2025 Pacific Northwest Loads and Resources Study

May 2025

2025 PACIFIC NORTHWEST LOADS AND RESOURCES STUDY

The White Book

BONNEVILLE POWER ADMINISTRATION
May 2025

Cover Picture:
Source: BPA Photo Archive https://river.bpa.gov

The McNary Dam is one of the four Federal projects located on the Lower Columbia River in the Pacific Northwest; it is part of the Columbia River Basin hydro projects. It serves a variety of purposes such as irrigation, navigation, recreation, and hydropower.

McNary Dam is a run-of-river type of Dam located roughly 290 miles upriver from the mouth of the Columbia River connecting Umatilla County, Oregon with Benton County, Washington. It has a powerhouse, navigation lock, as well as fish ladders and plays a major role in the transportation of commodities in the Columbia-Snake Inland Waterway. It is operated by the U.S. Army Corps of Engineers.

For more information on The McNary Dam, please visit: Walla Walla District - McNary Lock and Dam

https://www.nww.usace.army.mil/Locations/District-Locks-and-Dams/McNary-Lock-and-Dam/

ACKNOWLEDGMENTS

Preparation of the annual Pacific Northwest loads and resources study is a complex, multidisciplinary effort. BPA wishes to acknowledge the team—BPA staff and others—whose diligence and dedication result in a reliable, high quality document.

Bonneville Power Administration

Generation Asset Management:

Long Term Power Planning Group
Regional Coordination Group
Operational Planning Group

Customer Support Services:

Load Forecasting and Analysis Group

Bulk Marketing and Transmission Services:

Long Term Sales and Purchasing Group

NW Requirements Marketing:

Office of General Counsel

Pacific Northwest Utilities Conference Committee

Northwest Power & Conservation Council

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Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

May 16, 2025

In reply refer to: PGPR-5

Dear Interested Parties:

The Pacific Northwest Loads and Resources Study, commonly called "The White Book", is the Bonneville Power Administration's (BPA) annual publication of the Federal system and the Pacific Northwest (PNW) region's loads and resources for the upcoming ten-year period.

The White Book is used by BPA as a planning tool, as an information source for customers, as a published source of loads and resources information for regional interests, and as a data source for the Columbia River Treaty studies. The White Book is not used to guide day-to-day operations of the Federal Columbia River Power System (FCRPS) or to determine BPA revenues or rates.

This 2025 White Book presents the Federal system and the region's load obligations, contracts, and resources as of December 2024 for operating years (OY) 2026 through 2035. The 2025 White Book includes the following studies:

- Federal System Analysis—forecast of Federal system firm loads and resources based on expected load obligations and different levels of generating resources that vary by water conditions. The results are summarized below:
  - Annual Energy Surplus/Deficits: Under firm conditions; the Federal system is projected to have annual energy deficits across the study period, ranging from deficits of 426 aMW to 1012 aMW. Overall, these annual energy deficit projections are more than those projected in the 2024 White Book. Under median water conditions, the Federal system is projected to have annual energy surpluses throughout the study period.
- PNW Regional Analysis—forecast of regional firm loads and resources, based on expected retail loads and different levels of generating resources that vary by water conditions. The decommissioning of existing resources, the availability of uncommitted PNW Independent Power Producer (IPP) generation, and new resource additions are key variables in the results of this analysis. The results are summarized below:
  - Annual Energy Surplus/Deficits: Under firm water conditions, the PNW region is projected to have an annual energy surplus as large as 960 aMW in OY2026, then sharply decreasing to a deficit of 3,026 aMW by OY2034. This result was mainly driven by the increasing PNW Retail Loads. Overall, the annual energy surplus/deficit position projections are more surplus than forecasts from the 2024 White Book until the outyears of the study period. Under median water conditions, the PNW region would begin to see energy deficits in the out years.

In February of 2025, BPA published our 2024 Resource Program designed to evaluate long-term power resources acquisition strategies. Many factors contribute to the uncertainty of the longer-term resources outlook for the region, such as resource retirements and development, resource adequacy and the efforts surrounding it, and other Federal and State policy mandates. As with resources, there is also much uncertainty with loads including the potential for electrification and data centers coming online. The 2024 Resource Program publication and the 2025 White Book are available on BPA's website: https://www.bpa.gov/energy-and-services/power/resource-planning or from BPA's Visitor Center, which you can reach toll-free at 800-622-4520 (or 503-230-4636). Details regarding regional loads, contracts, and generating resources are available upon request. The available report list can be found in the Appendix.

Please send questions and/or comments to whitebook@bpa.gov.

Sincerely,

MICHELLE CATHCART

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Date: 2025.05.27 13:17:25 -07'00'

Michelle Cathcart
Vice President| General Asset Management
Bonneville Power Administration
Enclosure

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SECTION 1: SUMMARY

Planning Context

The Pacific Northwest Loads and Resources Study, commonly referred to as the White Book, is a planning document produced by the Bonneville Power Administration (Bonneville) that presents its projection of load and resource conditions for the upcoming 10-year period from operating year (OY[1]) 2026 to 2035 (referred to in this document as "the study period"). The White Book includes analysis of Bonneville's forecasts of expected power obligations and resource generation for both the Federal system and the Pacific Northwest[2] (PNW) region. Information contained in the White Book is used for: 1) long-term planning studies for Bonneville; 2) planning studies for the Columbia River Treaty (Treaty); and 3) as a published record of information and data for customers and other regional planning entities. The White Book is not used to guide day-to-day operations of the Federal Columbia River Power System (FCRPS).

Bonneville's White Book traditionally focuses on long-term deterministic power planning for the Federal system and the PNW region. The load and resource balance are calculated by comparing expected loads and contract obligations to forecast resource generation and contract purchases under the Federal system. In the same manner, Bonneville's PNW regional analysis calculates the PNW regional load and resource balance by comparing expected regional retail loads and contract obligations to forecasted regional resource generation and contract purchases. Hydropower resources for the Federal system and PNW regional include variability by incorporating a variety of generation forecasts, associated with streamflow from the most recent 30-historical water conditions of the 2020 Modified Flows. These deterministic analyses are modeled by OY to be consistent with regional coordination of the Treaty. Analytical results are presented in annual and monthly energy, expressed in average megawatts (aMW). The Federal System Analysis is presented in Section 2, and the Pacific Northwest Regional Analysis in Section 3.

Bonneville, like the rest of the electric power industry, continues to explore ways to comprehensively assess the ability of the power system to meet long-term load obligations. Periodically, Bonneville incorporates additional studies and data into its planning that look at different analytical methods and evaluate different scenarios. This year's White Book does not incorporate any additional studies.

The total retail load, contracts, and generation forecasts used in this study were updated as of December 31, 2024. The 2025 White Book supersedes the 2024 White Book and is published as a single summary document.

A list of technical reports can be located at the end of this summary document in the Appendix, individual reports are available upon request only. Request for these reports can be made by emailing WhiteBook@bpa.gov.

[1] Operating Year (OY) is the time frame August 1 through July 31. For example, OY 2026 is August 1, 2025 through July 31, 2026.

[2] As defined in the Northwest Power Act

Load Obligations

The load obligations for the Federal system and PNW region contain multiple components in this study, forecasts are categorized as: 1) Total Retail Loads (TRL), defined as each individual utility's total retail electric power consumption on its system, including electrical system losses; and 2) contract obligations, which include reported PNW utility long-term contract sales within the PNW region as Intra-Regional Transfers (Out) and outside the PNW region as Exports. Contract obligations also include Federal system power sales delivered to Federal agencies, public bodies, cooperatives, and tribal utilities as preference customers described under section 5 of the Northwest Electric Power Planning and Conservation Act (NW Power Act), 16 U.S.C. 839 et seq., (December 5, 1980).

Forecasts of the regional TRL and Federal system load obligations are produced by Bonneville's Agency Load Forecasting (ALF) system. ALF forecasts are completed for individual PNW entities under one of two approaches, the largest share of load forecasts is now based on statistically adjusted end-use models while other forecasts are based on time-series-based regressions that follow the fundamental assumptions of historical retail electricity consumption patterns continuing. The statistically adjusted end-use models include calculated indexes for heating and cooling equipment, and other components. ALF forecasts also assume normal weather conditions, using normalized temperatures based on recent history to incorporate evolving climate trends. Obligations associated with Bonneville's Preference Power Sales Contracts are forecasted to continue as currently elected through the study period, contract obligations not associated with Bonneville's Preference Power Sales Contracts follow individual contract terms through the life of the contract and are not assumed to be renewed. All Federal system load and contract obligations are assumed to be firm and served by Bonneville regardless of weather, water, or economic conditions.

Resource Types

Regional resources consist of physical generating facilities (currently on-line and/or under construction) and contract purchases that are used to serve retail loads. PNW resources, with Federal systems included, are predominantly hydro based; therefore, generation levels can vary greatly both from month-to-month and from year-to-year. This analysis classifies resources as: 1) Hydro resources, which include regulated, independent, and small hydro projects; 2) Non-hydro renewable resources, which include wind, solar, and other renewable projects; 3) Thermal resources, which include nuclear, coal, natural gas, petroleum, biofuel and cogeneration projects; 4) Contract purchases, which include reported PNW utility long-term contract purchases from within the PNW regional as Intra-Regional Transfer (In) and from outside the PNW regional as Imports. Generation forecasts for these resources are provided by Bonneville models or from the project owners, and those are described in detail in the following sections.

Hydro Resources

- Regulated Hydro – Regulated hydro projects mainly consist of PNW Columbia River Basin hydro power projects for which the operation and generating capability is hydraulically linked. Bonneville forecasts the coordinated energy and capacity production from these hydro power projects using its Hydro-system Simulator (HYDSIM) model. The HYDSIM model considers

individual project operating characteristics and conditions to determine energy production expected on a project-to-project basis. Generation forecasts for these projects incorporate the month-to-month power and non-power requirements under each of the 30 historical streamflow conditions of record, 1989 through 2018. The HYDSIM model is described further in the Hydro Resource Modeling section.

- Independent Hydro - Independent hydro projects include those hydro projects whose generation output typically varies by water condition and are not operated or hydraulically linked to part of the Columbia River Basin. Independent hydro generation forecasts can vary month-to-month for energy and capacity and are developed and provided by individual project owners/ operators for the same 30-historical water conditions as the Regulated Hydro projects (1989 through 2018).
- Small Hydro – Small hydro project generation forecasts are either provided by individual project owners or are based on historical actual generation. These generation forecasts vary month-to-month; however, they are not assumed to be dependent on water conditions.

Non-Hydro Resources

- Wind – Firm wind generation incorporates the statistical modeling of wind generation based on historical weather data and actual generation from currently operating PNW wind projects. The single operating year with the lowest total PNW wind generation is selected as firm wind year. The firm wind year generation performance determines each project's energy forecast. The Federal system and PNW regional capacity analysis assume zero capacity contribution from wind resources.
- Solar – Solar projects are utility scale solar facilities that are metered and send generation to the grid; this does not include any behind the meter resources. Generation forecasts are either provided by individual project owners or are based on historical actual generation. The Federal system and PNW regional capacity analyses assume zero capacity contribution from solar resources.
- Other Renewable – Other renewable resources include all other projects identified as renewable, including geothermal and biomass/biogas waste projects. Generation forecasts for these resources are based on energy and capacity forecasts submitted by individual project owners.

Thermal Resources

- Thermal resources include nuclear, coal, natural gas, petroleum, biofuel (not identified as renewable), and cogeneration projects. Generation forecasts for these projects are based on energy and capacity capabilities submitted by project owners. These forecasts typically vary month-to-month, and total plant generation is reduced to account for scheduled maintenance. Forecasts are adjusted to show actual operational capabilities and expectations, and do not reflect economic dispatch.

Contract Purchases/ Imports

- Contract purchases include signed Federal system purchases and regional contract purchases with power delivered to PNW entities reported by utilities publicly and in data submittals.

These purchases are treated as resources in both the Federal system and PNW regional analyses. Purchases between entities within the PNW are called Intra-regional Transfer (In) and purchases from entities outside the PNW are categorized as Imports. Except for contracts associated with the Treaty, all existing Federal system and regional contract purchases follow individual contract terms throughout the life of the contract and are not assumed to be renewed. Treaty power deliveries are assumed to be in place through the study period.

Adjustment to Resources

The White Book assumes that resource generation and contract purchases are reliably delivered to load centers. To take this assumption into account, this study adjusts generation forecasts for 1) Operating and Balancing Reserves, held to meet reliability standards; and 2) Transmission losses, associated with power deliveries. These adjustments are considered as reductions to both energy and capacity and are described below:

- Operating and Balancing Reserves: Operating reserves consist of both spinning and non-spinning contingency reserves that respond to the unforeseen loss of a resource, which are calculated by summing three percent of forecast load and three percent of forecast generation. Balancing reserves consist of regulating, load following, and imbalance reserves that are dedicated to maintaining within-hour load and resource balance. Details in modeling of reserves are described in the Hydro Resource Modeling section. Reserve forecasts included in this White book are modeled consistent with those used in Bonneville's BP-26 Rate Case process.
- Transmission Losses: During the transmission of power to load centers some of the electrical energy is lost, typically in the form of heat, which is categorized as transmission losses. Transmission loss factors are calculated monthly and vary by seasonal generation, e.g. summer months versus winter months. Transmission Loss factors are applied to the sum of all generation and contract purchase forecasts. The monthly transmission loss factor has several components that combine to give the estimate of losses associated with Federal system generation: 1) step-up transformers from generation to the high-voltage transmission network; 2) high-voltage network transmission; 3) transfers to Federal loads over non-Federal transmission systems; and 4) step-down transformers from high-voltage transmission to low-voltage delivery. The Federal system transmission loss factors used in this White Book are consistent with those used in Bonneville's BP-26 Rate Case process:
    - Energy: 2.83 percent from September through May, and 3.04 percent from June through August.
    - Capacity: 2.88 percent from September through May, and 3.09 percent from June through August.
- Wheeling Loss (Financial Settlements): During the transmission of power from physical resource to load centers some of the electrical energy is lost, typically in the form of heat, which is categorized as transmission losses. Wheeling losses are those losses incurred by transmission customers who have elected to settle those losses financially. The calculation of wheeling losses is based on the losses on the 'high-voltage network transmission' system.

Hydro Resource Modeling

The HYDSIM hydro regulation model forecasts the energy production from the regulated hydroelectric power projects in the PNW. This includes the 14 federal hydroelectric projects that make up the Columbia River Federal system, and other major hydro projects in the PNW. Project level generation forecasts are produced in a continuous study for each month of the 30 year-historical streamflow record[3]: October 1989 through September 2018. Energy production is maximized by coordinating hydro operations while meeting power and non-power requirements. HYDSIM produces results for 14 periods: ten complete months plus two periods each for April and August. April and August are divided, first half -second half, due to natural streamflow and significant operational changes happening during these two months. Consequently, generations can differ significantly between the beginning and end of these months. For simplicity, the 14-period results are referred to as "monthly" values in this report.

The HYDSIM studies encompass both power and non-power operating requirements. Each hydro study specifies non-power hydroelectric project operations for fish, such as seasonal flow objectives, minimum flow levels for fish, spill for juvenile fish passage, reservoir target elevations and drawdown limitations, and turbine operation requirements. The operations modeled include the following as outlined in the U.S. Army Corps of Engineers Pacific Northwest Coordination Agreement (PNCA) data submittals:

- National Marine Fisheries Services 2008 Willamette Biological Opinion (BiOp) (July 11, 2008)
- 2020 Columbia River System Operations Environmental Impact Statement (CRSO EIS), (Sept. 28, 2020)
- 2020 NOAA Fisheries Federal Columbia River Power System Biological Opinion (2020 NMFS BiOp) (July 24, 2020)
- 2020 U.S. Fish and Wildlife Service Biological Opinion (November 12, 2019)
- 2023 MOU Appendix B 10-yr spill agreement (December 14, 2023)

Although the PNCA expired on September 15, 2024, PNCA project owners provided physical plant data as well as power and non-power constraints in a final data submittal to the Western Power Pool (WPP) in February 2024. Bonneville incorporates this data into HYDSIM to simulate the coordinated operation of the PNW hydro system. As with previous White Books, these assumptions were included through the 10-year study horizon. The 2025 White Book includes studies that reflect the expiration of the PNCA.

The construction of the three storage projects in Canada - Mica, Arrow, and Duncan - under the Treaty between the United States and Canada enhanced the volume of storage in the Columbia River Basin. These projects provide downstream power benefits by increasing the firm power generating capability of U.S. hydro projects. The Treaty calls for an Assured Operating Plan (AOP) to be completed six years prior to each operating year and allows a Detailed Operating Plan (DOP) to be

[3] 2020 Modified Flows

completed, if agreed upon, in the year prior to the operating year. The Canadian project operations simulated in HYDSIM are based on the best available information from the Treaty planning and coordination process. Canadian operations included in this White Book are based on the official 2025 AOP studies, with additional modifications that reflect updates used in the official 2025 DOP studies.

For the past several years, the United States and Canada have been in negotiations to modernize the Treaty. In July 2024, the United States and Canada reached a non-binding agreement on core issues to be reflected in a modernized Treaty and subsequently began the process of negotiating and drafting modernized Treaty text. During the pendency of these negotiations, the Countries agreed to implement a set of interim measures concerning the following aspects of Columbia River coordination:

- Beginning August 1, 2024, the Canadian Entitlement was reduced from 1141 Megawatts (MW) of hydropower generation capacity and 454 average MW (aMW) of energy to 660 MW of capacity and 305 aMW of energy. The Canadian Entitlement will stay at this reduced level until OY 2031, when it will be further decreased and then stabilized at 550 MW of capacity and 225 aMW of energy from OY 2034 through OY 2044.
- Effective November 1, 2024, Canada's Powerex assumed and started paying for 1,120 megawatts of transmission rights previously held by Bonneville to deliver the Canadian Entitlement.
- From September 2024 through 2027, Canada will provide 3.6 million acre-feet of water storage at Arrow Lakes reservoir for flood risk management for the United States, upon election and compensation by the Corps on behalf of the United States.
- Canada will provide up to 1.0 million acre-feet of flow augmentation to aid in salmon migration in the 2024-2025 operating year.

Bonneville along with the Corps is continuing to carry out and implement operational and other obligations pursuant to the current Treaty and associated agreements. The Canadian Entitlement energy amounts included in this White Book for OY 2026 through OY 2035 are based on the amounts identified above.

Balancing reserves, both incremental and decremental, reduce the ability to shape the Federal system generation. Incremental reserves are modeled by reducing the generation capability of projects.

Firm planning

Bonneville bases its resource planning on firm expected generation to ensure sufficient generation to meet obligation loads. Firm conditions are defined as when the PNW hydro system would be the most limited, due to a combination of operational constraints and low water conditions. For the Federal System this is established by considering the historical streamflow record, power and non-power operation constraints and the planned operation of non-hydro resources, combined with the

system load requirements. For operational purposes, Bonneville considers firm condition to be the tenth percentile (P10) of the monthly Tier One System Firm Critical Output (T1SFCO) system results. The percentile approach eliminates the anomalies observed in any single water year, e.g. 1937; it also aligns with metrics used in Bonneville's Resource Program[4].

Variability of Hydro Generation

The generating capacity of the Federal system and PNW regional hydro projects depends on several factors: 1) the amount of water flowing through the facilities, 2) the physical capacity of the facilities, 3) any flow or operating requirements, including those pursuant to biological opinions, court orders or applicable agreements, and 4) other operational limitations. Water conditions cause hydro generation to vary greatly year-to-year depending on weather factors such as precipitation, snowpack, and temperature. Project-level generation forecasts for regulated hydro resources are produced using HYDSIM for each of the 30 historical streamflow conditions of record, which are based on the period from 1989 through 2018. Additionally, Federal independent hydro project generation was updated by the Army Corps of Engineers, the Bureau of Reclamation, and other project owners incorporating the 2020 modified flows and up to date project operations.

This White Book study uses three generation scenarios to demonstrate the magnitude of hydro generation variability:

- Firm water: tenth percentile (P10) of system generation by month, it represents the firm water condition for energy and capacity of the hydro system.
- Median water: 50th percentile (P50) of system generation by month, it represents the exact middle value of generation distribution for energy and capacity of the hydro system.
- High water: 90th percentile (P90) of system generation by month, this represents the high generation scenario of the energy and capacity of the hydro system.

Hydro Capacity Modeling

Bonneville uses the RiverWare[5] model to forecast usable hydro capacity for long-term planning purposes. RiverWare incorporates the monthly historical 30 water year reservoir storage and flows from HYDSIM to simulate the relationship of hydro energy to hydro peaking capability for Federal system regulated hydro resources. For each month, RiverWare forecasts hourly Federal system hydro generation by maximizing generation while meeting non-power requirements. The forecasts consider scheduled hydro maintenance and reserves.

[4] Bonneville Power Administration Resource Planning

[5] RiverWare is a river system modeling tool developed by the University of Colorado Boulder College of Engineering and Applied Science, more specifically by the Center for Advanced Decision Support for Water and Environmental Systems (CADSWES). RiverWare | Center for Advanced Decision Support for Water and Environmental Systems | University of Colorado Boulder

Notable Updates

- The 2025 White Book includes updated forecasts of Federal system power sales contracts (PSC) obligations, PNW regional Total Retail Loads (TRL), contract purchases, and generation as of December 1, 2024.

Hydro capabilities in this study also reflect the updated Resilient Columbia Basin Agreement (RCBA, also known as the 12/14 agreement), published on 12/15/2023. Key items include:

- Spilling most projects in the spring to 125% Total Dissolved Gas (TDG) gas cap in the spring 24/7.
- John Day spills 40% of outflow for 16 hours during the day, and 125% TDG for 8 hours at night.
- Little Goose spill includes 8 hours of spill totaling 30% of outflow allowing for adult passage and 125% TDG for the remaining 16 hours, except 30% of outflow spill early in season does not begin until the sooner Apr 24th or adult criteria are met.
- Late summer spill transitions on August 1st instead of August 15th.
- Steelhead spill Sept-Nov 15th is everyday instead of every other day (4 hours per day via 1 Spillway Weir).
- Steelhead and early run juvenile spills are 24/7 beginning March 21st until the start of juvenile spill.

Sources of Uncertainty

Forecasts presented in this document represent the best information currently available under the defined metrics for loads and resources. However, all forecasts are affected by uncertainty in economic conditions, weather, environmental and governmental policies, and a variety of other factors that could significantly affect the magnitude, duration, and timing of projected surpluses and/or deficits. Uncertainties include:

- Changes to hydro system operations in response to Endangered Species Act requirements or other environmental considerations,
- Changes to hydro system operations in response to court actions and/or operational agreements,
- Natural variations in weather affecting electrical power demand and streamflow runoff that result in hydroelectric power generation changes,
- Potential new large individual retail load and/or other changes to major industrial operations,
- Potential service to new load such as new customers or the Department of Energy's Richland vitrification plant operations,
- Potential future policy requirements at local, state, and federal levels regarding the amount and type of renewable resources, conservation standards, electric vehicle saturation, and/or carbon emissions,
- Fuel cost and availability, which may be affected by environmental factors or competing uses for industry, transportation, and import/export markets,
- Changes to operating limits on existing and future thermal resources,

- Changes to retirement dates associated with resources,
- Failures of resources to operate at anticipated times and/or output levels,
- Changes to Treaty operations after the time the study was run,
- PNW entities' ability to purchase power from new and existing uncommitted regional resources to serve retail load,
- PNW entities' ability to purchase and transmit power from extra-regional import/export markets,
- Future obligations related to Provider of Choice elections.

The potential impacts of these and other sources of uncertainty are not quantified in this study.

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SECTION 2: FEDERAL SYSTEM ANALYSIS

The Federal System Analysis provides a deterministic forecast of the federal system loads and resources over a 10-year period from OY2026 through 2035. This analysis incorporates forecasts of the Federal system's firm requirement PSC obligations, contract sales and purchases, and resource generations. This section presents firm Federal system load and resource forecasts for energy. Additional detailed components of the Federal system study are available only upon request, a list of available reports can be found in the Appendix.

Load Obligations

Bonneville's ALF system is used to forecast Federal system load obligations, as described previously in Section 1: Summary – Load Obligations. Types of Federal system load obligations include: 1) Federal reserve power obligations to the U.S. Bureau of Reclamation (USBR), 2) Bonneville's Regional Dialogue (RD) PSC obligations to public, cooperative, and tribal utilities, and Federal agency customers, 3) contract obligations to investor-owned utilities (IOUs), 4) contract obligations to Direct Service Industry (DSI) customers, and finally 5) other Bonneville contract obligations including contract sales to entities within the PNW region (Intra-Regional Transfers (OUT)) and to those outside the PNW region (Exports). These load obligations are all considered firm power deliveries and are assumed to be served by the Federal system regardless of weather conditions, water supply, or economic environments. Bonneville's forecasts of these obligations are categorized in the following sections.

USBR obligations

USBR must meet statutory directives to provide reserve power to irrigation district facilities associated with USBR projects. Individual USBR project authorizations provide for irrigation districts to receive reserve power from specific FCRPS projects. The remaining power from USBR projects are marketed by Bonneville in the PNW.

RD Contract High Water Mark (CHWM) PSC obligations to Public & Federal agency customers

In December of 2008, Bonneville executed RD PSCs with public, cooperative, and tribal utilities, as well as federal agency customers. Bonneville is obligated to provide firm power deliveries from October 1, 2011, through September 30, 2028. Customers were offered three types of products: Load Following, Slice/Block, and Block. A total of 134 customers signed the RD contracts, and in this current period 124 are Load Following customers, 7 are Slice/Block, and three are Block.

Under the RD PSCs, customers made periodic elections of how to serve their Above Rate Period High Water Mark (A-RHWM)[6] load by 1) adding new non-Federal resources; 2) acquiring power from non-

[6] "Through the contracts and rate methodology, each public utility will get a High Water Mark (HWM) that defines its right to buy an amount of power at BPA's lowest cost-based Tier 1 rate. Power above the HWM must be purchased from either

Federal resources; and/or 3) requesting Bonneville to supply additional power (as a Tier 2 load service). The final customer election was made in October 2024 and set through fiscal year (FY) 2028, and this study assumes these along with the current contract elections continue throughout the study period. Based on this assumption, Federal system RD PSC obligation forecasts include elected and forecasted A-RHWM (Tier 2) load for the study period. Table 2-1 presents the A-RHWM load included in Bonneville's obligations by FY.

Table 2-1 Above Rate-High-Water-Mark Obligations (BP26 Rate Case)

FY	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Energy aMW	534	579	619	696	692	734	768	806	836	862

IOU Load Service under Regional Dialogue (RD) PSCs

There are six IOUs in the PNW region, and they are: Avista Corporation, Idaho Power Company, Northwestern Energy Division of Northwestern Corporation, PacifiCorp, Portland General Electric Company, and Puget Sound Energy, Inc. Although these IOUs all signed Bonneville RD PSCs for FY 2011 through FY 2028, no IOUs have elected to take power service under these contracts thus no net requirement power sales are assumed for the IOUs through this study period.

Direct Service Industrial (DSI) Contracts

Bonneville currently has one DSI customer, Port Townsend Paper Corporation. DSI deliveries are forecasted at 11 aMW and expected to remain at that level throughout the study period.

Other Contract Obligations

Bonneville provides Federal power under a variety of additional contract arrangements. These contracts obligations are categorized as: 1) power sales; 2) power or energy exchanges; 3) capacity sales or capacity-for-energy exchanges; 4) power payment for services; and 5) power commitments under the Treaty. These arrangements, collectively referred to as "Other Contract Obligations", are determined by individual contract provisions and have various delivery arrangements and rate structures. These contracts include power deliveries to entities within the PNW region as Intra-Regional Transfers (Out), and to those outside of the PNW region as Exports.

Treaty, RD PSCs, and DSI power deliveries are assumed to remain in place throughout the study horizon. Bonneville's Other Contract Obligations follow individual contract terms and are not assumed to be renewed after the expiration date.

Conservation

The PSC obligation forecasts developed by the ALF are expected load forecasts, which include conservation identified by individual Bonneville customers. As an embedded assumption in the load

non-Federal resources or from BPA at rates reflecting BPA's marginal cost of acquiring the additional power, or through a mix of BPA Tier 2 priced power and non-Federal resources. (P.4 Regional Dialogue July 2007)

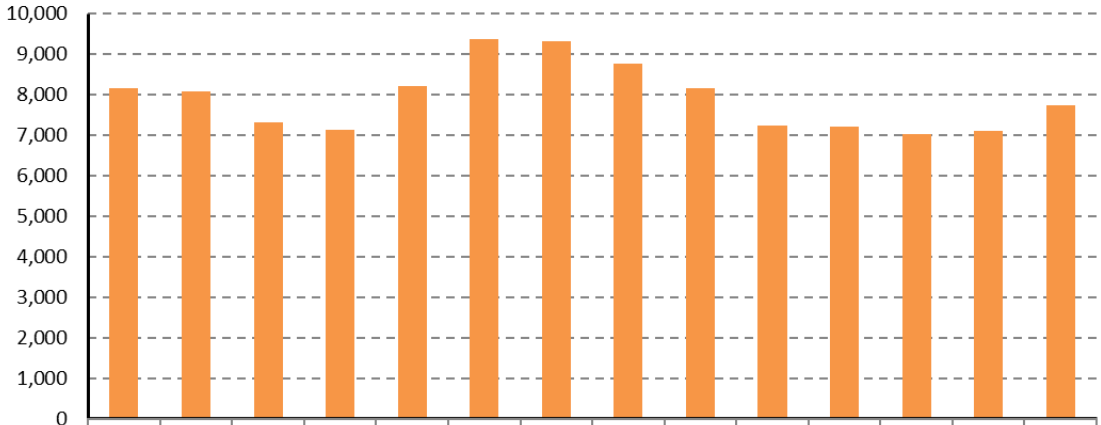
forecasts, it is expected that the historically embedded amount of conservation acquired will continue at the same rate going forward across the study period.

Firm Loads

The Federal system total firm load forecast shows a 4.3 percent average annual load growth over this study period. While Bonneville's forecast of PSC requirement loads increased roughly 9 percent over the study period, Bonneville's Exports and Intra-Regional Transfers (OUT) decreased due to the expiration or decrease in delivery of contracts.

Overall, the total Federal system load obligations remain relatively flat on an annual basis over the study period which is consistent with previous White Book studies due to the nature of Bonneville's RD PSCs. While on an annual basis these obligations demonstrate little variation across the study period, Bonneville's loads can vary greatly throughout the year. At a high level, Bonneville[7] experiences its highest loads in the late fall and winter months (November through March) primarily due to heating loads, with lower loads during spring, early summer and early fall months when temperatures are mild. July and August loads tend to be slightly higher than the rest of the summer months due to increasing air conditioning demands. Table 2-2 illustrates the monthly shape of the forecasted Federal system firm load obligations for OY2026.

Table 2-2 Federal System Firm Obligations for OY2026 - Monthly



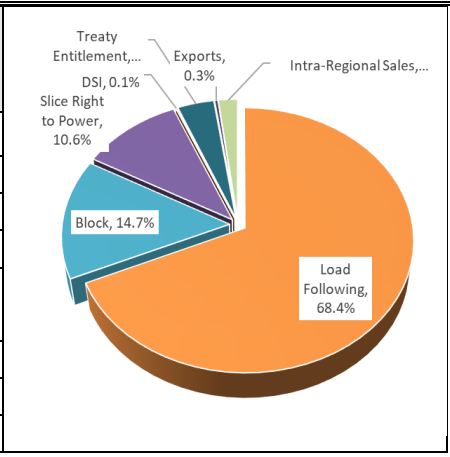
	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
Energy (aMW)	8169	8087	7315	7126	8218	9374	9325	8762	8168	7242	7202	7038	7104	7730

Table 2-3 shows the annual make-up of the Federal system firm load obligations for OY2026 in Energy aMW.

[7] This is reflective of Bonneville's total aggregate loads, individual customers highest loads vary by month and season.

Table 2-3 Federal System Annual Firm Obligations by Category OY2026

Customer Class	RD PSCs	Energy (aMW)	Percent of Firm Energy
Load Following	Yes	5,443	68.4%
Block	Yes	1,171	14.7%
Slice Right to Power	Yes	843	10.6%
DSI	No	11	0.1%
Treaty Canadian Entitlement	No	305	3.8%
Exports	No	26	0.3%
Intra-Regional Sales	No	160	2.0%
Total Firm Obligations	**na**	**7,958**	**100%**



As previously noted, RD PSCs expire at the end of FY2028, and negotiations for new 19-year Provider of Choice PSCs are ongoing with contracts expected to be executed in December 2025. Given the uncertainty around post-2028 obligation levels, this study assumes a continuation of RD PSC load levels for planning purposes.

Resources

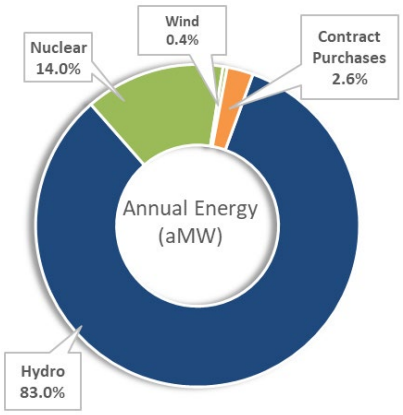
In the PNW, Bonneville is directed to market power from Federal hydroelectric projects and other resources acquired to meet firm power contractual obligations. By statute, Bonneville does not own generating resources, but instead, Bonneville markets power from Federal resources and non-Federal generating resources whose output Bonneville has acquired under contract. These resources and contract purchases are collectively referred to as "Federal system resources" in this study. Federal system resources are currently comprised of: 1) Hydro resources, which include regulated, independent, and small hydro projects; 2) Non-hydro renewable resources (wind projects); 3) Thermal resources, (Columbia Generating Station); and 4) Contract purchases, which are purchases from entities within the PNW region as Intra-Regional Transfers (In), including the estimated Mid-C Non-Federal Canadian Entitlement Return power (downstream benefit return as part of Columbia River Treaty) and from those outside of the PNW region as Imports.

Federal System Resource Types

Table 2-5 summarizes Bonneville's resources and contract purchases available to meet the Federal system load obligations. For OY2026, Federal system resources are forecast to produce 7,532 annual aMW of generation under Firm water conditions, with reserves and losses included.

Table 2-5 Federal System Generations by Resource Type for OY2026 - Firm Water Conditions

Resource Type	Annual Energy (aMW)	Percent of Firm Energy
Hydro	6,629	83%
Nuclear	1,116	14%
Wind	33	0.4%
Contract Purchases	209	2.6%
Total Federal Resources	7,988	100%
Reserves & losses	-455	--
Total Net Resources	7,532	--



Federal system contract purchases

Bonneville purchases or receives power under a variety of contract arrangements from entities within the PNW region as Intra-Regional Transfers (In), and from outside the region as Imports, to meet Federal system load obligations. These contract purchases, presented in Table 2-7 are made up of: 1) power purchases; 2) power or energy exchange purchases; 3) the estimated Mid-C Non-Federal Canadian Entitlement Return power; and 4) transmission loss returns under Slice/Block contracts. Bonneville's contract purchases are considered firm resources that are delivered to the Federal system regardless of weather, water, or economic conditions. Transmission loss returns capture the return of Slice/Block transmission losses to the Federal system as specified in the Slice/Block contract, and these returns are treated as Federal system resources. Except for the estimated Mid-C Non-Federal Canadian Entitlement Return power and transmission loss return of Slice/Block contracts, each contract purchase follows specific delivery terms and expiration dates and is not assumed to be renewed.

The Federal system resources are comprised of:

- Federal system hydro resources: Table 2-6 details the Federal system hydro resources from which Bonneville markets firm and non-firm power. Additionally, it shows the variability of individual Federal system hydro project generation for the three water conditions: firm, median, and high.
- Federal system non-hydro resources: Federal system non-hydro resources are generating resources whose output has been purchased by Bonneville. Table 2-7 details these generating resources, which include: 1) Columbia Generating Station; and 2) wind projects (non-hydro renewable resources). Forecasts for these resources are generally consistent from year to year but may change annually based on scheduling of annual maintenance, refueling, and capital improvements.

Table 2-6 Federal System Hydro Project Generation Forecasts by Streamflow Conditions[8] – OY2026

Project	Initial Service Date	Operator	Number of Units	Maximum Capacity [d/] (MW)	High [c/] Energy (aMW)	Median [c/] Energy (aMW)	Firm [a/c/] Energy (aMW)
Regulated Hydro							
1. Albeni Falls	1955	USACE	3	50	22.5	24.3	24.2
2. Dworshak	1974	USACE	3	465	274	184	171
3. Hungry Horse	1952	USBR	4	310	105	102	95
4. Libby	1975	USACE	5	605	262	242	195
5. Grand Coulee / GCL Pumping	1941	USBR	27	6,684	3,045	2,432	1,906
	1973		6	314			
6. Chief Joseph	1955	USACE	27	2,614	1,751	1,433	1,133
7. Lower Granite*	1975	USACE	6	930	259	159	134
8. Little Goose*	1970	USACE	6	930	315	178	154
9. Lower Monumental*	1969	USACE	6	930	290	172	145
10. Ice Harbor*	1961	USACE	6	693	254	167	143
11. McNary**	1953	USACE	14	1,120	676	543	447
12. John Day**	1968	USACE	16	2,480	1,221	910	771
13. The Dalles**	1957	USACE	22	2,080	955	801	639
14. Bonneville [b/]**	1938	USACE	18	1,221	711	512	395
15. Total Regulated Hydro Projects			**169**	**21,426**	**10,142**	**7,859**	**6,354**
Independent Hydro Projects							
16. Anderson Ranch	1950	USBR	2	40	15	13	9
17. Big Cliff***	1954	USACE	1	21	14	12	11
18. Black Canyon	1925	USBR	2	8.5	8	6	6
19. Boise Diversion	1908	USBR	3	2.5	2	1	1
20. Chandler	1956	USBR	2	12.2	8	7	6
21. Cougar***	1964	USACE	2	28	8	7	5
22. Cowlitz Falls	1994	LCPD#1	2	70	34	27	24
23. Detroit***	1953	USACE	2	115	33	26	24
24. Dexter***	1955	USACE	1	17	10	8	8
25. Foster***	1968	USACE	2	23	10	8	8
26. Green Peter***	1967	USACE	2	92	24	15	13
27. Green Springs	1960	USBR	1	18	7	7	7
28. Hills Creek***	1962	USACE	2	34	24	17	15
29. Lookout Point***	1954	USACE	3	138	11	18	15
30. Lost Creek	1975	USACE	2	56	38	37	30
31. Minidoka	1909	USBR	4	28	18	15	11
32. Palisades	1957	USBR	4	177	93	90	74
33. Roza	1958	USBR	1	14	9	8	7
34. Total Independent Hydro Projects			**38**	**894**	**365**	**323**	**273**
Small Non-Federally Owned Hydro Projects							
35. Dworshak/Clearwater Small Hydro	2000	ID DWR	1	5.4	2.6	2.6	2.6
36. Rocky Brook	1985	MCPD#1	1	1.6	0.3	0.3	0.3
37. Total Non-Federally Owned Hydro			**2**	**7**	**2.9**	**2.9**	**2.9**
38. Total Hydro Generation ***(line 15 + line 34 + line 37)***			**209**	**22,327**	**10,510**	**8,185**	**6,629**

* Lower Columbia Projects ** Lower Snake River Projects *** Willamette River Projects

a/ Firm energy is the 12-month annual average for OY 2025 assuming 10th percentile (P10) water conditions

b/ Bonneville Dam generation totals include Bonneville Fishway

c/ High Energy = 90th percentile, Median Energy = 50th percentile, Firm Energy = 10th percentile

d/ Maximum Capacity represent full capacity of resource including overload.

[8] Streamflow conditions do not always have a linear correlation with generation output. Projects with smaller head (head = forebay level minus tailwater level) are susceptible to having the inverse effect between flow and generation, e.g. Albeni Falls. Higher flow passes through the project increasing the tailwater level which results in less head, this results in lower generation than in other lower flow conditions.

Table 2-7 Federal System Non-Hydro Project Generation Forecast and Contract Purchase – OY2026

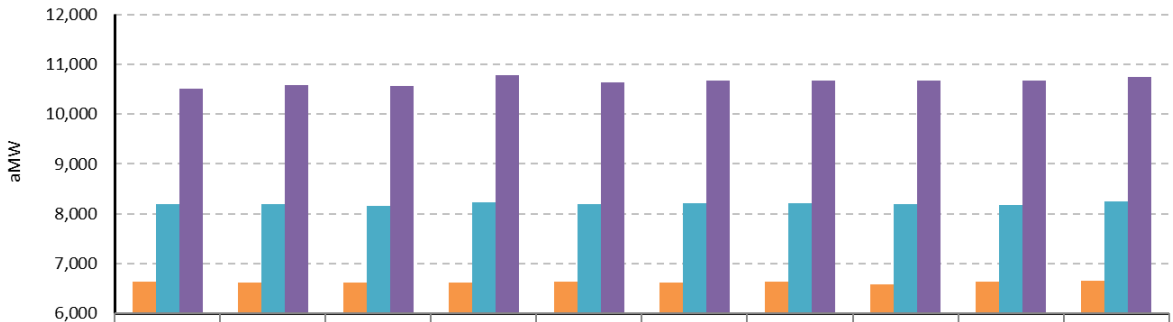
	Project	Initial Service Date	Resource Type	Operator	Maximum Capacity [a/] (Peak MW)	Firm Energy (aMW)
	Non-Hydro Resources					
1	Columbia Generating Station	1984	Nuclear	ENW	1,178	1,116
2	Stateline Wind Project [b/]	2001	Wind	PPM, FLP	0	21.2
3	Klondike Phase III [c/]	2007	Wind	NW Wind Power	0	11.8
4	Fourmile Hill Geothermal [d/]	Not in Service	Geo.	Calpine	0	0
5	**Total Federal System Non-Hydro Resources**				**1,178**	**1,149**
	Contract Purchases					
6	Canadian Entitlement for Canada (non-Federal)				147	84
7	Canadian Imports				1	1
8	Pacific Southwest Imports				0	0
9	Intra-Regional Transfers In (Pacific Northwest Purchases)				175	107
10	Slice Transmission Loss Return				29	17
11	**Total Federal System Contract Purchases**				**352**	**209**
12	**Total Federal System Non-Hydro Resources and Contract Purchases**				**1,530**	**1,358**

a/ This is the maximum generation for January 2025
b/ Stateline Wind Project contract expiring in 2028
c/ Klondike Phase III Project expiring in 2029
d/ Fourmile Hill is not assumed to be in operation within the study period

Federal System Hydro Generation Variability

The generating capacity of Federal system hydroelectric projects depends on the amount of water flowing through the facilities, the physical capacity of the facilities, flow requirements pursuant to biological opinions, a combination of other power and non-power constraints, and other operating limitations. Table 2-8 shows the annual variability of hydro generation under the three water conditions. Although hydro generation changes drastically from different water conditions, within each condition; however, it changes only slightly from year to year.

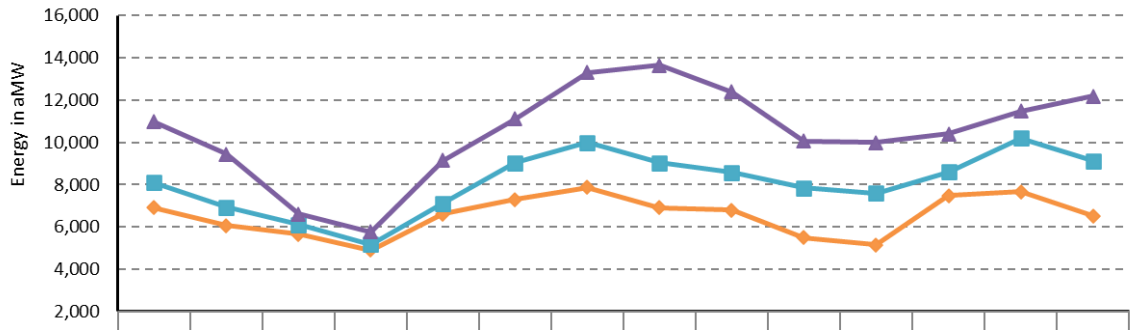
Table 2-8 Federal System Variability of Annual Hydro Generation by Streamflow Conditions – OY2026 – OY2035



	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Firm Water (P10)	6,629	6,616	6,623	6,625	6,634	6,622	6,645	6,589	6,635	6,651
Median Water (P50)	8,185	8,188	8,152	8,231	8,195	8,206	8,210	8,194	8,184	8,253
High Water (P90)	10,510	10,581	10,572	10,775	10,640	10,675	10,666	10,679	10,669	10,739

In OY2026, annual Federal system hydro energy generation is forecasted to be 6,629 aMW under Firm Water conditions. However, under the High Water conditions these same Federal system hydro resources could generate as much as 10,510 aMW. Table 2-9 displays the monthly variability of the Federal system hydro generation forecasted for OY2026, under the same three water conditions. Higher generation levels from January through March are largely due to drafting reservoirs for flood control and power production. Available water in those months depends greatly on annual rainfall and snowpack levels in the Columbia River Basin, and thus the generation exhibits large variability from year to year. Power production from April through July is variable based on the timing and amount of Columbia River Basin snowmelt runoff. Power production decreases through the end of summer and early fall as stream flows decline due to depleted snowpack and lower precipitation levels. Annual water volume variability generally has little impact on generation from the Federal system hydro resources in September and October. As observed from Table 2-9, hydro generation can vary by over 6,500 aMW in a single month, almost doubled in this case February, depending on operations and availability of water.

Table 2-9 Federal System Monthly Hydro Generation Variability by Streamflow Conditions – OY2026

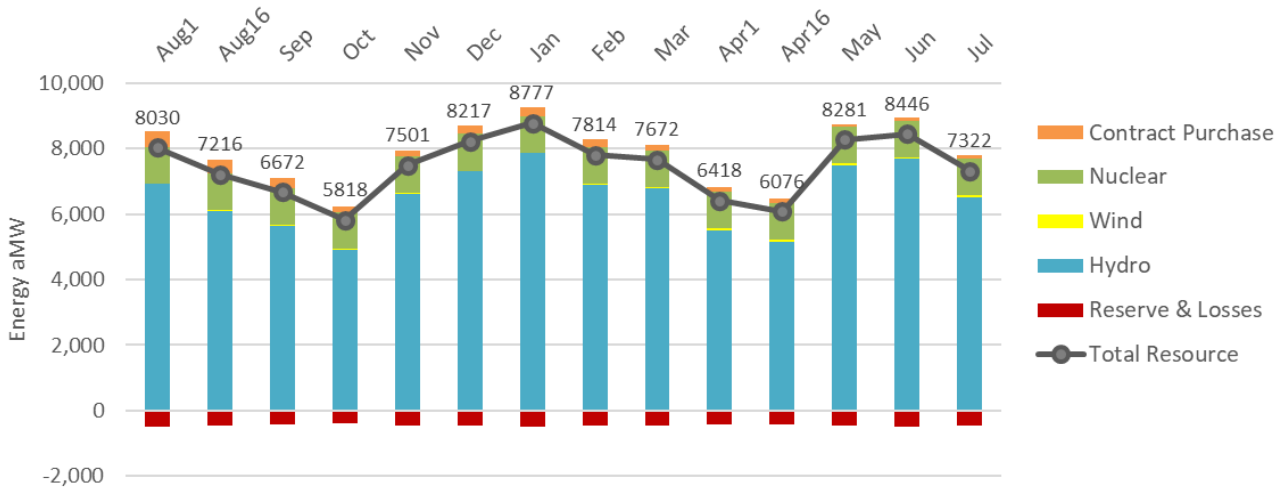


	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
Firm Water (P10)	6,921	6,078	5,649	4,912	6,611	7,300	7,861	6,903	6,792	5,504	5,162	7,492	7,678	6,520
Median Water (P50)	8,108	6,945	6,121	5,189	7,129	9,043	10,000	9,045	8,573	7,851	7,607	8,599	10,206	9,118
High Water (P90)	10,972	9,448	6,620	5,779	9,153	11,113	13,307	13,648	12,387	10,056	9,998	10,393	11,487	12,178

Total Federal System Resources

Table 2-10 shows the monthly shape of forecasted total Federal system generation for energy (in aMW) for OY2026, under Firm water conditions. This includes generation from all Federal system hydro and non-hydro resources, as well as contract purchases. Overall, the Federal system has the highest net generation forecasted in winter months to early spring and mid-summer periods.

Table 2-10 Federal System Monthly Generation for OY2026 under Firm Water Conditions



Key Results

Annual Energy

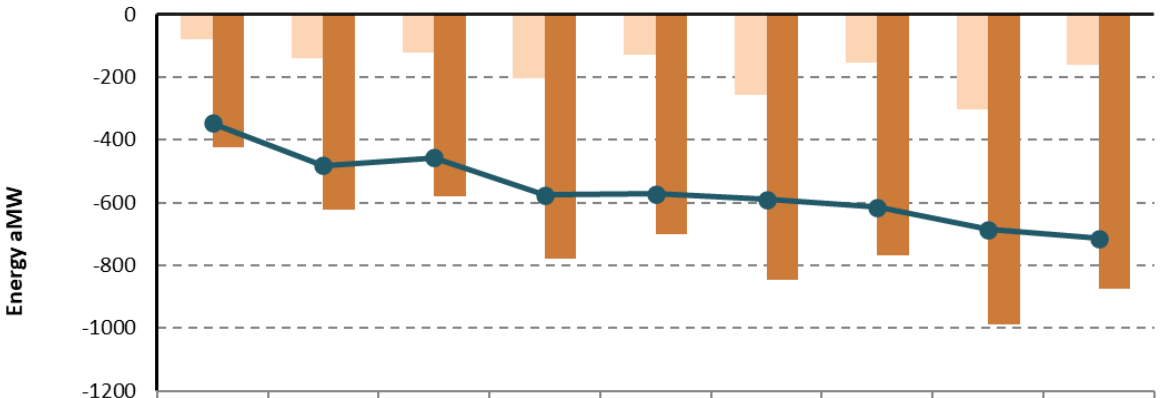
Table 2-11 shows that the Federal system is forecasted to have annual energy deficits throughout the study period. The individual components of the Federal system annual energy loads and resources are shown in Exhibit 4-1 for OY2026 through OY2035. The Federal system detailed monthly energy loads and resources are shown in Exhibit 4-2 for OY2026.

Table 2-11 Federal System Annual Energy Surplus/Deficit under Firm Water Conditions

Energy (aMW)	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Surplus/ Deficits	-426	-622	-580	-778	-701	-846	-768	-988	-876	-1012

Table 2-12 compares the 2025 White Book Federal system annual firm energy surplus/deficit results to those from the 2024 White Book. In this comparison, the 2025 White Book shows a consistent increase in deficits annually throughout the studying period. These results reflect changes in both Federal load obligations and Federal system generations.

Table 2-12 Federal System Annual Energy Surplus/Deficits Comparison under Firm Water

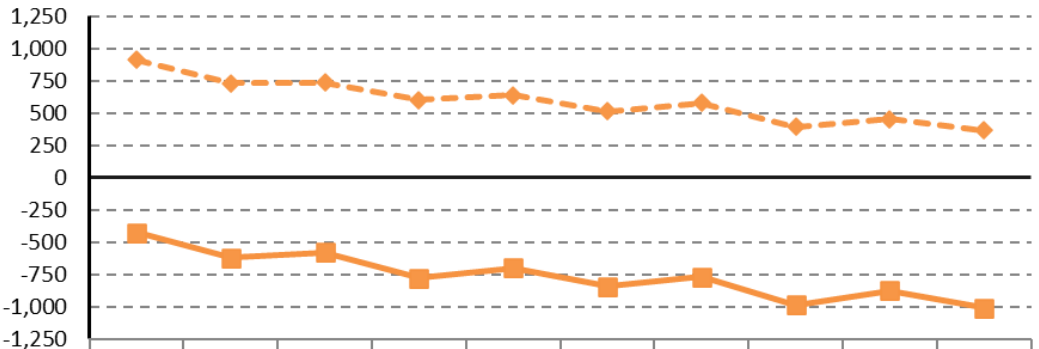


	2026	2027	2028	2029	2030	2031	2032	2033	2034
2024 White Book	-79	-139	-122	-203	-128	-257	-153	-303	-161
2025 White Book	-426	-622	-580	-778	-701	-846	-768	-988	-876
Delta	-346	-482	-457	-575	-572	-589	-615	-685	-715

Federal System Annual Surplus/ Deficit

Table 2-13 graphically presents the annual firm and median conditions energy surplus/deficits. Over the study period, the Federal system is forecasted to have a deficit in annual firm energy as high as 1,012 aMW in the last year of the study period. Noticeable differences in annual energy between odd and even years can be attributed to the biennial Columbia Generation Station (CGS) maintenance schedule[9]. Under Median Water conditions, the Federal System is surplus throughout the study period.

Table 2-13 Federal System Annual Surplus/ Deficits Under Firm Water Conditions



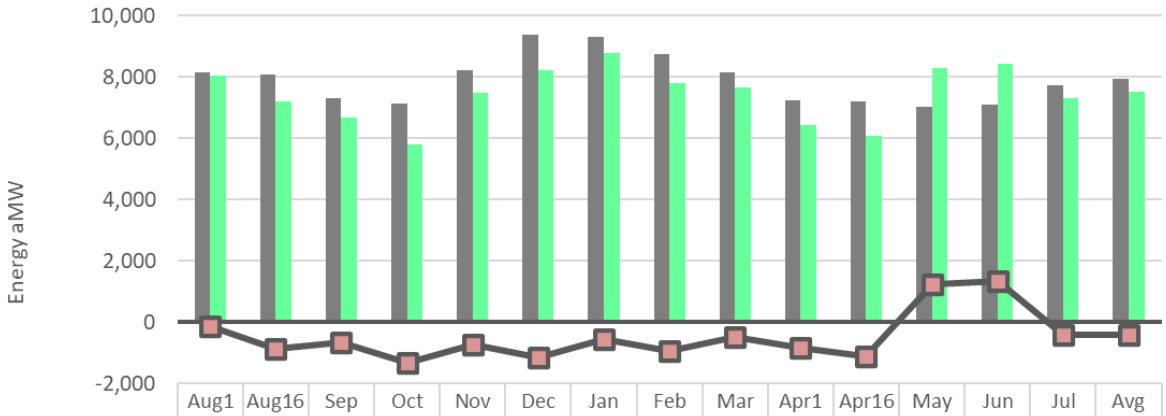
	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Energy (aMW)	-426	-622	-580	-778	-701	-846	-768	-988	-876	-1,012
Energy (aMW) p50	911	729	734	601	639	514	576	390	454	364

[9] CGS has routine maintenance cycle scheduled in odd calendar years, specifically in months of May and June. CGS is forecast to produce 994 aMW annually during maintenance years, and 1,116 aMW annually during non-maintenance years.

Federal System Monthly Surplus/ Deficit

Table 2-14 displays a graphic look at the Federal system monthly firm energy surplus/deficits for OY2026. Largest deficit comes in the month of October and better positions in the months of May and June, after spring run-off.

Table 2-14 Federal System Monthly Surplus/ Deficits OY2026 under Firm Water Conditions



	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
Total Firm Obligations	8169	8087	7315	7126	8218	9374	9325	8762	8168	7242	7202	7038	7104	7730	7958
Total Net Resources	8030	7216	6672	5818	7501	8217	8777	7814	7672	6418	6076	8281	8446	7322	7532
Surplus/ Defiict	-139	-871	-643	-1308	-716	-1157	-549	-948	-497	-825	-1127	1243	1342	-408	-426

Conclusion

Under Firm water conditions, the Federal system shows annual firm energy deficits through the 2026-2035 study period. These annual energy deficits range from 426 aMW in OY2026 to as high as over 1,000 aMW in OY2035. At a monthly resolution under Firm water conditions, the Federal system generally shows larger energy deficits across the winter and early spring periods until spring runoff starts, which then turns into surplus from May and to the early summer periods.

The Federal system surplus/deficit forecasts generally have a positive relationship with water conditions. Better water conditions generally yield more surplus overall. For example, the annual energy surplus can increase by over 4,000 aMW under better water conditions, while monthly surplus or deficit position can vary by over 5,500 aMW within the same year.

The range of Federal system monthly surplus and deficit forecasts under all 30-water years is presented in Exhibit 4-3. Additional monthly and annual details for OY2026 through OY2035 are available upon request, a list of available data reports can be found in the Appendix. Reminder: Data Report requests can be sent to WhiteBook@bpa.gov.

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SECTION 3: PACIFIC NORTHWEST REGIONAL ANALYSIS

The PNW Regional Analysis is an OY analysis that provides Bonneville's deterministic forecast of the PNW region's loads and resources over a 10-year period from OY 2026 through OY 2035. Firm load and resources forecasts are presented in energy based on regional retail loads, contract obligations, and resources. This White Book analysis assumes that generation from all regional uncommitted Independent Power Producer (IPP) projects is available to meet regional load. Regional retail loads, contract sales and purchases, and generating resources forecasts incorporate annual regional utility data submittals received by Bonneville.

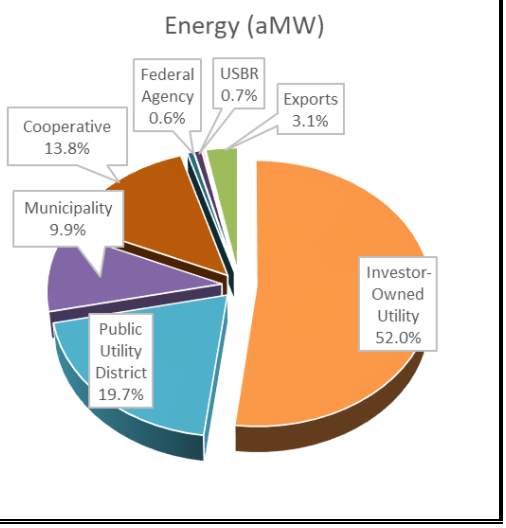
Regional Loads

The regional analysis incorporates regional load projections, which consist of two separate components: 1) Total Retail Loads (TRL), which is the sum of individual utilities' retail power consumption within the PNW region; and 2) Regional contract sales (Exports), which are the sum of all reported long-term regional contract deliveries to entities outside the PNW region. The TRL forecasts for the regional analysis are developed by Bonneville's ALF system. TRL forecasts reflect normal weather conditions, include historical conservation savings, and do not include specific adjustments for evolving climate trends. Apart from power commitments under the Treaty, all Export contract deliveries follow individual contract terms and are not assumed to be renewed after their expiration dates. Treaty power deliveries are assumed to be in place throughout the study period. The sum of the forecasted TRL and Export contracts represents the regional loads for the PNW.

Regional loads are comprised of roughly 96 percent retail loads and four percent exports. Table 3-1 shows the forecasted composition of PNW regional load for OY2026.

Table 3-1 PNW Region Firm Loads by Customer Category – OY2026

Customer Class	Energy (aMW)	Percent of Firm Energy
Investor-Owned Utility	13,617	52%
Public Utility District	5,518	19%
Municipality	2,582	10.2%
Cooperative	3,624	14.3%
Federal Agency	157	1%
USBR	192	0.8%
DSI	51	0.2%
Marketer	0	0.0%
Total Retail Load	**25,380**	**97%**
Exports	814	3.9%
Total Regional Load	**26,194**	**100%**



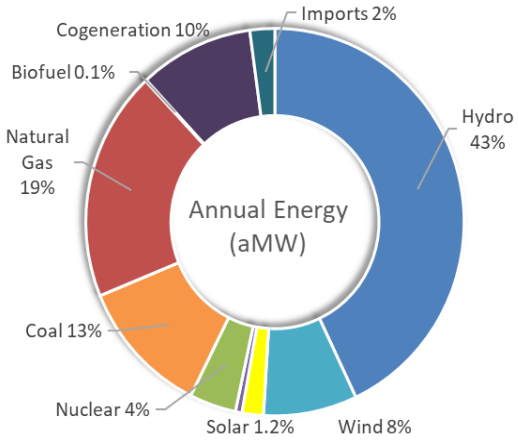
Regional Resources

PNW resources and contract purchases are collectively called "regional resources" in this study. Similarly to the Federal system resources, regional resources vary monthly by water conditions, resource type, and seasonality of generating resource potential. This analysis classifies resources as 1) Hydro resources, which include regulated, independent, and small hydro projects; 2) Non-hydro renewable resources which include wind, solar, and other projects; 3) Thermal resources which include nuclear, coal, natural gas, petroleum, biofuel and cogeneration projects; and 4) Contract purchases which are identified as Imports.

Table 3-3 summarizes the resource generation available to meet PNW regional loads. The generation forecasts for these resources are provided by Bonneville models or the project owners. New regional generating projects are included when those resources begin operating or are under construction and have a scheduled on-line date; similarly, retiring resources are removed from the forecasts based on the data of the announced retirement date. Contract purchases are provided by the individual utility, follow specific contract provisions, and can have various delivery arrangements.

Table 3-3 PNW Regional Generations by Resource Type – OY2026 Firm Water Conditions

Project Type	Annual Energy (aMW)	Percent of Energy
Hydro	12,013	43%
Wind	2,240	8%
Solar	510	1.8%
Other Renewable	157	0.6%
Nuclear	1,116	4%
Coal	3,201	11%
Natural Gas	5,371	19%
Petroleum	0	0%
Biofuel	26	0.1%
Cogeneration	2,730	10%
Imports	597	2%
Total Regional Resources	**27,960**	**100%**



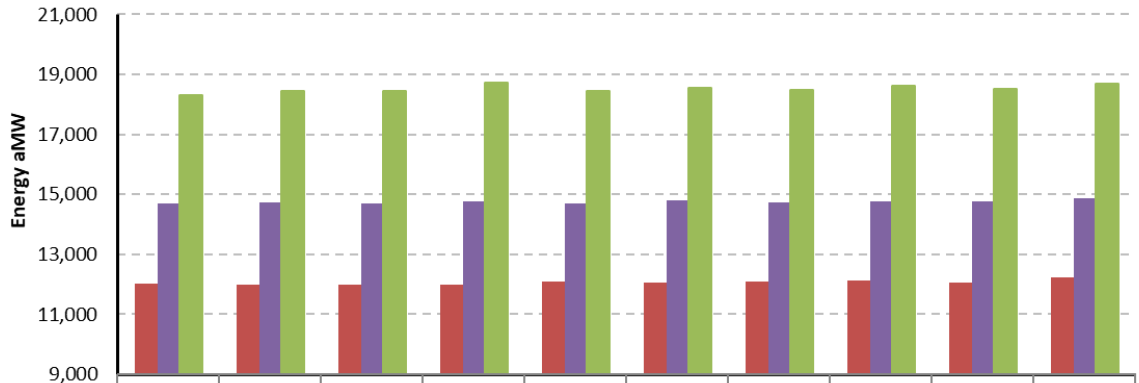
Regional Hydro Generation Variability

The generating capacity of regional hydroelectric projects depends upon the amount of water flowing through the facilities, the physical capacity of the facility, flow requirements pursuant to non-power requirements, and other operating limitations. Similarly to Federal Hydro Resources, Bonneville utilizes the 30-year streamflow record for planning purposes. Similarly, three water conditions are presented here to represent the magnitude of hydro generation variability.

Table 3-4 shows the annual variability of the region's hydro generation under the three streamflow scenarios. Details on the different streamflow scenarios please refer to Hydro Resource Modeling section.

In OY2026, annual firm energy generation from regional hydro projects is forecasted to be 12,013 aMW under the firm water conditions, and this represents about 43% of the region's resources. However, the generating potential from regional hydro projects can vary annually by over 6,000 aMW between firm and high water conditions.

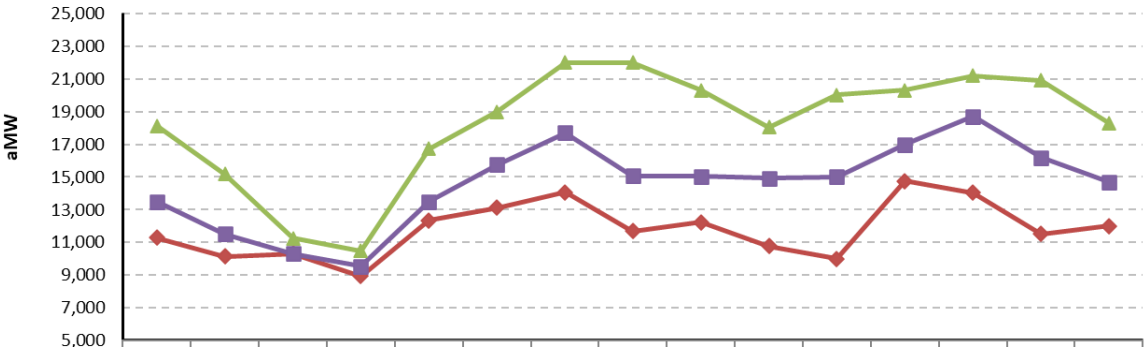
Table 3-4 PNW Regional Annual Variability of Hydro Generation by Streamflow Conditions



	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Firm Water (P10)	12,013	11,971	12,005	11,991	12,085	12,056	12,094	12,130	12,048	12,235
Median Water (P50)	14,687	14,741	14,684	14,756	14,709	14,813	14,724	14,766	14,749	14,874
High Water (P90)	18,303	18,444	18,452	18,732	18,447	18,554	18,476	18,620	18,512	18,675

Table 3-5 shows the monthly variability of regional hydro generation under the same three water conditions for OY2026. The increased level of generation in January through March is largely due to drafting reservoirs for power production and flood control, which can vary widely due to rainfall and snowpack levels in the Columbia River Basin. Power production fluctuations in the second half of April through July are highly related to the timing and amount of Columbia River Basin snowmelt runoff. Power production decreases through the end of summer and early full as streamflow are reduced due to depleted snowpack and lower precipitation levels. Water variability does not have a substantial impact on regional hydro generation from September through October as those are the months with overall lowest water availabilities. Regional hydro generation capability can vary by as much as 10,000+ aMW between firm and high water conditions within the same month.

Table 3-5 PNW Regional Hydro Generation Monthly Variability by Streamflow Conditions - OY2026



	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
Firm Water (P10)	11,278	10,148	10,313	8,946	12,350	13,126	14,067	11,686	12,234	10,785	9,998	14,753	14,029	11,502	12,013
Median Water (P50)	13,487	11,523	10,305	9,538	13,496	15,761	17,699	15,064	15,053	14,935	15,002	16,984	18,711	16,195	14,687
High Water (P90)	18,127	15,191	11,250	10,479	16,727	18,990	21,999	22,004	20,300	18,056	20,015	20,309	21,207	20,922	18,303

Uncommitted IPP Generation Delivered to the PNW Region

The PNW regional study includes uncommitted PNW IPP generation as regional resources. These resources, or the share of these resources that are not committed to serving specific loads, represent approximately 2,550 aMW of energy for OY2026. The inclusion of this uncommitted IPP generation is reasonable from the long-term planning perspective because the PNW Regional Analysis does not include any reliance on market purchases. However, PNW utilities may have to compete with other western markets to secure this generation to meet electricity demands. Table 3-6, next, details the region's total uncommitted IPP annual energy generation forecasts over the OY2026 through OY2035 study period.

Table 3-6 PNW Regional Annual Uncommitted IPP Generation

Regional Uncommitted IPP	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Annual Energy (aMW)	2,550	2,474	2,503	2,513	2,510	2,512	2,508	2,508	2,508	2,519

Table 3-7 details the region's uncommitted IPP projects and the associated fuel types. If uncommitted IPP generation is secured for long-term periods by load serving entities within the region or outside the region, the IPP forecasts will be updated in future studies to reflect those changes.

Table 3-7 PNW Regional Uncommitted Independent Power Producer Projects – OY2026 Firm Water Conditions

Project	Fuel Type	Energy (aMW)
Airport Solar	Solar	13
Centralia Complex [a/b/]	Coal	91
Clearwater Wind	Wind	23
Condon Wind	Wind	12
Cosmopolis Specialty Fibres	Wood Waste	14
Goose Prairie Solar	Solar	17
Hermiston Power Project	Wood Waste	567

Project	Fuel Type	Energy (aMW)
International Paper Energy Center	Wood Waste	16
Juniper Canyon Wind	Wind	36
Kittitas Valley Wind	Wind	24
Klamath Generation Facility	Natural Gas	436
Klamath Generation Peakings (CT)	Natural Gas	90
Klondike Wind 1	Wind	6
Klondike Wind 3	Wind	23
Klondike Wind 3a	Wind	18
Leaning Juniper Wind	Wind	47
Longview Fibre Paper & Packaging	Wood Waste	35
Nippon Paper Cogen (Port Angeles)	Wood Waste	5
Pelton	Hydro	14
Priest Rapids	Hydro	85
Rock Island	Hydro	84
Rocky Reach	Hydro	156
Round Butte	Hydro	31
Satsop Combustion Turbine Project	Natural Gas	584
SDS Lumber	Wood Waste	1
Smith Creek (Idaho)	Hydro	7
Stateline Wind	Wind	8
Stimson Lumber (Plummer)	Wood Waste	7
Tacoma Biomass (WestRock)	Wood Waste	0
Tieton Dam (Yakima)	Hydro	0
Vansycle Wind	Wind	23
Wanapum	Hydro	25
Weyerhaeuser Longview	Wood Waste	35
Willow Creek Wind	Wind	17
Total Uncommitted IPP Generation		**2,550**

[a/] Centralia #2 (670 MW) is scheduled for retirement on Dec 1, 2025. Puget purchased an increasing amount of this project beginning Dec 1, 2014 and ending Nov 30, 2025.

Key Results

Annual Energy

Table 3-8 shows annual energy surpluses for the PNW region in the first two operating years, then increasingly more deficit going forward to outyears. This study assumes that 100 percent of the PNW region's uncommitted IPP generation (2,550 aMW in OY2026 is available to serve regional loads. The individual components of the PNW regional annual energy loads and resources for OY2026 through OY2034 are shown in Exhibit 5-1, and OY2026 monthly PNW regional details are shown in Exhibit 5-2. Other details of each component for OY2026 through OY2035 are available upon request via email at WhiteBook@bpa.gov.

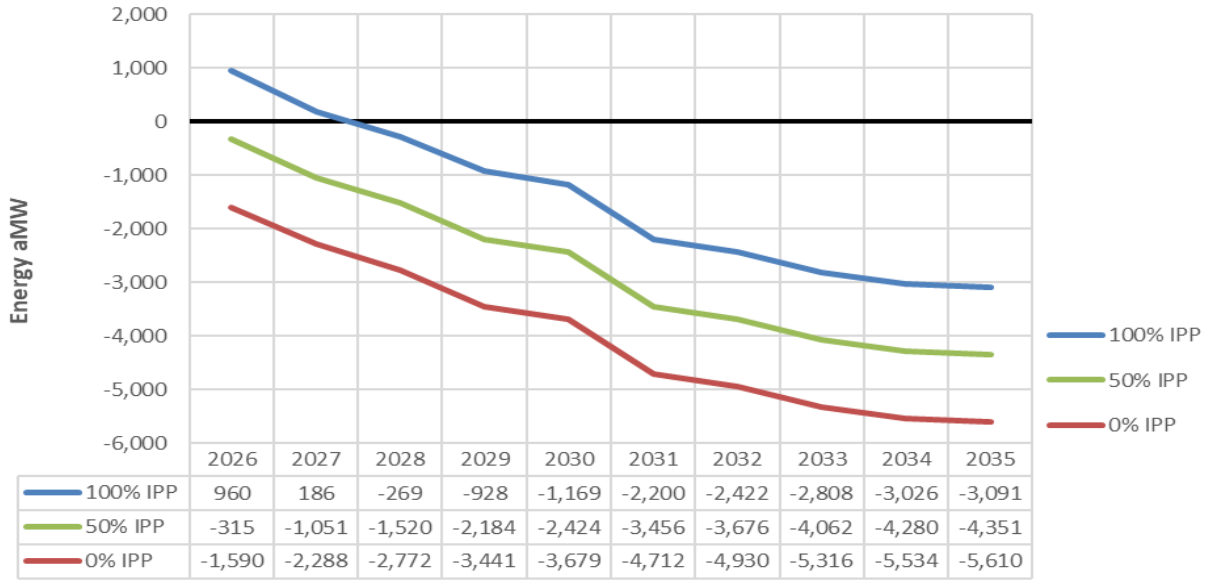
Table 3-8 PNW Regional Annual Energy Surplus/ Deficit - Firm Water Conditions

Assuming 100% of Uncommitted IPP Generation is Available to the Region

Energy (aMW)	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Surplus/ Deficit	960	186	-269	-928	-1,169	-2,220	-2,422	-2,808	-3,026	-3,091

Table 3-9 shows the significant variability in PNW regional annual firm energy surplus/deficit forecasts depending on the level of uncommitted IPP generation available to the region. IPP generation is detailed in Tables 3-6 and 3-7.

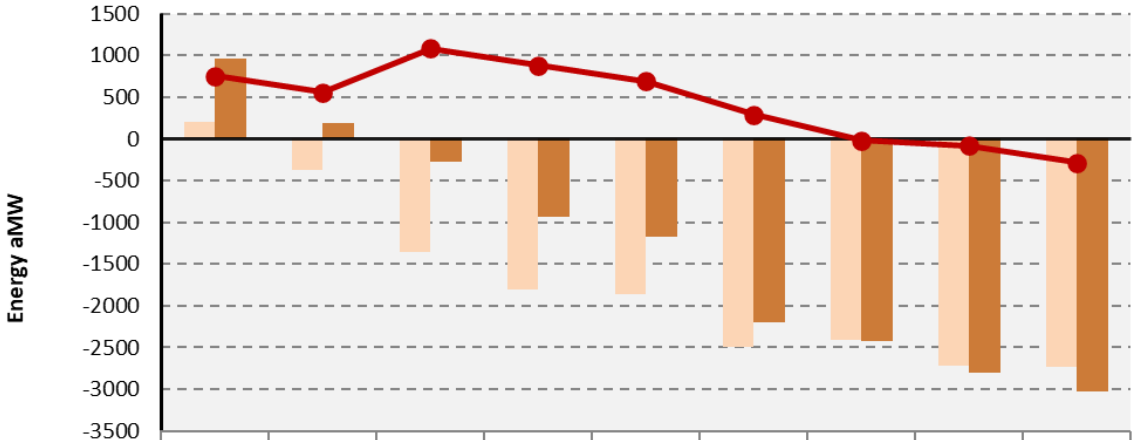
Table 3-9 PNW Regional Annual Energy Surplus/ Deficit by Uncommitted IPP Generation %



	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
100% IPP	960	186	-269	-928	-1,169	-2,200	-2,422	-2,808	-3,026	-3,091
50% IPP	-315	-1,051	-1,520	-2,184	-2,424	-3,456	-3,676	-4,062	-4,280	-4,351
0% IPP	-1,590	-2,288	-2,772	-3,441	-3,679	-4,712	-4,930	-5,316	-5,534	-5,610

Table 3-10 compares the 2025 White Book PNW regional annual firm energy surplus/ deficit forecasts to that of the 2024 White Book. The comparison shows significant change, the 2025 White Book shows OY2026 to have over 700 aMW more surplus energy available, and this continues through OY2028 where 2025 White Book forecast showed over than 1,000 aMW of change resulting in less deficit than forecasts from 2024 White Book. This change is mainly driven by the decrease in the PNW Regional Retail Load, more specifically in the new large industrial loads category. By OY2032 the forecasted regional position is very similar to the 2024 White Book, with growing deficits after that point in the study.

Table 3-10 PNW Regional Annual Surplus/ Deficit Comparison – Firm Water Conditions Assuming 100% Uncommitted IPP Generations available to the Region

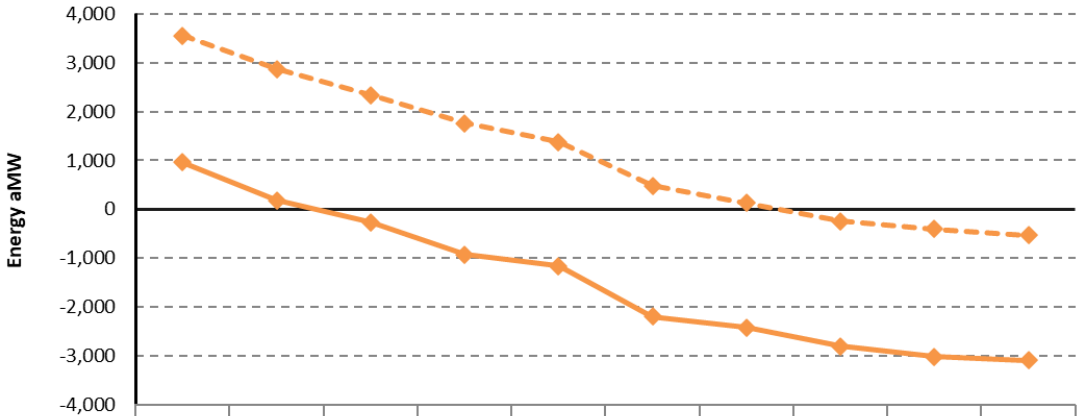


	2026	2027	2028	2029	2030	2031	2032	2033	2034
2024 White Book	207	-370	-1352	-1808	-1861	-2492	-2407	-2725	-2738
2025 White Book	960	186	-269	-928	-1169	-2200	-2422	-2808	-3026
Delta	753	556	1084	880	692	293	-15	-84	-288

Regional Annual Surplus/ Deficit

Table 3-14 graphically presents the annual firm energy surplus/ deficit forecasts for the PNW region under firm (P10) and median (P50) conditions. These forecasts assume 100 percent availability of the PNW uncommitted IPP generation to serve the region's loads. The regional annual energy surplus/ deficit declines over the 10-year study period.

Table 3-14 PNW Regional Annual Surplus/ Deficit – Firm & Median Water Conditions

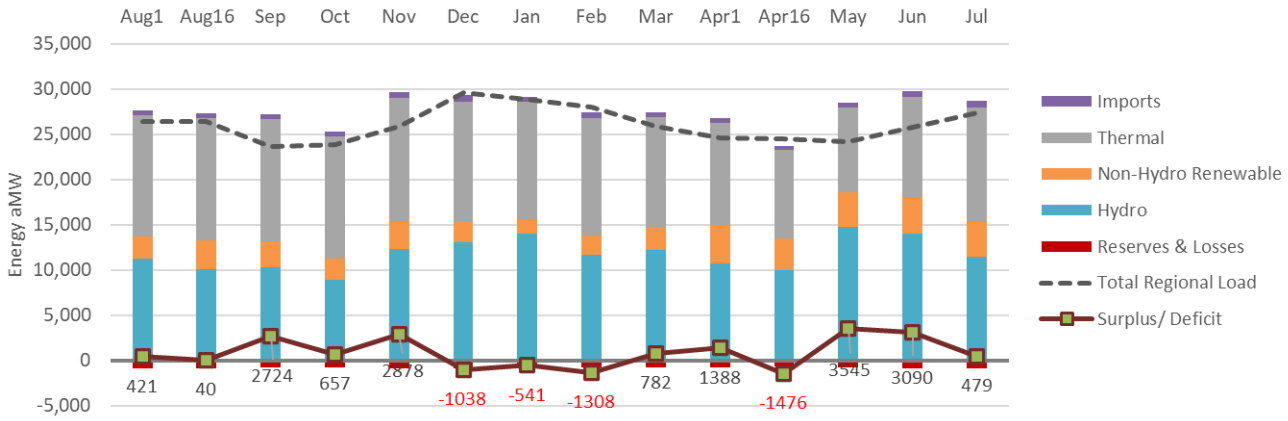


	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Energy P10	960	186	-269	-928	-1,169	-2,200	-2,422	-2,808	-3,026	-3,091
Energy P50	3557	2876	2333	1758	1378	477	132	-248	-403	-529

Regional Monthly Surplus/ Deficit

Table 3-15 shows the monthly energy surplus/ deficit forecast for OY2026, accompanied with monthly total firm obligations and resources by category. Again, these forecasts assume 100 percent of uncommitted IPP generation serving the region. This monthly view shows how both metrics follow a similar monthly shape with most surplus months in late spring to the beginning of summer when hydro generation is high, and most deficits around the second half of April, before the runoff begins historically and as fish operations begin.

Table 3-15 PNW Regional Monthly Surplus/ Deficit – OY2026 Firm Water Conditions



Conclusion

The PNW region is projected to have annual firm energy surpluses in the first two operating years, with surpluses declining and quickly becoming deficits and growing into larger deficits going into the outyears, under the assumption of 100 percent of the PNW region's uncommitted IPP generation available to serve the region's load. Additionally, because of the full uncommitted IPP generation assumption to serve the region's load, with its uncommitted nature, the supply of power within the region can change dramatically and quickly if those resources were to be used to serve loads outside of the region or retire early or unexpectedly. Under the median (P50) water conditions, the PNW region sees surpluses until the outyears of OY 2032.

Notably, the region's retail load forecasts adjusted downwards significantly in the front half of the study period from 2024 Whtie Book forecast, this is driven by the uncertainty of the new large single load category of the retail loads.

Detailed surplus/deficit forecasts for all 30-historical water conditions are presented in Exhibit 5-3; monthly and annual details for OY2026 through OY2035 are available upon request with the itemized list located in the Appendix.

The regional energy deficits identified in this study may be mitigated through resource options discussed in the NWPCC's Power Plan publications, NWPCC is currently working on updating their

2021 Northwest Power Plan[10] and it is updated roughly every 5 years. Bonneville provides this PNW regional planning analysis for informational purposes only.

[10] The 2021 Northwest Power Plan (nwcouncil.org)

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SECTION 4: FEDERAL SYSTEM ANALYSIS EXHIBITS

Exhibit 4-1: Annual Energy – Federal System Surplus/ Deficit:

Operating Years 2026 – 2035, Firm Water Conditions

Loads and Resources - Federal System Percentile
Operating Year: 2026 to 2035 Percentile: 10
White Book 2025 (Energy Only) Report Date: **4/16/2025**
S268-WB-20250415-174748

	Energy-aMW	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	Firm Obligations										
1	**Load Following**	5443	5525	5581	5665	5718	5767	5810	5859	5895	5930
2	Preference Customers	5096	5175	5225	5300	5349	5396	5437	5483	5517	5550
3	Federal Agencies	155	158	161	168	172	174	176	179	181	183
4	USBR	192	192	194	197	197	197	197	197	197	197
5	Federal Diversity	0	0	0	0	0	0	0	0	0	0
6	**Tier 1 Block**	560	573	586	583	588	590	590	590	589	589
7	Tier 1 Block	560	573	586	583	588	590	590	590	589	589
8	**Slice**	1454	1439	1441	1430	1440	1435	1439	1431	1438	1435
9	Slice Block	611	613	601	604	595	600	588	601	588	598
10	Slice Output from T1 System	843	826	839	826	845	835	851	830	850	838
11	**Direct Service Industries**	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
12	Direct Service Industry	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0
13	**Contract Deliveries**	491	340	328	328	301	246	247	246	247	247
14	Exports	331	317	318	317	290	237	237	237	238	237
15	Intra-Regional Transfers (Out)	160	22.4	10.7	10.7	10.7	9.44	9.44	9.44	9.44	9.44
16	**NR Obligation**	0	16.8	24.1	31.2	33.4	46.8	58.9	64.6	73.9	75.0
17	NR Rate Load	0	16.8	24.1	31.2	33.4	46.8	58.9	64.6	73.9	75.0
18	**Total Firm Obligations**	**7958**	**7905**	**7971**	**8048**	**8092**	**8096**	**8156**	**8202**	**8254**	**8286**
	Net Resources										
19	**Hydro**	6629	6616	6623	6625	6634	6622	6645	6589	6635	6651
20	Regulated Hydro - Net	6354	6344	6353	6353	6355	6340	6367	6326	6379	6391
21	Independent Hydro - Net	273	269	267	269	276	279	275	260	253	257
22	Small Hydro - Net	2.88	2.88	2.88	2.88	2.88	2.88	2.87	2.88	2.88	2.88
23	**Non-Hydro Renewable**	33.0	19.8	1.90	0	0	0	0	0	0	0
24	Wind - Net	33.0	19.8	1.90	0	0	0	0	0	0	0
25	Other - Net	0	0	0	0	0	0	0	0	0	0
26	**Thermal**	1116	994	1116	994	1116	994	1116	994	1116	994
27	Nuclear - Net	1116	994	1116	994	1116	994	1116	994	1116	994
28	**Contract Purchases**	209	102	102	99.2	91.3	80.7	77.6	77.0	77.5	77.3
29	Imports	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
30	Intra-Regional Transfers (In)	107	0	0	0	0	0	0	0	0	0
31	Non-Federal CER	84.0	84.0	83.8	82.5	75.0	64.6	61.2	60.9	61.1	61.1
32	Slice Transmission Loss Return	17.3	16.9	17.2	15.8	15.3	15.1	15.4	15.0	15.4	15.2
33	**Reserves & Losses**	-455	-448	-451	-447	-451	-447	-451	-446	-451	-447
34	Operating Reserves	0	0	0	0	0	0	0	0	0	0
35	Balancing Reserves	0	0	0	0	0	0	0	0	0	0
36	Transmission Losses	-232	-225	-228	-224	-228	-224	-228	-223	-228	-225
37	Wheeling Loss (financial settlement)	-223	-223	-223	-223	-223	-223	-223	-223	-223	-223
38	**Total Net Resources**	**7532**	**7283**	**7392**	**7270**	**7391**	**7250**	**7387**	**7214**	**7378**	**7275**
39	**Total Surplus/Deficit**	**-426**	**-622**	**-580**	**-778**	**-701**	**-846**	**-768**	**-988**	**-876**	**-1012**

Exhibit 4-2: Monthly Energy – Federal System Surplus/ Deficit: Operating Year 2026, Firm Water Conditions

Loads and Resources - Federal System Percentile
Operating Year: 2026 Percentile: 10
White Book 2025 (Energy Only) Report Date: **4/16/2025**
S268-WB-20250415-174748

	Energy-aMW	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
	Firm Obligations															
1	**Load Following**	5284	5250	4639	4843	5337	6325	6337	5969	5478	5171	5171	5076	5244	5640	5443
2	Preference Customers	4802	4761	4219	4570	5166	6136	6140	5757	5250	4771	4771	4600	4733	5048	5096
3	Federal Agencies	140	139	116	140	167	185	188	199	171	145	145	130	129	148	155
4	USBR	342	350	304	133	3.79	3.73	8.80	13.3	56.9	255	255	345	382	444	192
5	Federal Diversity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	**Tier 1 Block**	367	365	610	519	847	848	929	874	829	413	413	148	21.3	333	560
7	Tier 1 Block	367	365	610	519	847	848	929	874	829	413	413	148	21.3	333	560
8	**Slice**	1461	1356	1323	1210	1478	1644	1702	1561	1508	1305	1265	1462	1485	1380	1454
9	Slice Block	615	615	602	554	613	701	696	664	628	594	594	536	546	582	611
10	Slice Output from T1 System	846	741	721	656	865	943	1006	896	879	711	671	926	940	798	843
11	**Direct Service Industries**	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11
12	Direct Service Industry	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11.0	11
13	**Contract Deliveries**	1045	1105	733	543	545	546	346	347	342	343	343	341	343	366	491
14	Exports	485	550	376	305	305	305	305	305	305	305	305	305	305	328	331
15	Intra-Regional Transfers (Out)	561	554	357	238	240	241	41.3	42.0	37.4	38.3	38.3	36.3	38.3	37.4	160
16	**NR Obligation**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	NR Rate Load	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	**Total Firm Obligations**	**8169**	**8087**	**7315**	**7126**	**8218**	**9374**	**9325**	**8762**	**8168**	**7242**	**7202**	**7038**	**7104**	**7730**	**7958**
	Net Resources															
19	**Hydro**	6921	6078	5649	4912	6611	7300	7861	6903	6792	5504	5162	7492	7678	6520	6629
20	Regulated Hydro - Net	6587	5746	5356	4794	6268	7053	7564	6743	6613	5227	4883	7139	7275	6220	6354
21	Independent Hydro - Net	331	330	291	115	340	243	294	158	175	274	276	350	401	297	273
22	Small Hydro - Net	2.63	2.63	2.63	2.67	2.84	3.19	3.21	3.05	3.10	3.09	3.09	2.83	2.72	2.63	2.9
23	**Non-Hydro Renewable**	22.6	33.8	31.5	25.3	36.2	27.6	14.8	24.4	28.1	50.2	42.3	45.2	44.7	43.7	33
24	Wind - Net	22.6	33.8	31.5	25.3	36.2	27.6	14.8	24.4	28.1	50.2	42.3	45.2	44.7	43.7	33
25	Other - Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26	**Thermal**	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116
27	Nuclear - Net	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116
28	**Contract Purchases**	454	446	301	164	188	244	271	228	190	165	164	102	106	103	209
29	Imports	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.0
30	Intra-Regional Transfers (In)	350	350	200	64.5	88.3	139	164	125	89.0	64.4	64.4	0	0	0	107
31	Non-Federal CER	84.9	79.6	85.2	85.4	81.6	85.3	85.3	84.0	82.3	84.9	84.9	81.8	84.9	85.3	84
32	Slice Transmission Loss Return	17.6	15.4	14.7	13.3	17.6	19.2	20.5	18.2	17.9	14.5	13.7	18.8	19.6	16.6	17
33	**Reserves & Losses**	-483	-458	-426	-400	-450	-470	-486	-458	-454	-418	-409	-474	-498	-461	-455
34	Operating Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	Balancing Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	Transmission Losses	-260	-235	-203	-177	-227	-248	-263	-235	-231	-195	-186	-251	-275	-238	-232
37	Wheeling Loss (financial settlement)	-223	-223	-223	-223	-223	-223	-223	-223	-223	-223	-223	-223	-223	-223	-223
38	**Total Net Resources**	**8030**	**7216**	**6672**	**5818**	**7501**	**8217**	**8777**	**7814**	**7672**	**6418**	**6076**	**8281**	**8446**	**7322**	**7532**
39	**Total Surplus/Deficit**	**-139**	**-871**	**-643**	**-1,308**	**-716**	**-1,157**	**-549**	**-948**	**-497**	**-825**	**-1,127**	**1,243**	**1,342**	**-408**	**-426**

Exhibit 4-3: 30-Water Year Conditions Monthly Energy – Federal System Surplus/ Deficit: Operating Year 2026

Federal Report Surplus Deficit By Water Year
Operating Year 2026
White Book 2025 (Energy Only) Report Date: **4/17/2025**
S268-WB-20250415-174748

	Energy-aMW - Surplus Deficit	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1	1989 Federal Report Surplus Deficit	154	822	-665	-1308	-686	-17.5	77.7	-112	204	584	1923	2195	1794	41.1	274
2	1990 Federal Report Surplus Deficit	112	-546	-365	-866	-270	1921	1303	2785	805	1017	1798	1998	4095	3316	1314
3	1991 Federal Report Surplus Deficit	2618	2020	1.61	-1443	1533	2041	2826	3837	1752	1703	975	2249	3351	4151	1985
4	1992 Federal Report Surplus Deficit	3140	1568	-432	-1231	-198	-1157	-423	-464	-366	-679	-1092	1900	1204	-704	-31.6
5	1993 Federal Report Surplus Deficit	147	-580	-390	-1308	-516	-1212	-1141	-2361	-505	277	-1498	2604	2547	1172	-149
6	1994 Federal Report Surplus Deficit	860	-126	-6.29	-1385	-325	-1236	-878	-493	-364	-1140	161	1415	1342	-289	-198
7	1995 Federal Report Surplus Deficit	96.1	-850	-238	-1265	-606	-740	572	1729	1764	39.2	-337	1447	3637	2401	671
8	1996 Federal Report Surplus Deficit	1672	345	193	-281	2554	5131	5418	5883	5309	1988	3031	3002	4581	4446	3299
9	1997 Federal Report Surplus Deficit	2858	1238	309	-1035	-8.05	2120	5484	5729	4739	2525	4026	4257	5141	4376	3021
10	1998 Federal Report Surplus Deficit	3337	2881	1136	1094	1394	946	1289	2058	1129	-169	-432	3844	4196	2498	1867
11	1999 Federal Report Surplus Deficit	2990	805	-2.69	-1188	-716	1110	4133	4305	4045	1192	1998	2193	4061	4666	2164
12	2000 Federal Report Surplus Deficit	4518	3599	288	-695	1470	2608	2443	2159	2240	2020	2156	2332	1828	1821	1888
13	2001 Federal Report Surplus Deficit	2183	-697	-287	-1192	-597	-699	-1054	-948	-930	-1149	-2211	257	363	-408	-536
14	2002 Federal Report Surplus Deficit	462	-750	-668	-1640	-968	-1225	-549	-25.6	-497	397	1993	2178	4033	3724	448
15	2003 Federal Report Surplus Deficit	904	45.7	-195	-1214	-140	-883	-363	-1345	1034	768	1105	1649	3292	-157	261
16	2004 Federal Report Surplus Deficit	-575	-930	-591	-1162	-26.5	-308	87.0	-138	-328	-42.7	-56.5	1243	2559	421	76.6
17	2005 Federal Report Surplus Deficit	-226	16.2	128	-564	183	1214	928	893	291	-930	-926	1454	2339	1341	598
18	2006 Federal Report Surplus Deficit	463	-684	-359	-995	-156	872	3118	3523	942	3088	1663	3584	3977	1930	1541
19	2007 Federal Report Surplus Deficit	546	-649	-489	-1070	-530	1148	2335	2027	2565	1851	801	1882	2847	1533	1121
20	2008 Federal Report Surplus Deficit	343	-826	-643	-915	-60.7	341	133	312	38.5	-427	-1127	2239	4611	3004	670
21	2009 Federal Report Surplus Deficit	1431	1410	-30.3	-962	-620	-191	1713	-29.5	-107	1668	922	1841	2468	-231	549
22	2010 Federal Report Surplus Deficit	-153	-1150	-426	-1045	-219	-672	-203	-1508	-1179	-825	-1433	338	3941	1770	-78.5
23	2011 Federal Report Surplus Deficit	879	-97.8	-33.5	-1072	-610	972	4196	4877	2681	3903	659	2640	5093	5237	2203
24	2012 Federal Report Surplus Deficit	4061	1884	9.12	-1137	-466	743	2355	2190	2531	3319	3263	3106	4661	4871	2092
25	2013 Federal Report Surplus Deficit	3353	2189	-113	-889	141	2757	1086	255	484	2920	1444	2449	3511	2180	1409
26	2014 Federal Report Surplus Deficit	1261	-222	69.9	-1142	-313	-36.0	1699	-183	3035	2762	1275	2435	3808	3014	1251
27	2015 Federal Report Surplus Deficit	1315	-152	9.55	-1113	277	2043	3289	3592	4314	1334	-510	444	748	-1139	1107
28	2016 Federal Report Surplus Deficit	-61.9	-920	-743	-934	-773	81.6	847	361	2197	2389	2229	2543	1918	-728	548
29	2017 Federal Report Surplus Deficit	-139	-871	-305	-448	2065	802	3423	3994	5561	4360	3161	3737	4597	1861	2362
30	2018 Federal Report Surplus Deficit	1787	298	-331	-1035	-1047	90.1	3624	4850	2734	2500	1521	3959	4021	1235	1741

SECTION 5: PACIFIC NORTHWEST REGIONAL ANALYSIS EXHIBITS

Exhibit 5-1: Annual Energy – PNW Regional Surplus/ Deficit: Operating Years 2026 – 2035, Firm Water Conditions

Loads and Resources - Pacific Northwest Region Percentile
Operating Year: 2026 to 2035 Percentile: 10
White Book 2025 (Energy Only) Report Date: **4/17/2025**
S268-WB-20250415-174748

	Energy-aMW	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
	Regional Loads										
1	**Retail Loads**	25380	25871	26382	26944	27481	28059	28496	28883	29057	29203
2	Federal Agency	157	161	164	170	174	177	178	181	183	185
3	USBR	192	192	194	197	197	197	197	197	197	197
4	Cooperative	3624	3948	4336	4724	5124	5560	5875	6109	6171	6212
5	Municipality	2582	2597	2613	2629	2648	2666	2675	2682	2687	2693
6	Public Utility District	5158	5249	5293	5359	5424	5491	5551	5620	5670	5709
7	Investor-Owned Utility	13617	13673	13730	13813	13864	13917	13968	14042	14096	14154
8	Direct-Service Industry	51.3	51.3	51.3	51.3	51.3	51.3	51.3	51.3	51.3	51.3
9	Federal Diversity	0	0	0	0	0	0	0	0	0	0
10	**Exports**	814	800	800	798	769	468	373	373	373	373
11	Canada	319	317	318	317	290	237	237	237	238	237
12	East Continental Divide	3.33	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
13	Pacific Southwest	491	482	481	479	477	230	134	135	135	135
14	**Total Regional Loads**	**26194**	**26671**	**27182**	**27742**	**28250**	**28526**	**28869**	**29255**	**29430**	**29575**
	Regional Resources										
15	**Hydro**	12013	11971	12005	11991	12085	12056	12094	12130	12048	12235
16	Regulated Hydro - Net	10848	10813	10839	10834	10904	10884	10914	10938	10868	11036
17	Independent Hydro - Net	922	914	923	913	938	928	937	948	937	955
18	Small Hydro - Net	244	244	243	244	244	244	243	244	244	244
19	**Non-Hydro Renewable**	2907	2907	2906	2908	2907	2891	2902	2907	2907	2907
20	Wind - Net	2240	2240	2238	2240	2240	2224	2235	2240	2240	2240
21	Solar - Net	510	510	510	510	510	510	510	510	510	510
22	Other - Net	157	157	158	158	157	157	157	157	157	157
23	**Thermal**	12444	12176	12198	12103	12280	12029	12198	12158	12195	12090
24	Nuclear - Net	1116	994	1116	994	1116	994	1116	994	1116	994
25	Coal - Net	3201	3049	2955	2981	3034	2948	2962	3034	2948	2966
26	Natural Gas - Net	5371	5371	5373	5372	5368	5371	5372	5371	5371	5371
27	Petroleum - Net	0	0	0	0	0	0	0	0	0	0
28	Biofuel - Net	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5	25.5
29	Cogeneration - Net	2730	2737	2729	2730	2737	2691	2722	2734	2734	2734
30	**Imports**	597	600	605	609	613	132	38.7	38.8	38.9	39.0
31	Canada	38.8	38.8	38.8	38.8	38.8	36.7	36.5	36.4	36.4	36.4
32	Inland Southwest	509	513	517	521	525	93.6	0	0	0	0
33	Pacific Southwest	48.6	48.7	48.9	49.2	49.2	2.15	2.25	2.35	2.48	2.59
34	**Reserves & Losses**	-806	-798	-799	-796	-804	-782	-785	-786	-784	-787
35	Operating Reserves	0	0	0	0	0	0	0	0	0	0
36	Balancing Reserves	0	0	0	0	0	0	0	0	0	0
37	Transmission Losses	-806	-798	-799	-796	-804	-782	-785	-786	-784	-787
38	**Total Regional Resources**	**27153**	**26857**	**26914**	**26814**	**27080**	**26326**	**26447**	**26447**	**26404**	**26484**
39	**Total Surplus/Deficit**	**960**	**186**	**-269**	**-928**	**-1169**	**-2200**	**-2422**	**-2808**	**-3026**	**-3091**

Exhibit 5-2: Monthly Energy – PNW Regional Surplus/ Deficit: Operating Year 2026, Firm Water Conditions

Loads and Resources - Pacific Northwest Region Percentile

Operating Year: 2026 Percentile: 10

White Book 2025 (Energy Only) Report Date: **4/16/2025**

S268-WB-20250415-174748

	Energy-aMW	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
	Regional Loads															
1	**Retail Loads**	25467	25297	22727	23290	25177	28933	28409	27368	25206	23672	23672	23250	24863	26315	25380
2	Federal Agency	144	143	120	144	167	185	188	199	171	149	149	134	133	152	157
3	USBR	342	350	304	133	3.79	3.73	8.80	13.3	56.9	255	255	345	382	444	192
4	Cooperative	3415	3397	3104	3406	3601	4037	4023	3849	3639	3503	3503	3471	3642	3805	3624
5	Municipality	2379	2357	2241	2408	2698	3103	3123	2981	2729	2458	2458	2261	2253	2373	2582
6	Public Utility District	4854	4820	4468	4733	5302	6020	6008	5765	5268	4930	4930	4674	4851	5061	5158
7	Investor-Owned Utility	14284	14180	12441	12413	13352	15532	15006	14509	13291	12326	12326	12315	13552	14430	13617
8	Direct-Service Industry	50.2	50.1	50.9	51.8	52.2	51.9	52.3	52.0	51.5	51.9	51.9	50.4	50.1	50.1	51
9	Federal Diversity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	**Exports**	978	1190	969	642	777	665	498	623	671	959	863	901	948	1065	814
11	Canada	411	481	305	305	305	305	305	305	305	305	305	305	305	328	319
12	East Continental Divide	15.4	14.5	14.9	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	3.3
13	Pacific Southwest	552	695	649	336	471	359	192	317	365	653	557	595	642	736	491
14	**Total Regional Loads**	**26445**	**26487**	**23696**	**23932**	**25954**	**29597**	**28907**	**27992**	**25876**	**24631**	**24536**	**24152**	**25811**	**27380**	**26194**
	Regional Resources															
15	**Hydro**	11278	10148	10313	8946	12350	13126	14067	11686	12234	10785	9998	14753	14029	11502	12013
16	Regulated Hydro - Net	10070	8947	9277	8137	11049	12024	12958	10821	11258	9667	8715	13210	12472	10238	10848
17	Independent Hydro - Net	883	878	791	646	1172	976	986	733	815	838	1001	1140	1134	859	922
18	Small Hydro - Net	325	323	244	163	128	126	124	132	162	280	282	403	422	405	244
19	**Non-Hydro Renewable**	2411	3185	2867	2346	2933	2271	1454	2172	2525	4089	3558	3866	3942	3862	2907
20	Wind - Net	1593	2340	2162	1744	2430	1871	1047	1663	1897	3314	2802	3026	3049	2954	2240
21	Solar - Net	658	686	548	443	344	242	259	351	470	619	599	692	759	727	510
22	Other - Net	159	159	157	160	159	159	148	158	158	157	157	149	134	181	157
23	**Thermal**	13426	13433	13492	13523	13713	13218	13059	12992	12160	11440	9713	9373	11165	12644	12444
24	Nuclear - Net	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116	1116
25	Coal - Net	3821	3822	3825	3826	3824	3201	3082	3081	3029	2170	1974	2467	3095	3078	3201
26	Natural Gas - Net	5585	5592	5654	5716	5851	5921	5914	5853	5804	5484	4427	3366	4262	5587	5371
27	Petroleum - Net	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28	Biofuel - Net	23.6	23.6	25.4	26.7	27.0	24.6	24.3	24.4	27.0	25.4	25.4	27.2	25.0	25.8	26
29	Cogeneration - Net	2880	2880	2871	2838	2896	2955	2923	2918	2183	2644	2171	2398	2667	2837	2730
30	**Imports**	593	593	518	489	675	777	612	612	515	462	462	511	671	724	597
31	Canada	20.8	20.8	15.8	22.0	38.9	49.3	62.3	70.8	62.7	30.2	30.2	28.9	38.6	27.0	39
32	Inland Southwest	571	571	501	466	454	491	461	476	451	430	430	480	631	695	509
33	Pacific Southwest	1.34	1.34	1.34	1.48	182	236	88.9	64.8	1.48	1.48	1.48	1.48	1.48	1.48	49
34	**Reserves & Losses**	-842	-832	-769	-716	-840	-832	-826	-777	-776	-758	-672	-807	-906	-873	-806
35	Operating Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	Balancing Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37	Transmission Losses	-842	-832	-769	-716	-840	-832	-826	-777	-776	-758	-672	-807	-906	-873	-806
38	**Total Regional Resources**	**26866**	**26527**	**26420**	**24589**	**28832**	**28560**	**28366**	**26684**	**26659**	**26019**	**23060**	**27697**	**28901**	**27858**	**27153**
39	**Total Surplus/Deficit**	**421**	**40**	**2,724**	**657**	**2,878**	**-1,038**	**-541**	**-1,308**	**782**	**1,388**	**-1,476**	**3,545**	**3,090**	**479**	**960**

Exhibit 5-3: 30-Water Year Conditions Monthly Energy – PNW Regional Surplus/ Deficit: Operating Year 2026

Regional Report Surplus Deficit By Water Year

Operating Year 2026

White Book 2025 (Energy Only) Report Date: **4/24/2025**

S268-WB-20250415-174748

	Energy-aMW - Surplus Deficit	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1	1989 Regional Report Surplus Deficit	1025	2618	2079	1392	2754	500	92.0	386	1991	4596	6076	5617	5078	1750	2403
2	1990 Regional Report Surplus Deficit	1066	715	2725	1407	3915	4503	3099	5195	3092	5247	5582	5075	8764	7415	4274
3	1991 Regional Report Surplus Deficit	5054	4858	3251	910	7404	4229	4478	7462	4754	6239	3297	5625	7505	9185	5356
4	1992 Regional Report Surplus Deficit	6114	4319	2721	620	3047	-1096	-446	346	887	1378	-1048	3749	2277	-298	1432
5	1993 Regional Report Surplus Deficit	498	170	2112	603	2394	-1864	-2415	-3415	1004	3985	-1281	6952	5642	3771	1395
6	1994 Regional Report Surplus Deficit	2677	1302	3275	545	2255	-1478	-1267	-344	1493	1111	2282	3746	2995	556	1286
7	1995 Regional Report Surplus Deficit	601	-87.4	2649	774	2287	-63.7	1159	4294	4990	2795	218	4561	8333	5801	3027
8	1996 Regional Report Surplus Deficit	4134	2069	3568	2891	9125	9729	9123	11452	10744	7609	8168	7461	9480	9519	7811
9	1997 Regional Report Surplus Deficit	5761	3763	3946	1557	3663	4602	9648	10372	10504	8310	9265	9865	11066	10010	7376
10	1998 Regional Report Surplus Deficit	7013	6642	5870	5983	6362	2654	2956	4630	4143	3199	978	8526	9168	6168	5450
11	1999 Regional Report Surplus Deficit	5828	2940	3502	901	2801	3324	7135	7915	8339	5313	5709	6622	10257	10787	5941
12	2000 Regional Report Surplus Deficit	8831	7795	3931	2006	7054	5718	4121	4533	5278	7166	6169	5978	5365	4936	5326
13	2001 Regional Report Surplus Deficit	4312	961	2778	1038	1950	-1029	-2354	-1360	-325	413	-3560	1480	1562	386	435
14	2002 Regional Report Surplus Deficit	958	-36.5	1633	-21.3	2150	-1113	-572	814	722	4058	5318	5553	9154	8249	2638
15	2003 Regional Report Surplus Deficit	2676	1435	2992	576	2648	-1156	12.3	-1160	3461	4050	2942	4017	6885	885	2063
16	2004 Regional Report Surplus Deficit	-440	-270	2138	1439	3223	163	11.3	442	1187	3209	1236	3449	5476	2125	1789
17	2005 Regional Report Surplus Deficit	281	1513	3791	2092	3654	2954	1711	1923	2050	1196	-426	3796	4902	3281	2621
18	2006 Regional Report Surplus Deficit	1418	129	2503	1251	3011	2164	5971	6498	3283	8346	5055	8333	9064	4754	4499
19	2007 Regional Report Surplus Deficit	1835	448	2444	915	3886	2820	3595	3979	6776	6637	3106	5063	6249	4073	3808
20	2008 Regional Report Surplus Deficit	1514	150	2657	1397	2839	1464	-286	966	1394	1380	-1566	6752	9954	7400	2944
21	2009 Regional Report Surplus Deficit	3664	3639	3082	1144	2535	-153	2735	468	945	5379	3166	5344	6506	1336	2658
22	2010 Regional Report Surplus Deficit	715	-265	2369	1189	3289	-624	108	-1815	-363	1281	-1508	1814	9201	5210	1714
23	2011 Regional Report Surplus Deficit	2514	1632	3232	1178	2624	2513	7337	8489	6797	10228	3437	7148	11360	11851	5930
24	2012 Regional Report Surplus Deficit	8424	5171	3610	1183	2731	1645	3891	4532	5982	8954	8253	7602	9879	10551	5581
25	2013 Regional Report Surplus Deficit	6390	5063	3256	1600	4242	5289	1384	924	2332	8275	3875	6240	7535	5166	4160
26	2014 Regional Report Surplus Deficit	2651	1160	3522	1226	2596	84.1	2663	588	6891	7415	4045	6381	7984	7262	3916
27	2015 Regional Report Surplus Deficit	3003	1307	3162	1298	4315	4592	5621	7177	8560	5436	-103	1074	1741	-1032	3416
28	2016 Regional Report Surplus Deficit	76.4	-343	2522	1110	2460	1339	1679	2084	5635	7326	5848	5752	3992	139	2756
29	2017 Regional Report Surplus Deficit	373	-31.7	2428	3210	7488	1801	4749	7944	11776	11183	7696	8847	10148	4815	6037
30	2018 Regional Report Surplus Deficit	4175	2015	2761	1528	2585	1095	6034	8666	6195	7782	5463	8600	8209	3808	4898

APPENDIX – REPORTS AVAILABLE UPON REQUEST

Please send request via email to WhtieBook@bpa.gov, and allow three to five business days for turn-around time.

A. Annual Energy (aMW) – Operating Years 2026 – 2035
B. Monthly Energy (aMW) – Operating Years 2026 – 2035

	Report #	
Report Descriptions	**Annual**	**Monthly**
Federal Report Surplus/ Deficit	1A	1B
Regional Report Surplus/ Deficit	2A	2B
Regional Total Retail Load	3A	3B
Regional Exports	4A	4B
Regional Imports	5A	5B
Regional Intra-Regional Transfer	6A	6B
BPA Sales to Preference and Legacy Customers	7A	7B
Regional Regulated Hydro	8A	8B
Regional Independent Hydro	9A	9B
Regional Small Hydro	10A	10B
Regional Non-Hydro Renewable – Wind	11A	11B
Regional Non-Hydro Renewable – Solar	12A	12B
Regional Non-Hydro Renewable – Other	13A	13B
Regional Thermal – Nuclear	14A	14B
Regional Thermal – Coal	15A	15B
Regional Thermal – Natural Gas	16A	16B
Regional Thermal – Petroleum	17A	17B
Regional Thermal – Biofuel	18A	18B
Regional Thermal – Cogeneration	19A	19B
Non-Federal CER Deliveries to BPA	20A	20B
Federal Report Surplus/ Deficit by 30 Water Year	--	21B
Regional Report Surplus/ Deficit by 30 Water Year	--	22B

BONNEVILLE POWER ADMINISTRATION
DOE/BP-5429 ▪ May 2025