# Memorandum

To: Commissioners Christmann, Haugen-Hoffart and Fedorchak

From: Chris Hanson Public Utility Analyst

Date: April 6, 2023

Re: Otter Tail Power Company, Fuel Clause Adjustment Waiver, PU-23-081

On February 24, 2023, Otter Tail Power Company (OTP) filed a Fuel Clause Adjustment (FCA) Waiver Request (Case No. PU-23-81) to amortize $14 million of FCA charges over a four-month period. The intent of this was to lessen the impact on customers from the $16,553,604 of additional energy costs related to an outage of the Big Stone Power Plant (BSP) from November 5, 2022, through February 9, 2023. As part of the approval of this case, the Commission directed staff to analyze the facts around the outage and assess the prudence of OTP's actions to address it.

This memo is broken into three parts:

1. Timetable of the BSP outage and OTP's actions
2. Assessment of the financial impact of the purchase power agreements (PPAs) OTP entered into in reaction to the outage
3. Evaluation of the actions taken by OTP

## Timetable of the BSP Outage and OTP's Actions

On November 5, 2022, BSP personnel noted an increased vibration in the BSP plant 'exciter' causing personnel to shut down the generator to avoid further damage to the unit.

OTP communicated with Siemens which indicated they had a previously remanufactured rotor that OTP considered acquiring to swap out for the existing exciter. However, subsequent certification testing determined that the rotor was defective and that this was not a viable option.

As an alternative, OTP pursued the option of renting a mobile exciter unit from Siemens. Installing this unit required removing the existing BSP exciter and base to install the mobile unit and supporting equipment. OTP proceeded with this option and on December 9, 2022, encountered issues with a radial lead on the generator shaft between the mobile exciter and the generator, which caused additional damage to the unit and forced OTP to shut the unit down.

From November 5, 2022, through December 9, 2022, OTP had been purchasing power from the Midcontinent Independent System Operator (MISO) Regional

Transmission Organization (RTO). But after the damage from the failure of the radial lead and due to lead time for repairs, OTP personnel realized they were facing an outage that would extend into January 2023 or beyond.

It was also at this time that the weather system that would be named “Storm Elliot” (Elliot) appeared on the 14-day weather outlooks. OTP is winter peaking, so being faced with a pronounced cold snap combined with the loss of BSP capacity led OTP to secure additional energy production for the remainder of December 2022 through January 2023. OTP had already purchased a significant amount of energy for December and January earlier in 2022. But between December 15 and 22, 2022, OTP signed PPAs for an additional 62,400 megawatt hours (MWhs) for December 19 through 31, 2022 and 186,000 MWhs for January 2023.

The PPAs are referred to as Contracts for Differences (CFDs) and specify the timeframe, whether that power would be ‘peak’, ‘off-peak’ or ‘all hours’, the MW, and the price. The counterparties in these agreements are all members of MISO, but these agreements are made outside of the MISO process.

The CFDs are hedges that lock in a specific price to avoid the volatility of the MISO market. For instance, if OTP contracts for 100 MWs at $80/MWh but the MISO Local Marginal Price (LMP) for that period was $50/MWh, OTP would pay MISO $5,000 and the counterparty $3,000 ($80 contracted rate - $50 MISO LMP=$30 X 100 MWh). Alternatively, if the LMP price had spiked to $100 during that same period, OTP would have received $2,000 ($20 difference X 100 MWh) from the counterparties. Either way, OTP is made whole.

As expected, Elliot did bring significantly colder temperatures throughout the upper Midwest United States. This caused some freeze-offs of natural gas producing facilities, which limited the ability of utilities to operate their natural gas peaking units. However, wind resources during Elliot were sufficient that these peaking facilities were not required, and MISO Local Marginal Prices (LMPs) remained relatively low during the Storm. Temperatures returned to normal in late December and January temperatures were ‘seasonal’ without any severe storms or abnormally low temperatures.

OTP completed their repairs and restarted BSP using a rented mobile exciter on February 7 and were back online on February 9, 2023. They anticipate that the original exciter will be rebuilt and back in service by October 2023.

## Assessment of the Financial Impact of the (PPAs) OTP Entered into in Reaction to the Outage

As noted above, PU-23-81 recommended amortizing $14 million over 4 months. However, that was not meant to reflect the full cost of the outage. In reality, we don’t really know the full cost of the outage. As noted above, OTP had previous PPAs in place in December which were below the eventual December 2022 MISO LMP price and thus would have been profitable if sold. Additionally, we are not including the cost of

the power purchased from MISO from November 5, 2022, when the outage occurred, through December 15, 2022, when OTP entered into the PPAs referenced above. Finally, OTP didn't enter into PPAs for February as it realized it was on schedule to restart BSP in early February and as the weather forecasts were much more favorable. Thus, what we are considering to be the 'cost' of the outage is simply the cost of the PPAs that OTP entered into from 12/15/22-1/31/23 above the incremental cost of generating that same energy by BSP.

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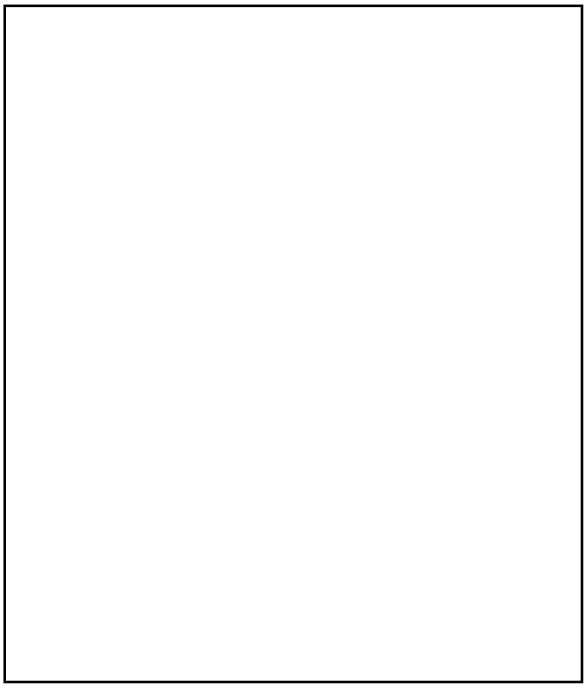

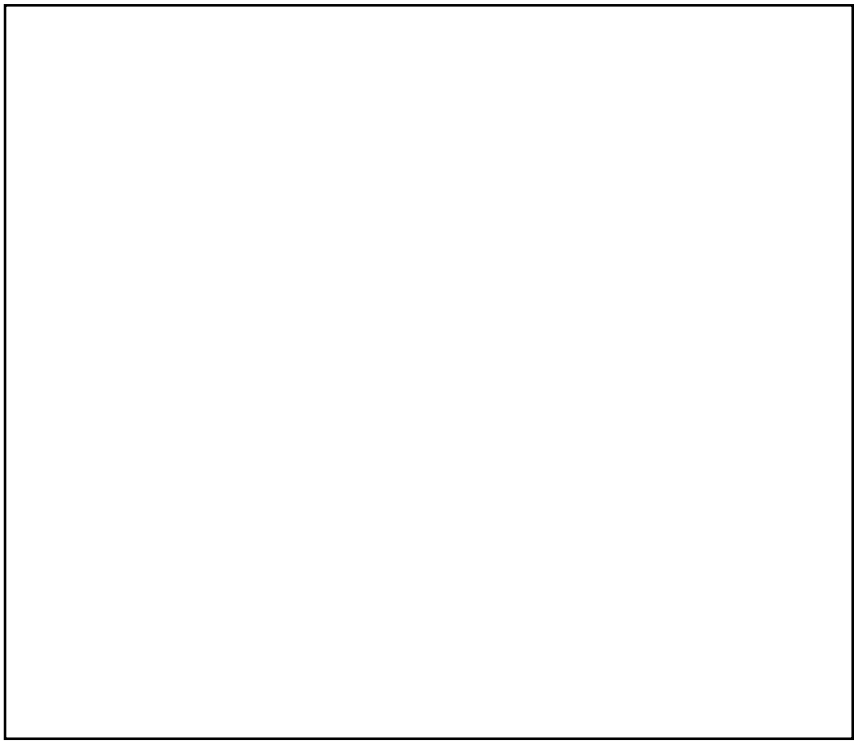

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There is another aspect of these purchases that should be considered regarding the cost calculation. That is that the MISO LMP rates for both December and January were significantly lower than the PPA prices paid by OTP for those same periods. Table 2 below corresponds to the previous calculations but illustrates the portion of the cost per MWh and total cost related to the MISO cost over BSP cost and the portion related to the PPA contract cost over the MISO cost.

This further analysis shows that had OTP continued to simply purchase power from the MISO market rather than enter into the PPAs, the total cost of the outage would have been $2,607,996, as the average MISO LMP rate was $34.69 during this period. The additional $13,945,608 of this outage cost was a result of the PPA contract rates being $90.83/ MWh or $56.14 higher than the MISO LMP rate.

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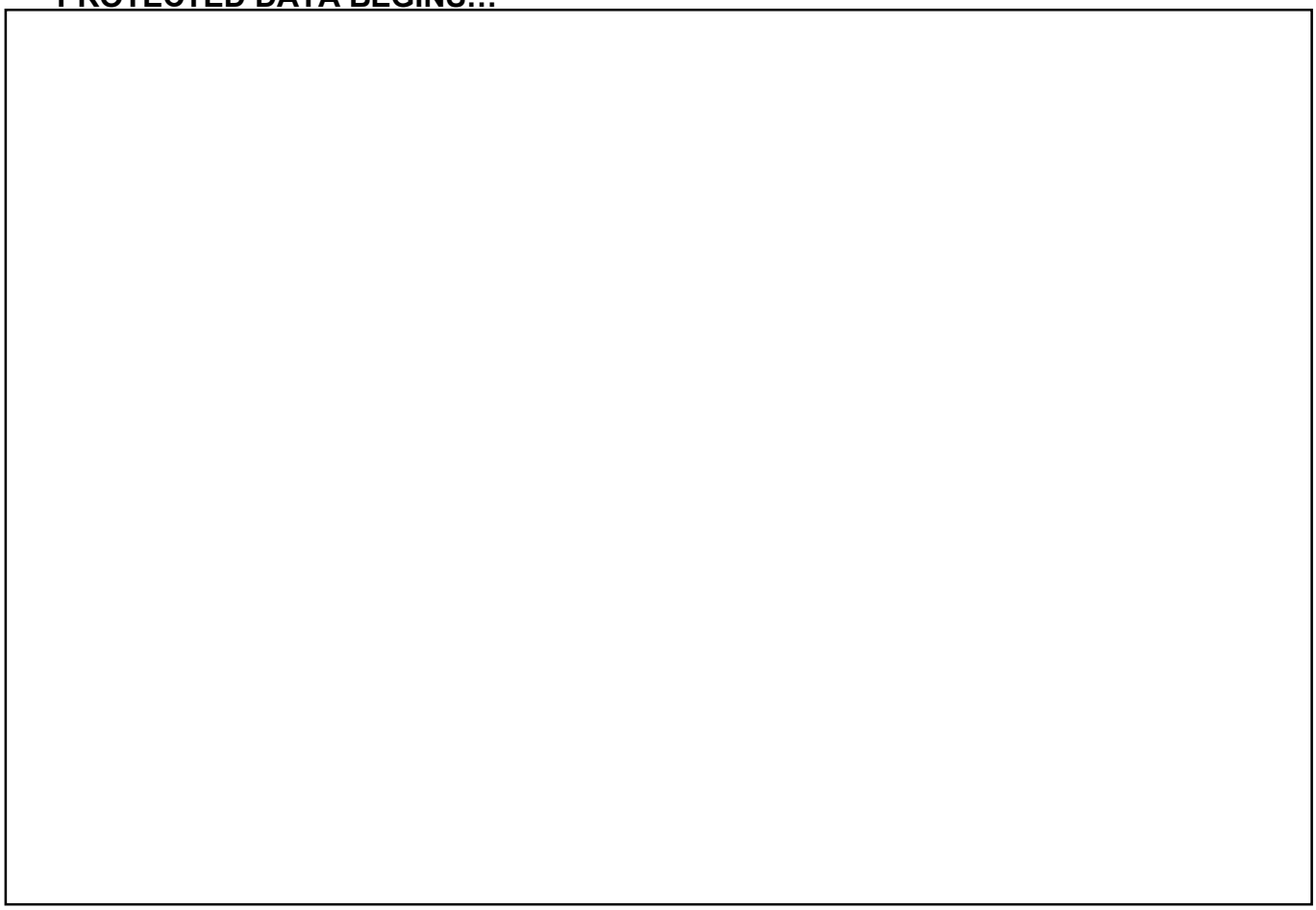

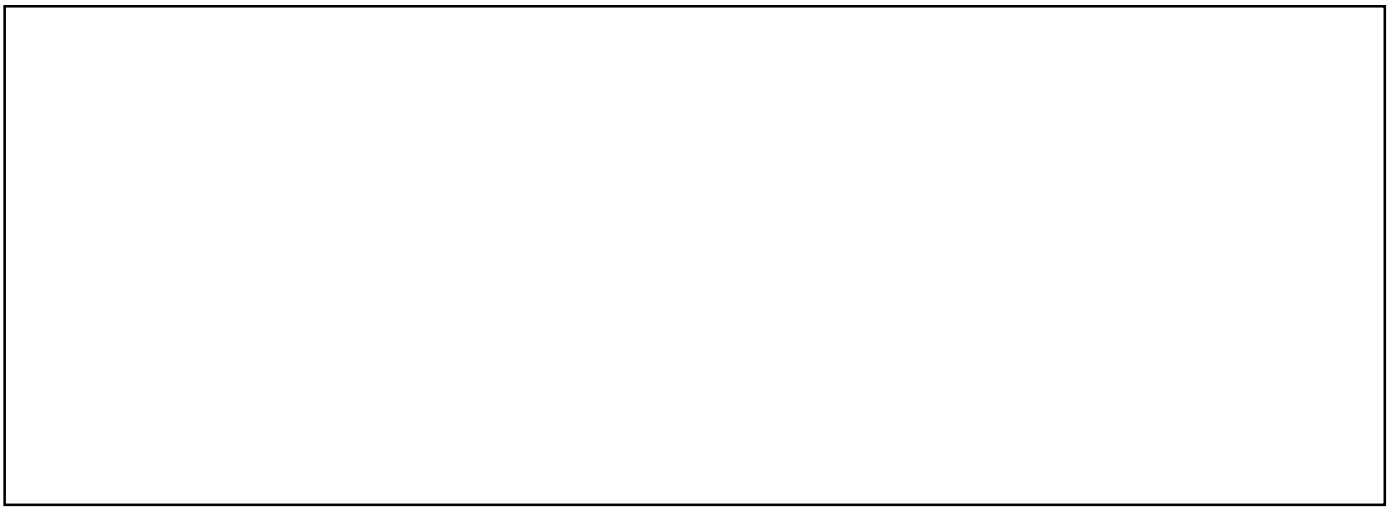

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In summary, the total cost of the BSP Outage (as defined) was $16,553,604. But if OTP had not contracted for the PPAs and had rather continued to purchase at the MISO LMP price, the cost would have been $2,607,996. $13,945,608 of that increase was

related to the PPA costs being higher than the actual MISO rates for the contracted volumes from 12/15/22 through 1/31/23

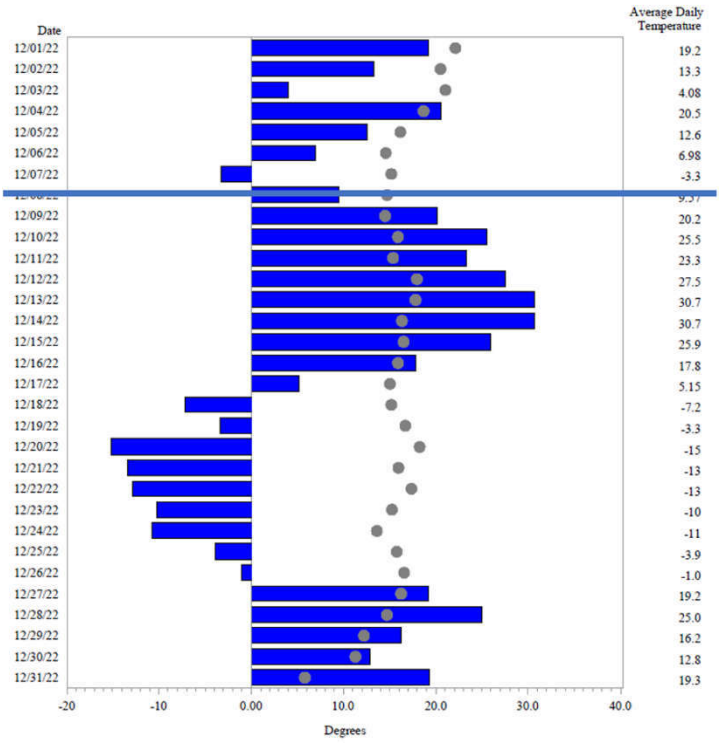
## Evaluation of the Actions Taken by OTP

Based simply upon the financial results and looking in retrospect, OTP's decision to enter into the PPAs would appear to have been imprudent. If they had simply continued to purchase power at the MISO LMP rate, rather than enter into the PPAs, the cost of the BSP Outage would have been about 85% lower. However, the determination of prudence is by its nature circumstantial, so we need to look at the circumstance surrounding the decision.

The first fact is that OTP is a winter peaking utility. Thus, they were entering their peak usage period having lost approximately 250MW of capacity. Additionally, in their presentation regarding the BSP Outage, OTP stated that, "December market considtions were playing a big factor in decision to make forward purchases to hedge price volatility risk." Specifically, they referenced the early December weather, high current and forward market prices for natural gas and LMPs as well as the extended forecast that was predicting a pronounced cold snap (Winter Storm Elliot).

As shown in Chart 3 to the right, seven of the first thirteen days of December were below average temperatures. On December 9th, when OTP realized that BSP was going to be out of service for an extended period of time, the extended forecast was showing a brief warm-up followed by an pronounced drop in temperatures.

Chart 3



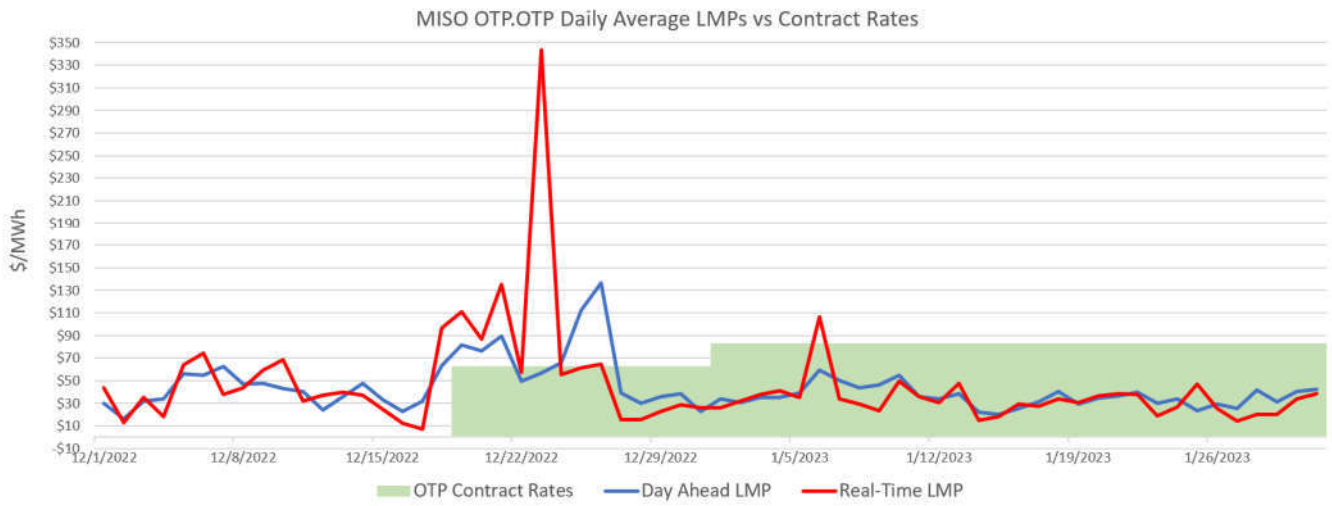

At this point OTP personnel were reviewing natural gas prices to assess the likelihood that their Astoria gas plant would be dispatched. On December 9th, the forward prices for the Ventura Hub for January were $8.9725 per MMBtu. Ryan Retzlaff pointed out that the heat rate for Astoria is ~9.5 times the natural gas price. That meant that on 12/9 their marginal cost for Astoria would have been approximately $85 per MWh for January based upon the forward price for that month. However, as they are unable to store gas

and gas prices generally increase as temperatures decrease, they anticipated that the price would rise during the cold snap and further raise their marginal costs. Ryan stated that during Elliot the natural gas spot price did hit $150 per MMBtu which would put Astoria at a marginal cost of $1,425 per MWh.

During the conference call on March 16, 2023, with Stuart Tommerdahl and Ryan Retzlaff, OTP noted that after the decision was made to enter into PPAs to replace the BSP capacity, they had difficulty procuring offers. Because Winter Storm Elliot was impending, several parties declined to participate and those that did were offering the power at what Ryan Retzlaff referred to as “Uri premium prices.” This refers to Winter Storm Uri (February 2021) where cold weather froze off natural gas supplies causing power outages and created large spikes in the LMP prices of electricity. The lack of response caused some delays and they stated that it “probably didn’t work in their favor as they got closer to the Elliot timeframe.”

Chart 4 below shows the LMP rates during Winter Storm Elliot did increase dramatically with the real-time rate increasing to $343 per MWh on December 23, 2022. In December, OTP was ‘in the money’ (where PPA rate was less than either the day ahead or real time LMP rate) in seven of the thirteen days covered by the PPAs. However, OTP still ended up paying $3.95 million more for the PPAs than the total MISO LMPs for December. In the thirty-one days covered by the PPAs in January, OTP was only in the money on one day and as a result, the total cost of the PPAs in excess of the MISO rates was just under $10 million.

Chart 4




The final point to consider is that while Astoria technically replaces the capacity lost by the closure of Hoot Lake, it doesn’t actually do so in reality. This is due to the fact that the fuel for the Astoria capacity is purchased on the spot market and cannot currently be stored. Additionally, as noted above, the price of natural gas tends to increase when temperatures decrease because cold temperatures create a stronger demand for natural

gas for heating. As OTP is a winter peaking utility and demand for electricity also increases in cold temperatures, the fuel cost and the resulting marginal cost of dispatch for Astoria increase at precisely the point in time when it is most needed.

Over the past several years, OTP has experienced the retirement of numerous small, older coal power facilities such as the Hoot Lake plant which was built in the 1950s. This was due to the fact that within the current operating environment, these facilities were not as efficient and required significant operational and environmental upgrades, which was not a cost-effective option in the case of Hoot Lake plant. However, coal powered facilities such as Hoot Lake not only provided generation capacity, but their ability to purchase their fuel on long-term contracts and store their fuel on-site meant that there was an effective ceiling or 'cap' on exposure to high MISO LMP markets. That is because as LMP prices rose there was a layer of these 'uneconomical' coal fired plants that could provide capacity at higher prices.

However, as these plants have been retired and replaced by gas plants, the MISO market no longer has this 'cap' on prices. That is because the gas peaking plants that 'replaced' this capacity experience higher gas prices during cold snaps in winter months when their capacity is required, resulting in spiraling LMP prices as was seen during Winter Storm Uri in 2021 and more recently in Winter Storm Elliot.

Thus, when faced with the loss of the BSP capacity, OTP realized that the Astoria plant likely wouldn't provide market price protection due to the rising natural gas prices. With the closure of Hoot Lake, they didn't have another source of fixed price power generation and based upon recent experience they were concerned that they could experience an extended period of extremely high prices if they continued to purchase directly from MISO. That led to their decision to secure a forward, fixed price, energy purchase which would eliminate exposure to a potentially extreme winter pricing event. Due to relatively minor market price conditions, the energy purchase ultimately turned out to be uneconomical.