2023 Demand Response Annual Report

Washington

FINAL

Issued June 27, 2024

PACIFIC POWER
A DIVISION OF PACIFICORP

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Introduction

PacifiCorp d/b/a Pacific Power & Light Company (PacifiCorp or Company) submits this 2023 Demand Response Program Report to the Washington Utilities and Transportation Commission (Commission) in accordance with the guidelines set forth in Docket UE-220550, Advice 22-03, introducing Tariff 106 for Demand Response Programs. The filing, which also established the Irrigation Load Control Program, indicated:

> *"PacifiCorp will provide an annual report for the irrigation program following one full year of program operation. Annual reporting will at a minimum provide summary of program activities, costs, and accomplishments, future changes under consideration, feedback received, and other items that are requested by the Company's Washington DSM Advisory Group. Annual reporting for demand response programs for the prior year will be included as an attachment to the clean energy progress and compliance reports due July 1 of each year. Drafts of the demand response report will be provided to the DSM Advisory Group at least 30 days ahead of the July filing."*

PacifiCorp Demand Response Programs

The creation of a portfolio of demand response resources, launched in 2023, was part of the Company's implementation of actions specified in the 2021-2025 Clean Energy Implementation Plan (CEIP) as part of the Company's compliance with the Washington Clean Energy Transportation Act (CETA).[1] In the CEIP, the Company indicated it expected to launch a number of demand response programs, to achieve a target of 37.4 MW of demand response by the end of 2025. The Company reaffirmed this target in the 2023 Biennial Update of its CEIP.

In 2021, the Company issued a demand response request for proposals (RFP). This RFP was a key component of identifying resource types and costs that were modeled and used to establish the demand response target. The Company emphasized in its RFP that bidders include programs in Oregon or Washington service areas and products that achieve at a minimum 3 megawatts (MW) in three years, scalable to 25 MW over five to 10 years. The Company received bids from 18 firms covering multiple programs for multiple sectors. RFP bids were scored based on cost, volume, and equity criteria and a top bid was selected for each customer end-use category was selected for inclusion into the 2021 Integrated Resource Plan (IRP) model. The modeling identified a need for demand response not just in the short term, but throughout the planning horizon (2021–2040) of the Company's 2021 IRP preferred portfolio.

[1] PacifiCorp's 2021 Clean Energy Implementation Plan, Refile, Docket UE-210829, Revised CEIP (Mar. 13, 2023) (available here: https://apiproxy.utc.wa.gov/cases/GetDocument?docID=277&year=2021&docketNumber=210829)

The Company contracted with three bidders from the RFP, to offer the following programs:

- Irrigation Load Control (ILC) Program was filed on July 22, 2022, under docket UE-220550, and became effective August 26, 2022.[2] The program began recruiting participants in January 2023.
- The Commercial and Industrial Demand Response (CIDR) Program, was filed on November 16, 2023, under docket UE-220848, effective December 23, 2022.[3] The program began recruiting participants in February 2023.
- The Optimal Time Rewards (OTR) Program, for residential water heaters and smart thermostats, was filed on May 19, 2023, under docket UE-220848, and became effective June 30, 2023.[4] The program began recruiting multi-family property managers in December 2023.

This report includes a detailed description of the 2023 operations for ILC and CIDR. OTR did not fully launch to customers in 2023. However, this report includes a description of OTR program development activities.

2023 Regulatory Activity and Washington Stakeholder Engagement

Demand Response Filings in 2023

November 16, 2022 – PacifiCorp filed a commercial/industrial demand response program and requested recovery of costs through a deferral account. (Docket UE-220848)

December 16, 2022 – PacifiCorp filed a petition for an accounting order to defer the costs associated with commercial, industrial and irrigation demand response programs. A corrected petition was filed December 29, 2022. On January 26, 2023, the Commission issued Order 01. This authorized the Company to track program costs in a deferred account and to accrue interest on the unamortized balance at the quarterly Federal Energy Regulatory Commission (FERC) rate. (Docket UE-220848)

April 27, 2023 – PacifiCorp filed request for an exemption from the annual requirement to file a revision to its Schedule 191, System Benefits Charge, under WAC 480-109-130(2). This was approved May 25, 2023. (Docket UE-230293)

May 19, 2023 - PacifiCorp filed for approval of a residential demand response program under the recently approved Schedule 106 and to position the program costs for recovery through a deferral account. The Company filed an amended petition for accounting order to update the petition to include the costs of a residential demand response program. This was approved in Order 02 on June 29, 2023. (Docket UE-220848)

[2] https://apiproxy.utc.wa.gov/cases/GetDocument?docID=7&year=2022&docketNumber=220550

[3] https://apiproxy.utc.wa.gov/cases/GetDocument?docID=11&year=2022&docketNumber=220848

[4] https://apiproxy.utc.wa.gov/cases/GetDocument?docID=31&year=2022&docketNumber=220848

November 1, 2023 – PacifiCorp filed the CEIP Biennial Update under docket UE-210829, which included reaffirming the demand response target of 37.4 MW.

Washington Stakeholder Engagement and Feedback

Washington DSM Advisory Group

At the Washington DSM Advisory Group meeting on March 30, 2023, PacifiCorp presented an overview of the status of the demand response portfolio. In response to a comment from Commission Staff, PacifiCorp clarified that it would continue to share updates to the demand response program through the DSM Advisory group and the Equity Advisory Group.

At the Washington DSM Advisory Group meeting on June 29, 2023, PacifiCorp presented the program design for OTR, which was filed with the WUTC on May 19, 2023, under the provisions of Schedule 106. The Company also discussed the PacifiCorp request to include the costs in a deferral account, and presented a high level overview of the EV Managed Charging program.

At the Washington DSM Advisory Group meeting on August 28, 2023, the Company announced that the EV Managed Charging RFP would be released on September 1.

At the Washington DSM Advisory Group meeting on September 13, 2023, PacifiCorp presented the proposed CEIP target for demand response.

At the CEIP Engagement Meeting on October 10, 2023, the Company presented an update of PacifiCorp's progress on the demand response actions listed in the CEIP. WUTC staff requested information on where to learn more about the demand response program. PacifiCorp responded via email on October 11, 2023, with links to the filing for Schedule 106, links to the information posted on the website for each program, and links to PacifiCorp's filed Transportation Electrification Plan, for more information about EV Managed Charging.

At the Washington DSM Advisory Group meeting on December 14, 2023, the Company presented the NEEA End Use Load Flex project and PacifiCorp's intention to participate. PacifiCorp asked Commission Staff and other stakeholders if they had any objections at that time to PacifiCorp requesting recovery for project costs in the future. Staff asked for time to review, and requested additional information via email. On February 13, 2024, PacifiCorp sent the DSM Advisory Group members a detailed written response to Commission Staff questions, drafted by NEEA staff.

Equity Advisory Group

At the Equity Advisory Group meeting on February 9, 2023, PacifiCorp presented the core concepts of the Optimal Time Rewards program, including the purpose of the program and benefit to ratepayers, and discussed features to consider such as the equipment required and control method, expected incentive levels, impact on participants, opt-out capability and other details.

At the Equity Advisory Group meeting on March 9, 2023, PacifiCorp presented an overview of the draft Transportation Electrification Plan, including a description of the Managed Charging program. The Company also gave a detailed presentation of the draft design for the residential demand response program (now known as Optimal Time Rewards).

At the Equity Advisory Group meeting on September 14, 2023, PacifiCorp presented an update on the Managed Charging pilot, announcing the RFP for an administrator had been issued.

Executive Summary

This report covers program operation and achievement in 2023, the first year of implementation of the ILC and CIDR demand response programs, and program development phase for OTR.

Demand Response Portfolio Summary

In 2023, both ILC and CIDR launched for customer participation, achieving significant growth and providing demand response resources to the Company. PacifiCorp achieved 4.9 MW at generation of available curtailable load during the year. Table 1 presents a summary of the demand response load provided by active programs in 2023. As shown, the demand response capacity achieved in 2023 was 13.1% of the CEIP target of 37.4 MW.

Table 1. 2023 Available Demand Response Capacity[a]

Program	MW at Site	MW at Generation
ILC[b]	4.3	4.6
CIDR	0.3	0.3
OTR[c]	n/a	n/a
Total	**4.6**	**4.9**
	% of 2025 CEIP Target	***13.1%***

[a] Available demand response capacity is the sum of average capacity provided by each program participant with the parameters of each program. Not all capacity is necessarily available at all times.
[b] ILC capacity was calculated based on an expected 25 kw per pump enrolled, and 171 pumps enrolled by end of year.
[c] OTR was not yet launched to customers in 2023.

As discussed in the May 10 meeting of the DSM Advisory Group, the Company currently forecasts the existing active programs will deliver 31.1 MW, equal to 83% of the CEIP target, by year-end 2025. The forecasts were developed in conjunction with our implementation partners and reflect uncertainty around customer acceptance of new program(s) and comparatively sparse historical uptake/participation data. PacifiCorp is exploring several adaptive management strategies to close the gap. These strategies include launch of the remaining programs identified in the CEIP – EV Managed Charging and Battery Demand Response. PacifiCorp is also exploring opportunities to expand the existing programs to new devices and markets; for example, expanding the water heater components of OTR to include commercial water heaters, or adding line voltage thermostats as an eligible OTR device. Priority will be given to the program(s) or offers with the largest MW impacts available before the end of 2025.

In their first year of implementation, ILC and CIDR recruited a significant number of participants, many of which enrolled multiple controlled loads. Table 2 shows the number of controlled loads enrolled by year-end. Enrolled indicates that any necessary load

control or monitoring device has been installed, and the customer load is available for dispatch according to the parameters established for each program.

Table 2. 2023 Year-End Participation by Program

Program	Number of Customers	Number of Controlled Loads Enrolled[a]
ILC	22	171
CIDR	2	4
OTR[b]	n/a	n/a
Total	**24**	**175**

[a] In ILC and OTR, a controlled load is a single controlled device – a pump, smart thermostat or water heater - and there may be multiple controlled loads connected to a single meter. In CIDR, each meter site is a unique controlled load.

[b] OTR was not yet launched to customers in 2023.

PacifiCorp used demand response resources available in both ILC and CIDR during 2023. Table 3 shows the ILC events and performance. The reduction in performance in August was due to in part to a several newly enrolled sites opting out of events during extremely hot weather.

Table 3. 2023 ILC Curtailment Events

Date	30-Jun-23	14-Jul-23	14-Aug-23	15-Aug-23	16-Aug-23
Event Start	3:45PM	5:00PM	5:00PM	4:00PM	4:00PM
Event End	4:15PM	8:00PM	9:00PM	8:00PM	8:00PM
Event Length (hrs)	1	3	4	4	4
Baseline Load (MW, at site)	0.3	0.2	0.5	0.5	0.5
Load Curtailed (MW, at site)	0.3	0.2	0.3	-0.1	0.0
Performance	98%	99%	61%	-21%	-4%

Table 4 shows the CIDR events and performance. The variation in performance is due to a large site enrolling in the program in July, failing to participate in early August, and unenrolling by Aug. 16.

Table 4. 2023 CIDR Curtailment Events

Event Date	30-Jun-23	14-Jul-23	11-Aug-23	14-Aug-23	16-Aug-23
Event Start	5:30 PM	6:00 PM	5:00 PM	5:00 PM	4:00 PM
Event End	6:30 PM	8:00 PM	8:00 PM	8:00 PM	7:00 PM
Event Length (hrs)	1	2	3	3	3
Participating Customers	3	4	5	5	4
Available MWs (at site)	0.20	0.84	0.86	0.86	0.25
Curtailed MWs (at site)	0.29	0.28	0	0.12	0.34
Performance	149%	33%	0%	14%	136%

In 2023, PacifiCorp spent a total of $632,008 across the three programs, as shown in Table 2. In both ILC and CIDR, the largest expense was the procurement and installation of necessary equipment at the customer site. In ILC, this is managed by the program administrator, and included as a delivery expense. For CIDR, PacifiCorp manages procurement and installation of necessary meter upgrades, which makes up the majority of the internal costs.

Table 5. 2023 Demand Response Program Costs

Program	ILC	CIDR	OTR	Total
Incentives	$16,000	$4,164	$0	$20,164
Delivery	$486,966	$4,354	$12,934	$504,254
Internal Costs	$11,328	$96,895	$8,645	$116,868
Annual Program Cost	**$514,294**	**$105,412**	**$21,579**	**$641,285**

Other Demand Response Activity

In addition to implementing ILC, CIDR, and OTR, PacifiCorp made progress on two other demand response initiatives in 2023. These included the EV Managed Charging program, and NEEA's End Use Load Flex (EULF) project. The EV Managed Charging program, proposed in the PacifiCorp Transportation Electrification Plan, will contribute to grid management by offering incentives to EV drivers to shift their charging off peak times. In 2023, PacifiCorp issued an RFP and received 11 proposals. At year-end, the Company was in the process of reviewing the bids received. Because the EV Managed Charging Program is funded as part of the Transportation Electrification Plan, future reporting on program operations will be provided in the Transportation Electrification annual report. Because the outcome of the program is demand management, PacifiCorp will include program results in the Demand Response annual reports.

In 2023, NEEA began outreach to utilities to solicit funding for EULF to accelerate the presence of CTA 2045 port and communication modules in residential equipment brought to market in the northwest and to explore options to control line voltage electric resistance heating.[5] At the DSM Advisory Group meeting on December 14, 2023, PacifiCorp presented the details to the UTC. PacifiCorp asked the Staff to discuss any concerns they had at that time about PacifiCorp submitting the costs for recovery in the future, noting the utility was not requesting formal approval to participate. The WUTC asked several clarifying questions via email in January 2024, and PacifiCorp worked with NEEA staff to provide written answers.

[5] NEEA's End Use Flex Load project is a continuation of the 2022 discussions and presentations around NEEA's role in helping increase flexible loads in the northwest.

Irrigation Load Control

Summary

This report describes activity and outcomes from 2023, the first full year of implementation of the state-wide Irrigation Load Control Program. During the year, PacifiCorp and its program administrator, Connected Energy, began recruiting customers for three notice time options: day-ahead (24 hours), hour-ahead, and 22.5 minutes ahead. Twelve customers representing 74 pumps were active during the season, and another 97 pumps were added after the season ended for a total of 171 pumps enrolled by year-end. During the season, the maximum capacity available was 1.1 MW, and the average capacity available was 0.4 MW. The average curtailed capacity was 0.1 MW. Including devices enrolled post-season in 2023, PacifiCorp estimates there was 4.6 MW of capacity in the program at year-end.

For a more detailed description of the program and activities and events in 2023, see the 2023 Irrigation Load Control Program – Administrator Report, in Appendix 1.

Costs

Program costs for ILC for 2023 are shown in Table 6. In 2023, all costs were attributed to the 22.5-minute product, since all WA participants were enrolled in that product.

Table 6. ILC 2023 Program Costs

Category	Amount
Incentives	$16,000
Delivery	$486,966
PacifiCorp Internal Costs	$11,328
Total	**$514,294**

Connected Energy, the Program Administrator, is responsible for purchasing, installing and maintaining the load control devices used in the program. The annual cost to procure and install load control devices amounted to $366,282, or 71% of the total cost for the year. The full cost of the device and installation is incurred by the program in the year installed, while capacity benefits continue year over year.

Activities and Accomplishments

The program began marketing activity in February 2023. Marketing included email blasts and postcard mailings to irrigation customers, as well as targeted calling to irrigation customers with high usage history.

The program administrator recruited and enrolled 171 pumps during the year. Of these, 74 were enrolled during the season, with the majority enrolled in August. Enrollment continued after the season ended, with another 97 devices installed.

The 2023 curtailment season ran from May 29 through September 17, 2023 (a total of 112 days). PacifiCorp called five events in 2023: one in June, one in July, and three in August, for a total duration of 15.5 hours, and an average curtailment of 0.1 MW at generation.

Cost Effectiveness

For the retrospective cost-effectiveness analysis for the 2023 program year, PacifiCorp updated the cost-effectiveness analysis referenced in Advice Letter 22-03 to reflect the actual costs and MW capacity from 2023.

PacifiCorp continued to apply the discount factors from the California Public Utilities Commission Distributed Energy Resource Avoided Cost Framework, Appendix A.[6]

PacifiCorp assessed the cost effectiveness of the program as a whole, but allocated all costs and benefits to the 22.5-minute tier, since that was the only option with participation for the year. Benefits were calculated using a 10 year levelized benefit of the program based on the capacity dispatched and actual energy prices in 2023. Total dispatched events for the levelized benefit in 2023 are based on 2023 actual dispatched hours and actual peak prices during 2023, using EIM scalar prices. Beyond 2023, a convergence of program availability hours and peak prices were used to simulate dispatch for the levelized benefit. Capacity amounts per dispatch were based on the average 2023 load reduction from each tier, adjusted for line losses. In the original program filing, PacifiCorp included reserve benefits expected to accrue from registering the 22.5-minute tier in the CAISO EIM market. After evaluating the business rules and potential complexity of registering demand response resources in the EIM, PacifiCorp elected to forgo this registration in 2023, and therefore CAISO EIM reserve value benefit is excluded from the 2023 analysis.

Program costs included participant incentives, delivery costs, and PacifiCorp internal costs. Program incentives were paid to customer by PacifiCorp as a bill credit. Delivery costs included control equipment and installation, administration fees to Connected Energy; and marketing expenses. PacifiCorp internal costs were labor and material costs directly attributable to the program operation.

Participant costs represent the value of service lost, transaction costs, additional management, and other costs that participants might experience as a result of enrolling and participating in the program. These costs are highly variable across participants and are difficult to observe or measure. At the same time, the fact that participants are willing to participate in the program provides some evidence that the maximum participant cost is some value less than the direct benefit they experience. Using this assumption, from the California demand response protocol and consistent with Northwest Power Planning and Conservation Council assumptions, PacifiCorp modeled participant costs as 75% of

[6] *2015 Demand Response Cost Effectiveness Protocols*, California Public Utilities Commission. 2015.

participant incentives.

Over time, the annual program cost effectiveness improves because the most significant program costs – the equipment and labor to install devices – are incurred only once for each device. In 2023, 71% of 2023 program costs were for purchase and installation of load control devices. Going forward, PacifiCorp expects that the majority of devices on the system will have been installed in previous years, and those costs will not apply to the program year even as capacity from those devices continues to provide a benefit.

Cost-effectiveness results for 2023 are shown in Table 7.

Table 7. ILC Retrospective Cost Effectiveness for 2023 Program Year

Parameter	2023
Avg. Curtailed Load (MW)*	0.1
Total Avoided Costs	$7,627
Incentives	$16,000
Delivery	$486,966
EM&V Costs	$0
PacifiCorp Internal Costs	$11,328
Participant costs **	$12,000
Utility Cost Test	0.01
Total Resource Cost Test	0.01

Below, is a summary of each of the components using in the calculation of benefits for the program. The benefits used in this analysis generally follow guidelines outlined in the California Public Utility Commission (CPUC) 2016 DR cost-effectiveness protocols, where applicable. The following information is used for valuation of demand response benefits:

1. *Avoided Generation Capacity Costs*

For the purposes of this analysis, the Company relied on the most recent avoided cost used in the Company's biennial conservation plan[7] relying primarily on inputs from the 2023 IRP.\. The avoided generation capacity benefit is spread across the hours of dispatch and then adjusted for the estimated capacity contribution. The ILC program's estimated capacity contribution is assumed to be equivalent to a 4-hr maximum duration summer only demand response resource.

2. *Avoided Energy Costs*

For the purposes of this report, energy value is reported based on the amounts shed, relative to the prior day baseline, without any adjustments related to shifting. For the 2023 valuation, the energy price component is built up from the Company's marginal

[7] UE-230904 available online at UTC Case Docket Detail Page | UTC (wa.gov)

costs, and includes energy, avoided ancillary service costs, and the value of stochastic risk reduction. The energy value reflects the locational marginal price in Washington and reflects either the marginal market purchase or marginal resource costs, including the social cost of carbon for any incremental emissions from the Company's resources.

3. *Avoided Transmission and Distribution Costs*

Assigning transmission and/or distribution deferral value(s) to load management is consistent with the Company's IRP, the Northwest Power Planning and Conservation Council's 2021 Power Plan[8] . Similar to generation capacity deferral values, transmission and distribution deferral values and their application in this analysis are derived from the most recent approved avoided cost values the Company's Washington's biennial conservation plan. These values are adjusted to reflect the expected capacity contribution of a 4-hr summer only demand response resource.

4. *Line Losses*

For valuation purposes, the hourly line loss factor methodology developed for the Washington GRC was used, based on a 2018 study. The value of avoided line losses is included in avoided energy and capacity costs. Avoided line losses are based on the estimated energy loss factors for irrigation customers in Washington.

5. *Adjustment Factors (based on 2016 CPUC CR protocol).*

Notification Time (B Factor)
Avoided costs are discounted depending on notification time to account for visibility and foresight into system need. Often the need for DR is based on conditions (particularly weather), which can change in the course of 24 hours. The longer notification of an event the less predictable the conditions driving an event need are. As a result, the Company makes the value discounts to avoided cost to reflect this logic.

Table 8 Factor B Adjustments

Notification Time	**B Factor**
30 minutes or less	100%
Day Of, greater than 30 minutes	94%
Day Ahead or greater	88%

In 2023, the program required no less than 22.5-minute- and no more than one day-ahead notification with the majority of customers being enrolled in the hour ahead or 22.5 minute products.

[8] 7th Power Plan applies transmission deferral value only.

Trigger (C Factor)
The C factor accounts for the triggers or conditions that permit the Company to call each DR program. In general, programs with flexible triggers have a higher value than programs with triggers that rely on specific conditions. Therefore, an adjustment should be determined so that programs with less flexible triggers can be de-rated. For programs with limited flexibility the avoided costs are derated by 5%.

Irrigation load control events can be called at the discretion of utility (within the specified months, weeks, days, hours). The Company considers this a limited-flexibility resource, and accordingly derated capacity by 5%. The 2023 events were triggered by a forecast for higher than typical power prices for the super peak period. In addition, hot weather was forecast for the period.

Key Findings and Future Changes Under Consideration

The strong pace of recruitment during and after the season indicates that the program offer is compelling to customers, and marketing approaches effective. Customers selected the 22.5 minute option for all pumps enrolled in 2023, indicating customers are not sensitive to the amount of notice time received ahead of an event.

The impact of weather and water availability remains unclear, despite 29 pumps being opted out during the August 15 and 16 events.[9] All the opted-out pumps were controlled by only three customers, all of which had enrolled the majority of their pumps in the week immediately prior to the events. None of the remaining 9 customers, whose pumps had all been enrolled longer, chose to opt out of the events.

The baseline for all three August events was the available load on August 13, 2023, a Sunday. Because load was unusually low on this day, relative to pumping levels in hours prior to the events, and during program eligible hours the week prior, it appears that using this day as a baseline may have resulted in an underestimate of curtailed load during the events. PacifiCorp and the program administrator are reviewing the baseline methodology for possible improvements in 2024.

[9] Participants in the ILC program are allowed to opt any enrolled pumps out of an event after receiving the curtailment notification. The opt-out applies only to the upcoming event, and does not mean the pump has been unenrolled from the program.

Commercial and Industrial Demand Response

Summary

2023 marked the first full year of implementation of the program. During the year, PacifiCorp and its program administrator, Enel X, began recruiting for four distinct demand response products to customers. The program contracted for over 16 MW of capacity, and enabled over 1 MW of capacity, though 2 customers, representing 0.7 MW withdrew before year-end. At the end of the year, 0.3 MW remained enrolled. The Company utilized the available resource 5 times over the summer months, achieving an average of 0.2 MW curtailment, over 12 hours of curtailment.

For a more detailed description of the program and activities and events in 2023, see the 2023 Commercial and Industrial Demand Response Program – Administrator Report, in Appendix 2.

Costs

Program costs for the CIDR program for 2023 are shown in Table 9. In 2023, all costs were attributed to the 60-minute product, since all WA participants were enrolled in that product.

Table 9. CIDR 2023 Program Costs

Category	Amount
Incentives	$4,164
Delivery	$4,354
Pulse meter installment/upgrade costs	$55,042
PacifiCorp Internal Costs	$41,852
Total Cost	**$105,412**

Pulse meter installment and meter upgrade costs was the largest category of cost in 2023. This is expected for the first year, since the program is focused on installing new customers. In future years, meter upgrades as a proportion of total costs is expected to decline, while incentives and delivery costs are expected to increase as program capacity increases.

Activities and Accomplishments

At the end of 2023, four sites representing two customers were enrolled in the 60-minute product, for a total capacity of 0.3 MW. During the year, another two sites, representing 0.7 MWs had enrolled in the 60-minute product, but unenrolled before the end of the year. No customers were enrolled in the remaining products.

Table 10. Capacity Enrolled, 2023 Year-End

	PAC 60M	PAC 20M	PAC 7M	PAC RT
Number of Customers	2	0	0	0
Available MWs	0.3	0.0	0.0	0.0

Although a number of customers signed participation agreements in 2023, enrollment was slow due primarily to a market shortage of KYZ pulse boards available for purchase. Participants typically require a meter upgrade – installation of a KYZ pulse board in the meter – to enable the Enel X monitoring device that is installed at most participating sites. The KYZ pulse boards are procured by PacifiCorp, and installations are completed by PacifiCorp meter technicians upon request by Enel X recruitment and enablement staff.

Supply scarcity issues were resolved in September, by which time a substantial backlog of contracted customers awaited enablement. As meter upgrades ramped up in the end of the year, the meter technicians, PacifiCorp program staff and Enel X identified and implemented a number of process improvements to streamline the process. Regardless, given the extremely rapid pace of contracting, 14 customers representing about 15 MW were still awaiting enrollment at the end of the year.

PacifiCorp dispatched the PAC 60M product 5 times in the summer of 2023. Performance (ability of participants to curtail the full amount they nominated into the program) varied depending on the mix of customers enrolled at the time of the event. Events that included the two participants that dropped out of the program had performance of 15% or below, as these two customers represented the great majority of available capacity but did not participate in the events. Events including the remaining enrolled sites, which were added over the course of the 60-minute season, had performance of 135% or greater.

PacifiCorp and Enel X also designed and completed initial development of an interface between the Enel X platform and PacifiCorp's central grid management system to improve response time for the PAC 7M (responds within 7 minutes) and the PAC RT product (instant and fully automated dispatch for frequency response.) This interface allows PacifiCorp dispatchers to call events directly from the PacifiCorp enterprise grid management software, eliminating the need to access the Enel X utility portal. It also allows for the real-time product to be dispatched automatically based on a signal from the enterprise system. User testing of the interface was ongoing as of December 2023.

Cost Effectiveness

For the retrospective cost-effectiveness analysis for the 2023 program year, PacifiCorp assessed the cost effectiveness of each product that had enrolled capacity in 2023, and the program as a whole. As the Company does for its other demand response programs, PacifiCorp applied the California Public Utilities Commission Distributed Energy

Resource Avoided Cost Framework ("Framework") as a guide when conducting the program year retrospective analysis. Only the PAC 60M product was involved in events in 2023, and therefore benefits were only allocated to this product. Capacity amounts per dispatch were based on the 2023 average load reduction, adjusted for line losses. Benefits were calculated using a 10 year levelized benefit of the program based on the capacity dispatched and actual energy prices in 2023. Total dispatched events for the levelized benefit in 2023 are based on 2023 actual dispatched hours and actual peak prices during 2023, using EIM scalar prices. Beyond 2023, a convergence of program availability hours and peak prices were used to simulate dispatch for the levelized benefit.

Delivery costs included customer recruitment and enrollment, all software and integration services, dispatch notification, calling events on behalf of PacifiCorp, and monitoring and coaching of participants, data tracking, incentive analysis and delivery, and reporting. PacifiCorp internal costs included contract oversight and program management, as well as procurement and installation of KYZ pulse boards at participant meters.

Participant costs represent the value of service lost, transaction costs, additional management, and other costs that participants might experience as a result of enrolling and participating in the program. These costs are highly variable across participants and are difficult to observe or measure. At the same time, the fact that participants are willing to participate in the program provides some evidence that the maximum participant cost is some value less than the direct benefit they experience. Using this assumption, PacifiCorp modeled participant costs as 75% of participant incentives.

The TRC ratio for Washington CIDR in 2023 was 0.14. Detailed cost-effectiveness results for 2023 are shown in Table 11.

Table 11. CIDR Retrospective Cost Effectiveness for 2023 Program Year

Parameter	CIDR 2023
Avg. Curtailed Load (MW at generation)	0.2
Total Avoided Costs	$14,490
Incentives	$4,164
Delivery	$4,354
EM&V Costs	$0
Pulse meter installment/upgrade costs	$55,042
PacifiCorp Internal Costs	$41,852
Participant costs (value of service lost, transaction costs, capital cost, etc.)	$3,123
Utility Cost Test	**0.14**
Total Resource Cost Test	**0.14**

In 2023, cost-effectiveness was negatively impacted by several factors that will likely diminish going forward. Avoided costs were reduced because the curtailed load (0.2 MW at generation) was less than the enrolled load (0.3 MW). This was in large part due to poor performance by two new participants during the 2023 events. The two poor performing participants unenrolled in 2023, and several MW of new capacity was contracted and expected to enroll in early 2024, so 2024 results are expected to improve.

PacifiCorp also expects pulse equipment costs to decline in 2024, as a proportion of total costs. PacifiCorp included all KYZ procurement completed in 2023 as a 2023 cost; however, less than half of the inventory the Company has purchased had been installed by the end of 2023. The remainder will be installed in 2024, but without impacting the 2024 cost-effectiveness. Although this is a major cost item in 2023, that is more a result of other values being unusually low. Going forward KYZ procurement should be a minor line item relative to other costs and benefits regardless of what year it is claimed.

For the PAC 20M and PAC 7M products, no benefits are incorporated because there was no capacity available in 2023. Additionally, in the original program filing, PacifiCorp included reserve benefits expected to accrue from registering these products in the CAISO EIM market. After evaluating the business rules and potential complexity of registering demand response resources in the EIM, PacifiCorp elected to forgo this registration in 2023, and therefore CAISO EIM reserve value benefit is excluded from the analysis.

Below, is a summary of each of the components using in the calculation of benefits for the program. The benefits used in the for this analysis generally follow guidelines outlined in the California Public Utility Commission (CPUC) 2016 DR cost-effectiveness protocols, where applicable. The following information is used for valuation of demand response benefits:

1. *Avoided Generation Capacity Costs*

For the purposes of this analysis, the Company relied on the most recent avoided cost used in the Company's biennial conservation plan[10] relying primarily on inputs from the 2023 IRP. The avoided generation capacity benefit is spread across the hours of dispatch and then adjusted for the estimated capacity contribution. The C&I program's estimated capacity contribution is assumed to be equivalent to a 3-hr maximum duration demand response resource.

2. *Avoided Energy Costs*

For the purposes of this report, energy value is reported based on the amounts shed, relative to the prior day baseline, without any adjustments related to shifting. For the 2023 valuation, the energy price component is built up from the Company's marginal costs, and includes energy, avoided ancillary service costs, and the value of stochastic risk reduction. The energy value reflects the locational marginal price in Washington and

[10] UE-230904 available online at UTC Case Docket Detail Page | UTC (wa.gov)

reflects either the marginal market purchase or marginal resource costs, including the social cost of carbon for any incremental emissions from the Company's resources.

3. *Avoided Transmission and Distribution Costs*

Assigning transmission and/or distribution deferral value(s) to load management is consistent with the Company's IRP, the Northwest Power Planning and Conservation Council's 2021 Power Plan[11] . Similar to generation capacity deferral values, transmission and distribution deferral values and their application in this analysis are derived from the most recent approved avoided cost values the Company's Washington's biennial conservation plan. These values are adjusted to reflect the expected capacity contribution of a 3-hr demand response resource.

4. *Line Losses*

For valuation purposes, the hourly line loss factor methodology developed for the Washington GRC was used, based on a 2018 study. The value of avoided line losses is included in avoided energy and capacity costs. Avoided line losses are based on the average energy loss factors for commercial and industrial customers in Washington.

1. *Adjustment Factors (based on 2016 CPUC CR protocol).*

Notification Time (B Factor)
Avoided costs are discounted depending on notification time to account for visibility and foresight into system need. Often the need for DR is based on conditions (particularly weather), which can change in the course of 24 hours. The longer notification of an event the less predictable the conditions driving an event need are. As a result, the Company makes the value discounts to avoided cost to reflect this logic.

Table 12 Factor B Adjustments

Notification Time	**B Factor**
30 minutes or less	100%
Day Of, greater than 30 minutes	94%
Day Ahead or greater	88%

In 2023, the program had notification times of hour ahead, 20 minute ahead, 7 minute ahead, and real time. As previously mentioned, only the hour ahead product was called upon in 2023.

Trigger (C Factor)
The C factor accounts for the triggers or conditions that permit the Company to call each DR program. In general, programs with flexible triggers have a higher value than

[11] 7th Power Plan applies transmission deferral value only.

programs with triggers that rely on specific conditions. Therefore, an adjustment should be determined so that programs with less flexible triggers can be de-rated. For programs with limited flexibility the avoided costs are derated by 5%.

Irrigation load control events can be called at the discretion of utility (within the specified months, weeks, days, hours). The 2023 events were triggered by a forecast for higher than typical power prices for the super peak period. In addition, hot weather was forecast for the period.

Key Findings and Future Changes Under Consideration

Customer response to all four product offers was extremely positive, with customers contracting for over 16 MW of capacity. Customers appear less sensitive to the difference between notice time of 60 minutes and 20 minutes than expected, with the PAC 20M product being the most popular of the four, accounting for 42% of the total capacity contracted. (Customer response to the PAC 7M and RT products is still somewhat untested, since recruitment and enablement were paused early in the year to allow for completion of the enterprise system interface.)

Additionally, in November of 2023, PacifiCorp paused further recruitment in the PAC 20M product. The product was more popular than initially anticipated, and PacifiCorp wanted to preserve an opportunity to ensure the product use case remains viable going forward, and to assess whether and how to achieve a more balanced distribution of capacity across available products, each of which has a unique use case.

Optimal Time Rewards

Summary

This report provides a description of start-up activities in 2023 for the Optimal Time Rewards program. Information on program performance and effectiveness will be provided in the 2024 annual report.

Optimal Time Rewards (OTR) is a demand response program targeted to the residential sector, enabling aggregation of electric water heater and heating and cooling loads. OTR is part of an overall equity approach by PacifiCorp to make demand response programs available to all customer classes. Participants receive an immediate benefit in the form of an incentive. The availability of flexible load benefits all customers including non-participants by reducing costs of utility operations. The program focuses on water heaters in multi-family buildings and smart thermostats controlling compressor-based cooling and/or heating equipment in single-family homes. The program requires installation of a WiFi-enabled control device to enable monitoring and control of electric water heaters. Smart thermostats are controlled through integration with manufacturers' cloud-based software platforms.

Costs

Program costs in 2023 included costs for administration and program delivery. The total costs are shown in Table 13. All costs incurred for 2023 related to development of the program that will serve both Oregon and Washington. To allocate these costs across the two states, PacifiCorp applied the assumed distribution of enrolled devices at year-end from the program administrator contract. As a result, costs allocated to Washington are 8% of the total OTR expenditures in 2023. (In future years, costs per participant will be allocated to the state where the participant resides wherever possible, and any central costs will be allocated based on an updated forecast.)

Table 13. 2023 Program Costs

Category	Amount
PacifiCorp Administration	$8,645
Delivery	$12,934
Total	**$21,579**

Activities and Accomplishments

During 2023, OATI and its partner Armada Power worked with PacifiCorp to finalize details of the program design. The OATI team also developed the software infrastructure for the program, necessary legal and operational resources, marketing plans and materials, and contributed to regulatory approval and stakeholder engagement activities.

Software Customization

OATI completed significant software customization efforts in 2023, including identifying user requirements, coding, and implementing customization of existing OATI systems to enable both smart thermostat and water heater demand response operations.

Software development efforts included many changes and customizations within the OATI webSmartEnergy DERMS system in order to meet PacifiCorp's system use requirements. For example, OATI added a system enhancement to receive, store and apply data exports from PacifiCorp's customer database to automatically validate incoming enrollments.

OATI's software customization efforts included successful integration, including setup, configuration and testing, with the following demand response headends (and the communication type for each):

- Google Nest Smart Thermostat (REST API)
- ecobee Smart Thermostat (REST API)
- Honeywell Home Smart Thermostat (REST API)
- Honeywell TCC Smart Thermostat (REST API)
- Emerson/Copeland Sensi Smart Thermostat (REST API)
- Armada Power Water Heater Control (REST API and SFTP)
- SkyCentrics CTA-2045-compatible Water Heater Control (OpenADR)

During 2023, PacifiCorp determined the internal timeline to enable two-way OpenADR integration with demand response resources on the PacifiCorp enterprise distributed energy resource management system (DERMS) would be extended. Absent this capability, OATI was not able to integrate their platform with the DERMS to allow PacifiCorp energy management staff control of the demand response resources. PacifiCorp and OATI identified an alternative approach, by granting PacifiCorp staff direct access to OATI's cloud-based platform, and creating special program-specific interfaces. This additional programming work extended the timeline, but could occur on a parallel track with other start-up activities and was the shortest path to a fully operational software platform.

OATI conducted significant and repeated testing on all functionalities of the PacifiCorp customization of its webSmartEnergy DERMS system throughout project development. OATI also conducted formalized internal testing of integrations and DERMS functionalities. OATI's formal internal system testing for smart thermostat functionality commenced on September 18, 2023. Formal internal system testing for water heater functionality commenced on October 1, 2023. Testing for both continued into 2024.

Development System user credentials for PacifiCorp grid operatives were created on October 23, 2023. Development System access was granted in 2024.

Go-Live planning and testing was substantively complete by the end of 2023. Go-Live occurred in 2024.

Creating Operational Resources

In 2023, OATI configured reporting on enrollments, events, and availability forecasting generated from the webSmartEnergy DERMS system based on PacifiCorp's requirements. The availability forecasting is created in coordination with Armada Power, and is calculated internally for the Smart Thermostat headends and SkyCentrics. OATI facilitated the creation of Terms and Conditions for both Smart Thermostats and Armada Power. The substantive creation of the Terms and Conditions was conducted by PacifiCorp and Armada Power legal teams with a focus on customer consent and data protections.

In coordination with PacifiCorp, OATI ensured that all necessary documentation was provided to the Smart Thermostat headends including final versions of the Terms and Conditions, and documentation of cyber security and program parameters.

Marketing

PacifiCorp developed the program website, with pages targeted to residential customers (focused on the smart thermostat option) and to property manager (focused on the water heater option). PacifiCorp also worked with the OATI team to develop a detailed Frequently Asked Questions (FAQ).

To manage to program cost-effectiveness, OATI and PacifiCorp planned to rely on the free, targeted messaging provided by the OEMs for smart thermostats. For water heaters, the primary outreach channel is direct marketing to property managers. Armada Power developed a marketing strategy, materials for distribution, giveaway and engagement collateral, and outreach planning for potential water heater host communities, community residents, and single-family home participants. These materials were reviewed by both OATI and PacifiCorp and ultimately approved for print and distribution by PacifiCorp.

Armada Power began the outreach process in December 2023, with emails to two large property managers in Washington.

Cost Effectiveness

Because there were no avoided costs generated by the program in 2023, PacifiCorp did not conduct a retrospective annual cost-effectiveness test.

Key Findings and Future Changes Under Consideration

Because PacifiCorp did not complete system development until the end of the year, there was no engagement with customers, enrolled load, or curtailment activity in 2023. As a result, there are no key findings regarding program effectiveness.

Appendix 1: 2023 Irrigation Load Control Program – Administrator Report

2023 Connected Energy Pacific Power Irrigation Load Control Program Report

In support of Pacific Power's regulatory activities related to the Irrigation Load Control Program in Oregon, Connected Energy prepares an annual report on program activities including total program enrollment, sites added, customer outreach, crops, weather data, and any available information on water restrictions, incentive payments, load control events and key observations. Connected Energy's report is provided as Appendix 1 to this report.

2023 Pacific Power Irrigation Washington Load Control Program Report

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Date: May 29, 2024

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Overview and Evolution of the 2023 Irrigation Load Control Program - Washington

This report provides an overview of the Irrigation Load Control (ILC) Program for Pacific Power in the state of Washington.

As background information, PacifiCorp requested authorization to implement a pilot irrigation load control program for irrigation customers in the Klamath Basin in Oregon in 2016. The pilot program was to investigate whether the existing Idaho and Utah program design would be effective in Oregon. The Company has incorporated learnings from delivering the Oregon program into its program design and implementation in Washington.

In 2023, the Washington Irrigation Load Control program started and delivered an average load reduction of 131 kW across 5 days when events were called. During the 2023 irrigation season, 74 load control devices were installed on participating pumps across 11 different participating irrigators. Maximum load available for curtailment was 1.15 MW and occurred on August 28, 2023, between 3:00 PM and 4:00 PM. Participating sites were compensated for allowing Pacific Power to shut off irrigation loads for specific time periods determined by Pacific Power and were provided either day ahead, hour ahead, or 22.5-minute notice of load control events, based on participant's notification option selection.

During 2023, 100% of customers selected 22.5-minute notice. In addition, participants had the opportunity to opt-out of (i.e., choose not to have their pumps curtailed) events as necessary to suit their day-to-day business operations.

Participant incentives in the ILC program are based on the site level average available load during load control program hours adjusted for the number of opt outs or non-participation in load control events. For 2023, the program hours were maintained as 12:00 PM to 10:00 PM Pacific Daylight Time (PDT) for all days (weekends and holidays included) from May 29, 2023, through and including September 17, 2023.

Pacific Power initiated load control events during the 2023 load control season on the following dates and times:

- June 30, 2023, during the hours of 3:45 PM – 4:15 PM
- July 14, 2023, during the hours of 5:00 PM – 8:00 PM
- August 14, 2023, during the hours of 5:00 PM – 9:00 PM

- August 15, 2023, during the hours of 4:00 PM – 8:00 PM
- August 16, 2022, during the hours of 4:00 PM – 8:00 PM

Load reductions for the events are calculated using five-minute interval metering data from Connected Energy's direct load control devices and from Pacific Power billing data for the one large customer with medium voltage (2300V) pumps.

Review of 2023 Customer Enrollment and Enablement

Customer Payment Structure

Participants get compensated by the program for their voluntary participation in load curtailment events. The participant payment is based on the amount of load able to be curtailed as well as the notice period that the participant agrees to in advance. In 2023, the program offered three different notice levels and associated incentive payments based on the customer selected notice period:

Advance Notice Period	Annual Incentive Payment ($/kW)	Devices Installed at End of Season by Notice
22.5 Minutes	$45	74
1 Hour	$30	0
1 Day	$18	0

For the 2023 irrigation season and as seen in the table above, all the participating Washington irrigators selected the 22.5-minute notice option.

The incentive payment provided to participants was based on the measured available load for curtailment throughout the program season adjusted for any opt outs or non-performance in load control events. This payment structure is designed to provide fair and consistent treatment for all sites. For the five events called by Pacific Power in 2023, all five were initiated with at least an hour ahead notice.

Due to the customer's operation of the pumps and varied run times during program hours, not all the participating customer pumps contributed to program load reduction objectives and therefore may receive reduced or no incentive billing credits.

Enrolled Customers

In 2023, the first year for the program in Washington, Connected Energy enrolled and installed 175 new load control devices on customer pumps. Of those 171 devices, 74 were installed during the irrigation season, with 97 installed after the season ended. Connected Energy started marketing activities early in the program year and continued marketing the program benefits to irrigators throughout the season. The 171 participating loads are distributed across 22 irrigation customers.

Data Quality

Connected Energy's load control devices are designed with an integrated metering chip that provides near real-time interval metering data during both Irrigation Load Control events and normal operation of the customer participating loads. This metered data is used to validate when the pump is running and when the pump has been successfully curtailed. Thus, there is no need to create a statistical methodology or tool to validate participation of enrolled loads in the program. In cases where participants power down pumps when they are not being used, Connected Energy will see no metering data coming into the platform and will treat that load as being powered off. When the load is powered up again, we will then either see positive load data (load is running) or zero load data (load is not running).

Connected Energy's load control devices utilize 4G (LTE) cellular communications which provides added benefits as the minimum projected network life for 4G (LTE) is currently year end 2032.

Review of 2023 Program Participants and Performance

Customer Crop/Operations and Pumping Equipment

For the 2023 Irrigation Load Control season, customer crop types/operations included alfalfa, potatoes, and grass fields for cattle and livestock grazing as well as pumping into reservoirs. Pump sizes at these locations ranged from 25 HP to 600 HP.

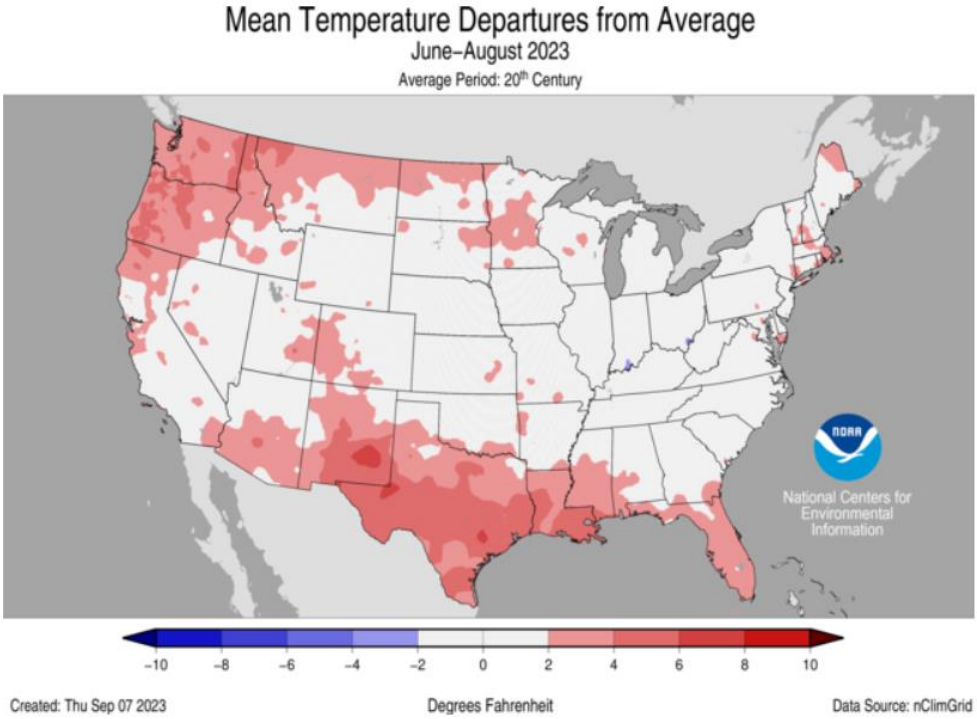
Impact of Irrigation Technology and Water Availability

While pump size is a clear determinant of total load availability in the Irrigation Load Control program, irrigation technology and water availability also impact irrigation pump run-time and thus can affect customer success in the Irrigation Load Control program. Pivot irrigation systems are operationally easier to manage for load control events than a wheel line or hand line irrigation system. During the 2023 season, participants continued to have concerns related to major water restrictions in the Pacific Northwest. These water restrictions resulted in several participants experiencing reduced pumping loads due to the lack of water to pump.

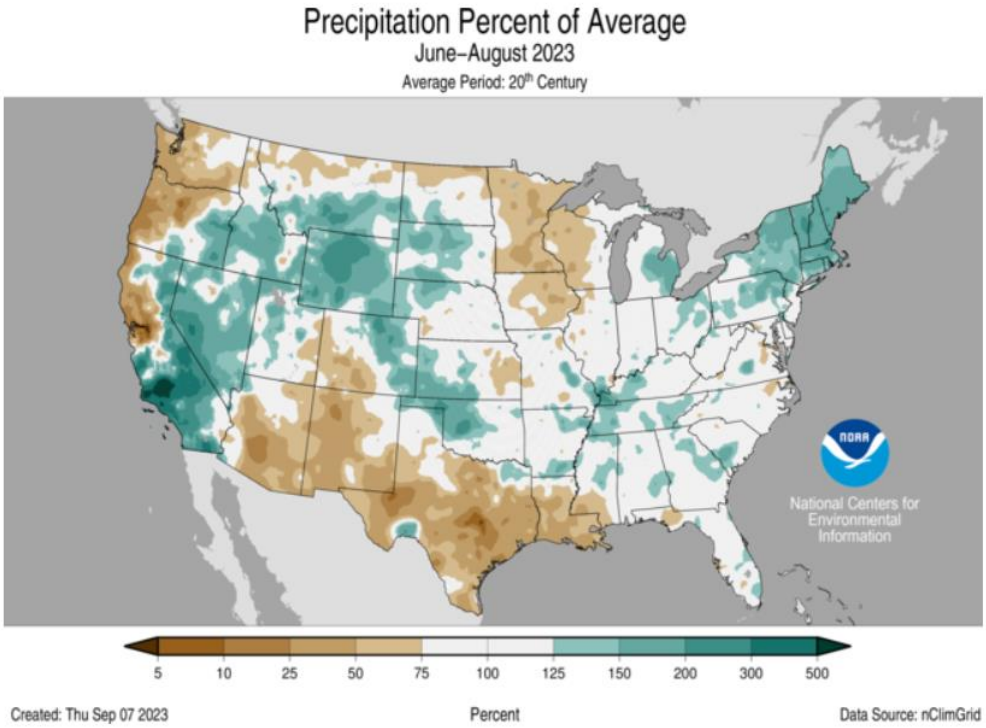
Weather & Drought Impact

Similar to the previous five years, 2023 was warmer than normal (including a record-breaking heat wave in August 2023) in the Irrigation Load Control geographical area, leading to greater irrigation needs. Like the previous 4 out of 5 years, precipitation levels were below average in the Irrigation Load Control geographical area. Along with below average levels of precipitation, water restrictions remained in place and resulted in lower pump loads versus historical averages.

The two images below highlight the above average temperatures and average to slightly below average precipitation across much of the western part of the country including the ILC program region during the 2023 program season.



Source: NOAA Mean Temperature Departures from Average (June-August) and Precipitation Percent of Average (June-August), available online: https://www.ncdc.noaa.gov/sotc/national/202008#season-precip



Source: NOAA Mean Temperature Departures from Average (June-August) and Precipitation Percent of Average (June-August), available online: https://www.ncdc.noaa.gov/sotc/national/202008#season-precip

Available Load Reduction

The Washington Irrigation Load Control program is evaluated based upon average available load reduction (kW) during the 2023 program year, which ran from May 29, 2023, through September 17, 2023 (a total of 112 days).

The chart below provides the details for the 2023 program year.

For the 2023 program year the portfolio average available load reduction for the operating season was 428 kW (see Figure 1 below) with a maximum of 1,147 kW occurring on August 28, 2023. The chart below shows daily available demand during active program hours (12:00 PM – 10:00 PM, all days) and active program months in 2023. The increase in load from late July into mid-August was the result of added enrollments and installations.

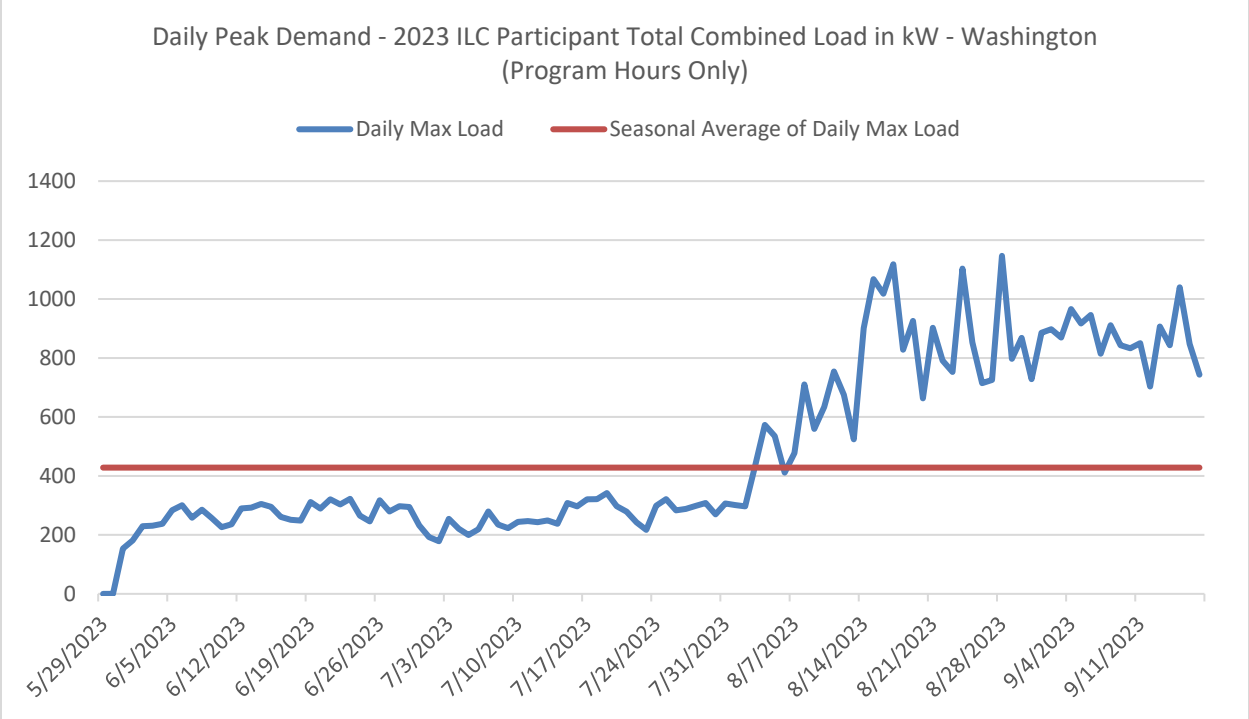


Figure 1 – 2023 ILC Participant Total Combined Load in kW for Program Hours Only

Load Control Events

Pacific Power activated the Irrigation Load Control program in Washington a total of five times during 2023:

- June 30, 2023, during the hours of 3:45 PM – 4:15 PM
- July 14, 2023, during the hours of 5:00 PM – 8:00 PM
- August 14, 2023, during the hours of 5:00 PM – 9:00 PM
- August 15, 2023, during the hours of 4:00 PM – 8:00 PM
- August 16, 2022, during the hours of 4:00 PM – 8:00 PM

Event notice times were as follows:

Event Date	Event Time	Event Notice Sent	Notice Provided
6/30/23	3:45 PM – 4:15 PM	6/30/23 @ 9:26 AM	6 hours, 19 minutes
7/14/23	5:00 PM – 8:00 PM	7/14/23 @ 7:44 AM	9 hours, 16 minutes
8/14/23	5:00 PM – 9:00 PM	8/14/23 @ 8:30 AM	8 hours, 30 minutes
8/15/23	4:00 PM – 8:00 PM	8/15/23 @ 10:51 AM	5 hours, 9 minutes
8/16/23	4:00 PM – 8:00 PM	8/16/23 @ 12:07 PM	3 hours, 53 minutes

Load reduction was measured as the difference between actual demand remaining on the system during the event and baseline demand. Baseline demand is the average demand during program hours (12pm to 10pm) on the most recent non-event, program day. Detailed baseline charts are provided in Appendix C for each event. Actual Load Reduction (kW), Baseline Demand (kW) and Load Reduction Performance Factor as reported here correspond to 5-minute interval energy usage measurements from Connected Energy's field installed equipment at customers' sites.

The 2023 portfolio delivered an average of 257 kW across the three called events on June 30, July 14, and August 14. The events called on August 15 and August 16, however, generated a calculated load reduction amount that was negative. This was because the baseline demand of 450 kW was from Sunday, August 13, 2023 (the most recent non-event program day) and was significantly lower than amount of program load on the system just prior to the start of both events (1,060 kW on August 15 and 980 kW on August 16). An additional factor impacting the amount of load reduction was related to the three customers (with a combined 29 pumps) who opted out of events on August 14 (4 pumps), August 15 (29 pumps), and/or August 16 (29 pumps).

Figures 2 through 6 below are graphs showing the Event Peak Load data for each of the 5 called events. The red line on each graph shows the 5-minute Peak Load Data on the day

of the event and the blue line shows the Average Peak Load During Program Hours for the baseline day.[12] The difference between the lines shows the amount of curtailed load achieved by the event.

[12] Note - the baseline period is the same day (August 13, 2023) for each of the events on August 14, August 15, and August 16. Pacific Power is reviewing the methodology used for baseline calculations, as the utilized baseline for these three events was significantly lower than available loads on each of event days.

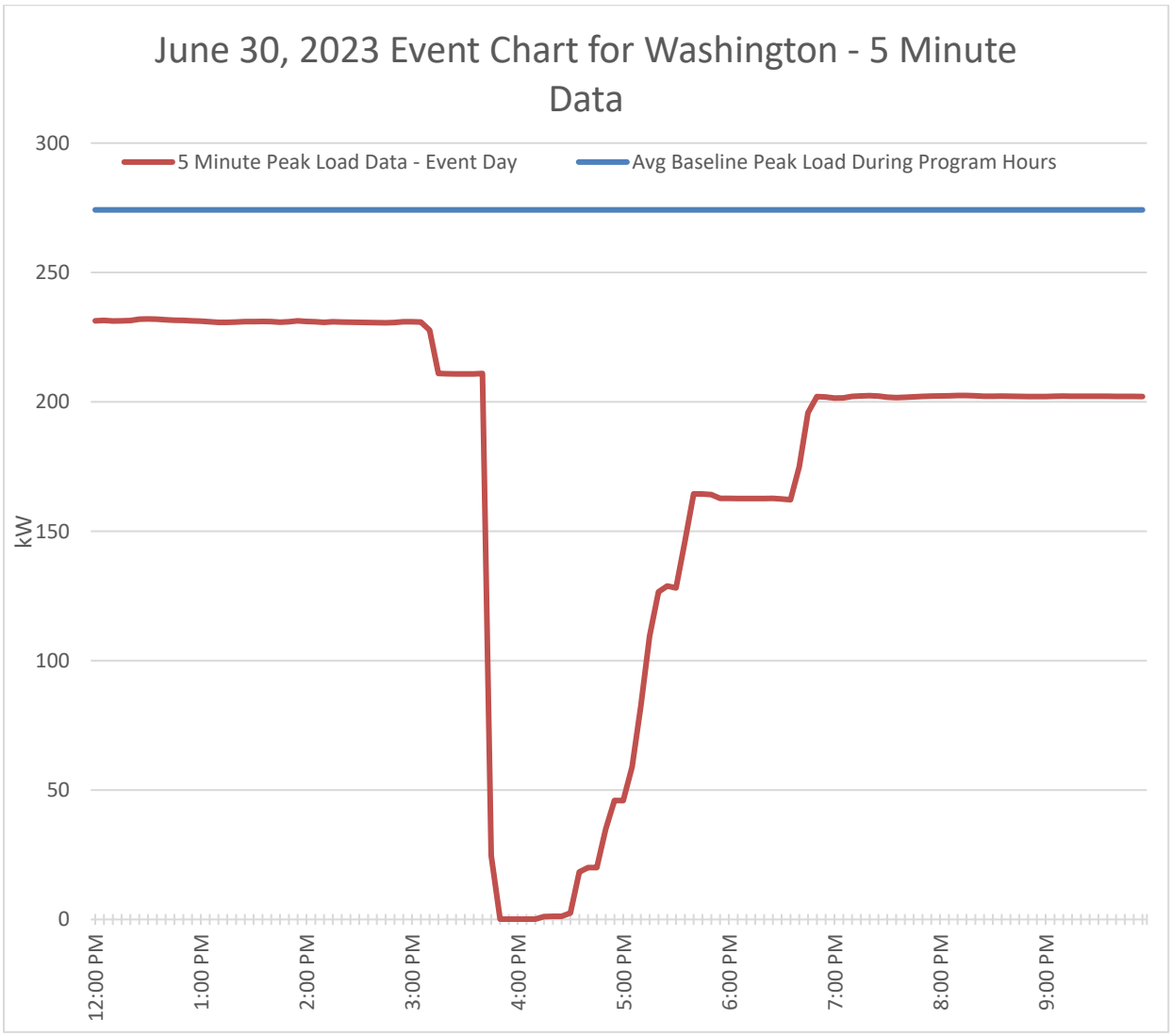


Figure 2 – June 30, 2023 Event Chart

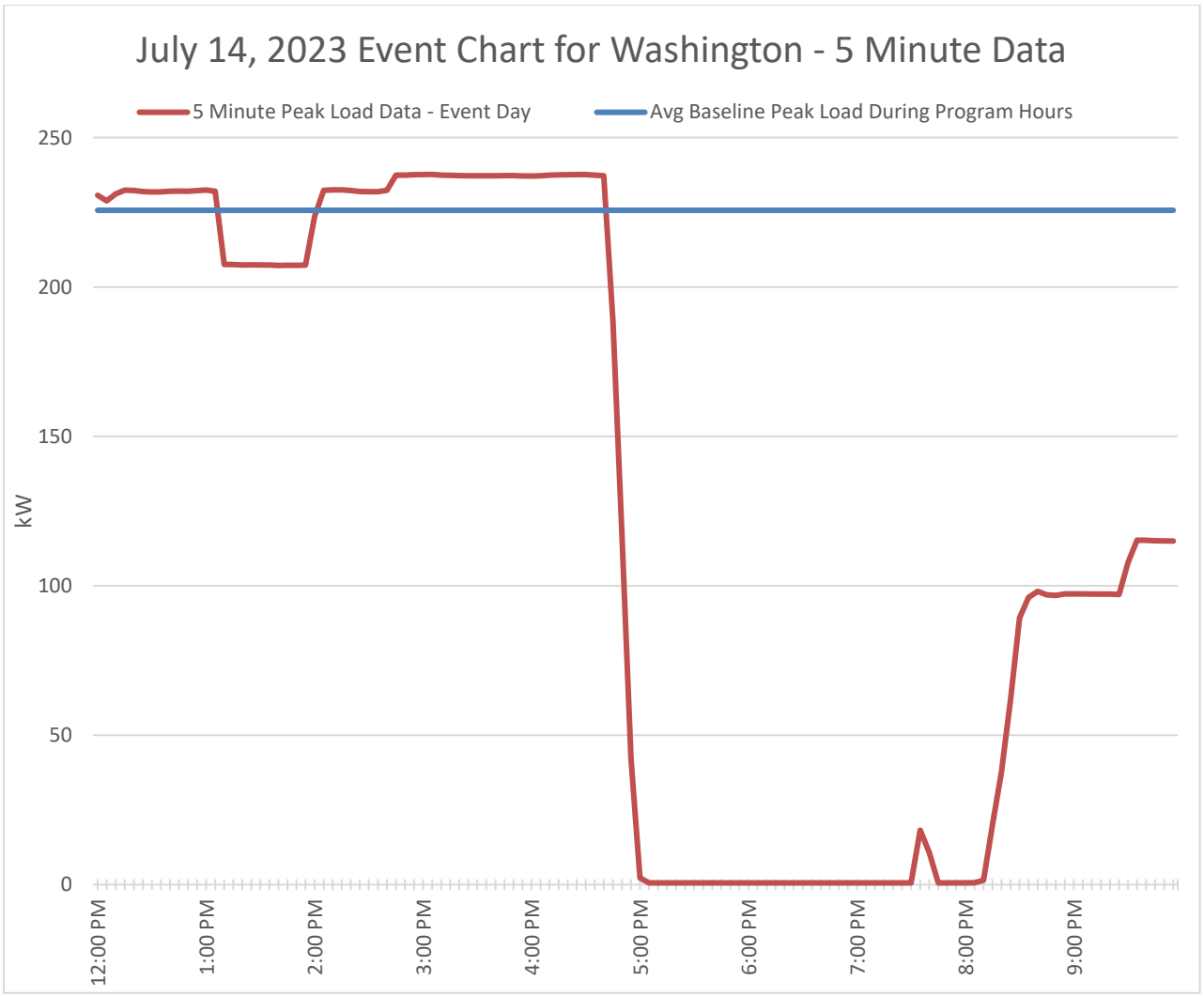


Figure 3 – July 14, 2023 Event Chart

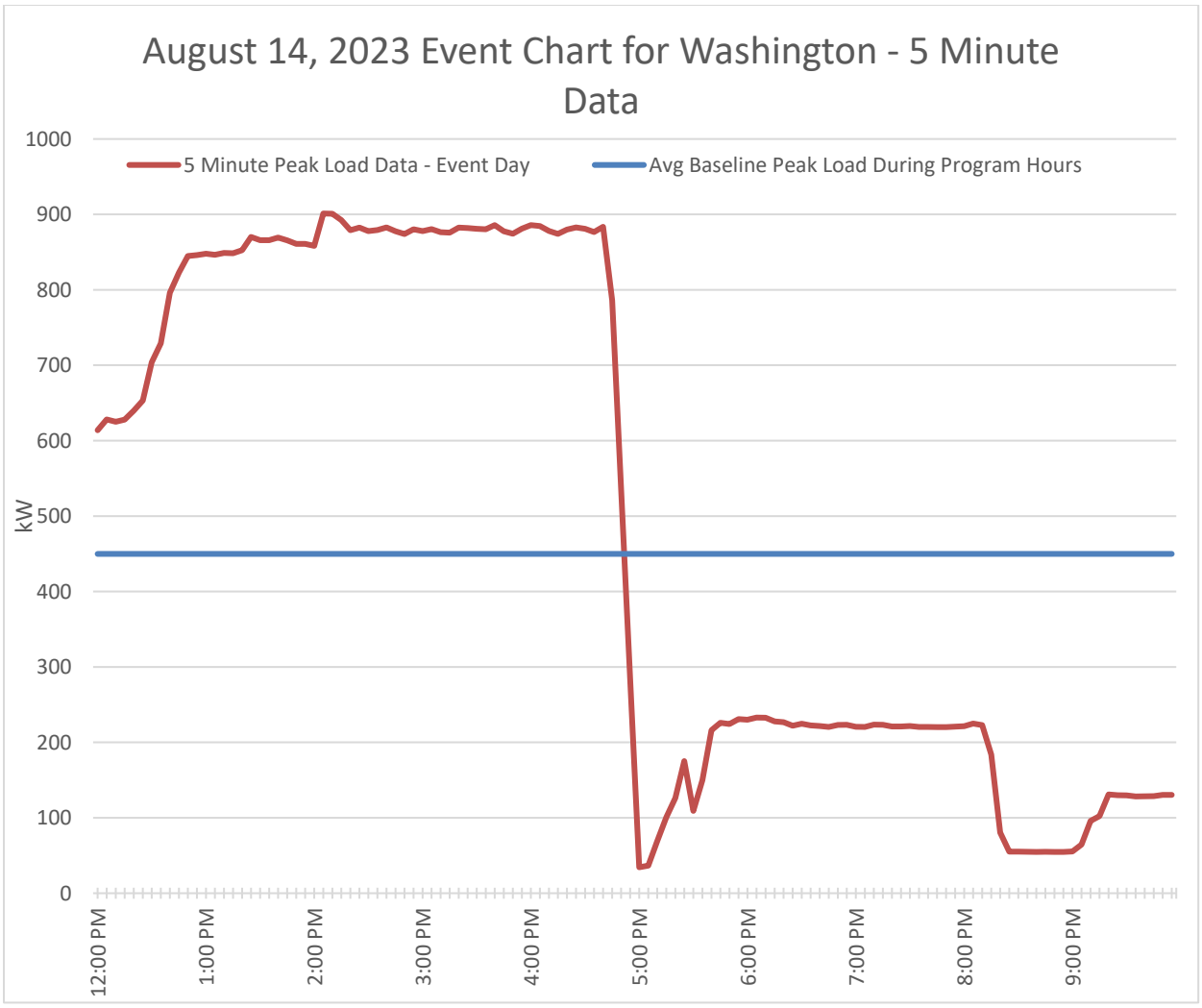


Figure 4 – August 14, 2023 Event Chart

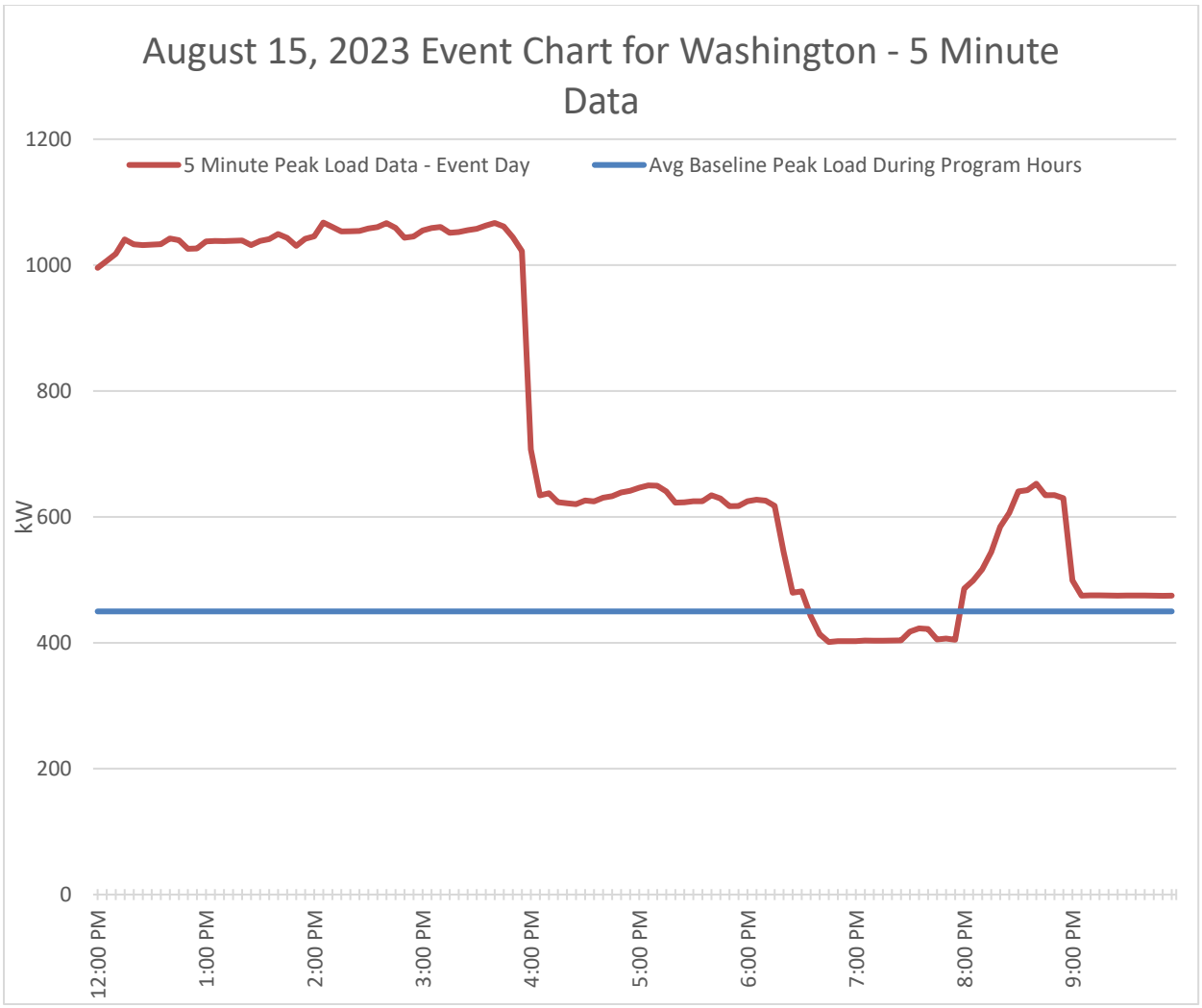


Figure 5 – August 15, 2023 Event Chart

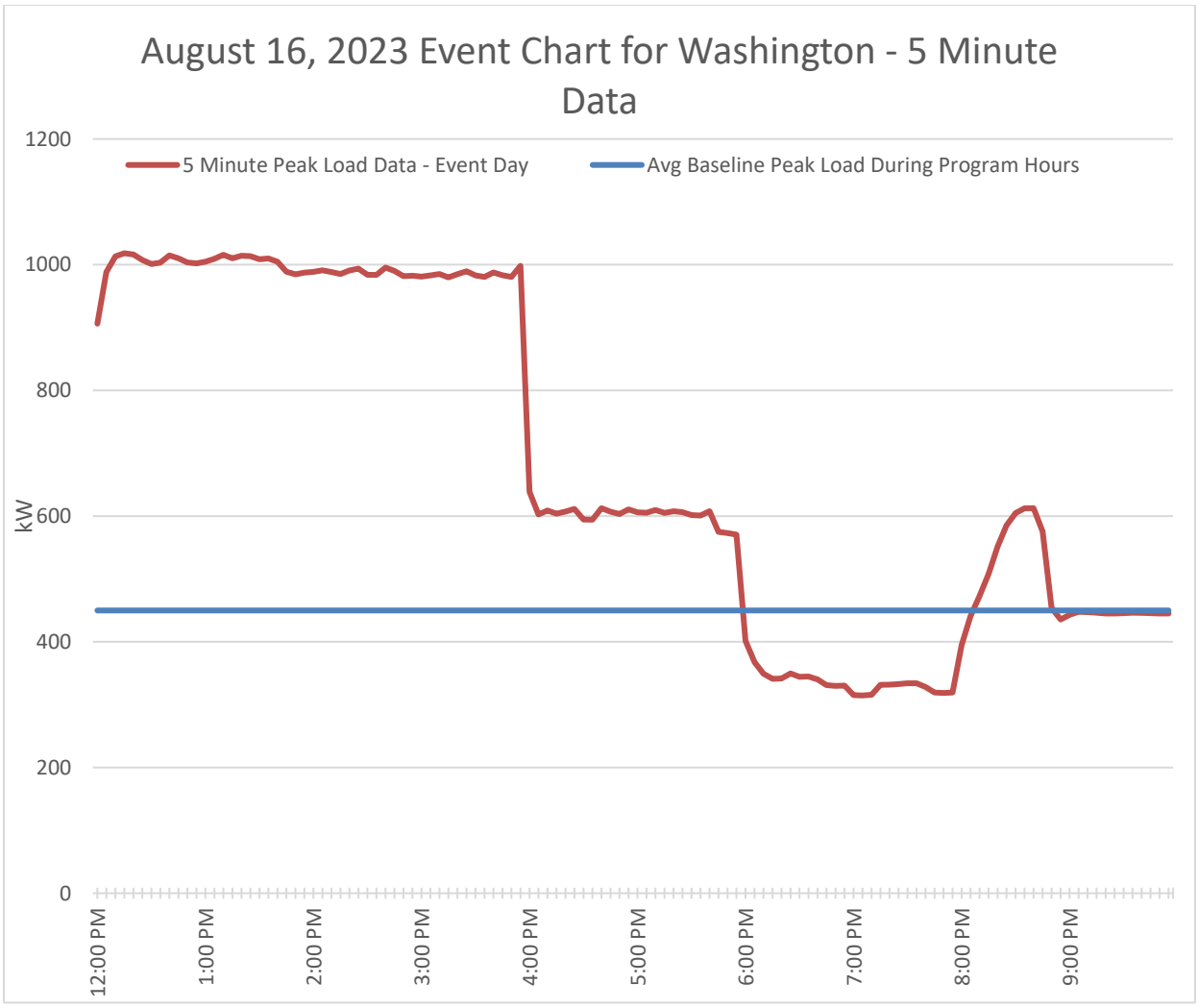


Figure 6 – August 16, 2023 Event Chart

Load Control Event Results

Table 1 below shows the summary detail for each of the five called events. Included is the actual load reduction (defined as Baseline Demand minus the amount of load remaining on the system), baseline demand, and performance factor (Actual Load Reduction / Baseline Demand) for each event.

Table 1: Actual Load Reduction, Baseline Demand, and Performance Factor, by Event

Date	Notice Groups Called	Event Time	Actual Load Reduction (kW)*	Baseline Demand (kW)*	Load Reduction Perf Factor (%)*
June 30 2023	**1**	**3:45PM - 4:15PM**	270	274	98.46%
July 14 2023	**1**	**5:00PM - 8:00PM**	224	226	99.38%
August 14 2023	**1**	**5:00PM - 9:00PM**	275	450	61.20%
August 15 2023	**1**	**4:00PM - 8:00PM**	-96	450	-21.24%
August 16 2023	**1**	**4:00PM - 8:00PM**	-20	450	-4.34%
Avg of 5 Events			131	370	46.69%

Notice Group 1 – 22.5 Minute Notice Provided

* Actual Load Reduction (kW), Baseline Demand (kW) and Load Reduction Performance Factor as reported here correspond to 5-minute interval energy usage measurements from Connected Energy's equipment at customers' sites and 5-minute data from the Pacific Power system, for the one customer with medium voltage equipment. These measurements may or may not correspond to realized load reduction on Pacific Power's system.

Customer Opt-outs of Called Events

Pacific Power's ILC program is a voluntary program that allows customers to opt out of any or all called events during the season. If customers do opt out of an event(s), their incentive amount is reduced proportionally based on the number of events called and the number of events opted out of by the customer.

During the 2023 program year, 3 customers opted out of any called events. The opt outs occurred on August 14, August 15, and August 16, during an extended record-breaking heat wave in the Pacific Northwest.

Event Date	# of Customer Opt-Outs	# of Devices Opted Out
6/30/23	0	0
7/14/23	0	0
8/14/23	1	4
8/15/23	3	29
8/16/23	3	29

Key Lessons Learned from 2023

- The 22.5-minute notice option was well received by participants, as demonstrated by 100% of participating customers selecting that notice option, which also provides a higher program incentive billing credit.

- Of the five called events in 2023, all events were initiated with at least a one-hour notice prior to the start of the event. Shorter notice times generally provide higher economic market value for Pacific Power.

Event Date	Event Time	Event Notice Sent	Notice Provided
6/30/23	3:45 PM – 4:15 PM	6/30/23 @ 9:26 AM	6 hours, 19 minutes
7/14/23	5:00 PM – 8:00 PM	7/14/23 @ 7:44 AM	9 hours, 16 minutes
8/14/23	5:00 PM – 9:00 PM	8/14/23 @ 8:30 AM	8 hours, 30 minutes
8/15/23	4:00 PM – 8:00 PM	8/15/23 @ 10:51 AM	5 hours, 9 minutes
8/16/23	4:00 PM – 8:00 PM	8/16/23 @ 12:07 PM	3 hours, 53 minutes

- Calling multiple events in succession (events call on August 14, 15, 16) along with record breaking heat wave resulted in 2 customers opting out of at least 2 of those back-to-back-to-back events.

- Continued program marketing efforts via multiple emails, postcards, and outbound calling were key in gaining program exposure and increased participation through added enrollments.

APPENDIX A: Customer-Facing Irrigation Load Control Marketing Activity

Listed below are the major marketing activities involving program participants that occurred in 2023.

	Activity	Date	Description
1	**Email**	2/7/23	New enrollment opportunity email to solicit new customers into the program.
2	**Postcard Mailing**	3/16/23	"Enroll today to save" postcard sent to potential participants to continue to provide program exposure
4	**Email**	4/25/23	New enrollment opportunity email to solicit new customers into the program.
5	**Postcard Mailing**	5/18/23	"Enroll today to save" postcard sent to potential participants to continue to provide program exposure
6	**Email**	6/20/23	New enrollment opportunity email to solicit new customers into the program.
7	**Postcard Mailing**	10/6/23	"This is your 1st chance to save" postcard sent to potential participants introducing the ILC program for 2024.
8	**Email**	10/10/23	New enrollment opportunity email to solicit new customers into the program.
9	**Email**	11/7/23	New enrollment opportunity email to solicit new customers into the program.

APPENDIX B: Customer Payments

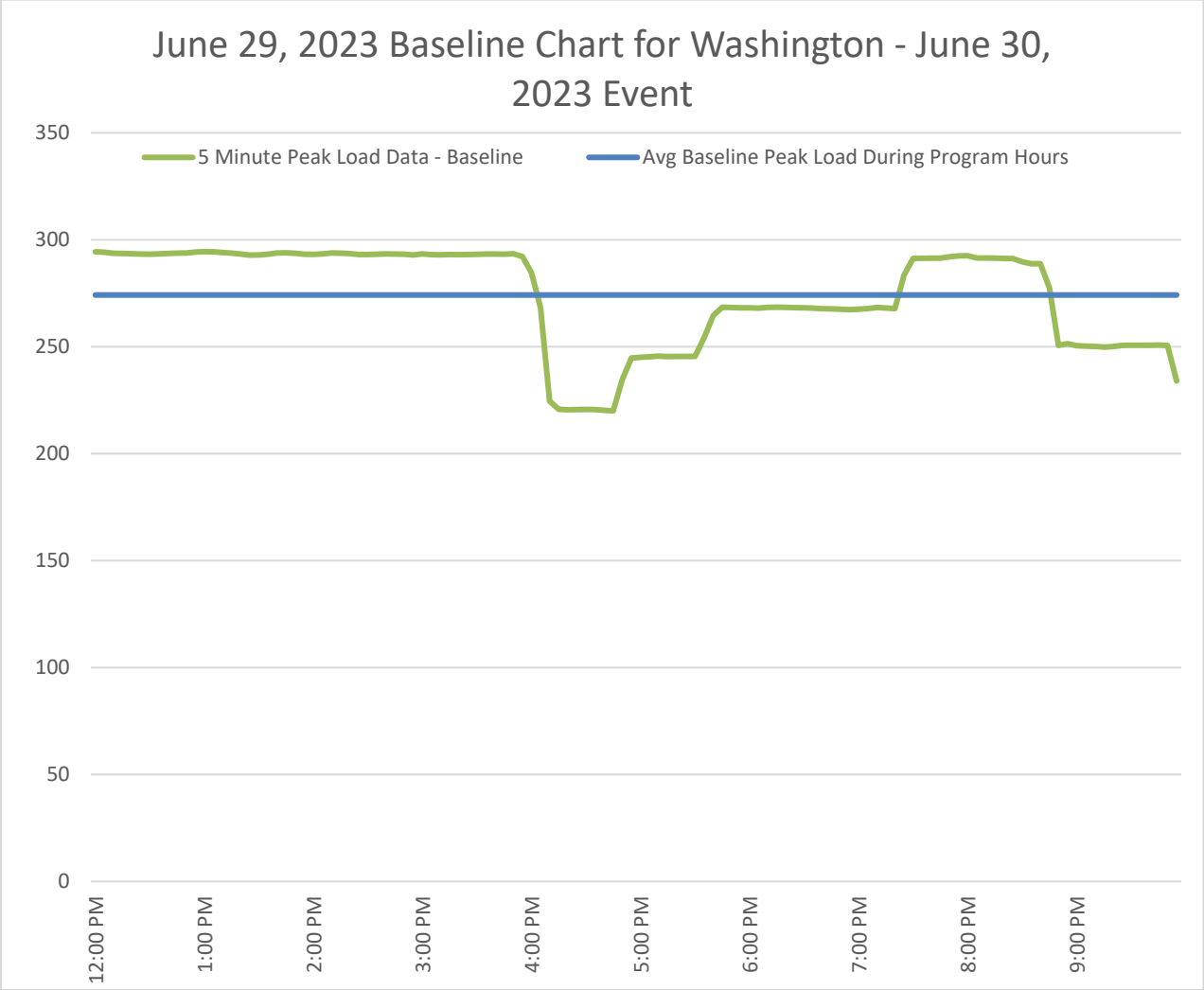
In 2023 the Washington Irrigation Load Control program provided customer incentive payments via a billing credit posted to the customer's account after the season had concluded.

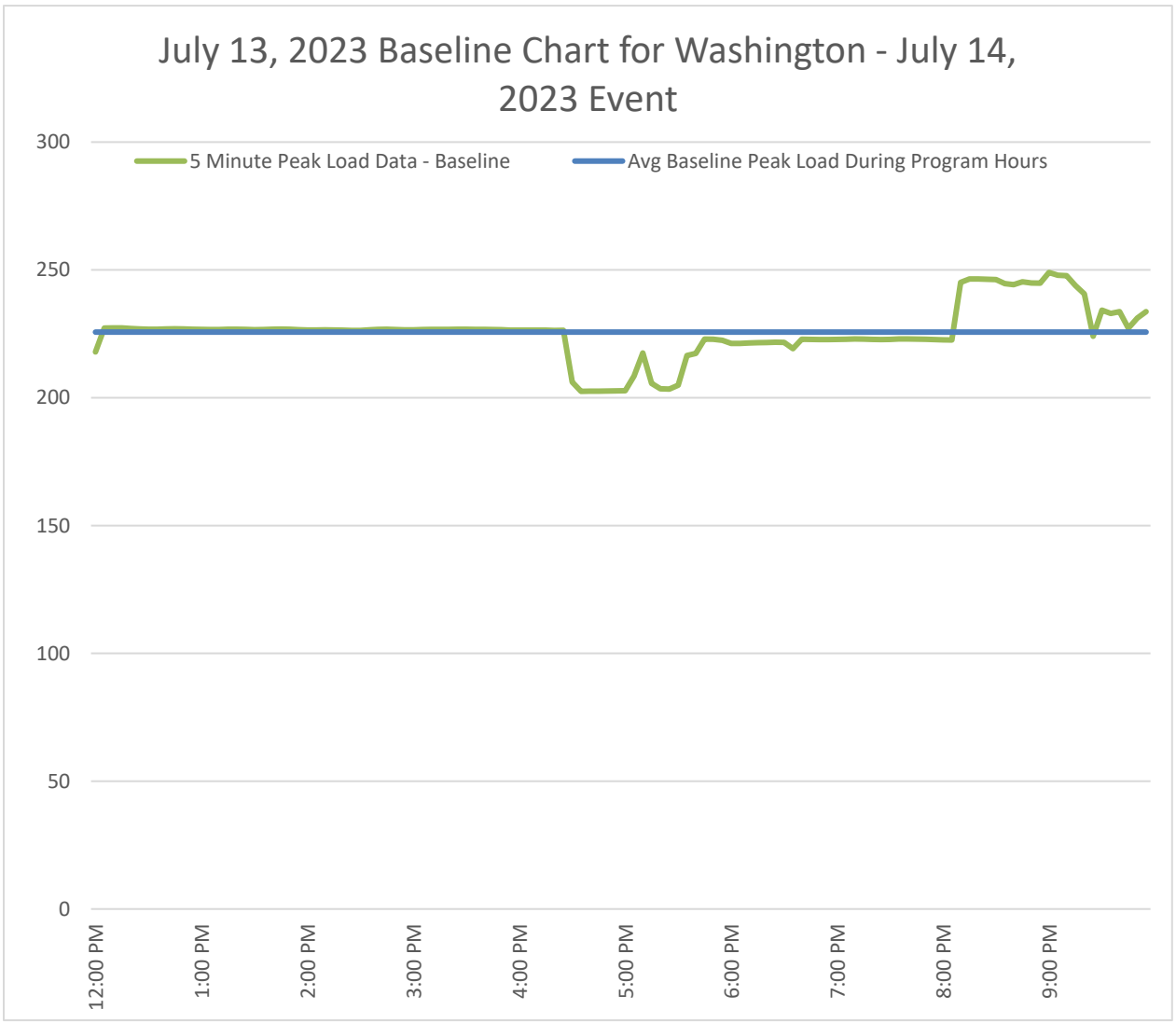
A total of 11 customers with 74 participating irrigation pumps were potentially eligible for an incentive bill credit in 2023. Once the final analysis was completed, 14 of those pumps were determined to be ineligible to receive an incentive due to insufficient run time during the program hours of 12:00 PM – 10:00 PM.

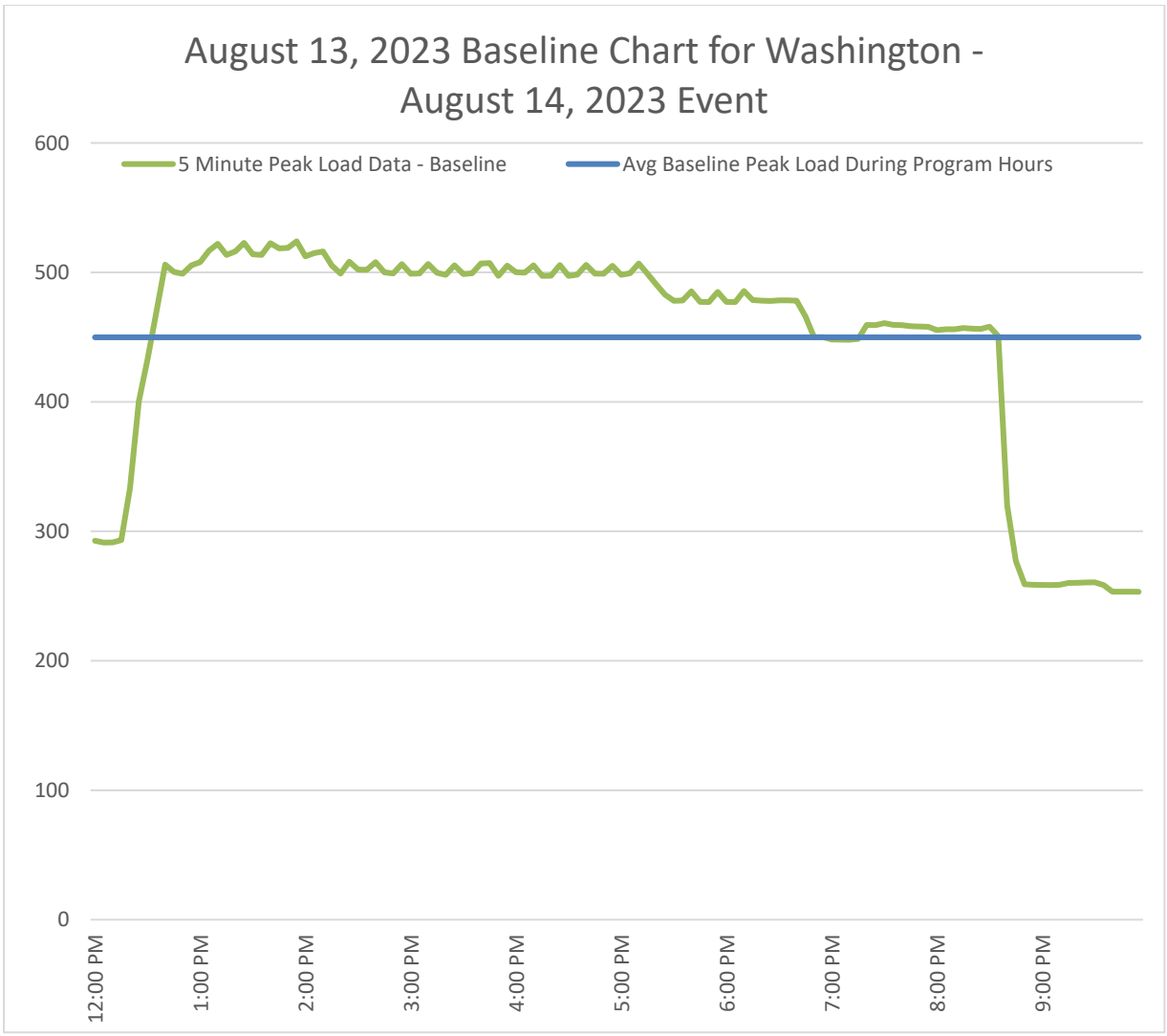
Incentive bill credits totaling $16,000.02 were issued to participating customers at the end of the 2023 irrigation season. The breakout of incentive payments based on customer selected notice period is as follows:

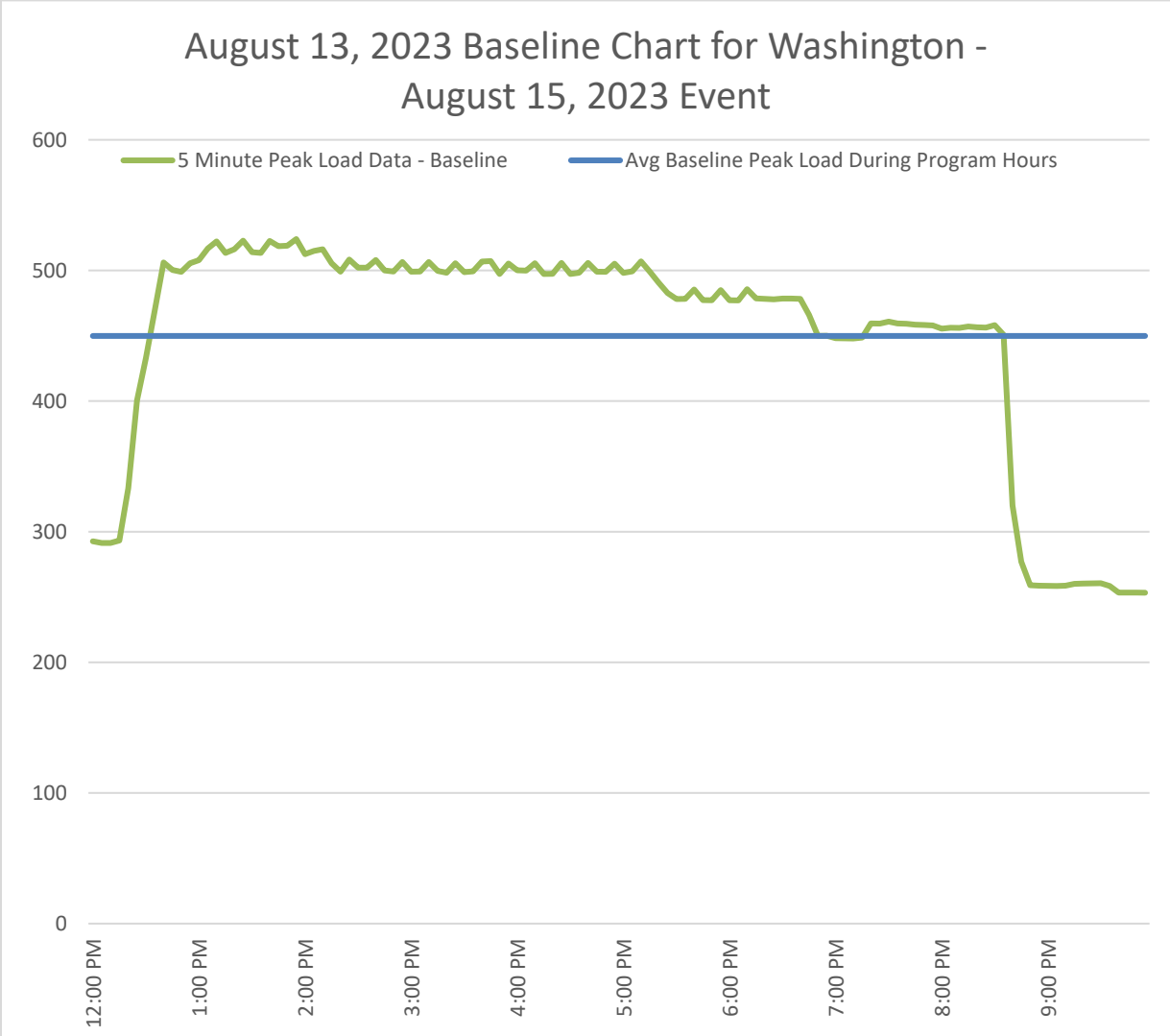
- 22.5 Minute Notice - $16,000.02
- Hour Ahead Notice - $0
- Day Ahead Notice - $0

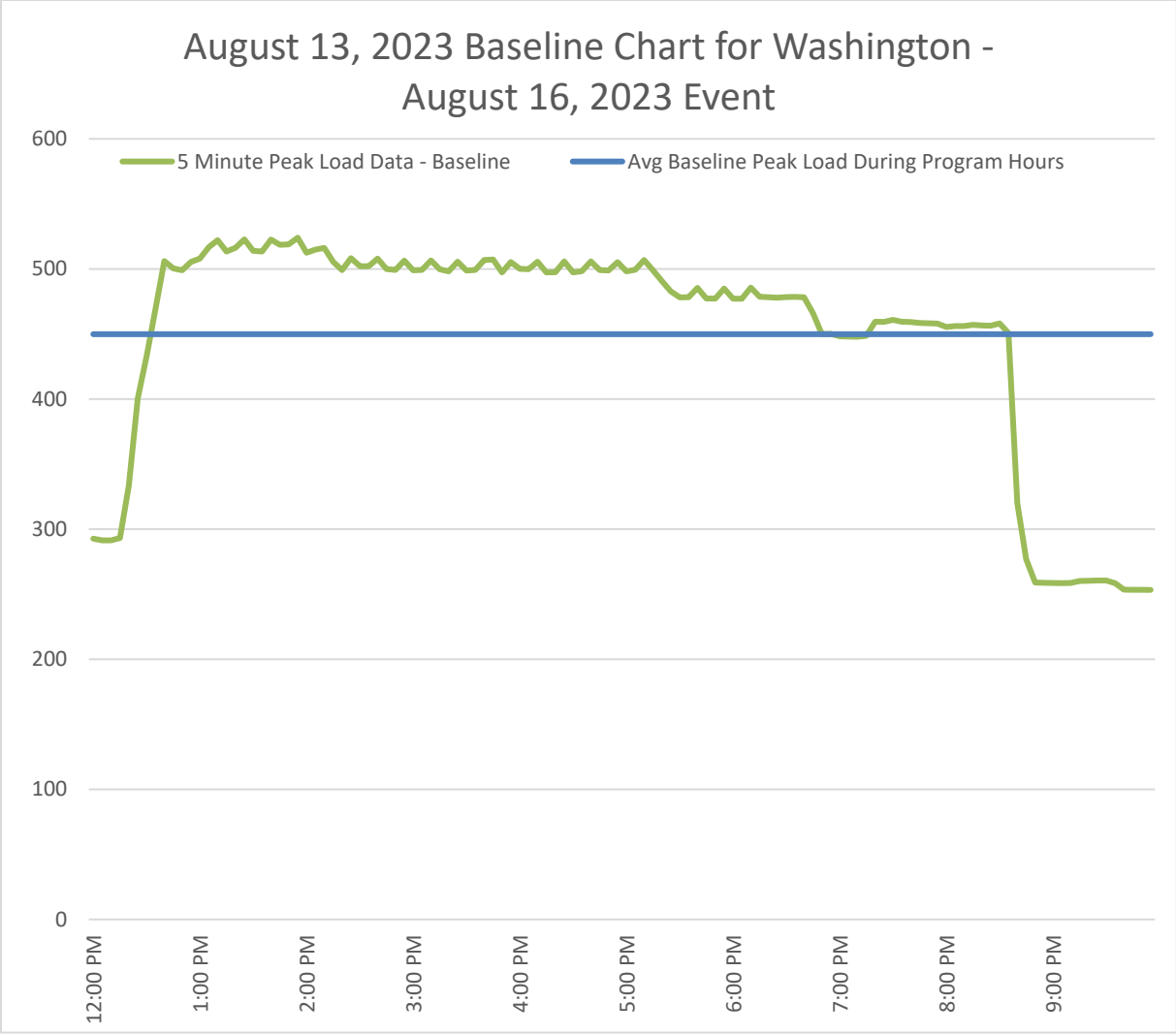
APPENDIX C: Detailed Baseline Charts




July 13, 2023 Baseline Chart for Washington - July 14, 2023 Event
5 Minute Peak Load Data - Baseline
Avg Baseline Peak Load During Program Hours
300
250
200
150
100
50
0
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM


August 13, 2023 Baseline Chart for Washington - August 14, 2023 Event
5 Minute Peak Load Data - Baseline
Avg Baseline Peak Load During Program Hours
600
500
400
300
200
100
0
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM


August 13, 2023 Baseline Chart for Washington - August 15, 2023 Event
5 Minute Peak Load Data - Baseline
Avg Baseline Peak Load During Program Hours
600
500
400
300
200
100
0
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM


August 13, 2023 Baseline Chart for Washington - August 16, 2023 Event
600
500
400
300
200
100
0
5 Minute Peak Load Data - Baseline
Avg Baseline Peak Load During Program Hours
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM

Appendix 2: 2023 Commercial and Industrial Demand Response Program – Administrator Report

Pacific Power C&I Demand Response Program

2023 Annual Report - Washington

Prepared for:

Pacific Power

Prepared by:

Enel North America

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Executive Summary

2023 was the first full program year and the first year with active participants in the Pacific Power Commercial and Industrial Demand Response (CIDR) program. In 2023, PacifiCorp and Enel X field-tested the program offer to customers, contracting and enrollment processes, and dispatch and reporting protocols for the first time. Customer response was positive, and led to customers contracting for over 50 MW of capacity. In addition, Pacific Power's Energy Supply Management group was able to use the available 60-minute capacity several times during the summer season.

There were also important lessons learned during the year. Delays in hardware procurement, changing understanding of optimal product design, and the need to build up and refine standardized operating and reporting procedures impacted overall program performance. The key takeaways from this program year are:

1) Maximize the capacity resource with Enel monitoring equipment to improve performance and customer experience.

2) Focus on shortening the performance and settlement feedback loop to improve performance and customer experience.

3) Review and refine the use case for the 20-minute product, and potentially revise product characteristics.

4) Leverage the centralized enablement control process to improve collaboration between organizations and ultimately decrease the overall enablement timeline.

All tables and figures in this report are specific to the state of Washington unless otherwise stated. Final total participation through the end of 2023 is shown in Table 14.

Table 14. 2023 Participation by Customers and Capacity

Product	Customers	Capacity (MW)
60-minute Ahead	2	0.28
20-min Ahead	0	0.00
7-min Ahead	0	0.00
Real Time	0	0.00
TOTAL CIDR	**2**	**0.28**

In addition to the 2 customers and 280 kW of capacity fully enrolled and available for dispatch by the end of the year, another 18 customers representing 16 MW of capacity had signed participant agreements and were awaiting enrollment. Participants included one customer each from the education and retail sectors.

Program Overview

The Pacific Power Washington Commercial and Industrial Demand Response (CIDR) Program provides incentives to participating customers in exchange for granting Pacific Power the right to curtail participating customers' loads at certain times within the dispatch parameters and during the dispatch period. Pacific Power contracts with Enel X as the program administrator to deliver the CIDR program; Enel X oversees the enrollment of participating customers, delivers dispatch notifications, and calls dispatch events on behalf of Pacific Power. The ability to curtail these loads provides Pacific Power with curtailment, regulation reserve, contingency reserve, and frequency response grid services. The four demand response product offerings (DR products) are the Pacific Power 60-min Ahead (PAC 60M), Pacific Power 20-min Ahead (PAC 20M), Pacific Power 7-min Ahead (PAC 7M), Pacific Power Real Time (PAC RT), which vary by dispatch notification length, and other parameters.

Enel X is responsible for recruiting customers, managing the enrollment of participating customers, installing Enel X energy monitoring devices where necessary, maintaining the Enel X utility portal that allows dispatches to be scheduled, maintaining the Enel X participant applications that allow participants to access their own energy and participation data, delivering dispatch notifications and calling dispatch events scheduled by PacifiCorp, reporting on program performance and calculating and delivering customer incentives. PacifiCorp is responsible for general program oversight, procuring and installing KYZ pulse boards and other equipment necessary to provide a pulse signal to the Enel X device (where installed), providing customer usage data where no Enel X monitoring device is installed, and scheduling dispatch events for the PAC 60M, PAC20M and PAC 7M products.

Customer Eligibility

Eligible customers and relevant load criteria are included in

Table 15 below. Eligible customers who meet the criteria and agree to participate are participating customers. Participating customers are required to sign a standard agreement with the Enel X to initiate participation. The agreement is perpetual (unless terminated by either party), and does not need to be re-signed at the start of each year. Customers are eligible to dual enroll in one of the following PAC 60M, PAC 20M, PAC 7M, and the PAC RT product. Customers are not allowed to dual enroll between PAC 60M, PAC 20M, and PAC 7M.

Table 15: Customer Eligibility Requirements

Category	Description
Eligible Customer	All commercial and industrial customers on Delivery Service Schedules 23,28,30, 47 and 48. Excluding Direct Access customers
Criteria	Interval meter installed 500 kW or more of curtailable load as determined by Program Administrator for Customers participating in 7 minute and Real Time Dispatch Notification

Incentives

Incentives, summarized in Table 16 below are available on a $/kilowatt (kW) per year basis and vary by DR product. Participants earn an equal incentive rate for each hour and month under the PAC 60M product. Under the PAC 20M and PAC 7M products customers earn a variably incentive rate across each month during the year based on value of the demand response capacity resource in each month. In each month, all hours for the PAC 20M product are equal and under the PAC 7M product the incentive is weighted by time of day, where the hours between 9am – 9pm provide a higher incentive rate than 9pm – 9am. The $/kW incentive rate for the PAC RT product is equal across all hours of the year.

Using data from Enel X installed equipment, loads available for curtailment (kW) during the hours, days and months of the dispatch period are averaged to arrive at an average available load which will be multiplied by participant performance during applicable dispatch events and the Incentive rate depending on the product offering selected. Loads opted out are removed from the connected load calculations and reduce the Incentive payment to the participating customer. In 2023, incentives were paid on an annual basis, though in future years, the PAC 60M product will be paid at the end of the season and all other products will be paid quarterly. In the event Pacific Power does not call a dispatch event, participating customers receive incentives based on the availability of load reduction.

Table 16: Incentives by DR Product

DR Product		Incentive Rates											
PAC 60M		Annual Rate ($/kW):	$30.00										
		Monthly Rate											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		N/A	N/A	N/A	N/A	$6.00	$6.00	$6.00	$6.00	$6.00	N/A	N/A	N/A
PAC 20M		Annual Rate ($/kW):	$55.00										
		Monthly Rate											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
		$5.50	$4.13	$2.75	$2.75	$2.75	$4.13	$8.25	$8.25	$5.50	$2.75	$2.75	$5.50
PAC 7M		Annual Rate ($/kW):	$75.00										
		Monthly Rate											
	Hours	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	9am - 9pm	$5.63	$4.22	$2.81	$2.81	$2.81	$4.22	$8.44	$8.44	$5.63	$2.81	$2.81	$5.63
	9pm - 9am	$1.88	$1.41	$0.94	$0.94	$0.94	$1.41	$2.81	$2.81	$1.88	$0.94	$0.94	$1.88
PAC RT		Annual Rate ($/kW):				$85.04							
		All annual hours equal ($/kW):				$0.00971							

Dispatch Parameters

The dispatch parameters for the four CIDR products are summarized in Table 17 below. The PAC 60M product is a summer only (May – September) product. All others are available year-round. The PAC 20M and PAC 60M are only available on non-holiday business days during their respective dispatch periods. The PAC 7M and PAC RT products are available every day of the year.

Table 17: DR Product Dispatch Parameters

	DR Product			
Dispatch Parameter	PAC 60M	PAC 20M	PAC 7M	PAC RT
Dispatch Period	May 1 - Sep 30	Jan 1 - Dec 31	Jan 1 - Dec 31	Jan 1 - Dec 31
Dispatch Days	Weekdays, non-holidays during Dispatch Period	Weekdays, non-holidays during Dispatch Period	Monday - Sunday during Dispatch Period	Monday - Sunday during Dispatch Period
Available Dispatch Hours	3:00 p.m. to 9:00 p.m. Pacific Time on all Dispatch Days	8:00 am to 9:00 p.m. Pacific Time on all Dispatch Days	24 hours/day on all Dispatch Days	24 hours/day on all Dispatch Days
Maximum Dispatch Hours	40 hours	60 hours	60 hours	5 hours
Maximum Dispatch Events	1 event/day	1 event/day	25 events/year	50 events/year
Dispatch Durations	up to 3 hours	up to 4 hours	up to 4 hours	up to 15 minutes
Dispatch Notification (minimum)	60 minutes	20 minutes	7 minutes	None

Marketing

For 2023, Enel and Pacific Power coordinated to develop the following marketing materials and campaigns:

- Frequently Asked Questions in print and online at Pacific Power's and Enel's websites. Spanish version is available on Pacific Power's website.
- Marketing and sales slide presentations.
- Informational sessions with Pacific Power's Regional Business Managers about the Pacific Power C&I Demand Response program, target customers and collaboration framework

Recruiting and Enablement

Recruitment

The Recruitment process is the set of activities that allows Enel to identify and contract with eligible commercial and industrial customers. Primary activities of this process include, but are not limited to:

- marketing and prospecting across various market sources to include utility data sources from Pacific Power for eligible customers.
- defining customer needs through interviews and applying customer analogs from market experience.
- evaluating which DR product is the best customer fit based on operations, historical load data, and financial incentives.
- contracting with the customer for the agreed site(s) and DR product(s).

Once the customer has fully executed a contract with Enel, they are ready to begin the enablement process.

Program recruitment activities through year-end 2023 are summarized in Table 18 below. Activities include phone calls, phone conversations, voicemails, emails, and virtual or in-person meetings. Customers Contacted is the number of unique customers contacted. Engaged Customers is the number of unique customers with whom Enel had at least an initial meeting. Meetings is the total number of meetings had with customers.

Table 18: 2023 Annual Recruitment Summary

Customers Contacted	Engaged Customers	Meetings
50	50	69

Table 19 shows the number of customers and capacity contracted. Contracted customers and capacity from December 2022 are included in the 2023 results since the 2023 report is the first year published. Contracted customers includes the number of customers who signed an Enel demand response order form agreeing to participate in one, or more, DR products. Contracted MWs is a sum of the number of MWs per site that were detailed on the Enel DR order form for all customers contracted.

Table 19: Contracted Customers and Capacity through December 2023

	PAC 60M	PAC 20M	PAC 7M	PAC RT	Total
Customers Contracted	4	9	2	5	20
MWs contracted	2.26	6.89	2.70	4.35	16.21

Recruitment through the end of 2023 was a significant success. The PAC 20M product was the most popular, with 9 customers signing up almost 7 MW. The product appeared to hit a "sweet spot" for customers. It offers a higher incentive than the PAC 60M peak shaving product, but as a reserve product, would likely be used for shorter curtailment events. Compared to the PAC 7M and RT products, the PAC 20M product is more attainable, because it does not have a minimum 500kw threshold, and customers can participate with manual curtailment rather than automation.

While customer interest in the PAC 20M product was an overall positive outcome, PacifiCorp paused further recruitment into this product in November 2023 for several reasons. First, PacifiCorp's program design assumes a more balanced distribution of capacity across the four products. The Company wanted time to assess the potential implications of the unexpected concentration of capacity in the PAC 20M product, while minimizing any potential negative impacts to customers if the product is modified. In addition, in the second half of 2023, the Company started to identify potential challenges with utilization of the PAC 20M product in its primary use case, as regulation reserve (see **Event Performance** for further discussion). Following the pause in recruitment, Enel X continued to enable customers already contracted for this product. In addition, the resource remained available for dispatch, and PacifiCorp continued to monitor for opportunities to use the resource under the existing parameters. At the same time, PacifiCorp began to explore possible revisions to the product that would improve functionality for PacifiCorp, and be compatible with customer operations.

The second highest contracted DR product was the PAC 60M product, which is also expected as it is the simplest program to participate in due to the longer notification time, lower dispatch expectations and lower enablement burden. All customers contracted into the PAC RT product are contracted as dual-enrolled into either the PAC 20M or PAC 7M as well. The final results for the PAC 7M and PAC RT products does not represent a complete year of activities as recruitment was paused for these products while PacifiCorp and Enel X integrated dispatch capability for these products into the central grid management system. Therefore, the number of customers and capacity contracted may not accurately reflect the market response to the fast-response DR products.

2023 was the first full year of recruitment and the initial outreach revealed a few general trends about the customer base. First, participants who use conditioned spaces, or HVAC loads, to participate typically make up a much larger portion of a traditional summer peak-shaving demand response program, like the PAC 60M product. However, it was difficult to find

participants with consistent available load for the duration of the product's active hours, 3:00 PM to 9:00 PM. Many of the potential participants with conditioned space loads, including schools, and offices set back their temperature settings too early, generally between 5 – 6 pm.

Second, potential updates to program design and implementation of the PAC RT, PAC 20M, and PAC 7M products impacted the recruitment effort as well. Initially, the PAC RT product had two options: localized and centralized. The localized option was intended to be dispatched at the site level and responded to local grid frequency deviations. On further review, PacifiCorp's energy supply management group indicated a strong preference to manage frequency on a system wide basis using a predictive algorithm that would dispatch all frequency resources at the same time. The localized option was ultimately removed, but after customers signed contracts to participate in this option of the PAC RT product. Work continues with these customers to help them better understand how often frequency events might be called with a system wide signal and whether they want to continue the enablement process.

During the 2023 program year, there was an extended period of defining and development work for the PAC RT product. Development of the platform integration began in 2023 but was not complete by the end of the year. Enel paused the recruitment process for the remainder of 2023 for the PAC RT product until dispatch capability was fully operational.

The PAC 7M product was designed during the RFP and negotiation process to qualify as contingency reserve capacity. However, to speed up the dispatch process and allow PacifiCorp to qualify these demand response resources as contingency reserve capacity the location of executing a dispatch event was moved from the Enel Flex platform to the PacifiCorp Energy Management System (EMS). The requirement to dispatch the PAC 7M product from the PacifiCorp EMS was a requirement uncovered during 2023. The product development work for the PAC 7M product followed the same timeline as the PAC RT product. Additionally, Enel had originally expected non-emergency generators to be eligible capacity for the PAC 7M product. Pacific Power decided to exclude these resources in 2023, which reduced the potential market.

Enablement

The Enablement process is the set of activities that enable a newly sold customer site to participate in their respective DR product. Primary activities in this process include, but are not limited to:

- upgrade of the utility meter where required to enable connection of the Enel monitoring device, by installing a KYZ pulse board. Some customers, dependent on the DR product requirements may not be monitored by an Enel device.
- Installation and configuration of the Enel monitoring device to provide the customer with near real-time access to energy usage, as well as control signals for energy curtailment.
- Platform testing and validation to ensure data accuracy.
- Customer preparation including additional education, software training, and DR testing as a practice dispatch event.
- (As needed) Capital project management for customers who need significant changes/updates to their operation such as building management systems upgrades, etc.

PacifiCorp is responsible for procuring and installing the KYZ boards. A KYZ pulse allows the utility meter to communicate with the Enel monitoring device and provide near real-time energy demand data to the customer, utility, and Enel. Enel X oversees the remainder of the enablement process.

Once a customer is fully enabled and has completed a demand response test, they are ready for enrollment into the program. The enablement results for 2023 are summarized in **Error! Not a valid bookmark self-reference.Error! Reference source not found.** below.

Table 20: Enabled Customers and Capacity through December 2023

	PAC 60M	PAC 20M	PAC 7M	PAC RT
Customers Enabled	4	0	0	0
Sites Enabled	6	0	0	0
MW	1.02	0	0	0

Since the PAC 60M product is a summer-only program, early 2023 was focused on enabling customers in that DR product to ensure the participants could participate for as much of the program season as possible.

2023 saw no enabled customers/sites in the PAC 20M, PAC 7M, and PAC RT products. The delay in PAC 20M enablement was driven by the lack of available KYZ pulse boards, due to national supply constraints. It took the program nine months to procure meaningful quantities of the required KYZ pulse hardware. The initial order of KYZ pulse boards was submitted in January of 2023. The hardware began arriving in the second half of 2023, with the order not being completely fulfilled until the end of 2023.

The KYZ pulse install is completed by a PacifiCorp meter technician and requires coordination across multiple units within at least three organizations – PacifiCorp, Enel and the customer. Initial pulse requests were hampered by poor communication, meter technicians declining to prioritize pulse installs over competing responsibilities, unexpected meter configurations requiring alternative equipment, and conditions on site that required special solutions. As requests for pulse installs increased in the fall and winter months, PacifiCorp program staff and Enel worked with meter technicians to document and share the program and device metering requirements, and establish a centralized control process for managing the workflow across organizations. In addition, the team developed solutions to execute customer meter setups in some less common configurations. Significant process improvements were made during 2023, but the initial learning curve resulted in lower enablement.

The lack of enrollment in the PAC 7M, and PAC RT products was also impacted by the KYZ pulse delays, but the primary barrier to enrollment was the platform integration project discussed in the **PacifiCorp Open Market Interface** section that paused enablement for customers recruited to participate in these products.

Enrollment and DR Event Performance

Enrollment

Final enrollment represents the customers, sites, and MWs available for dispatch in each respective DR product at the end of the program year (December), or in the case of the PAC 60M product, end of the program season (September). Two customers in Washington, representing 0.74 MWs were unenrolled during the 2023 season based on inability to participate. Final enrollment is summarized in Table 21 by DR product, number of unique customers, number of unique sites, and number of MWs. Table 22 provides a customer breakdown by industry type. Final enrollment by product and site is represented geographically in Figure 1.

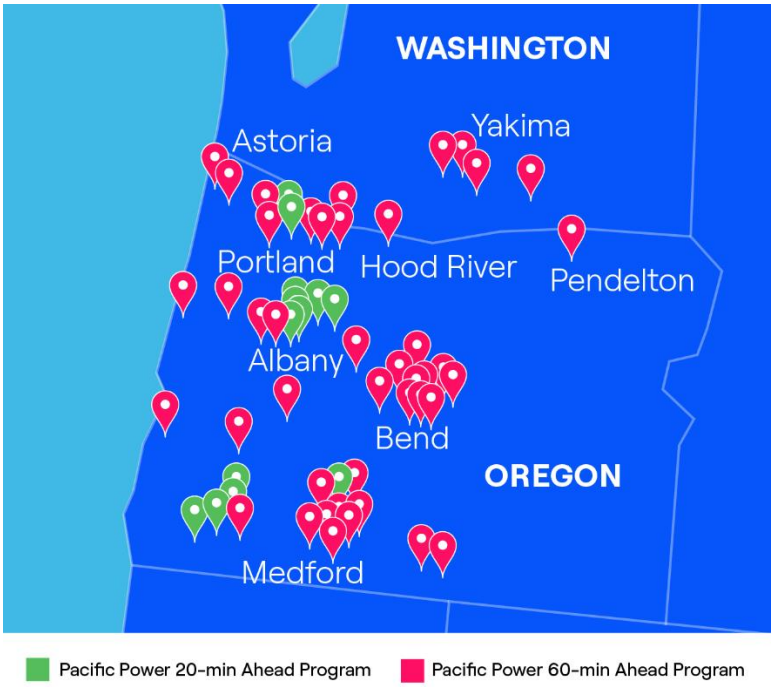
Table 21: Final Program Enrollment

	PAC 60M	PAC 20M	PAC 7M	PAC RT
Number of Customers	2	0	0	0
Number of Sites	4	0	0	0
MWs	0.28	0.00	0.00	0.00

Table 22: Enrolled Customers by Industry

	PAC 60M	PAC 20M	PAC 7M	PAC RT
Government	0	0	0	0
Education	1	0	0	0
Retail	1	0	0	0
Water and Sewage Services	0	0	0	0
Transportation and Storage	0	0	0	0
Other	0	0	0	0
Business and Consumer Services	0	0	0	0
Manufacturing	0	0	0	0
Metal Products Manufacturing	0	0	0	0
Energy and Utilities	0	0	0	0

Figure 1: Map of Pacific Power C&I Demand Response Enrolled Sites[13]



Enrollment trends match closely to the enablement results because 2023 is the first program year with enrolled customers. The underlying trends are the same as those discussed previously in the Recruitment through the end of 2023 was a significant success. The PAC 20M product was the most popular, with 9 customers signing up almost 7 MW. The product appeared to hit a "sweet spot" for customers. It offers a higher incentive than the PAC 60M peak shaving product, but as a reserve product, would likely be used for shorter curtailment events. Compared to the PAC 7M and RT products, the PAC 20M product is more attainable, because it does not have a minimum 500kw threshold, and customers can participate with manual curtailment rather than automation.

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[13] While this report discusses CIDR implementation in Washington, Enel X manages CI DR in both Oregon and Washington. While this map includes sites in both programs, sites in WA are clearly delineated.

for this product. In addition, the resource remained available for dispatch, and PacifiCorp continued to monitor for opportunities to use the resource under the existing parameters. At the same time, PacifiCorp began to explore possible revisions to the product that would improve functionality for PacifiCorp, and be compatible with customer operations.

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Second, potential updates to program design and implementation of the PAC RT, PAC 20M, and PAC 7M products impacted the recruitment effort as well. Initially, the PAC RT product had two options: localized and centralized. The localized option was intended to be dispatched at the site level and responded to local grid frequency deviations. On further review, PacifiCorp's energy supply management group indicated a strong preference to manage frequency on a system wide basis using a predictive algorithm that would dispatch all frequency resources at the same time. The localized option was ultimately removed, but after customers signed contracts to participate in this option of the PAC RT product. Work continues with these customers to help them better understand how often frequency events might be called with a system wide signal and whether they want to continue the enablement process.

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Enablement section.

Event Performance

PAC 60M Event Performance

A summary of all 2023 PAC 60M events are provided below. The available load varied from 0.2 to 1 MWs and delivered MWs ranged from 0 to 0.34 MWs. The highest performance, in percentage terms of the season was during the June 30th event at 148%. The lowest performance was during the August 11th event. Dispatch events ranged from one to three hours. Available and participating customers increased from the first two second event, but then declined as customers were removed for inability to participate. Overall, the program saw all events dispatched in the late afternoon and evening hours as expected coinciding with the Pacific Power summer peaking hours. Customers received a minimum 60-minute notice for all events.

Table 23: PAC 60M Event Performance in 2023

Event Date	Jun-30	Jul-14	Aug-11	Aug-14	Aug-16
Notification to customer	10:01 AM	4:01 PM	3:01 PM	3:01 PM	2:01 PM
Event Start	5:30 PM	6:00 PM	5:00 PM	5:00 PM	4:00 PM
Event End	6:30 PM	8:00 PM	8:00 PM	8:00 PM	7:00 PM
Event Length (hrs)	1	2	3	3	3
Available Customers	3	5	6	6	5
Participating Customers	3	3	6	6	5
Available MWs	0.195	1.015	0.862	0.862	0.248
Delivered MWs	0.290	0.151	-0.054	0.122	0.336
Performance %	148.8%	14.9%	-6.3%	14.2%	135.4%

In general, the performance in 2023 was extremely varied primarily due to the small portfolio size. When the portfolio size is small, individual performances can drive portfolio level trends. All individuals sites may have low event performance occassionally, but within a smaller portfolio those irregularities have an outsized impact. The low performing events were also a direct result of the two customers who represented 0.74MWs and were unable to participate. Those customers were not enrolled during the June 30th event, and one customer, representing 0.64MWs was removed from the program prior to the August 16th event. Performance trended much higher when you exclude those two customers.

Another contributing factor was the lack of Enel devices installed at customers' sites due to the procurement and supply chain issues discussed in the Recruitment through the end of 2023 was a significant success. The PAC 20M product was the most popular, with 9 customers signing up almost 7 MW. The product appeared to hit a “sweet spot” for customers. It offers a higher incentive than the PAC 60M peak shaving product, but as a reserve product, would likely be used for shorter curtailment events. Compared to the PAC 7M and RT products, the PAC 20M product is more attainable, because it does not have a minimum 500kw threshold, and customers can participate with manual curtailment rather than automation.

While customer interest in the PAC 20M product was an overall positive outcome, PacifiCorp paused further recruitment into this product in November 2023 for several reasons. First, PacifiCorp’s program design assumes a more balanced distribution of capacity across the four products. The Company wanted time to assess the potential implications of the unexpected concentration of capacity in the PAC 20M product, while minimizing any potential negative impacts to customers if the product is modified. In addition, in the second half of 2023, the Company started to identify potential challenges with utilization of the PAC 20M product in its primary use case, as regulation reserve (see **Event Performance** for further discussion). Following the pause in recruitment, Enel X continued to enable customers already contracted for this product. In addition, the resource remained available for dispatch, and PacifiCorp continued to monitor for opportunities to use the resource under the existing parameters. At the same time, PacifiCorp began to explore possible revisions to the product that would improve functionality for PacifiCorp, and be compatible with customer operations.

The second highest contracted DR product was the PAC 60M product, which is also expected as it is the simplest program to participate in due to the longer notification time, lower dispatch expectations and lower enablement burden. All customers contracted into the PAC RT product are contracted as dual-enrolled into either the PAC 20M or PAC 7M as well. The final results for the PAC 7M and PAC RT products does not represent a complete year of activities as recruitment was paused for these products while PacifiCorp and Enel X integrated dispatch capability for these products into the central grid management system. Therefore, the number of customers and capacity contracted may not accurately reflect the market response to the fast-response DR products.

2023 was the first full year of recruitment and the initial outreach revealed a few general trends about the customer base. First, participants who use conditioned spaces, or HVAC loads, to participate typically make up a much larger portion of a traditional summer peak-shaving demand response program, like the PAC 60M product. However, it was difficult to find participants with consistent available load for the duration of the product's active hours, 3:00 PM to 9:00 PM. Many of the potential participants with conditioned space loads, including schools, and offices set back their temperature settings too early, generally between 5 – 6 pm.

Second, potential updates to program design and implementation of the PAC RT, PAC 20M, and PAC 7M products impacted the recruitment effort as well. Initially, the PAC RT product had two options: localized and centralized. The localized option was intended to be dispatched at the site level and responded to local grid frequency deviations. On further review, PacifiCorp's energy supply management group indicated a strong preference to manage frequency on a system wide basis using a predictive algorithm that would dispatch all frequency resources at the same time. The localized option was ultimately removed, but after customers signed contracts to participate in this option of the PAC RT product. Work continues with these customers to help them better understand how often frequency events might be called with a system wide signal and whether they want to continue the enablement process.

During the 2023 program year, there was an extended period of defining and development work for the PAC RT product. Development of the platform integration began in 2023 but was not complete by the end of the year. Enel paused the recruitment process for the remainder of 2023 for the PAC RT product until dispatch capability was fully operational.

The PAC 7M product was designed during the RFP and negotiation process to qualify as contingency reserve capacity. However, to speed up the dispatch process and allow PacifiCorp to qualify these demand response resources as contingency reserve capacity the location of executing a dispatch event was moved from the Enel Flex platform to the PacifiCorp Energy Management System (EMS). The requirement to dispatch the PAC 7M product from the PacifiCorp EMS was a requirement uncovered during 2023. The product development work for the PAC 7M product followed the same timeline as the PAC RT product. Additionally, Enel had originally expected non-emergency generators to be eligible capacity for the PAC 7M product. Pacific Power decided to exclude these resources in 2023, which reduced the potential market.

Enablement section. Without installed devices, customers receive no real-time feedback via the Flex platform on how they are performing relative to their available load. When devices are

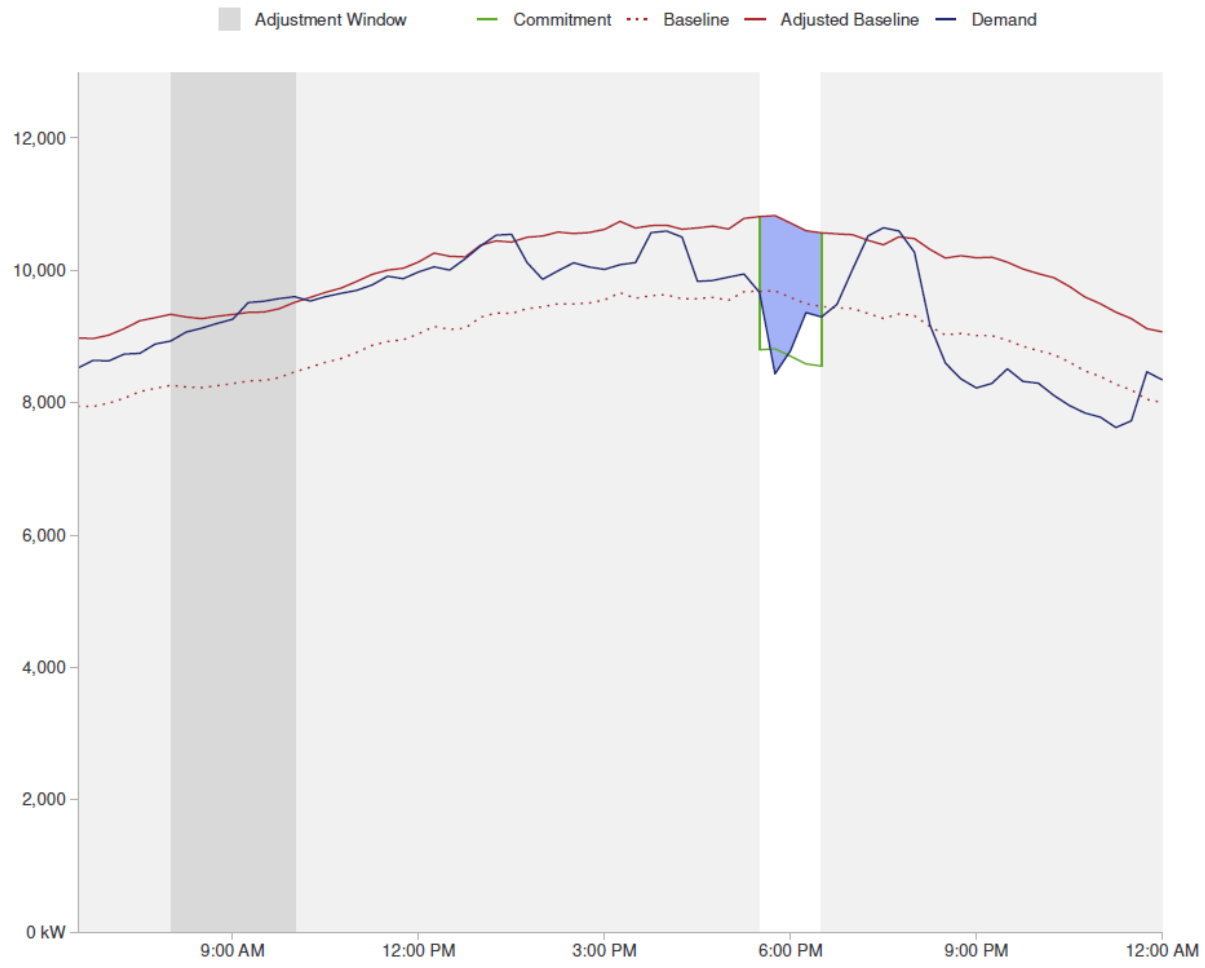
installed, and streaming energy demand to the Flex platform, Enel can leverage this data to provide feedback to underperforming customers via email and SMS communications as well as contact customers via phone to coach them to better performance.

The season long trend, is that 2023 is the first year of the program. Many of the customers are participating for the first time in a demand response program. Executing the customers' curtailment plan, providing a highly accurate available kW/MW load, and optimizing performance all require some learning to do well. This learning process likely explains the increasing performance for the three August events.

In addition to aforementioned trends, the higher performance during the June 30th event is also boosted by the shorter event time. For longer events, customers' curtailment starts to taper as the event goes on and shorter events lessen that impact. A visual representation of the June 24th event is depicted in Figure 2. [14] The Commitment (green) is the portfolio's capacity obligation subtracted from the Adjusted Baseline for each interval during the dispatch event window. The Baseline (dotted red line) is the unadjusted baseline measured as the average of the four highest energy demand days of the previous five non-event business days. The Adjusted Baseline (solid red line) is a result of comparing the current day's demand during the Adjustment Window (dark gray region) against the Baseline and factoring it up or down accordingly. Demand (solid blue line) is an aggregation of all participants' energy demand.

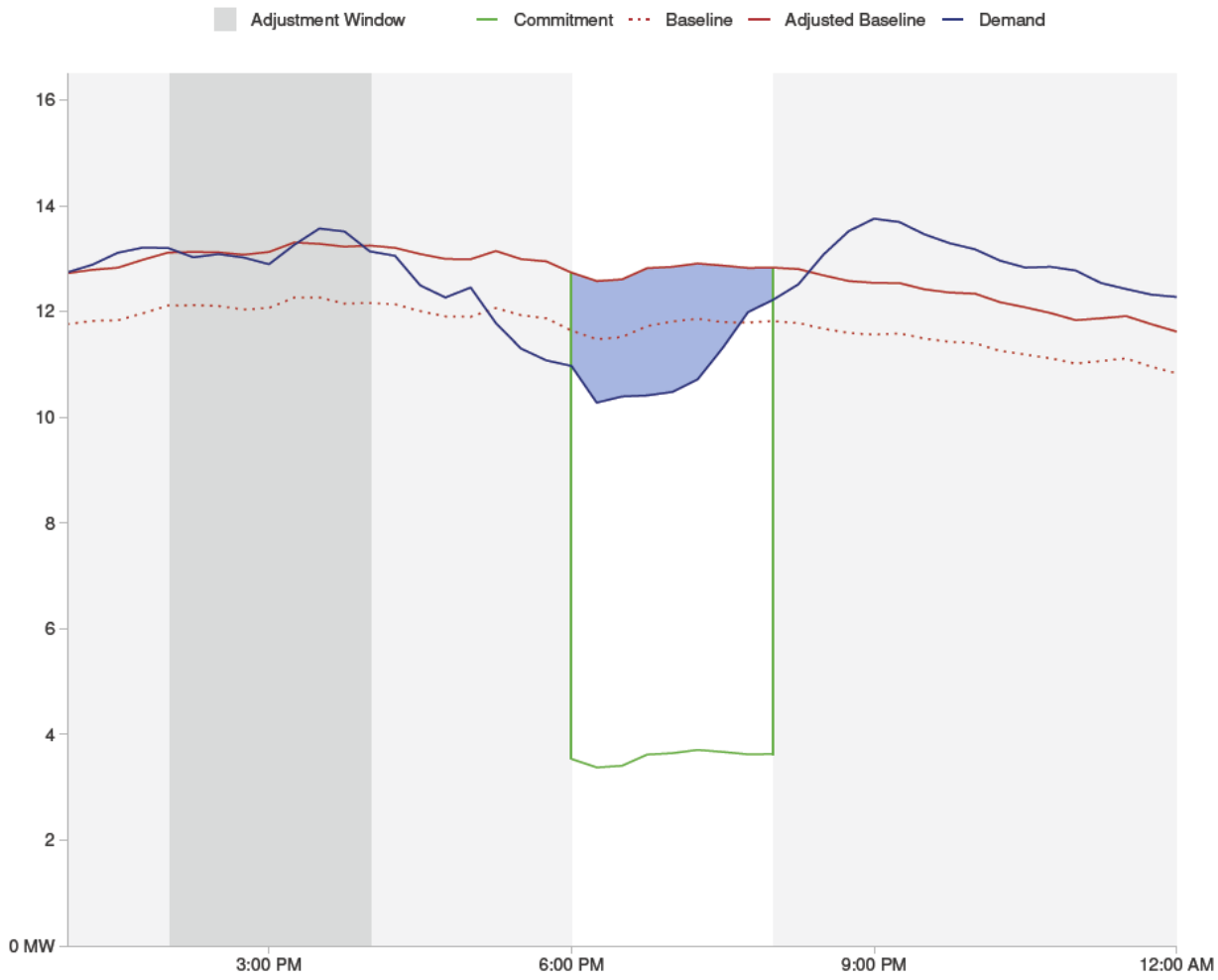
[14] Enel X and PacifiCorp developed the ESM scheduling capability to dispatch both Oregon and Washington resources simultaneously to manage grid needs at the balancing authority level. During the initial year of operation, the visualization provided included both states.

Figure 2: June 30th Event Performance Graph for Oregon and Washington



The July 14th event saw a lower performance 14.9%. In addition to the general trends discussed above, one issue that caused low performance in this event was a platform error that failed to include 2 customer sites in the event. These customers were not notified of the event by the Enel Flex platform. Therefore, their energy demand during the event was not included in the delivered MWs for the program. This error was resolved after the event and did not repeat for the remainder of the season, nor is it expected to occur in the future. For incentive purposes, this subset of customers was not penalized and was credited full participation for this event. A visual representation of the July 14th event is depicted in Figure 3.

Figure 3: July 14th Event Performance Graph for Oregon and Washington



Visual representations of each August event are depicted in Figure 4, Figure 5, and Figure 6. Under performance August 11th and 14th were driven by the two customers discussed above. The August 16th event saw performance above expectations after those customers were removed.

Figure 4: August 11th Event Performance Graph for Oregon and Washington

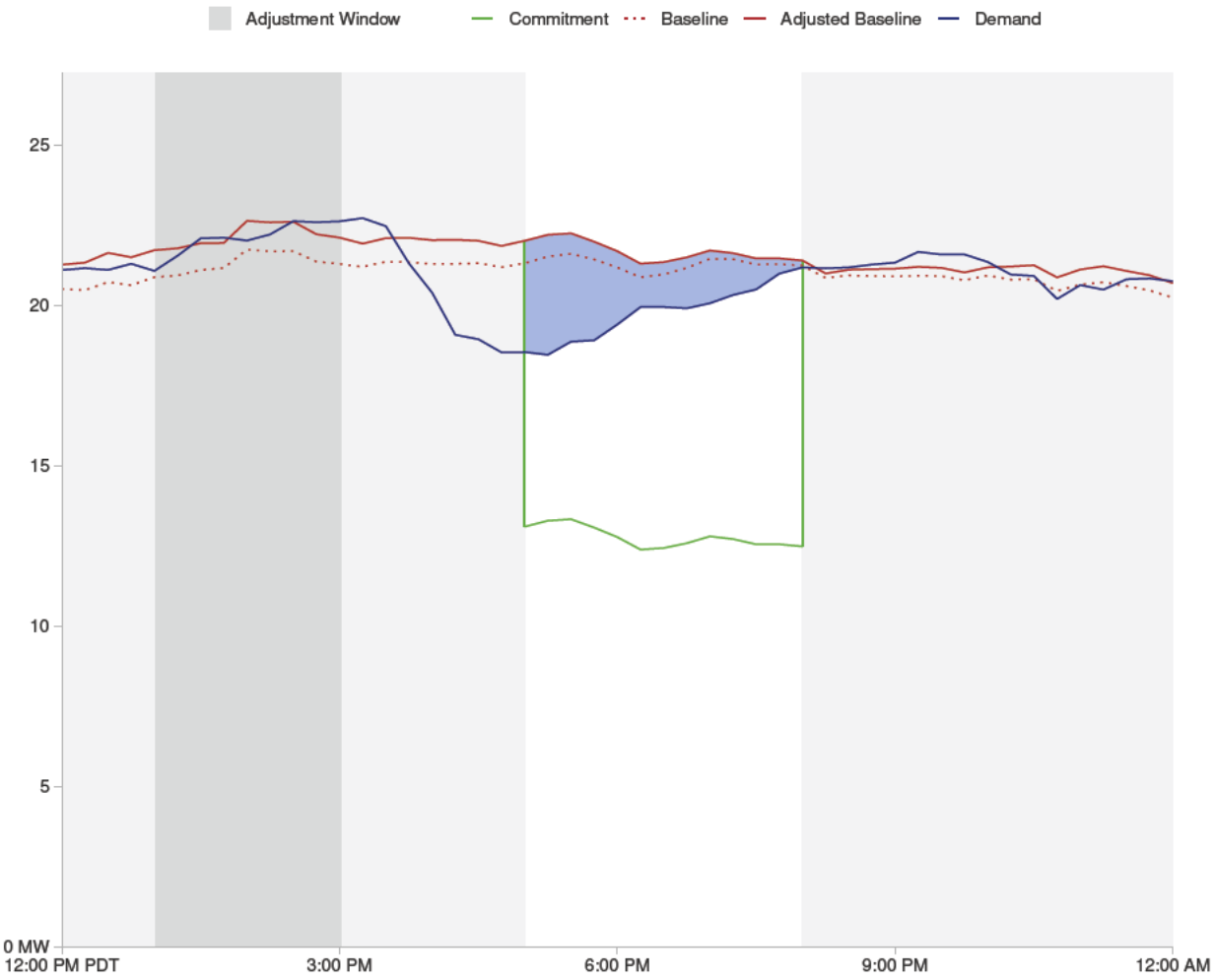


Figure 5: August 14th Event Performance Graph for Oregon and Washington

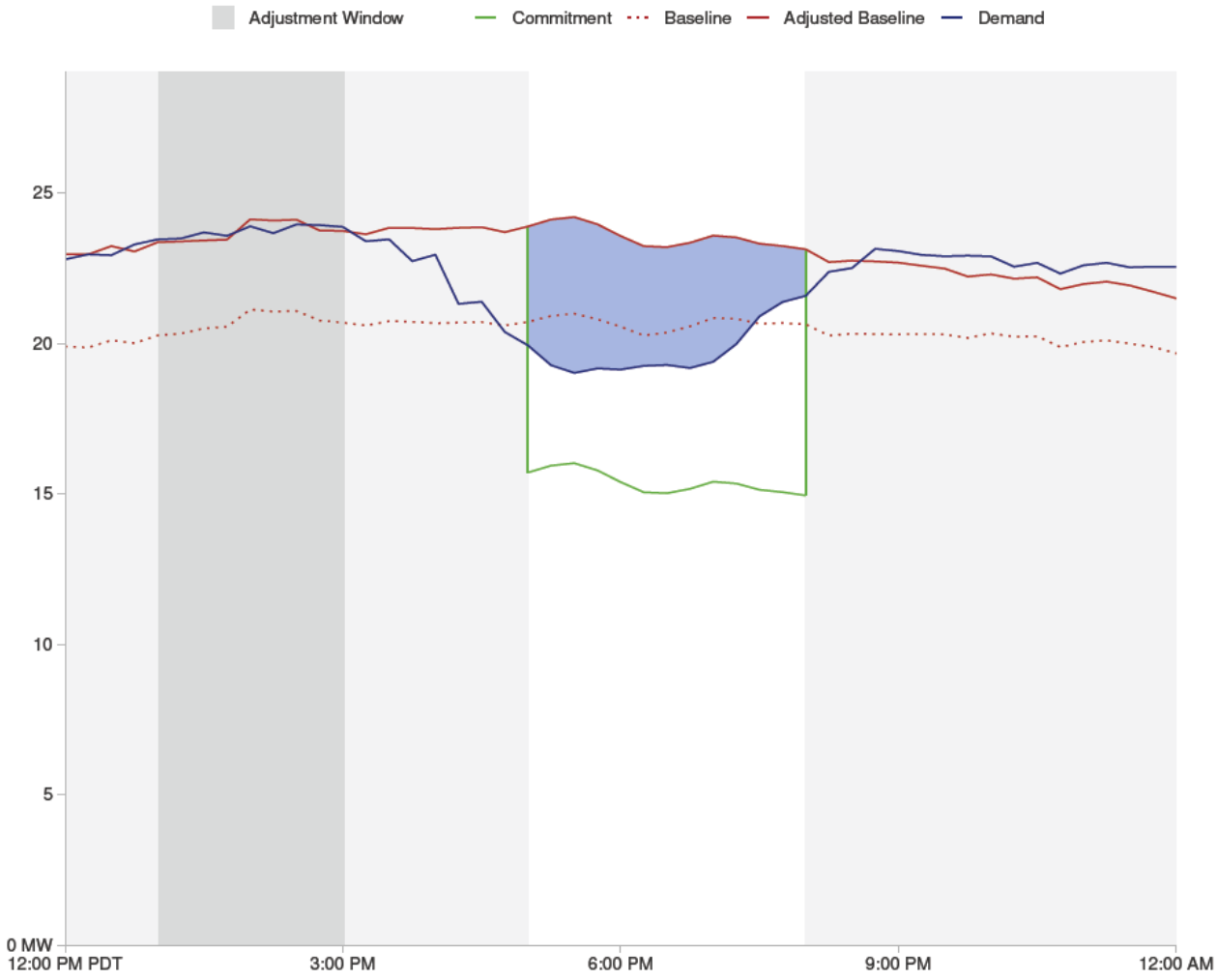
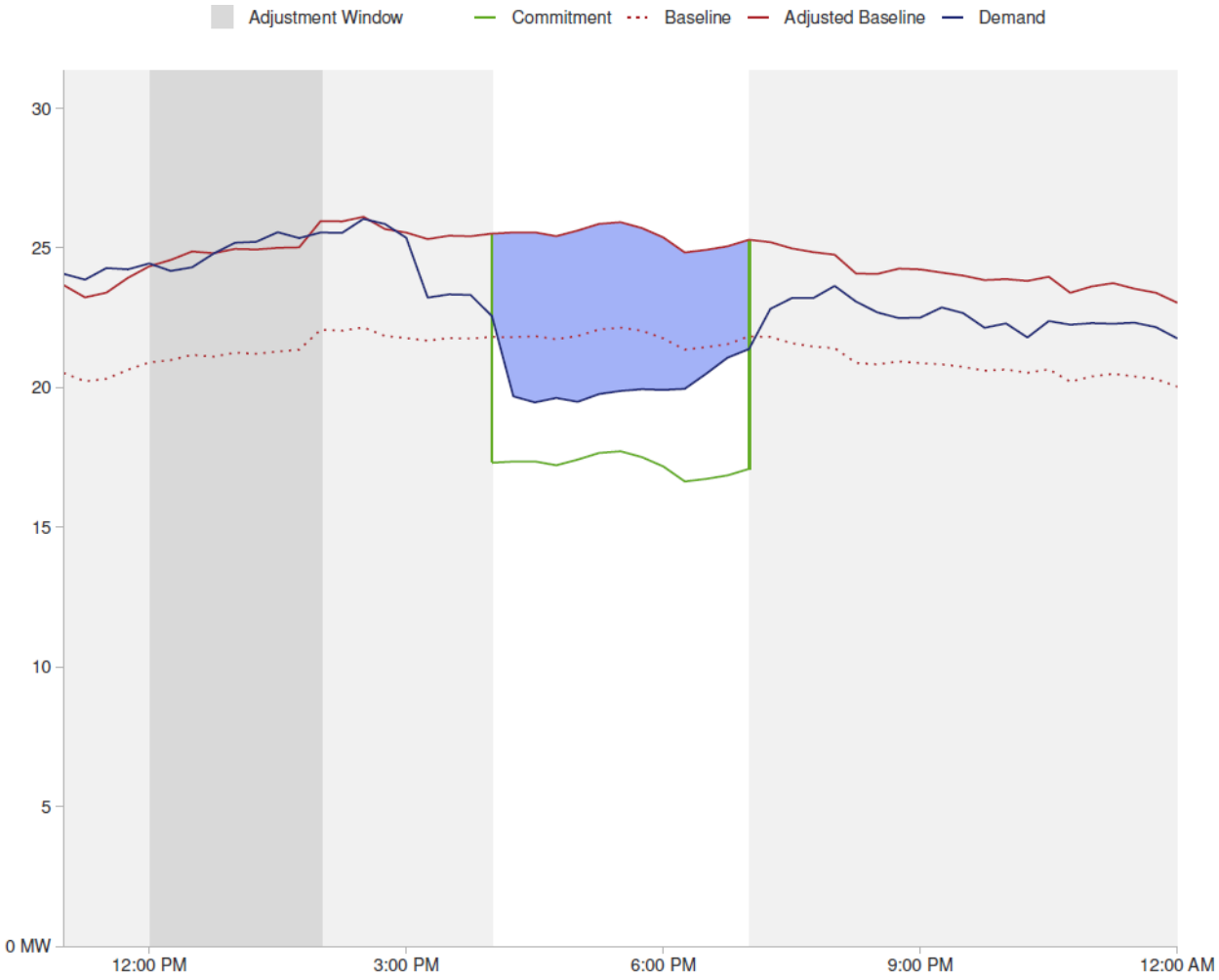


Figure 6: August 16th Event Performance Graph for Oregon and Washington



PAC 20M Event Performance

The PAC 20M product had no available Washington load during the 2023 program year, and therefore no dispatch events.

The PAC 20M product was initially designed primarily as a reserve product able to respond inside the 30-minute response time allowed by the Control Performance Standard (CPS).[15] At the time, PacifiCorp anticipated a growing need for resources with this response capability. However, grid needs and available resources have been changing at a rapid pace since the product was designed in 2021. Throughout 2023, energy supply management staff had other resources available to maintain the CPS, including resources that could respond within 15 minutes. Energy supply management staff has a strong preference for resources available within 15 minutes to ensure they have time to implement a second recovery strategy if the initial strategy is not sufficient. Given this result for 2023, PacifiCorp is evaluating the potential for the PAC 20M to be utilized under BAL-001-2 in the future, other potential use cases for the existing product, and possible changes to the product that might improve the usability for 2024 and beyond.

PAC 7M Event Performance

The PAC 7M product had no available load during the 2023 program year, and therefore no dispatch events.

PAC Real Time Event Performance

The PAC RT product had no available load during the 2023 program year, and therefore no dispatch events.

[15] NERC Reliability Standard BAL-001-2. https://www.nerc.com/pa/Stand/Reliability%20Standards/BAL-001-2.pdf

Incentive Payments

Overview

Customers were issued incentive payments for each month in which they were enrolled. Enel issues a capacity payment in respect of each hour during the given month in the amount of the following:

- If there were no dispatch events within the month, the customer's available load during each hour of the month, multiplied by the DR product capacity payment rate for the respective month/hour, or
- If there were dispatch events within a given month, the customer's available load during each hour of the month, multiplied by the customer's event performance during the given time period, multiplied by the DR product capacity payment rate for the respective month/hour.

Incentive Payments for 2023

2023 customer incentive payments were issued in February 2024 after all customer data was received, and performance was finalized. The delay for PAC 60M customer incentive payments was due to customer data acquisition delays due to occasional glitches in the new automated reporting system PacifiCorp established to support this program, and additional time needed to finalize performance measurement and verification. Similar delays in the future program years are not expected. Customer incentive payment amounts are summarized in Table 24 below.

Table 24: 2023 Customer Incentives by DR Product

DR Product	PAC 60M	PAC 20M	PAC 7M	PAC RT	2023 Total
Incentive Amount	$ 4,164.09	$ -	$ -	$ -	$ 4,164.09

Overall incentive payments for the PAC 60M customers were lower than expected based on the low-performance trends discussed in the **Event Performance** section.

No incentive payments were issued to PAC 20M, PAC 7M or PAC RT customers because there were no enrolled customers or available load during the 2023 program year.

Customer Experience

Motivations for customer participation in the Pacific Power C&I Demand Response program are multi-faceted. First, it is an opportunity to earn revenue. Participating in the Pacific Power C&I Demand Response program opens up additional revenue streams not previously accessed. Second, the Enel energy monitoring device provides near real-time and historical insight into energy demand. Customers are able to leverage this data to reduce their energy use overall, and lower costs on goods and operating expenses. Less money spent on operating increases revenues and allows for additional opportunities. However, customers participate for other reasons outside of financial incentives.

Supporting a community is a significant motivator. Customers continue to see the impacts of constrained grid conditions and are driven to be good community partners during those times. Related to community support is sustainability. A majority of customers now have corporate sustainability goals. Enel and Pacific Power help customers achieve those goals through demand response participation. One trend not as prevalent in the Pacific Power program as in others is operational reliability. Many customers engaged during recruitment have not, or rarely experience outages. If a customer has not experienced outages, then the motivation to prevent them is not as impactful.

While 2023 recruitment was a success, customers did provide some feedback. Customers appeared to be impacted by the initial learnings the program went through during its first full program year. Delays to enablement, changes to DR product use, and delays to payments negatively impacted customers. The extended gap between a signed contract and installation work at the customer's site negatively impacts a customer’s trust and motivation to participate in the program. With some customers, after the enablement process was able to resume, it required some re-education on the program and how it works. Customers who contracted for the PAC RT product also required re-education when the product options changed. The recruitment team was required to revisit all customers who signed contracts for the PAC RT product and determine if the customer was still interested and could meet the dispatch requirements of the DR product.

The other area of customer feedback was the delay in performance results and incentive payments. The delays in acquiring customer interval data and finalizing performance negatively impacted the customer experience during the program season. Enel was unable to provide feedback to all participants on their performance between dispatch events in the PAC 60M product. Providing performance feedback during the inter-event period is critical to improving customer performance within the program season. These delays also resulted in customers contacting Enel to inquire about when they should expect incentive payments. Enel planned to issue incentive payments within the 2023 calendar year, but the causes discussed in the Incentive Payments section delayed the payments until Q1 of 2024.

Flex Platform Development

Flex Platform

The Enel Flex platform provides various resources to all demand response participants. All participants can view their past event performance, historical earnings, manage their capacity obligations and other aspects of their enrollment. Customers with an Enel monitoring device are able to view their real time and historical energy demand anytime. They can also monitor their real-time performance during a demand response event. The Flex platform provides this wide range of functionality while utilizing robust cyber security controls.

The Flex platform enables Enel, as the demand response service provider, to implement demand response programs on behalf of Pacific Power by aggregating a heterogenous portfolio of participants into a single demand response resource. It allows Pacific Power to create, edit, monitor, and review demand response events across all DR products. The Flex platform allows the utility to view near real-time energy demand at multiple levels from site to program level for the utility. During a demand response event, the platform enables Enel to notify participants according to their preferences, optimize performance by synthesizing real-time data, and provide feedback and coaching to all participants.

The creation of a demand response event in the Flex platform is a manual process which allows Pacific Power the flexibility of selecting various event parameters. However, tor the PAC 7M and PAC RT products, this manual process is not fast enough. To meet PacifiCorp's need for faster response, Enel developed an open market interface, which PacifiCorp IT staff integrated to PacifiCorp's central energy management system (EMS).

PacifiCorp Open Market Interface

Overview

During the 2023 program year, Enel, Pacific Power, Rocky Mountain Power, and PacifiCorp collaborated to develop an open market interface between Enel's Flex platform and the PacifiCorp EMS. The PacifiCorp open market interface is an API endpoint that provides PacifiCorp a robust, always available, low-latency solution to self-create and end demand response events. The initial purpose was to provide a software solution configured to curtail loads within 30 seconds of Enel receiving an automated dispatch signal from PacifiCorp via the PAC RT product. During the requirements gathering process, the scope was expanded to include dispatching the PAC 7M product as well. PAC 7M product was changed to this dispatch mechanism to reduce the time required to dispatch the DR product and satisfy contingency reserve capacity requirements.

For the PAC RT product, the open market interface enabled PacifiCorp to automate demand response events and satisfy the BAL-003 requirement for tertiary frequency response. An automated signal is sent from the PacifiCorp EMS, the signal is processed in the Enel Flex platform, a demand response dispatch event is created with start time, end time, selection of customers, performance expectations and reporting via the Enel Flex platform. Then communications are sent to the participating customers within 30 seconds of Enel's receipt of the signal.

For the PAC 7M product, the open market interface enables PacifiCorp to use the Pacific Power available load as contingency reserve capacity. A manual signal is sent from the PacifiCorp EMS to create a demand response event for seven minutes from the current time and automate the creation of a demand response dispatch event is created with start time, end time, selection of customers, performance expectations and reporting via the Enel Flex platform, and communications to participating customers.

Timeline

The initial investigation into this product solution began in February 2023. Several alternatives were explored such as using different communication protocols, user software interfaces, and reporting requirements. The scope and technical approach of the project was agreed upon in June. From there, specific business requirements for each functional area of the open market interface began. After discussions between Enel and PacifiCorp, the requirements were agreed upon in September. At this point Enel and PacifiCorp's IT team began platform development work in parallel. Development work for the testing version of the integration took place in October. After testing was complete Enel and PacifiCorp completed the final development work and released the integration in December. Development tasks including the user interface configuration and end date updates continued into the 2024 program year.

Conclusions

2023 was a critical learning year for the Pacific Power C&I Demand Response program. It was a year of launching four brand new C&I demand response products, where none existed prior. This first year of experience resulted in a strong start to building demand response capacity in the C&I sector, as well as several lessons learned that can improve implementation in future years. The recommendations for 2024 are:

1) Maximize the capacity resource with Enel monitoring equipment. Enel's experience in other markets shows that when customers and Enel have access to near real-time energy demand data program performance and customer experience significantly improves.
2) Focus on shortening the performance and settlement feedback loop. 2023 provided the program team the ability to experience a full program year from enrollment to incentive payments, as well as establish processes and procedures for data acquisition, data validation, and measurement and validation. The program can now shift to improving the time it takes to execute these tasks.
3) Review and refine the use case for the 20-minute product, and potentially revise product characteristics.
4) Leverage the centralized enablement control process. After overcoming supply chain issues for KYZ pulse boards and developing a standardized process for installation, Enel and Pacific Power should focus on utilizing this process to improve collaboration between organizations and drive down the time required from customer contracted to initial enrollment date.