# MEMORANDUM

EUGENE WATER & ELECTRIC BOARD

Rely on us.

TO: Commissioners Brown, Carlson, Barofsky, McRae and Schlossberg

FROM: Megan Capper, Energy Resources Manager

DATE: April 5, 2022

SUBJECT: 2022 Power Market, Budget Hedging, and Generation Update

OBJECTIVE: Information Only

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

**Background**
The Power Planning and Trading Operations sections manage EWEB's power supply and wholesale market activities consistent with utility financial objectives, in accordance with Board Policy contained in SD8, and as further described in the EWEB Energy Risk Management Procedures. Generation 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. As a result, the 2021 spot market average price finished at the highest level since 2008. These changes to spot market drivers are also lifting forward electric market prices, and given the current natural gas price outlook, staff anticipates this shift in market dynamics may persist for at least the next couple of years. This is having an impact on EWEB's financial outlook as it effects both wholesale revenue and purchased power costs. This shift in markets, as well as the region's ongoing work to develop an RA program, are informing a new effort to modernize the approach EWEB takes to balance its portfolio.

Maintenance and repairs continue at several EWEB generation facilities. Where necessary, repairs are being coordinated with FERC. The Leaburg power canal and powerhouse remain offline due to ongoing dam safety concerns, a strategic evaluation is underway, and results will be presented to the Board by the end of 2022. Relicensing work continues at the Carmen-Smith project, but with some work plan changes, due to the 2021 discovery of sinkholes and ongoing dam safety investigations. Oregon hydrologic conditions are expected to trend below normal conditions for McKenzie areas below Trailbridge and at Vida, which may result in a low flow operation at Walterville this summer. Non-McKenzie projects continue to operate as expected.

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

## Discussion

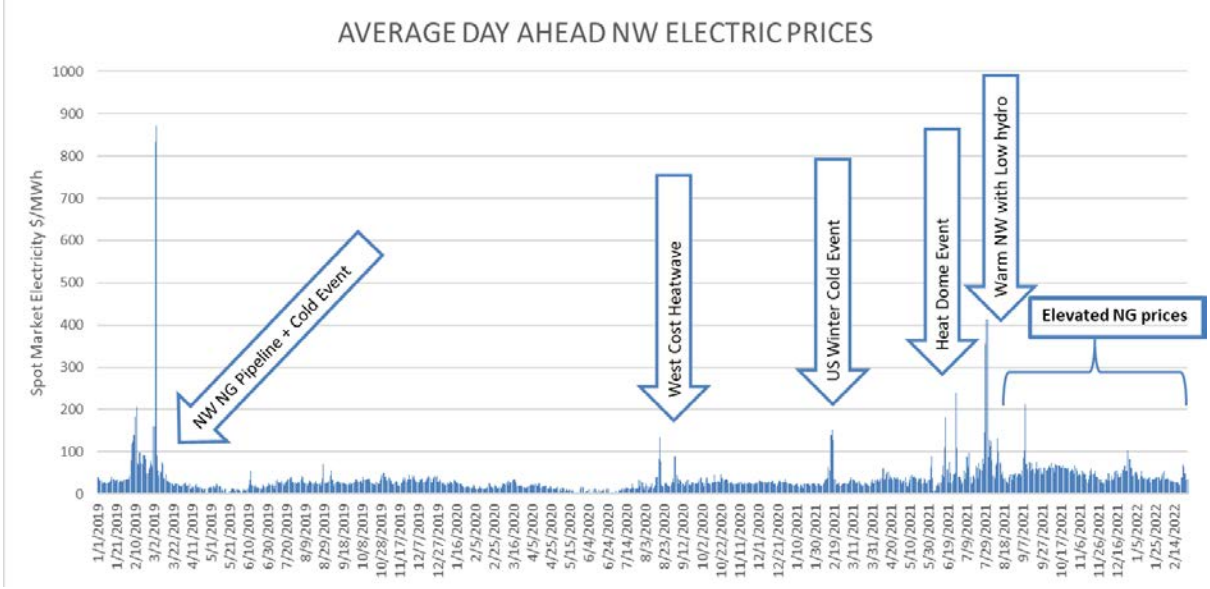
*Market Price Update*

Wholesale energy markets can generally be described as either near term "spot markets" or longer term "forward markets"[1]. For spot markets, 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*

Over the last couple years, the WECC[2] region, including the PNW, 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 makeup of the regional generation stack has increased the abundance of low/zero cost marginal energy while, at the same time reducing the amount of controllable capacity resources available to meet demand during high load periods[3]. This has resulted in recent spot markets that can be characterized as long 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 mix[4], it is exhibiting similar trends in local spot market and forward market pricing.

**Figure 1: Daily average, Northwest spot market prices since 2019**




[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.

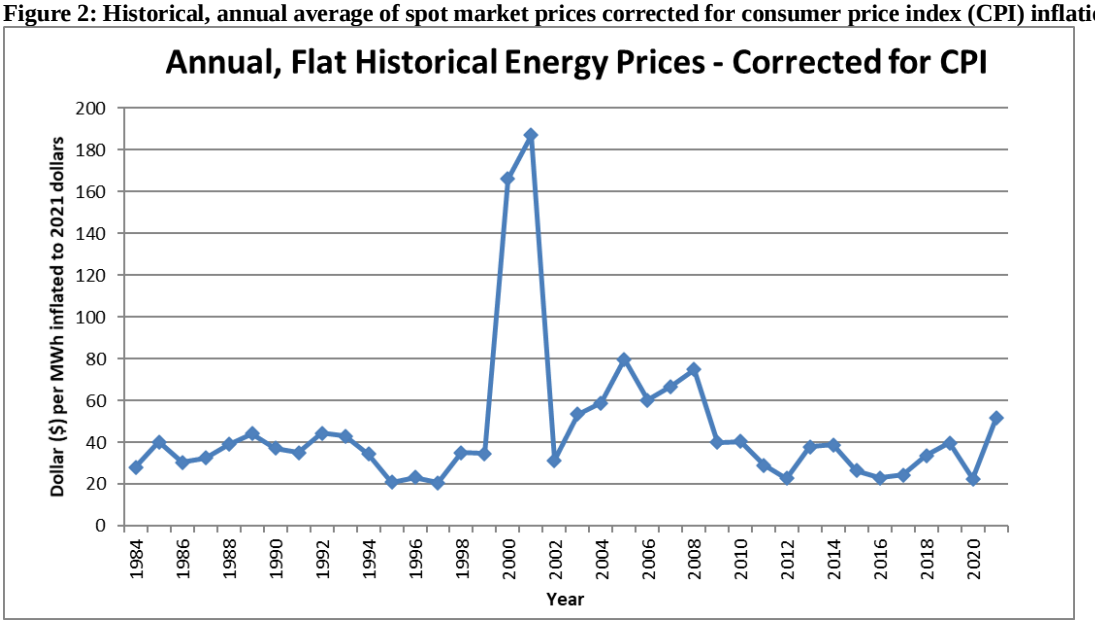
[4] https://www.nwcouncil.org/energy/energy-topics/power-supply

In 2019, a cold weather event drove up retail energy demand during a period where natural gas[5] storage and transmission were constrained. This led to relative shortages in natural gas availability for both electric generation and direct retail use, which caused a rapid increase in spot market electric prices, culminating in a brief period of day ahead prices trading near $900/MWh. After this winter event, spot market prices returned to forecasted levels and were more stable for the remainder of the year. Overall spot market prices in 2019 were approximately $37/MWh.

2020 didn't include a major disruptive gas event like 2019, but a historic west coast heatwave occurred in August, which resulted in rolling blackouts in California for the first time since the 2001 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.

2021 experienced a variety of load and resource factors, 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 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 hydro generation available to serve both the northwest and California for the anticipated summer period. In June, the PNW 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 is the highest settled price since 2008.

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




*Forward Markets*

[5] Natural gas generally determines the marginal cost of electric generation used to serve demand. Increases in natural gas costs drive increases in electricity pricing in both spot and forward markets.

Forward market prices for 2022 are currently trading above 2021 spot market prices at close to $53/MWh for the year. The shift appears to be driven primarily by the lingering increased cost of natural gas that started in the summer of 2021. This shift in natural gas market prices can be attributed to many factors, including reduced supply, given lagging natural gas production investment and natural gas production supply chain concerns. Further, there is increased demand for natural gas due to coal generation replacement, post-COVID economic recovery, and increased levels of global LNG exports. These LNG exports are effectively connecting US natural gas markets to the rest of the world, including Europe, which also experienced high energy prices last summer and is currently grappling with the impacts of war between Russia and the Ukraine. It's too early to know the long-term impact of this crisis, but it is likely to resonate within US energy markets. As of January 14th, the U.S. Energy Information Administration ("EIA") forecasted that Henry Hub[6] natural gas commodity prices will stay relatively flat through 2022, and slightly decline in 2023[7].

In addition to gas costs, the market is anticipating a warmer than normal summer[8], and potential underperformance of NW hydro generation[9] given residual drought conditions. The combination of these factors may lead to additional periods of price volatility. Current forward markets show the highest prices during summer ($155/MWh for Aug '22 Peak[10]) and winter ($76/MWh Dec '21 Peak) months. This shape in seasonal pricing largely mirrors the spot market history experienced over the last couple of years, though trading at elevated levels.

Though average electric prices may decline with decreases in the price of natural gas, price volatility is expected to continue with ongoing decarbonization efforts. In 2020, renewable resources became the second most abundant source of electric generation in the United States[11], surpassing sources of controllable thermal energy like coal and nuclear. 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. Renewable buildout is expected to continue as more regulators adopt new clean energy standards[12] and utilities work to decarbonize generator fleets.

Forward markets do not account for emergent policy issues like the development of new, complementary markets such as energy imbalance, capacity, and carbon, which are expected to trade outside of traditional energy markets. The value of these emergent markets to EWEB will largely be a function of implementation. As such, staff continue to take a proactive advocacy role in all relevant regional conversations.

Finally, forward market prices are subject to change with emergent conditions. Some recent factors that are driving market uncertainty include electrification efforts (e.g., transportation and

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[6] 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.

[7] https://www.eia.gov/todayinenergy/detail.php?id=50898

[8] https://www.cpc.ncep.noaa.gov/products/predictions/long_range/t05.2c.gif

[9] https://www.eia.gov/todayinenergy/detail.php?id=51378

10 Generally, "Peak" or "on-Peak" refers to a daily 16-hour period that coincides with the greatest amount of electrical energy usage, and the highest marginal cost of energy.
https://www.naesb.org//pdf/weq_iiptf050504w6.pdf

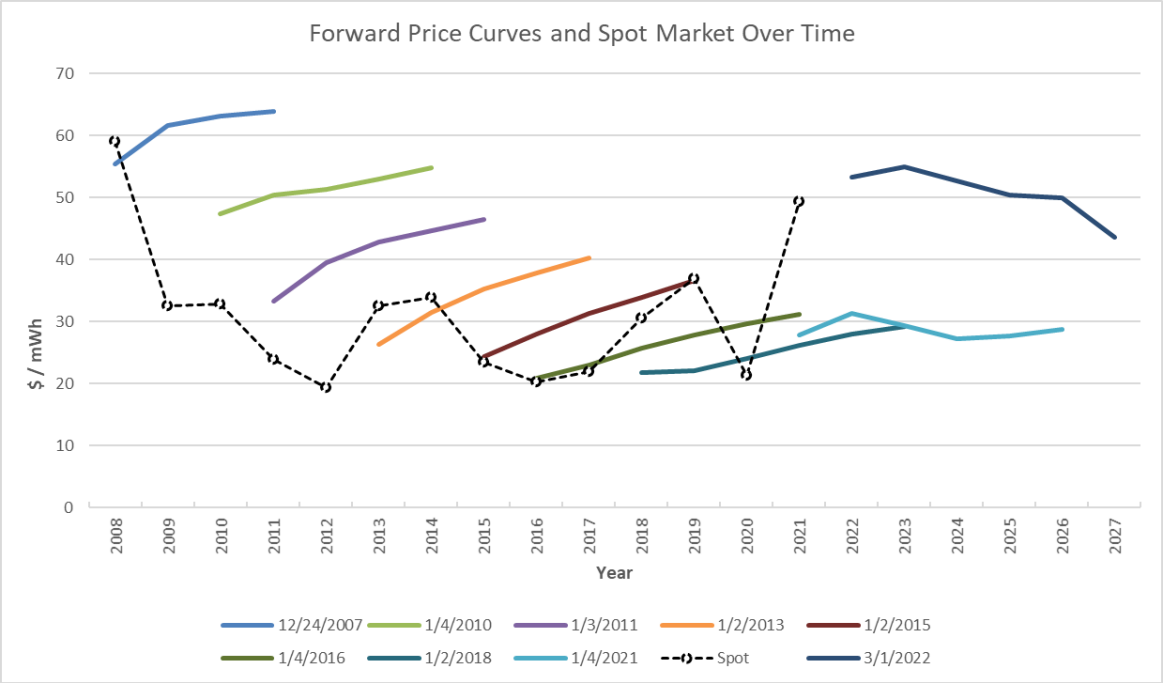
[11] https://www.eia.gov/todayinenergy/detail.php?id=50622

[12] https://www.eia.gov/todayinenergy/detail.php?id=51118

space heating), the strength of the US economy, the ongoing recovery from the COVID pandemic, domestic natural gas production investments, and US exports of liquified natural gas[13]and global uncertainty.

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. The subsequent lines reflect changing forward price curves for the years that followed. Since 2008, forward market price curves experienced a period of consistent declining value. With recent changes in natural gas pricing forward market curves have jumped drastically, and now reflect some of the highest pricing seen in the last decade. The 3/1/2022 curve reflects this elevated pricing, but with a slope that is declining as it moves to the right. This shift mirrors current expectations that natural gas prices will trend down after 2023, which should in turn reduce electric energy prices.

**Figure 3: Historical forward price curves and spot prices**




[13] https://www.eia.gov/todayinenergy/detail.php?id=51358

*Resource Adequacy*
EWEB continues to actively participate in the Western Power Pool (WPP) effort. Having established a shared set of standards in Phases 2A&B, now during Phase 3A the organization is focused on obtaining FERC approval of a regional, voluntary RA program designed to promote cost effective resource adequacy for the entire region.

Questions have arisen as to whether the WPP RA program will mean the region will avoid the kind of supply disruptions and customer outages that California experienced in the summer of 2020, and that Texas experienced the following winter. The direct answer is "not necessarily." The WPP RA program is intended to serve the region's capacity critical load hours more cost-effectively, assuming 1-year-in-10 peak weather events. California and Texas experienced *very* extreme weather events (extreme heat in California, and extreme cold in Texas) over consecutive days that resulted in inadequate supply given the associated demand. No utility plans its system to serve loads under all circumstances. Therefore, all regional grids are vulnerable to extreme weather events, which seem to be more frequent with climate change. The WPP RA program is one of several actions the region is pursuing to improve market depth, and to help reduce the impact of such widespread disruptions in the future.

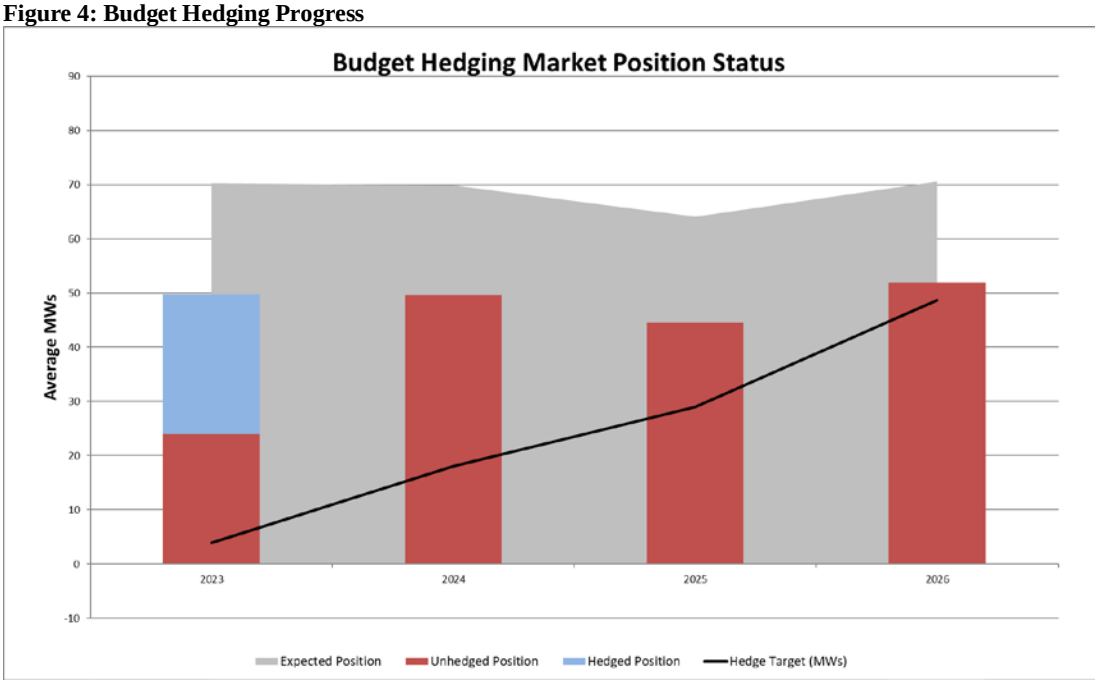
*Surplus Position Hedging Update*

In accordance with EWEB's Risk Management Procedures, staff hedges[14] a portion of its surplus position[15] 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. Beyond five years EWEB does not hedge any surplus energy.

There is a current effort underway to modernize how EWEB approaches 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 2023 and 2024 only.

Figure 4, below, shows EWEB's surplus market position for 2023-2026 based on the budget hydro assumption which is 90% of expected hydro generation. 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 blue bar represents the volume of energy hedged by staff. The red bar represents the remaining unhedged surplus. The black line reflects the desired pace of hedging activity the Risk Management Committee (RMC) would like to achieve over time. The gray area behind the stacked columns reflects EWEB's expected surplus, without the budget hydro assumption.

**Figure 4: Budget Hedging Progress**




*EWEB Owned-Generation Update*

[14] 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.

[15] 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 2023-2026 there is about 50 aMWs of surplus compared to EWEB's load of about 265 aMWs

The Leaburg power canal and powerhouse remain offline due to dam safety concerns identified in late 2018. Following a Semi-Quantitative Risk Analysis (SQRA) in 2020, EWEB's Board of Commissioners indicated their support for a parallel path approach to implement near-term risk reduction measures while performing a strategic evaluation of return-to-service versus decommissioning alternatives. Selected risk reduction concepts are progressing forward and the strategic evaluation is underway. Staff will provide the Board with a recommended strategic direction for Leaburg by the end of 2022.

The Walterville power canal and powerhouse continued to operate reliably in 2021, managing to continue operation through the late summer and early fall despite lower river flow conditions. Investigations to support updated dam safety analyses progressed well in preparation for the 5-year safety inspection which will be performed by an independent consultant and reviewed by the FERC in 2022.

At the Carmen-Smith Project, 2021 saw the deployment of significant environmental and recreational improvements including reconstruction of the Chinook Salmon Spawning Channel below Trail Bridge Dam, relocation of a portion of the transmission line out of Deer Creek and installation of bird flight diverters on over-water transmission spans, and completion of approximately 80% of the improvements to Trail Bridge Campground. Following delays to Carmen power plant work in 2020, refurbishment of the first turbine-generator unit started in summer 2021. Completion of the second Carmen unit is expected by the end of 2023. At the Trail Bridge power plant, reliability improvements are expected to start and complete in 2022. Recent major work plan changes at Carmen-Smith relate to the discovery of sinkholes on the bottom of the reservoir in May 2021. The sinkhole discovery triggered urgent investigation to determine root cause, with substantial geophysical studies completed in 2021 and subsurface drilling work anticipated in 2022. Findings from these efforts will help ensure that there are no adverse effects on or from the sinkholes associated with the planned fish passage improvements, which have been delayed while the dam safety investigations proceed.

Following a wet and cold early January, the 2022 hydrologic year for the Oregon Cascades, which will affect EWEB's owned hydroelectric resources, is forecasted to trend below average this spring/summer on the McKenzie below Trail Bridge and at Vida. Recent changes to planned operations at the Army Corps' Cougar reservoir are anticipated to result in lower-than-normal summertime flows in the lower McKenzie, affecting expected generation at the Walterville Project. Staff will continue to monitor conditions through mid-April in order to determine the appropriate flow guidance to operate the Walterville facility, though it is likely that low flow mode operations will be required. An update to the Board will be included in the May Board meeting materials.

EWEB's other owned generation facilities (Stone Creek Hydroelectric and Harvest Wind) continue to operate normally and are expected to do so throughout 2022. Harvest Wind is scheduled to have typical maintenance outages throughout the year. Following high priority repairs to the Stone Creek transmission line in 2020 due to the Riverside Fire, the outstanding replacement of 31 fire damaged poles will be completed in 2022. EWEB will take advantage of the required outage to also perform annual plant maintenance and inspection activities.

**Requested Board Action –** None