacifiCorp estimated the \$42.25 metering cost by applying PacifiCorp's distribution infrastructure "use of facilities" factor⁴ to an estimate of the cost to install a time-of-use capable meter.⁵

² PacifiCorp annual cost per typical specialist is \$87 per hour at 2,080 hours per year.

³ PacifiCorp cost per typical call center agent is \$50 per hour.

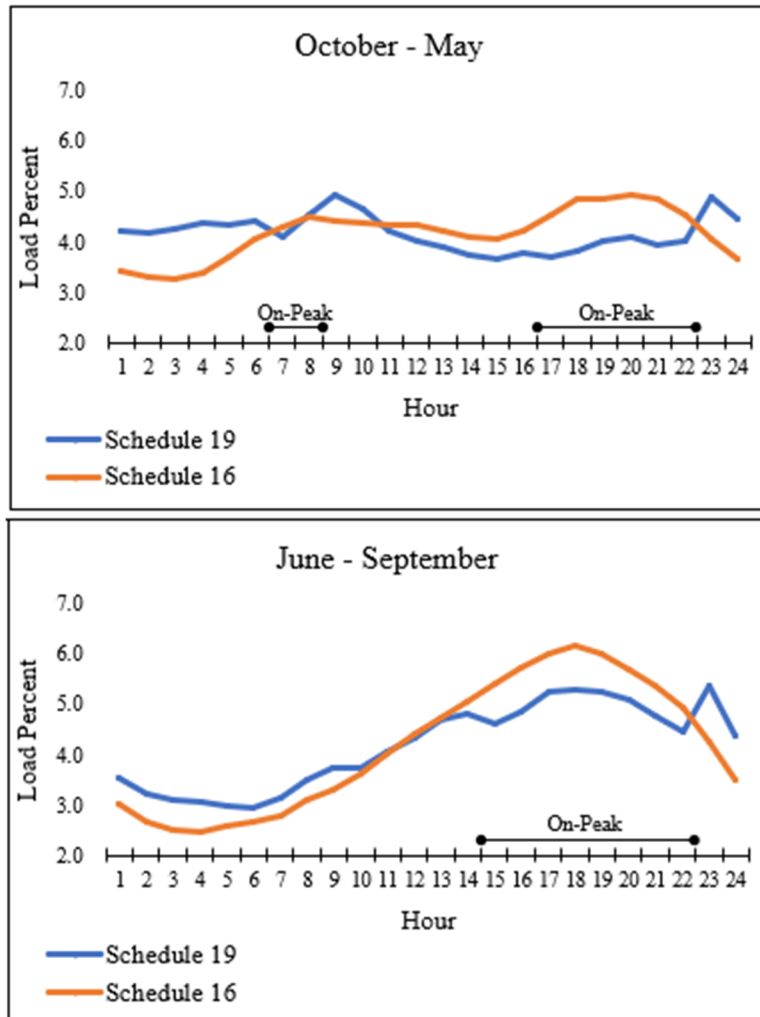
⁴ This was 8.11 percent as of 2024 and includes Return on Capital, Recovery of Capital, Income Taxes, and Local Property Taxes. PacifiCorp uses this factor to estimate how a one-time capital investment will become an annualized cost.

⁵ This was \$521 as of 2024 and includes costs for labor and travel time in addition to the cost of the meter itself.

Benefits Detail

Figure 2 below shows the hourly profiles Schedules 19 and 16⁶ for winter (October through May) and summer (June through September).

Figure 2. Schedule 19 and Schedule 16 Hourly Profiles



This comparison shows that the average Schedule 19 customer load shift away from on-peak hours was about 4.6 percent in winter and 5.7 percent in summer. The shift was more significant for afternoon and evening on-peak hours and less significant for winter morning on-peak hours.

Valuing the benefits of this shift requires estimating its kilowatt (“kW”) capacity and kilowatt-hour (“kWh”) energy amounts so that the relevant market prices can be applied. However, these load percents represent an annual kWh load of 17,782 for the average Schedule 19 customer and

⁶ For the twelve months that ended April 30, 2024.

15,773 for the average Schedule 16 customer.⁷ To produce a load shift estimate that adjusts for this variance, PacifiCorp applied the hourly percentage differentials between the two profiles to the average Schedule 19 customer’s kWh for each month. Table 4 below shows the average shift in kWh for a Schedule 19 participant by hour and month.

Table 4. Average Schedule 19 Participant Shift in Load (kWh)

Month	Hour																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
January	(16)	(15)	(14)	(19)	(11)	(7)	5	(4)	(12)	(13)	(3)	3	8	9	5	7	18	23	18	19	18	10	(12)	(17)
February	(15)	(16)	(16)	(18)	(11)	(5)	6	3	(8)	(4)	1	4	6	7	2	0	12	16	13	17	17	12	(11)	(13)
March	(15)	(20)	(21)	(24)	(20)	(13)	3	3	(6)	3	6	8	7	8	9	8	13	16	14	14	17	13	(11)	(12)
April	(19)	(21)	(23)	(18)	(11)	(2)	7	2	(5)	0	5	6	4	5	8	11	17	16	16	16	13	6	(15)	(17)
May	(6)	(3)	(4)	(2)	2	6	6	(1)	(3)	1	1	1	0	2	5	6	7	6	6	3	6	1	(24)	(16)
June	(10)	(8)	(6)	(4)	(3)	(2)	(2)	(2)	(1)	4	2	2	3	4	14	15	13	11	8	5	4	1	(25)	(21)
July	(4)	(5)	(6)	(5)	(3)	(3)	(4)	(4)	(4)	(3)	(5)	(2)	(4)	0	8	8	5	11	12	9	6	13	(12)	(8)
August	(8)	(6)	(6)	(8)	(6)	(4)	(4)	(6)	(7)	(3)	(1)	3	0	4	9	10	11	11	9	9	11	8	(14)	(12)
September	(5)	(10)	(13)	(13)	(8)	(5)	(8)	(8)	(10)	(4)	1	3	4	4	11	13	12	12	11	10	10	5	(7)	(4)
October	(5)	(12)	(14)	(13)	(8)	(1)	(2)	(4)	(10)	(7)	1	5	5	4	7	8	10	10	8	9	10	5	(4)	(2)
November	(10)	(14)	(13)	(13)	(7)	(5)	2	(0)	(7)	(6)	2	8	4	6	6	7	10	14	10	11	11	7	(13)	(9)
December	(10)	(10)	(13)	(16)	(16)	(13)	3	0	(10)	(9)	3	5	4	4	4	3	13	20	16	16	18	11	(11)	(9)
Total	(124)	(139)	(149)	(154)	(102)	(56)	11	(21)	(83)	(40)	14	45	42	57	88	96	140	166	141	137	142	90	(158)	(140)

Table 4 shows that Schedule 19 customers shifted load away from afternoon and evening hours, providing system benefits at the times when it is more expensive for PacifiCorp to meet customer demands. Table 5 summarizes PacifiCorp’s estimate of the dollar benefits of the shift.

Table 5. Average Program Benefit per Schedule 19 Participant

Generation Capacity	Transmission Capacity	Energy	Total Benefit
\$24.56	\$2.30	\$12.78	\$39.63

PacifiCorp estimated the \$24.56 generation capacity benefit by applying PacifiCorp’s 2024 levelized avoided capacity rate⁸ to a loss of load probability capacity reduction estimate. Table 6 summarizes the results of this approach and shows that the majority of Schedule 19 capacity reductions occur in afternoon and evening hours.

⁷ There are several reasons why Schedule 19 customers use more on average. For example, customers with larger bills may be more interested in a program that provides potential savings. Also, customers who charge electric vehicles at home will likely have above average bills and be interested in reducing them by charging during off-peak hours.

⁸ \$108,287 per megawatt-year (see Schedule QF, effective January 1, 2024).

Table 6. Average Generation Capacity Reduction from Schedule 19 Load Shift (Watts)

Month	Hour																								Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
January	0	0	0	0	0	0	(2)	(9)	(17)	(4)	(0)	0	0	0	0	0	1	3	1	1	1	0	0	0	(25)
February	0	0	0	0	0	0	1	0	(1)	(0)	0	0	0	0	0	0	0	0	1	0	0	0	0	0	2
March	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
April	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	4
May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
June	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	7	0	(1)	0	8
July	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	13	6	23	29	13	15	18	(1)	0	123
August	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	5	7	12	24	21	13	3	(1)	0	90
September	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	1	2	3	2	1	0	(0)	0	15
October	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
November	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
December	0	0	0	0	0	0	1	4	(4)	(2)	0	0	0	0	0	0	1	5	4	0	0	0	0	0	10
Total	0	0	0	0	0	0	(0)	(5)	(22)	(5)	(0)	0	0	1	10	23	18	50	62	39	37	22	(3)	0	227

PacifiCorp estimated the \$2.30 transmission capacity benefit by applying the 2024 network service rate that PacifiCorp charges its transmission customers⁹ to the average of the load shifts that were coincident with PacifiCorp’s peak hour for each month of the year.¹⁰ This identification of load coincident with each of PacifiCorp’s twelve monthly peaks is consistent with PacifiCorp’s 2023 general rate case transmission cost allocations.

Table 7 shows the peak time for each month, the shift at that time, and the average of all twelve.

Table 7. Average Transmission Capacity Reduction from Schedule 19 Load Shift (Watts)

Month	Peak		Watt Shift
	Day	Hour	
January	27	13	26
February	24	13	450
March	10	13	(119)
April	13	13	197
May	26	21	102
June	27	22	468
July	6	21	(79)
August	12	22	52
September	8	21	182
October	12	12	(69)
November	24	14	97
December	28	23	(791)
Watt-Year Average			43

⁹ \$53,530 per megawatt-year (see the 2024 Transmission Formula Rate Annual Update, Attachment H-1)

¹⁰ Approximately 43 watts per Schedule 19 customer, assuming the monthly peaks occurred at the same times as over the twelve months ended June 2022.

PacifiCorp estimated the \$12.78 energy benefit by applying the total shift for each hour of each month to the Western Energy Imbalance Market (“WEIM”) prices for those times. By shifting load from afternoon and evening times when market prices are higher to times when they are lower, Schedule 19 customers benefit PacifiCorp’s system. Table 8 shows the average WEIM prices by hour and month for the PAC-W node for the 36-month period ending June 2023.

Table 8. WEIM Prices by Month and Hour (Cents per kWh)

Month	Hour																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
January	6	6	6	6	6	7	7	7	7	6	6	6	5	5	5	6	7	8	8	7	7	6	7	6
February	5	4	5	5	5	6	6	5	4	4	4	4	3	3	3	4	5	6	7	6	5	5	5	5
March	4	4	4	4	4	5	5	5	5	4	4	4	3	3	3	3	4	4	5	5	5	5	5	4
April	5	4	4	4	5	6	6	5	5	5	5	4	4	4	4	4	4	5	6	7	7	6	6	5
May	2	2	2	2	2	2	2	2	2	2	2	2	3	2	2	2	3	3	3	3	3	3	3	3
June	2	1	1	1	1	2	2	2	2	2	2	2	3	3	3	3	3	3	3	4	3	3	3	2
July	3	3	2	2	2	2	2	2	3	3	3	3	3	4	4	4	4	5	5	5	4	4	4	3
August	5	4	4	4	4	4	4	4	3	4	4	4	4	5	5	6	5	7	8	8	6	5	5	4
September	5	4	4	4	4	5	5	4	4	4	4	5	5	5	5	7	7	9	12	12	6	5	5	5
October	4	4	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	6	5	5	5	5	4
November	5	4	4	4	5	5	5	5	5	5	5	5	4	4	4	5	6	7	6	6	6	5	5	5
December	9	9	9	9	10	11	11	11	11	10	10	10	9	9	9	11	13	14	13	12	12	11	11	10

Cost of Service Analysis

PacifiCorp prepared an alternative analysis of costs and benefits using a cost of service study like PacifiCorp produced for its most recent general rate case, but with Schedule 19 as its own class to estimate by how much Schedule 19 revenue is greater than or less than PacifiCorp’s cost of serving Schedule 19. This analysis shows that Schedule 19 participants pay 4.4 percent more than their cost of service, indicating that, from a cost of service lens, Schedule 19 participants provide benefits to all other customer classes. To further explore this result, PacifiCorp produced an alternative study that assumes the Schedule 19 hourly profile shape is equal to that of Schedule 16. This alternative study shows that if Schedule 19 participants had not shifted their load, they would pay 3.6 percent less than cost of service. Table 9 shows the results of both studies.

Table 9. Schedule 19 Cost of Service Results

Cost of Service (COS) Study Results						
	Assuming Schedule 19 Loads Per Hourly Percents Per					
	Participants on Schedule 19 Profile			Participants on Schedule 16 Profile		
	Sch 19	Sch 16	All Schedules	Sch 19	Sch 16	All Schedules
Retail Revenue \$000	85	175,987	404,629	86	175,986	404,629
COS Revenue Requirement \$000	81	188,787	411,823	89	188,779	411,823
Percent Difference	(4.4)	7.3	1.8	3.6	7.3	1.8

The difference in the results of these studies suggests the Schedule 19 load shift away from peak times is a program benefit. However, the very small sample size of 47 customers calls into question the significance of this finding.

Conclusion

The Schedule 19 Residential Time of Use Pilot has demonstrated the potential benefits of time varying rate options for residential customers. However, the program has not been very popular, and the metering cost of the program is a challenge. PacifiCorp recommends closing Schedule 19 to new service.