



Department of Energy

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POWER SERVICES

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In reply refer to: P-6

To the parties interested in Climate Change Update to the Long-Term Hydro Generation Forecast:

BPA has decided to adopt the proposed updates to its base assumptions for long-term hydropower generation planning. Going forward, BPA will use the recent 30-year subset of streamflows (1989-2018) from the 2020 Level Modified Streamflow¹ dataset as opposed to the 90-year historical record (1929-2018). The recent 30-year subset, which captures observed and emerging climate change trends in the Columbia River Basin, is the best available data for forecasting near-term future hydro generation. This change will result in a more accurate forecast of the capability of BPA's resources to produce power under constrained conditions.

BPA will also use a monthly 10th percentile² (P10) from the generation output of hydro-regulation studies to establish firm generation, rather than the current practice of using the generation from the 1937 water year, which had the lowest winter runoff on record. The monthly P10 sets a consistent statistical threshold for firm power and captures risk in all seasons by using the full distribution of generation outcomes that result from the regulation of a wide distribution of runoff volumes and shapes under current operational assumptions.

BPA will apply both of these forecasting changes in numerous routine planning processes, including the Pacific Northwest Loads and Resources Study (White Book), BPA Needs Assessment, BPA Resource Program, and in setting wholesale power rates beginning with the 2024 Rate Period High Water Mark (RHWM) process and BP-24 Rate Case. For longer-term planning, where a study is looking out 15 or more years in the future (on a rolling basis), BPA will assess at its discretion whether the base streamflow assumptions for a given study should be informed by future climate change studies rather than relying on the recent 30-year historical record.

Background

The now-adopted updates to the long-term hydro generation forecast were discussed in a public process this spring. The process included two workshops where BPA explained the reasoning behind the changes and shared information on how each was expected to impact BPA's long-term hydro planning

¹ Modified streamflows are historical streamflows that would have been observed if current irrigation depletions existed in the past and if the effects of river regulation were removed. See <https://www.bpa.gov/energy-and-services/power/historical-streamflow-data> for more information.

² The 10th percentile is the expected value at or below which 10% of the values in a distribution might be found.

and subsequent outcomes in the rates process. As BPA explained during this process, the past method of forecasting long-term hydro generation assumed that historical streamflow data dating back to 1929 were representative of the range of future streamflows expected, with water year 1937 determining what constituted the firm power that can be produced by the federal dams in the Columbia River Basin. These assumptions are not consistent with recent and emerging climate trends and no longer align with future streamflow expectations.

BPA analysis shows that over the last several decades increasing temperatures throughout the Columbia River Basin (inclusive of Canada) have contributed to increased average winter and early spring flows, with average peak spring runoff now appearing several days earlier, along with decreased summer flows. The best available climate change science, including the River Management Joint Operating Committee climate change study (RMJOC-II), indicates that in the coming decades these trends will likely continue. Temperatures in the Columbia River Basin are expected to continue to increase. The region is also expected to experience wetter winters, longer summer dry periods, declining snowpack, higher average fall and winter flows, earlier peak spring runoff and longer periods of low summer flows.

Last year, BPA completed extensive analysis comparing the recent 30 years of historical streamflows to data in four RMJOC-II future streamflow scenarios.³ BPA found that the recent 30-year data shows consistency with the climate change signals experienced in the region and largely follows the projected trends for future streamflows from RMJOC-II. Based on this analysis and best available science, BPA concluded that the 90-year historical record includes runoff patterns that have a diminishing probability of reoccurrence in the future as the climate continues to warm, and therefore the full 90-year historical record does not provide the most reasonable or best available information for planning. BPA determined that the recent 30-year data provides a more accurate projection of near-term future generation.

BPA further found that using generation from fiscal year 1937, with its low winter and high summer flows, was inconsistent with emerging climate change signals and future projections, and thus increasingly unlikely to reoccur.⁴ Basing firm capability on a single year, like 1937 or 2001⁵, leads to arbitrarily defining firm capability based on the anomalies associated with one particular water year and the conditions that surrounded that specific year, which have a very low probability of reoccurring. Low generation conditions in a given month arise fairly frequently because water years are diverse and water is regulated to serve a variety of priorities. Single water years do not reflect the diversity of possible streamflow conditions that lead to low generation, and therefore also do not accurately reflect the integrated planning that occurs to serve BPA's load obligations in low water conditions. BPA determined that using a monthly P10 based on the recent 30-year period better captures these elements and therefore is a more reasonable basis for assessing firm capability of the system. The P10 metric also

³ These four RMJOC-II scenarios were used in the Columbia River System Operations Environmental Impact Statement (CRSO EIS) and represent an appropriate range for total, bulk generation across the system.

⁴ BPA conservatively estimates there is roughly only a 1/270 (0.37%) probability of such low winter flows to reoccur going forward, with the probability further declining over time.

⁵ BPA assessed the 2001 water year as well, which was the lowest water year in the 30-year streamflow set. While runoff patterns in that year were more consistent with emerging climate change signals, BPA found it was still arbitrary to base firm capability on a single year.

provides consistency across BPA's planning processes, providing alignment with BPA's Resource Program, which has used a P10 metric since 2008 to represent BPA's firm inventory position.

The Tiered Rate Methodology (TRM) gives BPA the discretion to make this update in the determination of the critical period for rate setting. See TRM sections 3.1.3.1 and 3.1.3.2. While the reason for making this update is to ensure that BPA is using the best available information in its planning for resource output and meeting load obligations, BPA did consider how this change would affect its firm power customers. BPA analysis found that this update resulted in an increase of 218 average megawatts to BPA's Tier 1 system firm critical output (T1SFCO), which is within the range of fluctuations that have occurred to the T1SFCO from rate period to rate period over the course of the Regional Dialogue contracts. BPA's analysis of the customer impacts associated with this increase in T1SFCO showed minor net impacts to rates in fiscal years 2024 to 2025, translating to a Tier 1 rate decrease of 0.8%.

Additional supporting documentation on both the climate and streamflow analysis and customer impacts are available in the workshop materials on BPA's climate change webpage:

www.bpa.gov/energy-and-services/power/climate-change-fcrps.

Stakeholder feedback

BPA received comments from customers, stakeholders and trade associations. We heard support from many customers for implementing the proposed change without further delay. Slice customers asked BPA to not make the change at this time and/or provide additional time to discuss this change through the RHWM process.

Specifically, Slice customers asked BPA to look at different methods of establishing the firm generation besides the P10, such as a P6.5 or synthetically shaping 1937 annual output to the recent 30-year monthly streamflows. During the public process, these customers asked for additional analysis to understand the impacts to rates and firm power purchase amounts. BPA understands that some Slice customers are concerned that this update in streamflow assumptions will result in an increase to the amount of their forecast critical Slice and a corresponding decrease to their block purchase amounts. BPA further understands that some Slice customers raised concern that this change could introduce novel challenges to meeting BPA's Requirements Slice Output (RSO) test.

BPA response

BPA appreciates the engagement and feedback from stakeholders. At the request of customers, we extended the public process and conducted additional analysis requested by customers that was provided during a second workshop. For reasons explained below, BPA will not extend the public process into the RHWM process or further consider additional methods for measuring firm capability of the system (such as a P6.5).

This change does not represent a significant departure in the T1SFCO; it is within the range of fluctuations that have occurred from rate period to rate period over the course of the Regional Dialogue contracts. By design, customers who purchase the Slice product also assume the risk of changes in hydro generation. These changes come in a variety of forms, including operational changes, outages, and

climate variability. The adopted update to the hydro generation forecast enables BPA to use the best available data on expected current climate conditions and near-term future impacts of climate change in the region, providing the most accurate prediction of the output and capabilities of the federal hydro system. This adopted update also enables a more accurate forecast of the critical Slice output for customers purchasing BPA's Slice product, better matching the forecast amount with actual Slice purchase amounts that are based on actual runoff shape and volume. BPA appreciates the seriousness with which its customers seek to meet the RSO test obligation. This update does change one of the three elements in BPA's RSO test; the impact this will have on RSO test passage is not yet clear. BPA will not preemptively update the RSO test or its deeming guidance in advance of understanding RSO performance and circumstances contributing to future RSO test failures. Consistent with BPA's deeming guidance, BPA will work constructively with impacted customers to understand unique circumstances, should RSO failures manifest.

Conclusion

BPA is adopting the approach proposed in the public process. Specifically:

- 1) For routine planning, the base streamflow assumptions for the long-term hydro generation forecast will include only the recent 30 years from the 2020 Level Modified Streamflow (1989 to 2018).
- 2) For longer-term planning (15 or more years into the future, on a rolling basis), BPA will assess at its discretion whether the base streamflow assumptions for a given study should be based on future climate change studies (such as RMJOC-II).
- 3) BPA will calculate annual firm energy from the monthly 10th percentiles (P10) of generation from the period of record (currently 1989-2018).

BPA will apply these changes to routine planning in forecasting its loads and resources in numerous processes including the White Book, Needs Assessment, Resource Plan, and in setting wholesale power rates beginning with the 2024 RHWM process and BP-24 Rate Case.

This update provides a better indicator of the range of future hydro generation from the Federal system, allowing BPA to plan accordingly in its Resource Program and rate cases. BPA appreciates the engagement and feedback of customers and other stakeholders in discussing this important update that better aligns BPA's planning assumptions with emerging climate change signals.

Thank you,

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