Assessment of January 2024 Cold Weather Event

As the Program Administrator of the first regional resource adequacy (RA) program in the Western Interconnect, and as a partner to its members in managing critically important reliability programs, the Western Power Pool (WPP) has a vested interest in ensuring safe and reliable grid operations.

The conditions experienced January 12 through January 16, 2024, highlighted a tipping point and demonstrated how close the region is to a resource adequacy crisis.

This analysis of the January 2024 cold weather event provides a high-level overview of the actions taken by the RC West Reliability Coordinator and the support provided to the Northwest by the Desert Southwest and Rocky Mountain states during the extreme temperature and load conditions. **The amount of inter-regional support necessary to manage Balancing Authority (BA) operations through the cold weather event is indicative of the pressing need to address RA and potential capacity shortfalls as soon as practicable, highlighting the value of an RA program with a broad geographic footprint and diversity of load and resources**.

A significant amount of progress has been made on the Western Resource Adequacy Program (WRAP) since the region's call to action in 2019, and work carries on in earnest.

Since WPP received FERC approval of its WRAP tariff in February 2023, it has been working to ensure broad participation in a binding program that incentivizes resource adequacy planning and operations. The WRAP will help ensure participating load responsible entities (LREs) have sufficient capacity to meet a reliability metric set based on regional analytical modeling results, allowing the LRE and its customers to access load and resource diversity benefits and potential investment cost savings, especially during an event such as this one.

This cold weather event analysis will focus on the Northwest, defined as British Columbia, Washington, Oregon, Idaho, and Western Montana, and uses publicly available data.

Northwest BAs communicated widely that they were experiencing sustained temperatures at or near record lows for the five-day period from January 12 to January 16, 2024, contributing significantly to high loads.

Overview of RC West Reliability Coordinator Actions

During the period beginning the morning of January 13 and ending the evening of January 15, 2024, the RC West Reliability Coordinator placed four entities in either an Energy Emergency Alert Watch (EEA Watch), an EEA 1 (all resources in use or committed, energy deficiencies

expected) or an EEA 3 (BA is at risk of not meeting firm load and maintaining contingency reserves and is preparing for potential rotating power outages).

The Role of Imports from the Desert Southwest and the Rockies

As part of a BA's EIA-930 reporting requirements, it must provide data on the interchange (specifically, the sum of the net metered tie line flow) between its BA and any other directly interconnected BAs. This interchange data enables us to identify net importing or net exporting BAs in the Northwest during the five days from January 12 – January 16, 2024. We can also use the data to identify the source of the exports coming into a net-importing region.

When the hourly interchange for the 15 BAs in the Northwest region is summed together, and interchange between entities in the region is excluded (neither an import into or export out of the region), and then the hourly values are averaged, it is revealed that the **Northwest was a net importer of an average of 4,900 MW per hour** during the five days from January 12 – January 16, 2024**.**

This analysis will attempt to attribute the 4,900 MW of support to the Northwest region to BAs in the Eastern/Rockies AC System, the Desert Southwest and California, again underscoring the value of a region-wide RA program that leverages diversity in geography and load.

To determine the support provided by the Eastern portion of the WECC footprint, we summed and averaged the interchange between Northwest BAs and Nevada Power Company, PacifiCorp East and Western Area Power Administration, Upper Great Plains West. Using EIA 930 data, **2,067 MW of imports into the Northwest originated from the Eastern/Rockies AC System.** Of note, 155 MW were transferred from the Eastern Interconnect to the Western Interconnect from the Southwest Power Pool BA.

Summing the CAISO and non-CAISO BAs interchange (and excluding interchange internal to those California BAs) results in an average interchange of -691 MW. This indicates that on average the CAISO and other California BAs were net importers. Since CAISO was exporting 2,833 MW to the Northwest Region but itself was a net importer, CAISO necessarily imported a greater number of MW from elsewhere, in this case the Desert Southwest. Note that there were also exports from California to Mexico.

The same interchange data shows the Desert Southwest/Rockies BAs were net exporters of approximately 5,334 MW on average. **Those exports from the Desert Southwest/Rockies region supported CAISO and other California BAs as well as 2,833 MW of imports to the Northwest on the Pacific AC Intertie.**

These data are represented in Figure 1, showing the average net imports into the Northwest during the cold weather event of January 12 through January 16, 2024.

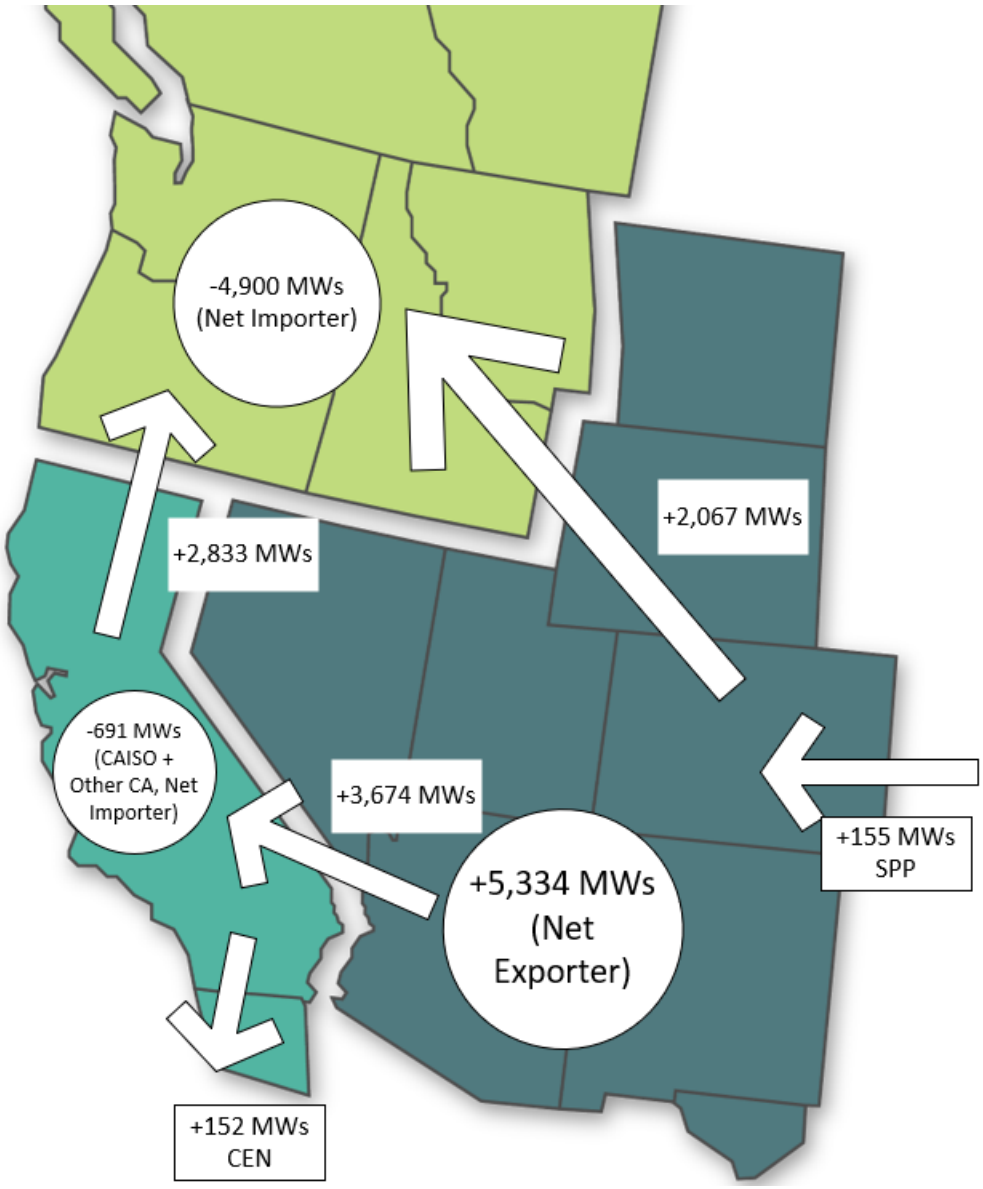

Figure 1 - Average net regional imports into the Northwest during January 12 through January 16, 2024.

As part of this analysis, it should be noted:

1. The EIA data was used as-is without an attempt to correct internal inconsistencies that were identified as part of the analysis. EIA states, "We publish hourly operating data from individual BAs exactly as we received the data. Hourly U.S. and regional aggregations and all daily data aggregations incorporate procedures for handling anomalous values of some data elements. We advise caution when using these data." For this analysis the "FROM_BA" data was utilized. In some cases, it did not exactly match the corresponding "TO_BA" information.

2. The assumed 2,067 MW import from the Eastern AC system could include transfers from PacifiCorp East to PacifiCorp West.
3. It should not be assumed that all 4,900 MW of imports into the Northwest region were day-ahead or real-time transactions.

Overview of Regional Temperatures

WPP used the National Weather Service's Automated Surface Observing System (ASOS) data to visually represent historical temperatures for a set of representative Northwest cities. The minimum temperatures during the peak hours (HE7-HE22, or 6am to 10pm) of each winter season (December-March) for the 20-year period beginning in 2004 and ending in 2024 were plotted to identify the minimum, maximum, median and quartiles, as shown in Figure 2. The lowest temperature during the peak hours on each day in the five-day period in 2024 (January 12–January 16) was overlaid in red on the box and whisker plot below. It is clear from the data that many Northwest cities were experiencing near-record or record-low temperatures, contributing significantly to high loads.

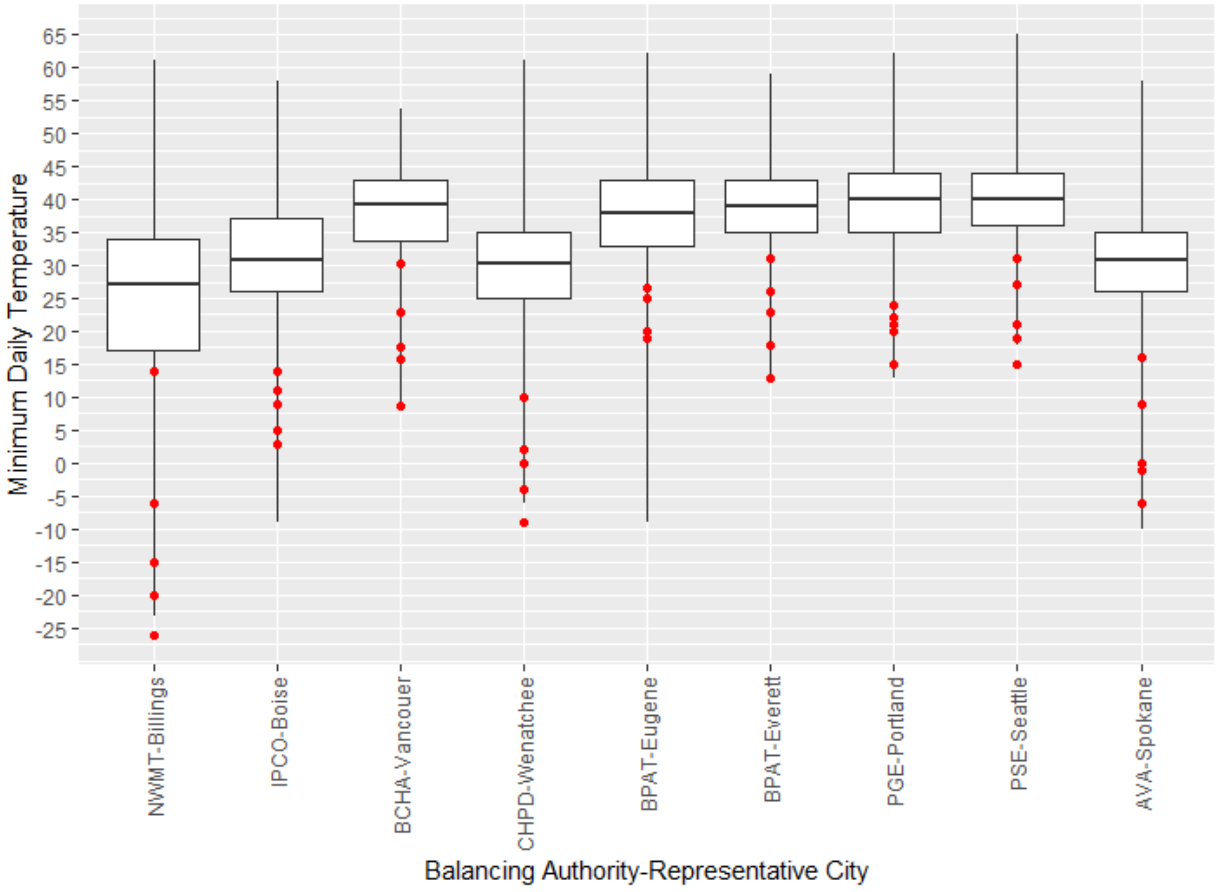

Figure 2 - Comparison of the lowest temperatures in Northwest cities during the peak hours of each day during January 12-16, 2024 (red dots) to the range of lowest temperatures during those hours during winter over the last 20 years (vertical lines indicate minimum/maximum range, box indicates the two quartiles [about half the data] around the bold horizontal median line) (source: htttps//www.weather.gov./asos)

Overview of Balancing Authority Loads

Each BA submits hourly operating data, including demand, as part of its Form EIA-930 obligations. Collection of BA demand data did not begin until July 2015, so it cannot be used to indicate whether a BA has achieved an all-time peak. The demand data can, however, be used to understand how loads compare to the recent historical record. The horizontal line at 1.0 on Figure 3 represents the peak load during the high-load hours (HE7 – HE22) of the winter season (December-March) for the 9-year period beginning July 1, 2015, and ending January 11, 2024, for 12 BAs. The historical data are overlaid with the observed load over the peak hours of each day from January 12 through January 16, 2024. Many BAs had loads that exceeded their previous 9-year peak. In many other instances, BAs had extended periods where loads were greater than 90% of the 9-year peak. Note that the Canadian BA BC Hydro is not included as it does not have an EIA-930 requirement, but it has publicly acknowledged reaching a record high

peak of 11,300 MW on the BC Hydro system (which includes most load in the BC Hydro BAA) on Friday January 12, 2024.[1]

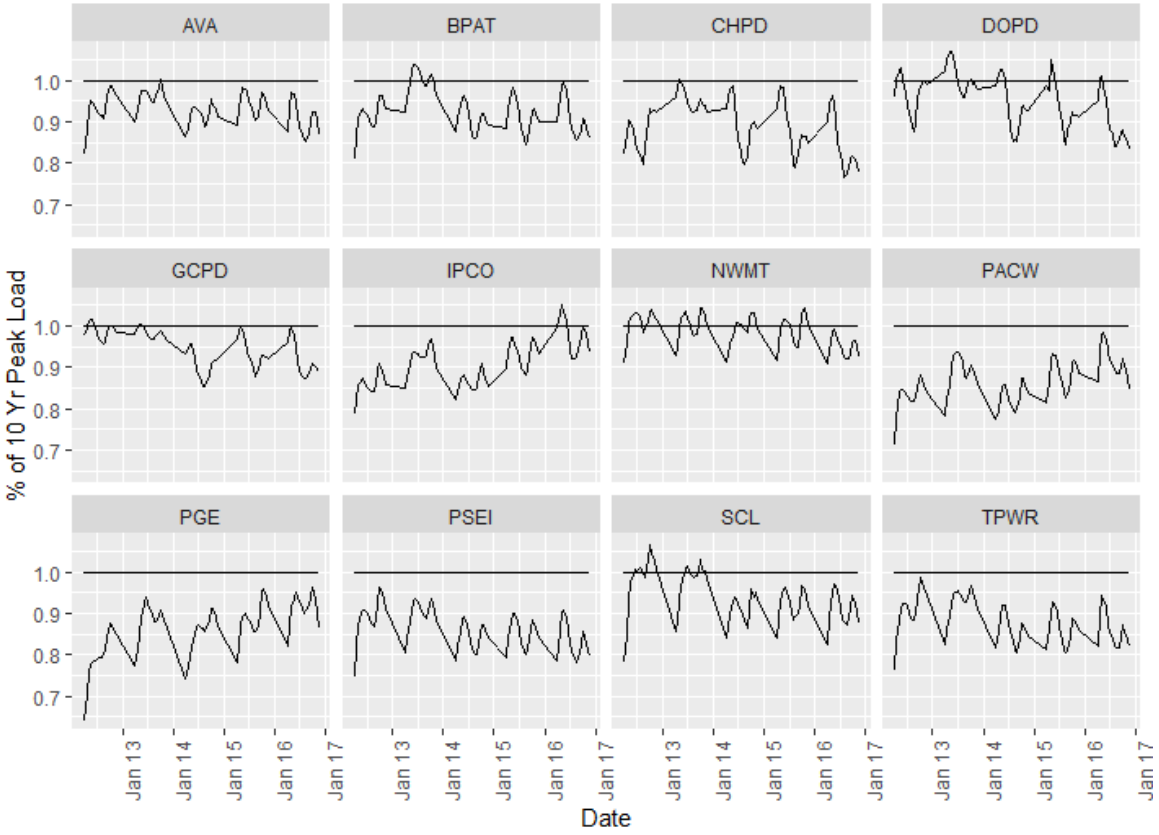

Figure 3 - The observed load for 12 BAs during January 12 – 16, 2024 (trend lines) relative to their peak loads (horizontal line at 1.0) during the winter for the last 10 years (Source: U.S. Energy Information Administration (EIA) - Real-time Operating Grid [select download data -> Balancing Authority/Region Files])

Conclusion

There is no better indicator of the importance of and need for a program like the WRAP than the cold weather event the Northwest recently experienced. Temperatures and loads were at or near historic peaks, BAs were managing through energy emergencies in real time and there was a significant amount of support required from BAs outside of the Northwest Region, particularly from the Desert Southwest and Rockies regions.

All these factors point to the need to act quickly to address potential capacity challenges in the Northwest and realize the benefits afforded by full, binding implementation of a nearly WECC-wide resource adequacy program like WPP's WRAP.

[1] https://www.bchydro.com/news/press_centre/news_releases/2024/record-breaking-electricity-demand-helps-neighbours.html