



MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

Rely on us.

TO: Commissioners Carlson, Barofsky, McRae, Schlossberg, and Brown
FROM: Megan Capper, Energy Resources Manager; Jonathan Hart, Power Trader; Marciana Rosales, Energy Resource Analyst
DATE: April 4, 2023
SUBJECT: 2023 Power Market, Budget Hedging, and Generation Update
OBJECTIVE: Information Only

Issue

The purpose of this backgrounder is to provide an annual update of wholesale power markets and a generation resource outlook.

Background

The Energy Division, which is comprised of the Power Planning and Trading Operations Departments, manages EWEB's power supply and wholesale market activities consistent with utility financial objectives in accordance with Board Strategic Direction Policy SD8, and as further described in the Power Risk Management Procedures (Procedures) maintained by the Power Risk Management Committee (RMC). The Generation Department manages EWEB's owned generation assets.

Summary

Due to increases in the cost of natural gas and changes to the makeup of the regional resource mix, spot market electricity prices are both lifting and becoming more volatile, relative to recent market experience. Accordingly, the 2022 spot market average price finished at the highest level since the early 2000s. The aforementioned changes to spot market drivers are also lifting forward electric market prices and, given the current natural gas price outlook, Staff anticipates this change in market dynamics may persist for at least the next couple of years, which has an impact on EWEB's financial outlook as it effects both wholesale revenue and purchased power costs. Market shifts, as well as the region's ongoing work to develop a Resource Adequacy (RA) program are informing a new effort to modernize EWEB's approach to portfolio balancing.

Following a relatively wet and cold first quarter, current 2023 river flow forecasts for EWEB generation are trending around average for this spring and summer on the McKenzie below Trail Bridge and at Vida. Resolution 2302 was approved at the January 2023 Board meeting, providing a Record of Decision to decommission the Leaburg Hydroelectric Project. Staff are now working to develop a decommissioning plan for Leaburg, which will include a plan to evaluate, likely in the late 2020s, whether to relicense or decommission Walterville after its license expires. Walterville continues to operate reliably, though the project will be evaluated for seismic stability in 2023. Stone Creek Hydroelectric and Harvest Wind Projects continue to operate normally and are expected to do so throughout 2023.

This update for markets and generation is reflected in our current financial projections.

Discussion

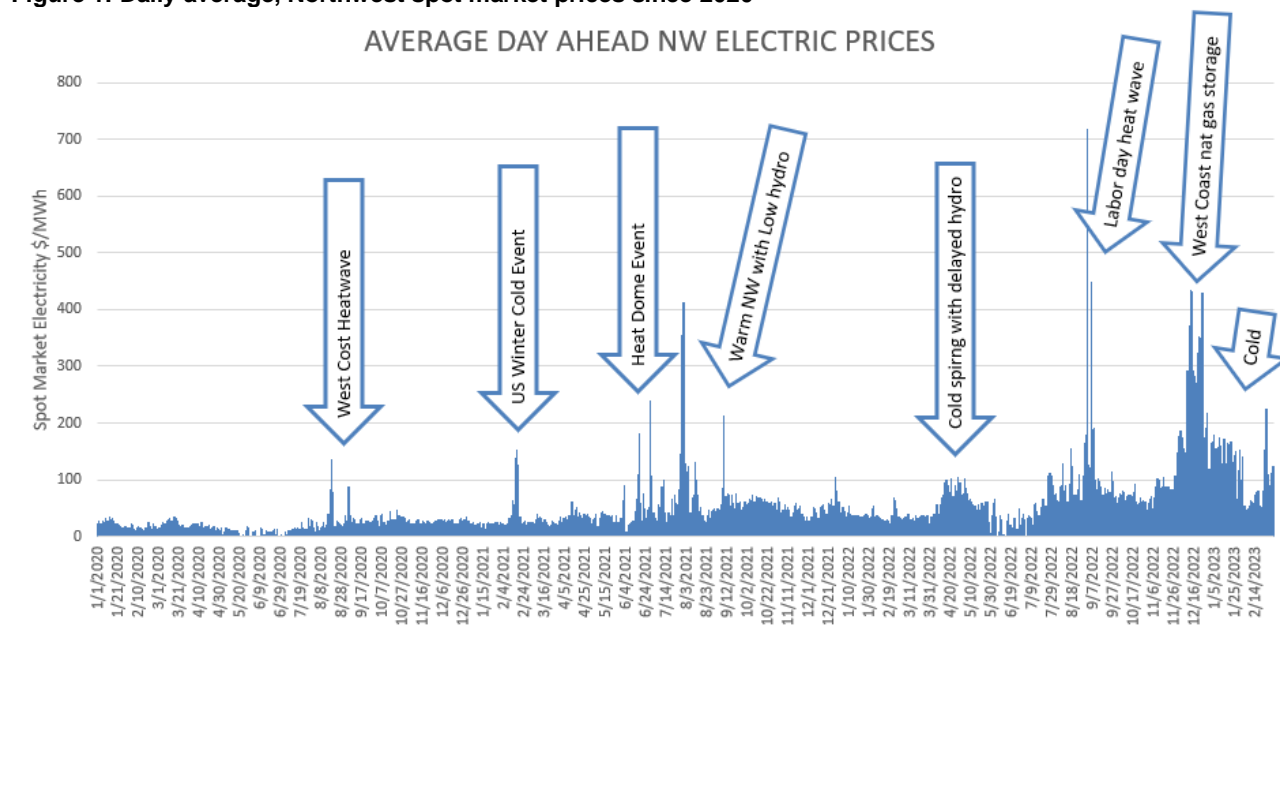
Market Price Update

Wholesale energy markets can generally be described as either near-term “spot markets” or longer term “forward markets”¹. Spot market prices are impacted by weather (e.g., temperature and precipitation), fuel costs, and operational phenomena (e.g., generation and transmission availability), while forward markets tend to reflect longer term market expectations of energy supply and consumer demand. Both forward and spot markets can influence the cost of balancing EWEB’s energy portfolio in annual, monthly, daily, and hourly time frames.

Spot Markets

In recent years, the WECC² region, including the Pacific Northwest (Northwest), have seen continued generation additions from renewable resources like wind and solar, and incremental retirements of conventional, thermal resources like coal and nuclear. This shift in the composition of regional generation has increased the abundance of low and zero cost marginal energy while, at the same time reducing the amount of controllable capacity resources available to meet demand during high load periods³. This has resulted in recent spot markets that can be characterized as periods of generally low/stable prices, interspersed with short, intense periods of extremely high and volatile pricing. Because the Northwest is interconnected with other parts of the WECC Region (e.g., California) and experiencing similar changes in regional supply mix⁴, it is exhibiting similar trends in local spot market and forward market pricing.

Figure 1: Daily average, Northwest spot market prices since 2020



1 Spot markets typically refer to markets where commodities are traded for immediate (next day, next hour) delivery, whereas forward markets imply markets where the traded commodity is delivered in a future period.

2 Western Electricity Coordinating Council.

3 Market penetration of capacity only resources (ie batteries) is growing, but still limited. As such, the current fleet of renewable resources can only replace a portion of the effective capacity of now retired thermal resources.

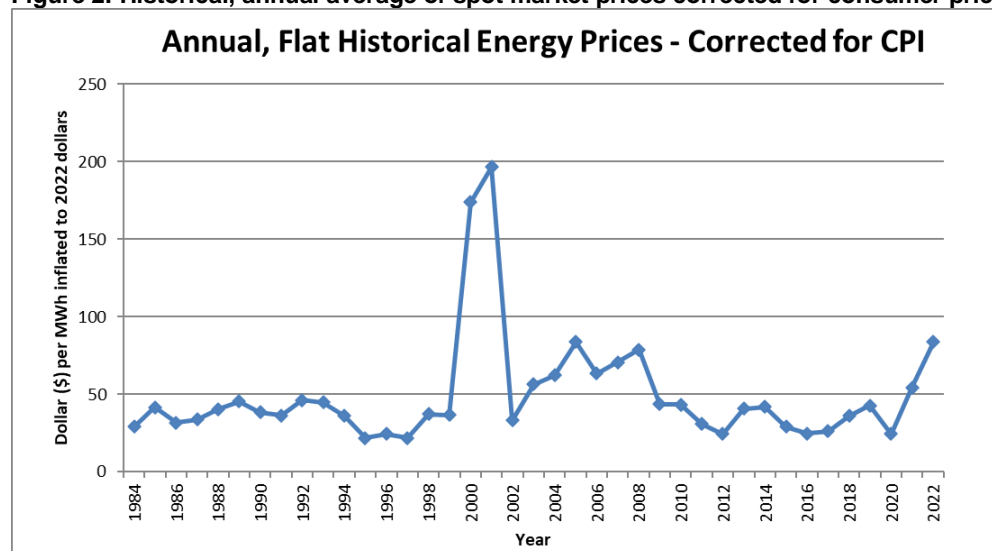
4 <https://www.nwccouncil.org/energy/energy-topics/power-supply>

In 2020, a historic West Coast heatwave occurred in August, which resulted in rolling blackouts in California for the first time since the 2001 West Coast energy crisis. The event occurred over several days during which Northwest day-ahead prices peaked at \$136/MWh. Aside from this event, spot market prices in 2020 were relatively stable. The 2020 average, annual spot market price finished near historical lows at approximately \$21/MWh, substantially below the 2019 settled average of \$37/MWh.

2021 experienced a variety of load and resource changes, which resulted in general increases to both the average price and price volatility. In February, prices surged during a nation-wide cold weather event, which drove up demand for energy while limiting the supply of natural gas. This resulted in a week-long high price event, causing electricity markets to jump from approximately \$25/MWh to over \$150/MWh. After February, a prolonged period of drought diminished the supply of hydroelectric generation (hydro) available to serve both the Northwest and California for the anticipated summer period. In June, the Northwest experienced an unprecedented heat dome event, where high loads and limited hydro resulted in average day ahead prices that peaked at \$239/MWh. Similar drivers led to a July price spike near \$412/MWh, though lifting natural gas prices were also an influencing factor. After July, the West Coast experienced relatively mild weather for the remainder of the year, though electricity prices remained elevated, primarily due to increases in natural gas commodity pricing. The 2021 average, annual spot price finished near \$49/MWh, which at the time was the highest settled price since 2008.

2022 prices reflected both increases in daily price volatility and overall price levels. During this time we saw longer duration price events that cycled over weeks instead of days. These results demonstrate how markets in the West are evolving, given changes in load/resource balance and natural gas supply fundamentals. Beginning in March, cold temperatures across the region increased overall demand. The Northwest demand profile looked more like what would be expected in January or February rather than mid-way through April – this is a consequence of a colder, wetter spring. With temperatures well-below normal, the Northwest trading hub was trading over California hubs due to both hydro systems and natural gas systems inability to keep up with the unusual demand at that time of year. This was partially related to multiple gas generators in the Northwest Pipeline going offline, spill season being in full effect, and a chillier region. In late summer, the Northwest experienced heat spikes, increased load, and dwindling hydro. Since the heat dome that occurred a couple of years ago, there is increased speculation that air conditioner installations are pushing load averages higher than expected in summer months, but this has yet to be confirmed. On the last day of August, in the midst of a heatwave and corresponding increased load and demand, prices shot up to \$950/MWh ahead of the Labor Day weekend while Mid-Columbia (Mid-C) heavy load trading saw \$1000/MWh prices. During the winter, the Northwest experienced well-below normal temperatures throughout the region, which, accompanied with a lack of precipitation, allowed prices to increase from \$2.50/MWh up to \$80/MWh in November. Sustained heating demand and prolonged cold and dry weather resulted in elevated power and natural gas prices. The 2022 average settled price was \$82, which was the highest average price since 2004.

Figure 2: Historical, annual average of spot market prices corrected for consumer price index (CPI) inflation



Forward Markets

Forward market prices for 2023 are currently trading above 2022 spot market prices at close to \$97/MWh for the year. The shift appears to be driven by a variety of factors including the higher cost of natural gas fuel supplies for generators (particularly in the Northwest), changing regulatory policy, the shift in regional load resource balance, and general uncertainty surrounding physical resource adequacy.

During 2022, natural gas commodity price forecasts at Henry Hub⁵ ranged between \$3 and \$10/mmBTU. Price volatility can be attributed to many factors, including changes in supply from natural gas production investment⁶, changes in demand due to fuel switching from coal⁷, and increased levels of global LNG exports⁸. LNG exports are effectively connecting US natural gas markets to the rest of the world, including Europe, where demand for natural gas is high, given the needs of their energy system and the impacts of a protracted war between Russia and the Ukraine. It's too early to know the long-term impact of this crisis, but its impact resonates within US energy markets. On Dec 21st, 2022, West Coast gas prices peaked around \$50/mmBTU during a period of peak gas/electric demand where there was coincident storage and supply limitations⁹. As of January 18th, the U.S. Energy Information Administration (EIA) forecasted that natural gas commodity prices will stay relatively flat through 2024¹⁰, though at levels that are higher than the period prior to the 2022 price run up.

At the start of 2023, the Washington State Department of Ecology (DOE) implemented the Washington Climate Commitment Act (CCA), which seeks to cap and reduce greenhouse gas (GHG) emissions from their largest emitting sources and industries. This policy has a direct impact on Northwest energy markets, as the region's most traded energy point, the Mid-C hub, is located in the State of Washington. GHG emitters and parties that import resources with embedded carbon

5 Henry hub (located in Louisiana) is the physical delivery point for natural gas traded on the NYMEX and ICE. As such, it generally serves as the primary benchmark reference for US natural gas commodity prices.

6 <https://www.eia.gov/todayinenergy/detail.php?id=53859>

7 <https://www.eia.gov/todayinenergy/detail.php?id=55319>

8 <https://www.eia.gov/todayinenergy/detail.php?id=55025>

9 <https://www.eia.gov/todayinenergy/detail.php?id=55279>

10 <https://www.eia.gov/todayinenergy/detail.php?id=55219>

attributes, will be required to procure emission allowances that are priced through an auction process. The first such auction¹¹ occurred on Feb 28th where 6.18 million allowances were sold for a settled price of \$48.50 per metric ton of allowable carbon. Because Northwest power trading can carry carbon liability, the cost of compliance is now likely embedded in power market prices, though the total dollar impact has yet to be determined.

In 2020, renewable resources became the second most abundant source of electric generation in the United States¹², surpassing sources of controllable thermal energy like coal and nuclear. Further for 2023 and 2024, the largest forecasted increase in resource capacity is expected to come from renewable resources¹³ and batteries¹⁴. Variable, must-run energy resources like wind and solar typically lack the capability to shape or store energy. In regions with high levels of renewable penetration, market prices can experience drastic swings with changes in the level of renewable energy production. Batteries can help with short-term, in-day volatility, but the technology has not progressed to the point of addressing multi-day load and resource balance concerns.

When it comes to load and resource risk, as well as physical RA balancing concerns, forward markets are consistently reacting to near-term shifts in weather-driven load events, and concerns about the risk of underperformance in Northwest hydro generation. The combination of these factors prompts concerns about general market scarcity risks, which adds a layer of uncertainty into the market. This uncertainty can influence forward prices as bilateral market participants may be pricing in a risk premium to address increasing levels of potential physical scarcity risk.

Forward markets do not directly account for emergent policy issues like the development of new, complementary markets such as energy RA capacity markets, which are expected to trade outside of traditional energy markets. Any interaction that occurs between existing and emergent markets will largely be a function of implementation. As such, EWEB Staff will continue to take a proactive advocacy role in all relevant regional market's conversations.

Figure 3 below shows both forward market price curves and spot market prices over time. A forward curve reflects prices for future periods of delivery, which can be traded today. The first blue line on the left reflects a forward curve taken at the end of 2007 and subsequent lines reflect changing forward price curves for the years that followed. For the period of 2008 - 2020, forward market price curves experienced a period of consistent declining value. However, since 2021, changes in natural gas price forwards as well as changes in regional policy have caused electric market price curves to jump drastically, and now reflect some of the highest pricing seen since the 2001 West Coast energy crisis. The March 2, 2023, curve reflects this elevated pricing but with a slope that is declining as it moves to the right. This shift mirrors current expectations that near-term load/resource stress will trend down after 2023, which should in turn reduce electric energy prices that are still elevated compared to recent history.

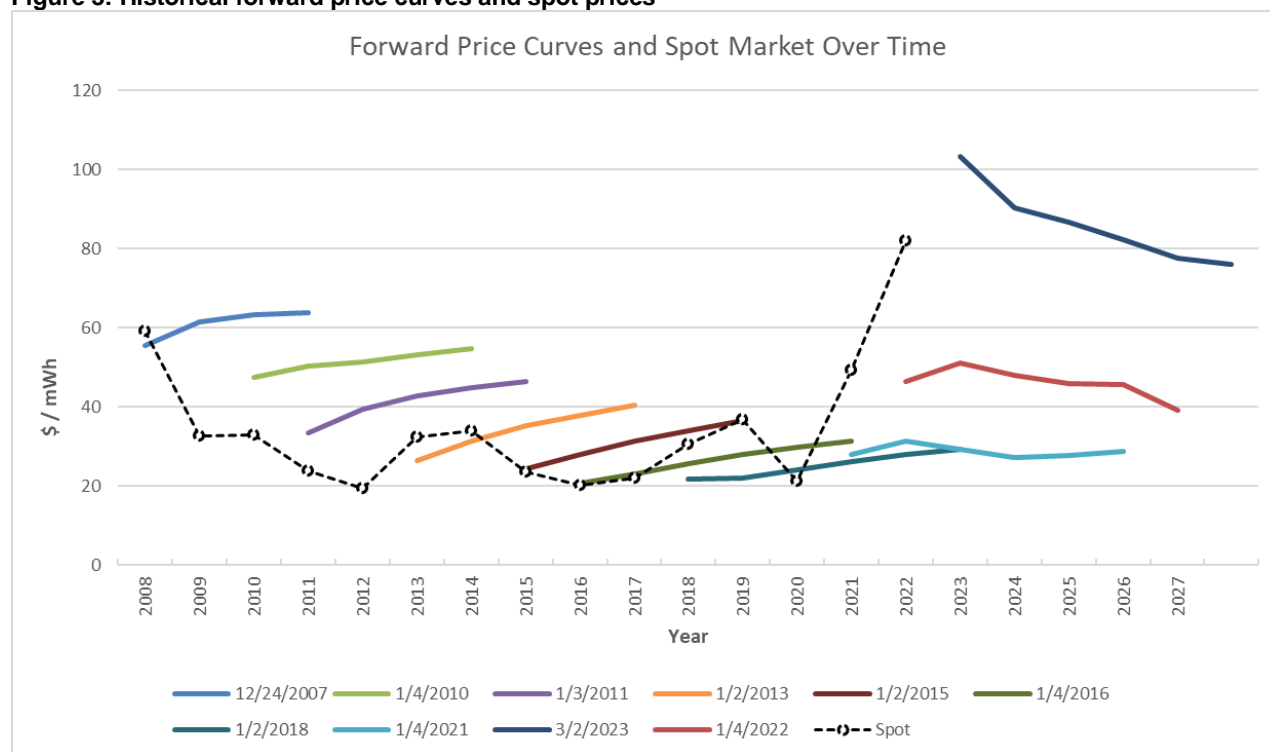
11 https://ecology.wa.gov/About-us/Who-we-are/News/2023/March-7-Successful-first-auction-turning-point?utm_medium=email&utm_source=govdelivery

12 <https://www.eia.gov/todayinenergy/detail.php?id=50622>

13 <https://www.eia.gov/todayinenergy/detail.php?id=55239>

14 <https://www.eia.gov/todayinenergy/detail.php?id=54939>

Figure 3: Historical forward price curves and spot prices



Resource Adequacy

EWEB continues to actively participate in the Western Power Pool’s (WPP) RA effort. On February 10th the WPP announced that the Federal Energy Regulatory Commission (FERC) approved the tariff for the Western Resource Adequacy Program (WRAP), which means that the WPP can complete the implementation of the program. As such, the program now moves from a “non-binding” portion of the implementation to a “binding” paradigm where the tariff dictates how the program operates. This is an exciting step forward as it shows regional progress and commitment towards addressing future resource adequacy concerns. Further, the WRAP program is seen as a major step towards the development of a future organized market structure where physical resources are economically dispatched by a central market operator.

To date, 18 utilities including EWEB have signed on to participate in the next phase of the WRAP program. EWEB sees several benefits to program participation. Externally, we want to provide continued support for the development of new resource adequacy standards and want to be able to advocate for business practices that reflect the capabilities of EWEB’s resources and transmission rights. Internally, we want to gain insights for how well EWEB’s portfolio aligns with these new standards. Those learnings will inform operational changes as well as assumptions included in our ongoing IRP modeling.

As a participant, EWEB has elected to not be “bound by the tariff¹⁵” until after the start of the next BPA contract in 2028. Because the majority of EWEB’s resources come from BPA, it’s integral that future BPA products align with WRAP, or its successor, before EWEB fully commits to the program. BPA will likely also be a participant. Should EWEB determine that the WRAP program is not a good fit, withdrawal is allowed with two years notice.

¹⁵ Subject to the full requirements of the tariff including operational requirement and penalty structures for non-performance.

Surplus Position Hedging Update

In accordance with EWEB's Risk Management Procedures, Staff hedges¹⁶ a portion of its surplus position¹⁷ up to five years in advance. In years past, this has provided two benefits: 1) it has reduced financial exposure related to market prices; and, 2) it has resulted in sales executed at various times which diversifies the sales price by "dollar cost averaging" through time. This strategy resulted in near-term years being fully hedged while year five is the least hedged, with interim years somewhere in between. EWEB does not hedge any surplus energy beyond five years.

An effort is underway to modernize EWEB's approach to budget hedging and portfolio balancing activities. This effort recognizes that EWEB's portfolio needs are changing and that current market dynamics may require adjustment to existing hedging goals, requirements, strategies and metrics. Until this effort has completed, budget hedging activities will primarily be focused on years 2024 and 2025, though RMC will continue to monitor for emergent needs in all five years. Staff expect most of the length of 2024 to be hedged in the next couple months. After that, the focus will shift to 2025.

Figures 4 and 5 below show EWEB's surplus market peak and off-peak positions for 2024 and 2025 based on a budget hydro assumption of 90% of expected hydro generation. For each chart, the top of each stacked column indicates EWEB's original surplus market position (i.e., the amount of forecasted generation EWEB expects to realize in excess of that which is forecasted as being necessary for reliable load service). The white and red/blue column segments represent the volume of energy risk already hedged by Staff. The solid red/blue column segments represent the remaining unhedged surplus. The black and red/blue column segments reflect energy that is reserved by the RMC for strategic management of seasonal risk. The gray area behind the stacked columns reflects EWEB's expected surplus, without the conservative hydro assumption.

16 A hedge is a trade, or set of trades, that reduces the market price exposure risk inherent in EWEB's portfolio length. EWEB hedges to provide greater wholesale revenue certainty.

17 Surplus position is an amount of energy that staff forecasts will not be needed to serve EWEB's customers and is therefore exposed to changes in market price. For 2024-2025 there is about 50 aMWs of surplus compared to EWEB's load of about 272 aMWs

Figure 4: Peak Budget Hedging Progress

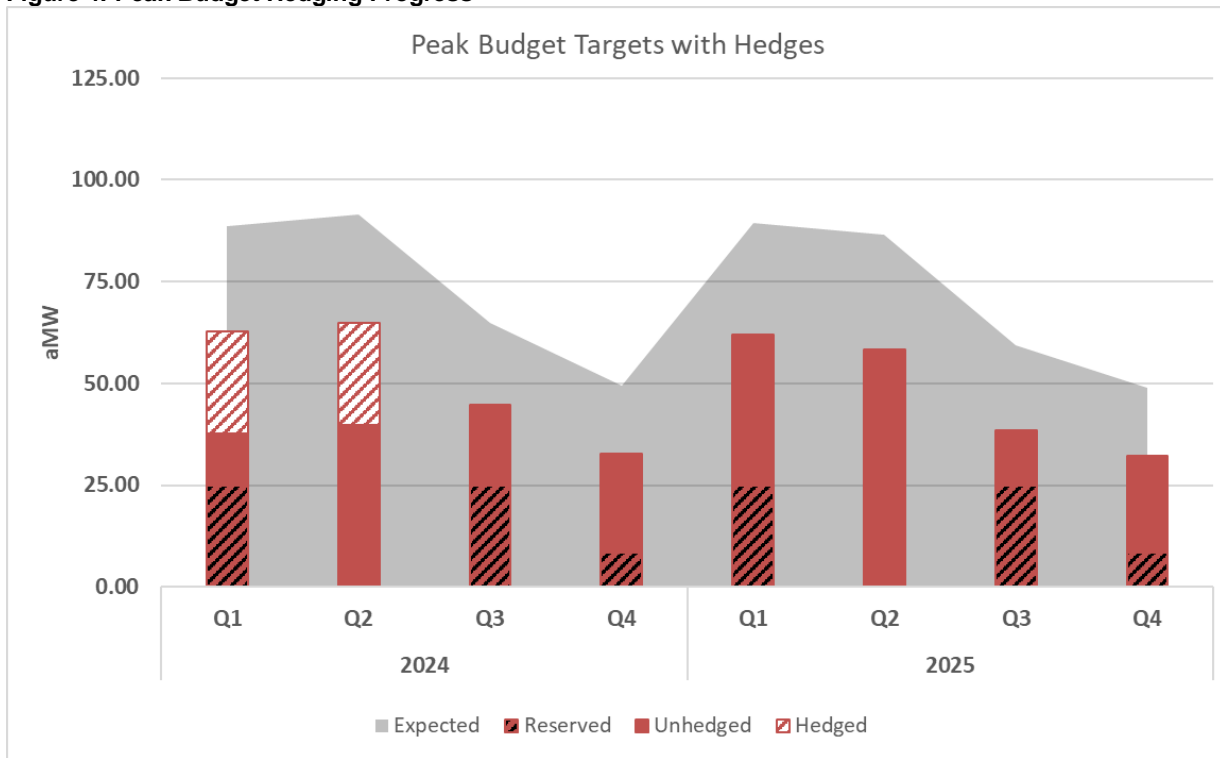
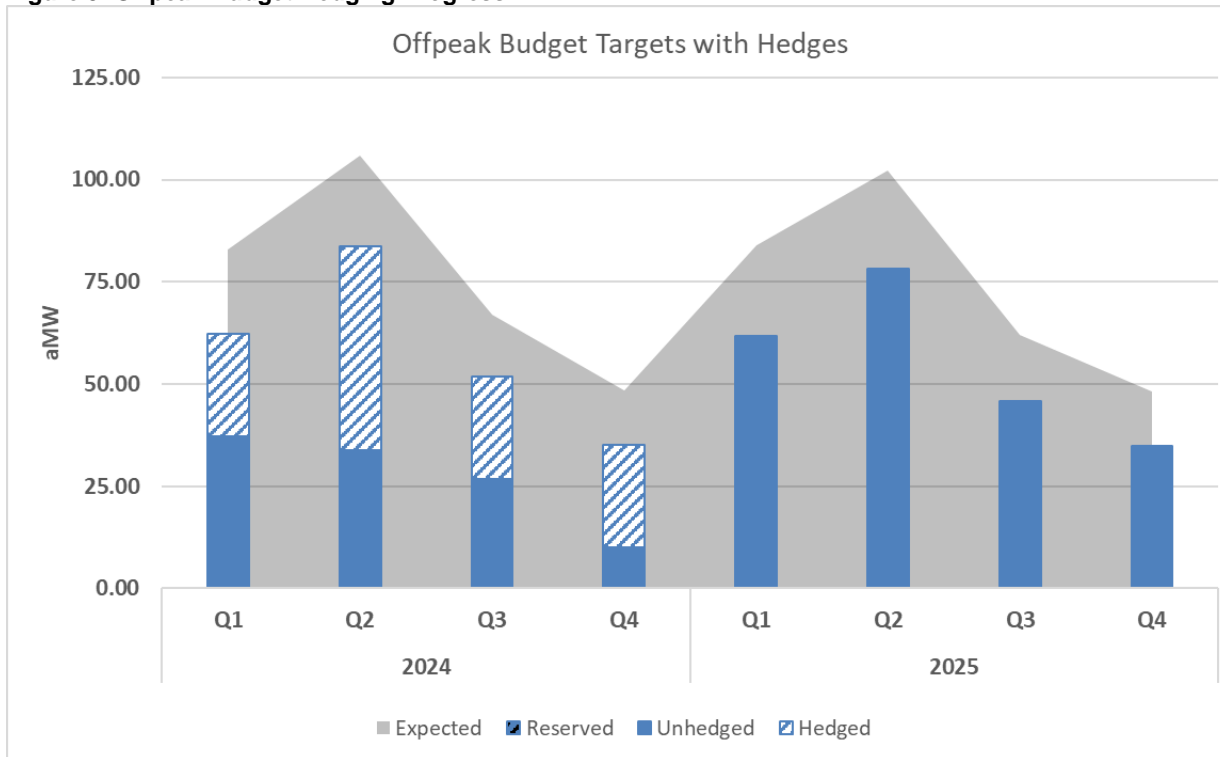


Figure 5: Offpeak Budget Hedging Progress



Counterparty Creditworthiness Update – Financial Institution Sector

To support EWEB's spot market and forward hedging activity, Middle Office Staff maintains a list of entities (counterparties) with which Power Traders are approved to transact. Prior to approval, each counterparty undergoes a review process for creditworthiness where credit limits and approvals are established in accordance with the Procedures. Following an initial approval, a periodic review or "documentation" schedule is followed to periodically review financial statements and assess the counterparty's ability to continually meet their contractual obligations with EWEB. Additionally, as Middle Office tracks industry-specific news for potential impacts to EWEB's trading portfolio, updates are provided to the RMC for further discussion.

In recent weeks, Staff has been actively monitoring activity in the financial institution sector after news that Silicon Valley Bank (SVB) was placed under receivership by the FDIC. SVB's failure to meet federally regulated capital requirements occurred after depositors rushed to withdraw nearly \$42 billion from the institution, marking the second largest bank failure in the U.S. since the 2008 financial crisis. Just two days later, Signature Bank was closed by the New York State Department of Financial Services for similar reasons. The FDIC subsequently transferred ownership of Signature Bank to Flagstar Bank. In each case, the FDIC has assured the public that all depositors of the institutions will be made whole.

EWEB does *not* have trading relationships with either SVB or Signature Bank, therefore these bank failures are not anticipated to have a direct impact on EWEB. However, downstream impacts of these recent events are unknown at this time as the financial institutions, depositors, and credit rating agencies further assess the landscape of banking industry.

EWEB does actively trade with three large financial institutions, two of which are headquartered in the United States and are considered Global Systemically Important Banks (G-SIBs). G-SIBs are designated based on the size and the scope of their operations and are subject to higher capital requirements than smaller banks. Each of the financial institutions EWEB trades with holds a "BBB+" or higher rating from S&P Global Ratings and are considered to be well capitalized. Annual credit reviews for all three of these financial institutions are scheduled to occur over the coming months where findings will be reported to the RMC.

EWEB-Owned Generation Update

The Board approved a resolution to decommission the Leaburg Hydroelectric Project at their January 2023 meeting. The Leaburg power canal and power plant had been offline since October 2018 due to dam safety standards and a FERC order. Based on the Board's decision, Staff will work on the development of a decommissioning action plan in 2023 while also pursuing near-term risk reduction measures to mitigate dam safety concerns that remain even with the power generation facilities offline. Staff will present the Leaburg Decommissioning Action Plan to the Board by the end of 2023.

The Walterville Hydroelectric Project continued to operate reliably in 2022, managing to continue operation through the late summer and early fall despite relatively low river flow conditions. Investigations to support updated dam safety analyses continued and an independent consultant performed the 5-year dam safety inspection. The final inspection report will be submitted to EWEB and FERC in April 2023. Geotechnical drilling is occurring at Walterville in 2023 to investigate seepage conditions at the forebay and evaluate seismic stability of the canal at high hazard locations. An element of the Board's resolution to decommission the Leaburg Project was a directive to complete a strategic evaluation by 2030 of the Walterville Project and determine whether to relicense or decommission after license expiration in 2040.

At the Carmen-Smith Project, there was progress on environmental and recreational improvements in 2022. Reconstruction of the Trail Bridge Campground was completed and EWEB coordinated with

State and Federal fish agencies to move Chinook salmon from the recently improved spawning channel below Trail Bridge Dam up into Trail Bridge Reservoir. This interim effort creates an opportunity for spawning above the dam prior to construction of the permanent trap and haul facility. These types of interim efforts became increasingly important as the overall fish passage work plan experienced further schedule delays related to the May 2021 discovery of sinkholes in Trail Bridge Reservoir. Field investigations to determine root causes and critical details on the sinkhole formation mechanisms continued including the start of geotechnical drilling in September 2022. Findings from these investigations will determine if the planned fish passage improvements can safely proceed or if they will need to wait until sinkhole remediation work is complete.

Refurbishment of the first turbine-generator unit at the Carmen Power Plant continued in 2022, though contractor delays pushed back the projected return-to-service date to summer 2023. The second Carmen unit will continue to operate until the first unit comes back online. The second Carmen unit overhaul is now expected to start in late 2023 and complete by the end of 2024. Work at the Trail Bridge Power Plant proceeded on schedule in 2022. The power plant went offline for reliability improvements in July and was able to start-up for commissioning in December 2022.

Following a relatively wet and cold start of the year, current 2023 river flow forecasts are trending around average for this spring/summer on the McKenzie below Trail Bridge and at Vida. Recent changes to the Army Corps' reservoir operations will continue and are anticipated to result in slightly lower-than-normal summertime flows in the lower McKenzie, affecting expected generation at the Walterville Project. Staff will monitor flow forecasts through mid-April in order to determine whether low flow mode operations will be required. An update to the Board will be included in the May Board meeting materials.

Other EWEB-owned generation facilities (Stone Creek Hydroelectric and Harvest Wind) continue to operate normally and are expected to do so throughout 2023. Both Stone Creek and Harvest Wind are scheduled to have typical maintenance outages this year. Following high priority repairs to the Stone Creek transmission line in 2020 due to the Riverside Fire, 31 outstanding fire damaged poles were replaced in 2022. All transmission system restoration work associated with the September 2020 fire is now complete. A new debris boom was installed at the Stone Creek diversion dam in late summer 2022 and has been performing well during the current wet weather season. No significant capital improvements are taking place in 2023.

Recommendation and Requested Board Action

This item is information only and no Board action is requested.