Portland General Electric
121 SW Salmon Street • Portland, OR 97204
portlandgeneral.com

October 15, 2025

Public Utility Commission of Oregon
Attn: Filing Center
201 High Street, S.E.
P.O. Box 1088
Salem, OR 97308-1088

RE: PGE UM 1856 2025 Annual Energy Storage Update

Pursuant to Public Utility Commission of Oregon (OPUC or Commission) Order No. 18-290, Portland General Electric Company (PGE) submits its sixth annual report on the progress of its energy storage proposal which includes: Camino del Sol (formally named Baldock), Coffee Creek, Microgrid pilot, Port Westward 2 (PW2), Residential Storage pilot (called the "Smart Battery pilot"), and the controls for the energy storage systems. During operation of the projects, PGE will submit comprehensive evaluations in the third, sixth, and tenth operating year, along with annual progress updates. The following report details each project and includes progress, challenges, and preliminary learnings, as available.

History of Energy Storage Docket

The Commission opened Docket No. UM 1751 in September 2015 to implement House Bill 2193 (2015), which required Oregon electric companies (PGE and PacifiCorp) to submit proposals by January 1, 2018, to procure qualifying energy storage systems with capacity to store at least five megawatt hours of energy. PGE met this requirement and procured 11 MWh of energy storage (Port Westward 2 and a Microgrid site Beaverton Public Safety Center) as of December 31, 2019.

2025 Annual Energy Storage Update

Camino del Sol Mid-Feeder Energy Storage System (formally Baldock)

This project was planned to develop and build a 2 MW, two-hour energy storage system adjacent to PGE's Camino del Sol Solar facility and will be interconnected to the Canby-Butteville feeder.

This project was cancelled due to estimated costs that exceeded the stipulated cost cap for this project with no clear path to complete this project within the cost recovery limits in the stipulation. Due to these circumstances, PGE is not moving forward with the project.

Note that the project name was changed, though it is the same location and facilities. The adjacent solar array had been named after the Baldock freeway and rest area that it was geographically near, but when the Oregon Department of Transportation renamed the rest area in late 2022 PGE followed suit. The name of the solar facility and by extension the battery project were renamed to Camino del Sol.

Coffee Creek Substation Energy Storage System

Overview

This project is a 17 MW, two-hour energy storage system sited and interconnected at PGE's Coffee Creek Substation. Coffee Creek BESS was commissioned in Nov 2024.

Construction and Commissioning

PGE selected FlexGen as the Engineering, Procurement, and Construction (EPC) Contractor for equipment supply and construction of the project in 2022. Battery module fabrication started shortly after contract award with factory acceptance testing of the modules completed in September 2023. This site began commercial operation in November 2024.

Construction began in February 2024 and ended in September of 2024 with site excavation for the BESS (2/27/24) and civil work in the substation (2/12/24). Note that there was tree clearing done Q4 of 2023. The BESS was energized in Sept 2024 (9/10/24) and testing/commissioning was completed in Nov 2024 (11/21/24). During excavation for the BESS we encountered a significant amount of large rocks which delayed construction and required revisiting the grounding system. As a result, the initial service date for the BESS was delayed by two months. Capacity tests were conducted during commissioning in November 2024 to determine Round Trip Efficiency (RTE). The resulting average capacity was 41.37 MWh and average RTE was 88.3%.

System Operation

Coffee Creek BESS is connected to the Coffee Creek distribution substation at 12.47kV.

Month and Year	Number of Frequency Response dispatches
November 2024	0
December 2024	0
January 2025	0
February 2025	0
March 2025	3
April 2025	7
May 2025	9
Month and Year	Number of Frequency Response dispatches
June 2025	11
July 2025	0
August 2025	0

This project is registered with and bids into the Western Energy Imbalance Market (WEIM) and CAISO with five-minute low locational marginal prices (LMPs) tracking.

Preliminary Learnings

Early on the CCRK BESS system experienced persistent gas communication alarm problems, which were traced back to wiring and hardware installation issues. These false alarms during the first months of operation highlighted the need for more rigorous validation of sensors during the commissioning phase. We have included additional checks in our commissioning procedures.

Additionally, the system underwent multiple PCS software updates in the first few months of operation, each addressing different operational bugs and compatibility concerns. We have created a standardized software update procedure in response to ensure consistency and traceability of future software updates.

Despite these challenges, the 6-month maintenance cycle was completed successfully, with all scheduled inspections and servicing performed without major setbacks. However, while restoring the site, VPN tunnels were lost, disrupting remote monitoring and requiring reconfiguration to restore secure access for the integrator. We have incorporated additional verifications before executing work that can affect the network connection.

From a merchant perspective, Battery Energy Storage System (BESS) operations began with a simple arbitrage strategy. Operators would purchase blocks of energy during periods when market prices were low, typically during off-peak hours, and store that energy in batteries. Later, when prices rose—often during peak demand—they would discharge the stored energy back into the grid. A limitation of CCRK is that it cannot charge at the same rate as it discharges due to transformer loading concerns. It takes 4 hours to charge fully while a full discharge is only 2 hours. Merchant indicated that trying to find a 4 hour window every day with low prices could be difficult.

In May 2025 merchant transitioned into participating in the California Independent System Operator (CAISO) 5-minute real-time market. This shift allowed for more dynamic and responsive operations, where energy could be dispatched based on real-time price signals rather than relying solely on day-ahead forecasts.

Future Investigations

PGE would like to investigate voltage control opportunities at a BESS site that shares a common bus with other voltage control equipment such as capacitor bank and a transformer equipped with a Load Tap Changer (LTC). This configuration introduces complex interactions between reactive power sources and voltage regulation mechanisms.

The CCRK BESS is capable of providing dynamic voltage support through reactive power injection or absorption. However, when operating alongside a capacitor bank—which provides fixed reactive power—and an LTC transformer—which adjusts voltage in discrete steps—there is potential for control conflicts or oscillations. These can result in voltage instability, inefficient reactive power dispatch, or unintended tap changes.

PGE would like to better understand these interactions, optimize control coordination among the BESS, cap bank, and LTC, and ensure stable voltage regulation under varying load and generation conditions. Insights from this future investigation will help refine PGE’s approach and improve system reliability.

Microgrid Projects (Beaverton Public Safety Center and Anderson Readiness Center)

Overview

The Microgrid Pilot Project completed its first microgrid at the Beaverton Public Safety Center (BPSC), commissioned in September of 2020. The second microgrid at the Oregon Military Department's Anderson Readiness Center (ARC) was commissioned in May 2023. Both microgrid sites are designed to support community resiliency.

PGE and the City of Beaverton signed an agreement to deploy the 250 kW, four-hour battery and microgrid at BPSC in 2019, with PGE owning and operating the battery. The microgrid is also powered by a 300 kW PV solar array and a 1,000 kW standby diesel generator, both owned by the customer.

PGE and the Oregon Military Department signed an agreement to deploy a 500 kW, two-hour battery and microgrid at ARC in 2020, with PGE owning and operating the battery. The microgrid is also powered by a 270 kW PV solar array and two 800 kW standby diesel generators, all owned by the customer.

The BPSC battery was provided by Powin as part of a microgrid that also includes solar and a microgrid controller. In June of 2025 the battery provider, Powin, filed for Chapter 11 bankruptcy. This introduced uncertainty across its deployed systems, raising concerns about long-term support, software updates, and spare parts availability. Powin's assets have been secured out of bankruptcy by the same integrator of the Coffee Creek BESS. This transition will help maintain existing systems, provide updates, and offer reliable customer service.

ARC Construction and Commissioning

ARC houses servers that are critical to the State of Oregon. Keeping this high availability site running during construction and commissioning required careful coordination to avoid any outages greater than ten minutes.

The ARC BESS equipment layout and conduit routing designs went through several iterations. This was partly due to updated requirements from the site owner that were shared partway through the project. Fortunately this was a Design-Build project which made it adaptable to those changes and the site owner has been pleased with the end results.

ARC microgrid commissioning included dozens of grid-connected and islanded tests to verify the microgrid's performance and reliability. One of the main challenges was integrating the existing diesel generation resources that are part of PGE's Dispatchable Standby Generation (DSG) program. The logic for control handover between the microgrid controller and the existing DSG Programmable Logic Controller (PLC) required several iterations to get right.

System Operation

These microgrid systems respond to system frequency events and are dispatched both for contingency reserve and demand response. System frequency is monitored at a central location near Sherwood and if a deviation is detected the site controller immediately dispatches the battery

at full output for three minutes before ramping down and slowly recharging. Contingency reserves are centrally dispatched when needed by the Balancing Area Authority Operators. These systems have automatically responded to 303 frequency events and been dispatched for contingency reserves 49 times since September 2023.

Table 1 below shows the number of contingency reserve and frequency response dispatches of both the BPSC and ARC microgrid batteries over the last 12 months.

Table 1

	BPSC		**ARC**	
Month and Year	Number of Contingency Reserve dispatches	Number of Frequency Response dispatches	Number of Contingency Reserve dispatches	Number of Frequency Response dispatches
September 2024	0	3	0	3
October 2024	0	2	0	1
November 2024	0	0	0	0
December 2024	0	3	0	3
January 2025	0	2	0	2
February 2025	0	0	0	1
March 2025	0	10	0	6
April 2025	0	2	0	4
May 2025	0	0	0	8
June 2025	0	6	0	10
July 2025	0	1	0	1
August 2025	0	0	0	1

Overview of Expected Demand Response

During anticipated periods of high electricity demand, BESS sites can be strategically charged in advance and then discharged to help relieve stress on the grid. This proactive approach supports grid stability and ensures reliable power delivery when it's needed most. The sites listed below have participated in three (3) events so far in 2025.

Preliminary Learnings

Our learnings to date include confirmation that the system can reliably respond to system frequency events and be dispatched for contingency reserve to provide those useful grid services to PGE's operators. Future operations testing plans over the 10-year life of this project will include expanding the BESS use to the other identified use cases, including testing that is being done for autonomous proportional frequency support (freq/watt) and proportional voltage support (volt/var).

Both microgrids have the ability to support the customers' load during a utility outage, with the system at BPSC reacting numerous times to utility outages. The BPSC system's ability to form an

island and support load has not been 100% successful and required several software and firmware changes. Since these changes were made, the system seems to be functioning as designed however more time is required to assess this. One positive example was in July of 2024 when the site lost power caused by a tree falling on a power line and the site maintained operation using solar and battery power.

The microgrid at ARC employs a simpler system for islanding during outage events and based on testing, this system seems to have worked properly from the beginning. However, the site has not been subjected to an actual outage since commissioning. Therefore, more time is required at this site as well to assess the efficacy of islanding.

There have also been additional learnings related to operations and maintenance (O&M) on the microgrid projects. O&M activities such as troubleshooting when equipment trips, resetting components, control system updates, and procuring replacement parts has been more involved than initially anticipated. PGE is capturing these topics and making updates to our project requirements and specifications in order to better address these items on future projects. Future operations testing plans over the 10-year life of this project will include expanding the BESS use to the other identified use cases.

Port Westward 2 (Generation Kickstart) Energy Storage System

Overview

This project has developed and built a 5 MW, two-hour energy storage system coupled with PGE's Port Westward 2 Generating Station (PW2). By coupling the energy storage system with PW2's reciprocating engines the combined resource becomes enabled to qualify as contingency reserve, even while the engine is not running.

The project design work was completed in November 2020 and the battery energy storage equipment was delivered to the site in December 2020. Construction and controls integration work commenced and continued through August of 2021. The battery was energized and the system testing and commissioning were completed in September 2021, upon when the project was put into service.

System Operation

Over the last year the system has continued to respond to system frequency events. System frequency is monitored locally and if a deviation is detected the site controller immediately dispatches the battery to full output and discharge for three minutes before ramping down. The system has automatically responded to approximately 40 frequency events since September 2024.

Table 2 below shows the number of frequency response dispatches of the PW2 battery over the last 12 months.

Table 2

Month and Year	Number of Frequency Response dispatches
September 2024	3
October 2024	2
November 2024	0
December 2024	4
January 2025	2
February 2025	1
March 2025	9
April 2025	4
May 2025	4
June 2025	8
July 2025	2
August 2025	1

Preliminary Learnings

Our learnings to date include confirmation that the system can reliably respond to system frequency events and provide that useful grid service to PGE's operators. Future operations testing plans over the 10-year life of this project will include expanding the BESS use to the other identified use cases. From a maintenance standpoint, Tesla has been monitoring the system and performing planned maintenance as required for the system.

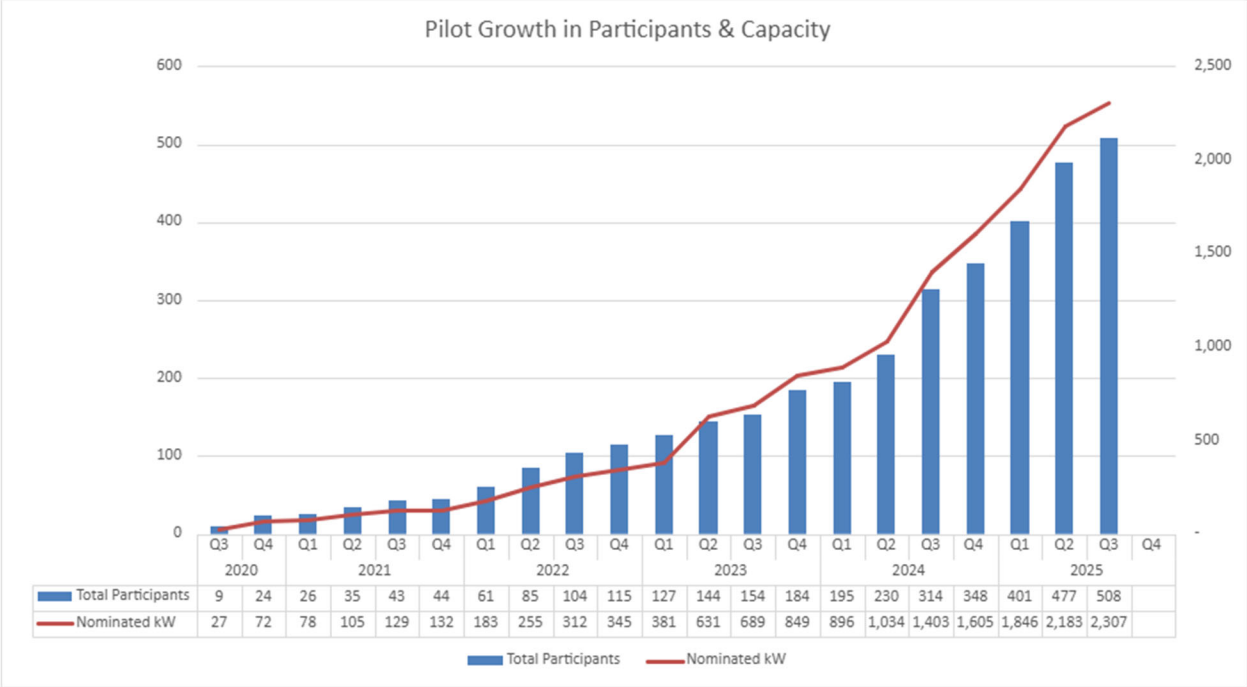
Since commercial operation date, there have been very few maintenance problems. The problems that we had early on were de minimis. Since correcting those, the system has been 100% reliable.

Future operations testing plans over the 10-year life of this project will include expanding the BESS use to the other identified use cases.

Residential Storage Pilot

Overview

PGE's Smart Battery Pilot became effective in August 2020, and had a tariff update effective May 2023. A further update was made in 2025, shifting the expiration date from July 31, 2025, to December 31, 2025, to avoid transitioning customers to a new program structure during Demand Response Season. As of August 27, 2025, the Pilot has 507 enrolled customers and a dispatchable potential of 6.9 MWh. Roughly 98% of participants have solar and storage.



The pilot has seen tremendous growth and activity in 2025, with 68% year-over-year growth from 2023 in the first three-quarters of 2024. In fact, PGE exceeded the internal program enrollment 2025 goal by midyear. Exceeding the target is primarily due to the fact that Franklin WH was added as qualified battery and targeted specifically via two marketing campaigns, one via email and the other by direct mail.

System Operation

PGE sought to study additional grid services beyond demand response for the battery fleet, and intended to do a customer test for autonomous frequency regulation in early 2025. Due to both technology limitations and ongoing commitments to customer affordability measures, this work was paused and will be reevaluated as part of future workstreams.

The other grid service PGE is actively pursuing is contingency reserves. This is more complicated, requiring new programming from PGE's third-party DERMS software as well as an interconnection with PGE systems for an automatic dispatch in response to a system generated signal. Due to the software provider's own update roadmap as well as PGE's internal efforts on building out Virtual Power Plant (VPP) functionality with new information systems, this work has not yet been completed. The VPP project currently underway will involve new and more sophisticated dispatch software from an enterprise standpoint than what currently exists, but that project will not be live for a few more years. PGE is assessing the best way to achieve this goal without making investments in a system that will not continue to be used in the future.

This concludes PGE's Annual Energy Storage Update for 2025.

Please direct any questions regarding this filing to Chris Pleasant at (503) 464-2555. Please direct all formal correspondence and requests to the following email address pge.opuc.filings@pgn.com

Sincerely,

\s\ *Jaki Ferchland*

Jaki Ferchland
Senior Manager, Pricing & Tariffs

cc: UM 1856 Service List