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November 4, 2022

Mr. Will Seuffert
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101-2147

PUBLIC DOCUMENT – NOT PUBLIC (OR PRIVILEGED) DATA HAS BEEN EXCISED

RE: In the Matter of Otter Tail Power Company's 2022-2036 Resource Plan
Docket No. E017/RP-21-339
Supplemental Comments

Dear Mr. Seuffert:

Otter Tail Power Company (Otter Tail) respectfully submits these Supplemental Comments to the Minnesota Public Utilities Commission (Commission) in the above-referenced docket. This filing 1) reiterates why dual fuel at Astoria Station is important for Otter Tail's customers, 2) provides updated information concerning the nature of dual fuel at Astoria Station and project costs, and 3) explains why the Commission can act now rather than defer this issue.

Otter Tail has taken reasonable efforts to maintain the secrecy of the information marked as PROTECTED DATA, which derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use (the "Protected Data"). The Protected Data is therefore "trade secret information" and "nonpublic data" under Minn. Stat. § 13.37.

Otter Tail has electronically filed this document with the Commission and is serving a copy on all persons on the official service list for this docket. A Certificate of Service is also enclosed.

Should you have any questions, please contact me at njensen@otpco.com or (218) 739-8989.

Sincerely,

/s/ NATHAN JENSEN
Nathan Jensen
Manager, Resource Planning

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Enclosures
By electronic service
c: Service List

STATE OF MINNESOTA
BEFORE THE
MINNESOTA PUBLIC UTILITIES COMMISSION

In the Matter of Otter Tail Power Company's 2022-2036 Integrated Resource Plan	**Docket No. E017/RP-21-339** **SUPPLEMENTAL COMMENTS Summarizing Otter Tail's Request for Authority to Commence Development of On-Site Fuel Storage at Astoria Station (Aka Dual Fuel)**

I. INTRODUCTION

Otter Tail Power Company (Otter Tail or Company) provides these Supplemental Comments in support of its proposal to add dual fuel capability at Astoria Station. These comments consolidate information on the dual fuel proposal previously provided in this proceeding, and they describe relevant developments that have occurred since the original filing.

Otter Tail's on-site fuel inventory project (aka dual fuel) is well-supported and the record supports approval. The project will mitigate fuel supply and fuel price risks, and it will provide reliability and rate stability for Otter Tail customers.

The current risks can be summarized as follows: until we have on-site fuel storage at Astoria, we are dependent on just-in-time delivery of fuel from the gas pipeline. This dependency exposes our customers to uncontrollable and unpredictable market disruptions and their effects on reliability and price. Recent economy-wide supply chain events have demonstrated that reasonable operators of facilities for which high reliability is required must ensure access to inventories of crucial inputs. More specific to the energy industry, recent events in SPP and ERCOT have illustrated that market disruptions can have catastrophic reliability and economic consequences.

We highlight that the Astoria Station was constructed to replace the capacity and dispatchable attributes of Otter Tail's Hoot Lake coal-fired generating plant, retired in 2021.[1] However, while Astoria currently can function very well to replace the capacity lost at Hoot Lake, its dependency on just-in-time delivered fuel limits its ability to serve as a dispatchable hedge against energy market disruptions. The now-retired Hoot Lake plant had a substantial on-site source of fuel (i.e. the coal stockpile, upon which it could

[1] Merricourt Wind project was constructed to replace Hoot Lake's energy attributes, but Merricourt did not replace Hoot Lake's capacity and dispatchable attributes.

operate for approximately 30 days), and this attribute was lost upon Hoot Lake's retirement.

As the Commission has noted in prior proceedings, it is important as we transition the generation fleet to consider how similar attributes to existing generation can be retained as we add new modes of generation. In this instance, until we add the capability for some on-site fuel inventory at Astoria, we will be without an important dispatchable-market-hedge attribute that was lost when Hoot Lake was retired.

This filing 1) reiterates why on-site fuel inventory at Astoria Station[2] is important for Otter Tail's customers, 2) provides updated information concerning the nature of on-site fuel inventory at Astoria Station and project costs, and 3) explains why the Commission can act on on-site fuel inventory in advance of other parts of Otter Tail's Integrated Resource Plan.

II. BACKGROUND

On September 1, 2021, Otter Tail submitted its Initial Filing to the Minnesota Public Utilities Commission (Commission) for approval of its 2022-2036 Integrated Resource Plan (IRP) The Resource Plan discussed in detail Otter Tail's short term (2022-2028) action plan**,** which included the addition of dual fuel capability at Astoria Station by 2026. Our request meets the IRP criteria for Commission approval of resource additions as laid out in Minnesota Statute 216B.2422 Subd. 4 and Minnesota Rule 7843.04 Subpart 3.

On November 1, 2022, the Commission granted Otter Tail's October 14, 2022 Supplemental Filing and Request for Changes in Procedural Schedule (October Letter) addressing developments since the Initial Filing and to request that the Commission amend the current procedural schedule to permit Otter Tail to update its modeling in light of recent developments[3] while also asking the Commission to maintain the current IRP schedule as it relates to dual fuel at Astoria Station.[4] In that filing, we stated:

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[2] Astoria Station, located near Astoria, South Dakota, is a wholly owned 245 MW natural gas peaking unit that was an approved resource addition as part of our 2016 Plan and came online in early 2021.

[3] The most significant of these developments is the Midcontinent Independent System Operator (MISO) adopting tariff revisions that include a seasonal resource adequacy construct and capacity requirements. These changes allow MISO to move forward with seasonal capacity auctions with each season having its own requirement based on seasonal coincident peak loads and a seasonal reserve margin. These changes will be implemented in the 2023/2024 planning year. Of particular consequence for our Company is MISO's pending adoption of a winter season Planning Reserve Margin (PRM) of 25. 50 percent, which was not anticipated, and which differs significantly from the PRM percentage forecast in the modeling for our Initial Filing. Another significant development since the Initial Filing was the passage of the Inflation Reduction Act (IRA), which President Biden signed into law on August 16, 2022. The IRA provides approximately $369 billion toward wind, solar, clean energy storage, and clean energy manufacturing projects.

> "[w]e believe it is appropriate to address dual fuel at Astoria Station without delay to strengthen the resilience and availability of the unit during extreme conditions. We believe this is necessary to protect our customers from extreme events and related market volatility.
>
> Our preferred plan anticipates 2026 commercial operation of dual fuel at Astoria Station and we are currently engaged in development activities with that target date in mind. Current supply chain issues and inflationary pressures are sufficiently complex that delays on this particular element of our IRP filing would expose our customers to cost increases and would not be in the public interest."[5]

In addition to filing these Supplemental Comments, Otter Tail is updating responses to relevant information requests to the extent necessary. Those updates to information requests will be served and filed separately from these comments and submitted in the ordinary course.

III. DUAL FUEL AT ASTORIA STATION WILL PROTECT OUR CUSTOMERS FROM EXTREME EVENTS AND MARKET VOLATILITY.

A. Dual Fuel at Astoria Station Enhances Generation Resiliency.

As stated in Section 3.8 "Resilience" of our Initial Filing:

> "Historically, resource plans have been focused on energy and capacity metrics to assess a utility's ability to produce electricity cost-effectively and reliably for its customers. With changes in the marketplace, however, concepts of resilience have grown in significance. These concepts were highlighted during events such as the 2014 Polar Vortex and the 2021 Winter Storm Uri, where renewable generation was at times not available, natural gas availability was at times limited, and electricity market prices and natural gas prices were at times extremely high. While Otter Tail had limited exposure during these events, some other utilities experienced very concerning service interruptions and high fuel and electricity bills.
>
> While resiliency is not a defined term as applied to generation resources, in the context of cold or hot weather conditions (mentioned above) we identify three characteristics of a resilient generation resource:
>
> 1. Dispatchability – A generation resource is dispatchable if it can reasonably be expected to generate when called upon.
> 2. Reliable Fuel Supply – A generation resource has a more reliable fuel supply when fuel is available onsite, when onsite fuel storage is possible or there is more than one reasonable means for fuel delivery.

[4] In our October 14, 2022 filing we proposed filing updates to our IRP by March 31, 2023, with Comments due on July 31, 2023, and Reply Comments due on September 29, 2023.
[5] Otter Tail October 14, 2022 Supplemental Filing, p. 3.

3. Energy Price Protection – A generation resource has more energy price protection if the availability and cost of fuel for generation can be managed during volatile market conditions.

Table 3-8 below provides a high-level summary of what resiliency factors Otter Tail's current and potential future generation resources possess. The resources are also listed in order of most resilient to least resilient."

Table 3-8: Generation Resources and Resiliency Factors

Generation Resource	Dispatchable	Reliable Fuel Supply	Energy Price Protection	Ranking Factors
1. Coal Generation	Yes	Yes	Yes	Fuel storage capability and low volatility in fuel price
2. Dual Fuel Simple Cycle	Yes	Yes	Yes	Fuel oil storage capabilities, multiple fuel sources, fuel oil storage protects from volatility in natural gas market
3. Fuel Oil Simple Cycle	Yes	Yes	Yes	Fuel oil storage capability protects from volatility in natural gas market
4. Natural Gas Simple Cycle	Yes	No	No	Without dual fuel capabilities, no storage capability, dependence on single natural gas supply pipeline, no protection from volatile natural gas markets and relatively close correlation in gas and electricity markets
5. Solar	No	No	No	Ranked higher than wind due to generation occurring during peak loads, and while not dispatchable, no significant correlation to energy and natural gas markets
6. Wind	No	No	No	No fuel storage and relatively close inverse correlation between wind generation operating and energy and gas market prices

Otter Tail provides Supplemental Table 3-8, which is the same as the original table, except we have added battery storage as one of the considered generation resources.

Supplemental Table 3-8: Generation Resources and Resiliency Factors

Generation Resource	Dispatchable	Reliable Fuel Supply	Energy Price Protection	Ranking Factors
1. Coal Generation	Yes	Yes	Yes	Fuel storage capability and low volatility in fuel price
2. Dual Fuel Simple Cycle	Yes	Yes	Yes	Fuel oil storage capabilities, multiple fuel sources, fuel oil storage protects from volatility in natural gas market
3. Fuel Oil Simple Cycle	Yes	Yes	Yes	Fuel oil storage capability protects from volatility in natural gas market
4. Natural Gas Simple Cycle	Yes	No	No	Without dual fuel capabilities, no storage capability, dependence on single natural gas supply pipeline, no protection from volatile natural gas markets and relatively close correlation in gas and electricity markets
5. Battery Storage*	Yes	No	No	The fuel supply cannot be considered reliable only covering 17% of one day. Limited fuel supply also diminishes the ability to protect customers in volatile events.
6. Solar	No	No	No	Ranked higher than wind due to generation occurring during peak loads, and while not dispatchable, no significant correlation to energy and natural gas markets
7. Wind	No	No	No	No fuel storage and relatively close inverse correlation between wind generation operating and energy and gas market prices

*Batteries are not technically generation; they are stored energy.

Section 3.8 "Resilience" of our Initial Filing continues as follows:

"In addition to considering individual resource resiliency, Otter Tail also considers the resiliency of its entire generation portfolio. This includes the diversity of its portfolio and the portfolio's ability to withstand significant unforeseen events. One question at the heart of resiliency is the extent to which wind and solar generation may be relied upon during a significant event. As shown in Table 3-8 above, from an individual generation resource level, wind and solar are not dispatchable and have other features considered less resilient than dispatchable resources. Therefore, the analysis of market exposure detailed below conservatively assumes no contribution from wind and solar resources. From an overall generation portfolio perspective, however, it is reasonable to expect solar and wind resources to provide some generation in many of the hours of high loads. In terms of our expectations for actual operation, some portion, if not all, of the "market exposure" identified below is expected to be covered by Otter Tail's variable resources. The addition of new resources and the removal of other resources requires Otter Tail to look at what opportunities it is taking advantage of and whether it is creating potential resiliency problems for the portfolio.

While our portfolio has performed exceptionally well, even during significant events, maintaining and enhancing the overall resiliency of the portfolio is an important consideration. One cost effective option to maintain and enhance resiliency is adding dual fuel capability at Astoria Station, which would allow Otter Tail to use natural gas supplied by the current pipeline as the main source of fuel and use stored fuel oil during rare instances of pipeline unavailability or volatile natural gas markets. Otter Tail currently operates its Solway combustion turbine in similar fashion…

…Given the three criteria listed above for assessing resiliency, Table 3-9 compares Otter Tail's total current resilient generation resources to what the Preferred Plan resilient generation would be in 2030, assuming dual fuel capability is added at Astoria. Controllable load is also included in the list of resilient resources because the net result of a reliable load control system and a resilient generator is similar in terms of reducing market exposure during peak load situations. Two separate values have been given for summer and winter generation capabilities since Otter Tail's combustion turbines and load control resource have varying output capabilities depending on the season.

Table 3-9: Resilient Generation

	Current Winter	Current Summer	Preferred Plan Winter	Preferred Plan Summer
Big Stone	256	256	256	256
Coyote	149	149	0	0
Astoria	0	0	285	245
Solway	46	43	46	43
Oil Peakers	74	69	74	69
Controllable Load	115	20	115	20
Total (MW)	**640**	**537**	**776**	**633**

Otter Tail provides Supplemental Table 3-9 Resilient Generation below which provides the current resilient generation assuming dual fuel capability is added at Astoria. Supplemental Table 3-9 replaces the columns based on 2030 resilient generation included in the initial filing Table 3-9 above with the current resilient generation plus Astoria dual fuel. This supplemental table reflects only the change to Otter Tail's resilient generation with the addition of on-site fuel inventory at Astoria Station.

Supplemental Table 3-9: Resilient Generation

	Current Winter	Current Summer	Current + Astoria Dual Fuel Winter	Current + Astoria Dual Fuel Summer
Big Stone	256	256	256	256
Coyote	149	149	149	149
Astoria	0	0	285	245
Solway	46	43	46	43
Oil Peakers	74	69	74	69
Controllable Load	115	20	115	20
Total (MW)	**640**	**537**	**925**	**782**

As noted in Section 3.8 "Resilience" of our Initial Filing:

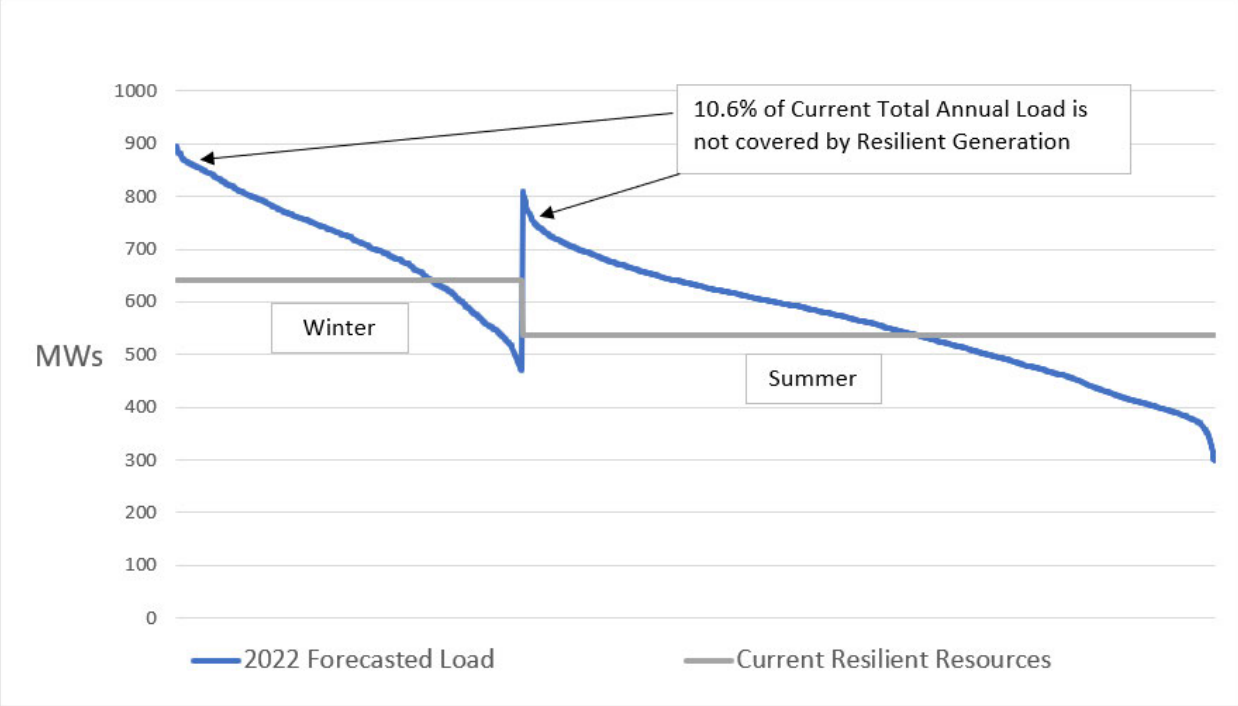
> "Figure 3-9…compare[s] the resilient generation levels listed in Table 3-9 to the forecasted hourly load in 2022…The hourly load has been sorted by season and then sorted from high to low to show the quantity of hours during which load would be expected to exceed dispatchable/fuel secure/price-protected generation capabilities.
>
> In 2022 the forecasted market exposure is roughly 130,000 MWh, or 10.6 percent of Otter Tail's total load."

Supplemental Figure 3-10 compares the resilient generation levels listed in Supplemental Table 3-9 to the forecasted hourly load for 2026 (once Astoria dual fuel is commercially operational). Looking ahead to 2026, Otter Tail anticipates total market exposure to be zero percent. As provided in the Initial Filing:

> "…As noted above it is reasonable to expect solar and wind resources to provide some generation in many of the times total load exceeds resilient generation. In terms of our expectations for actual operation, some portion, if not all, of the forecasted market exposure is expected to be covered by Otter Tail's variable resources.
>
> The forecasted market exposure is not a ceiling for Otter Tail's market purchases. Actual market purchases will likely be higher due to Otter Tail's ability to take advantage of low market prices as those opportunities arise.
>
> Taking advantage of market opportunity is an important tool that has allowed Otter Tail to keep rates low. The distinction between market exposure and market opportunity is an important point that must be understood. *Market exposure* can be thought of as the times when total load exceeds total resilient generation potential. *Market opportunity* is the times when market energy prices are lower than the variable energy costs of our dispatchable resources. In times of market opportunity most of our dispatchable resources can be ramped down or completely curtailed, which reduces customer cost. The important factor to remember is that just because the dispatchable units are ramped down to minimums or offline completely does not mean they are unavailable to cover Otter Tail's load, should market conditions change.
>
> Figure 3-9 (below) compares Otter Tail's 2022 forecasted hourly load to existing resilient generation capabilities. The blue line in Figure 3-9 depicts OTP's winter and summer load duration curves. A load duration curve illustrates the total amount of load in each hour of the season arranged in order of magnitude. From it, we can consider the maximum amount of load we need to be prepared to serve over the course of a year. The grey line in Figure 3-9 is drawn to show the level of our resilient generation resources. The purpose of this figure is to show the relationship between resilient generation capabilities and forecasted hourly load and potential market exposure if variable resources were not generating at the time load exceeded the resilient generation capabilities. As shown in the figure,

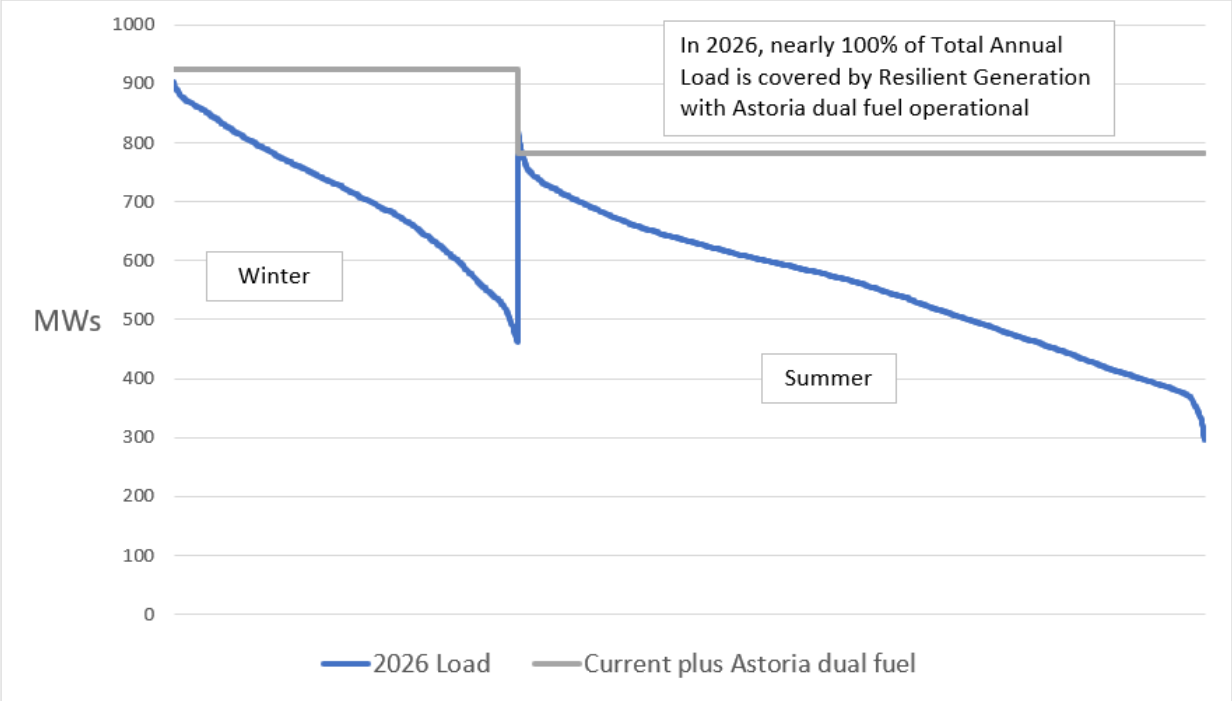
Otter Tail projects that 10.6 percent of its overall load will be exposed to market energy prices assuming no variable resource generation in 2022."

Figure 3-9: 2022 Forecasted Load Relationship with Resilient Generation



Supplemental Figure 3-10 below similarly compares Otter Tail's 2026 forecasted hourly load with the resilient generation from current resources plus Astoria dual fuel. As illustrated by Supplemental Figure 3-10, dual fuel at Astoria reduces the amount of load not backed by resilient generation from 10.6 percent to zero percent in the winter and almost zero percent in the summer.

Supplemental Figure 3-10: 2030 Forecasted Load Relationship with Resilient Generation (Current plus Astoria Dual Fuel)



Assuming for analysis that Otter Tail did not add dual fuel at Astoria Station, then Supplemental Figure 3-10 does not fully capture the total market risk, and the total market risk in 2026 would be similar to 2022 in Figure 3-9 above. As provided in the Initial Filing:

> "The reason for this is because natural gas units tend to be the marginal units in the MISO energy market. This means that they set the price based on their variable energy cost. High market price situations are usually accompanied (or caused) by high natural gas prices. Relying on natural gas units to serve load during volatile market situations will not provide adequate price protection for customers unless those units have the ability and fuel on hand to switch to an alternate fuel source when natural gas prices are elevated. There is also the potential in extreme situations that natural gas might not be available, in which case the unit would be forced offline and unable to generate when it is needed most. This makes the addition of dual fuel capability at Astoria a particularly attractive resiliency enhancement.

> …To reduce the risk associated with natural gas generation, Otter Tail currently uses forward energy purchases to hedge against the potential for high natural gas prices in the winter months. Recently the forward energy purchase price points have been competitive due to the low market prices seen in the last handful of years. This is an adequate solution for the time being but adding dual fuel capability at Astoria will mitigate the need for forward energy hedge which Otter Tail finds desirable to reduce exposure to the forward energy purchase market.

The current forward energy purchase market is more volatile and has seen considerably higher prices than recent years. This considerable change is especially true in winter months where, as of October 2022, winter 2022-2023 on-peak prices are forecasted to average $100/MWh and off-peak prices are forecasted to average over $80/MWh for the upcoming December, January, and February. This compares to on-peak average pricing of $30/MWh and off-peak average pricing of $23.50/MWh for the same winter period from our Initial Filing. As provided in footnote 8 of the October Letter:

> "Since our Initial Filing, natural gas and market energy pricing have experienced a period of heightened volatility. The natural gas forecast in our Initial Filing included a $3.00 per MMBtu average price for 2022. Through August 2022, the Ventura Hub average timely price per MMBtu was $6.21/MMBtu. Similarly, our 2022 market energy forecasts in our Initial Filing included peak energy of approximately $28.50 and off-peak energy of $21.00. Through August, the 2022 actual peak and off-peak pricing for Otter Tail's load zone were $56.34 and $38.21, respectively."

In summary, forecasted market pricing has increased significantly since our initial filing in this docket and that increase has brought even greater emphasis to the market exposures that we described in the initial filing.

B. Dual Fuel at Astoria Station Mitigates Natural Gas Price Volatility.

As provided in our Initial Filing, Section 3.10 "Adding Dual Fuel Capabilities at Astoria Station":

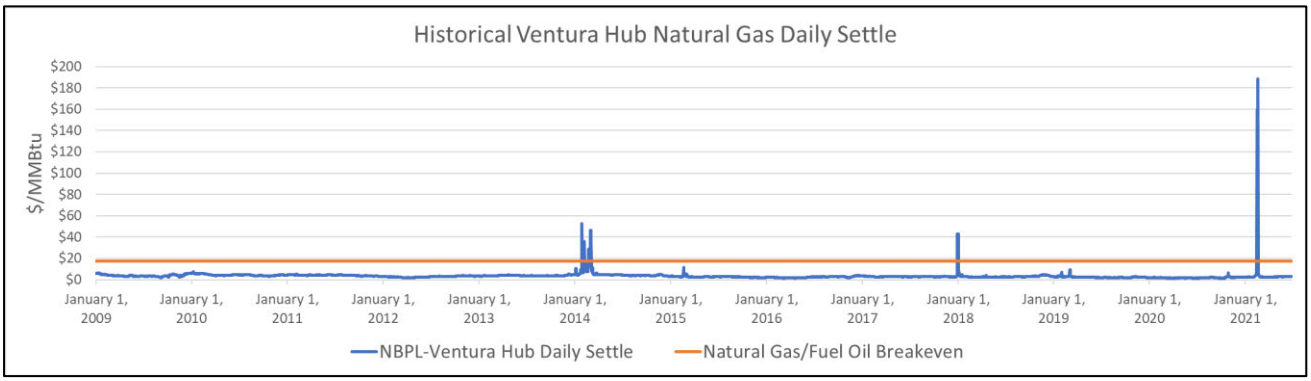
> "Astoria Station was designed, permitted, and constructed with natural gas as the sole source of fuel. Prior to selecting a combustion turbine, Otter Tail confirmed that any one of the potential combustion turbines selected could be converted to dual fuel. To be clear, MISO does not currently require dual fuel capabilities for capacity accreditation. Prior to MISO, it is our understanding that MAPP (the Midwest Area Power Pool) required fuel oil backup for natural gas fired units which is why we have fuel oil backup at our Solway Power plant. The natural gas transmission lines are very reliable. In fact, even during Winter Storm Uri in February 2021, natural gas would have been available for Astoria Station if it would have needed to operate. What Winter Storm Uri highlighted more so than any time before is natural gas volatility and intra-day price risk; risk that dual

fuel capabilities at a peaker would protect against. The volatility seen during Winter Storm Uri demonstrates that installation of dual fuel capability at Astoria is justified and have inherent reliability benefits, as discussed below.

Natural Gas Price Volatility

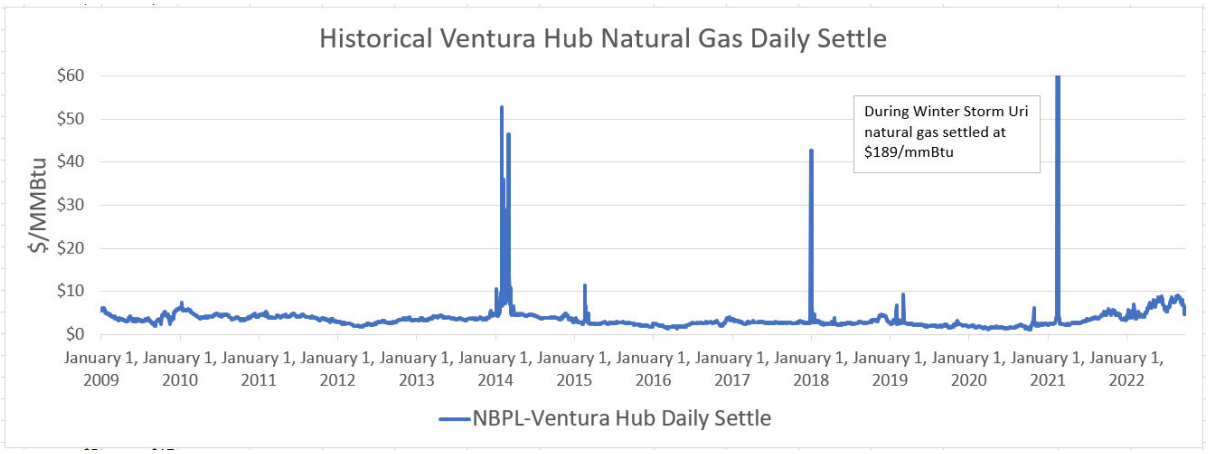
The natural gas transmission lines, where the Otter Tail natural gas peakers are located, are very reliable. The extraordinary pricing variability during the 2021 Winter Storm Uri event generated our internal review of the intra-day pricing variability exposure of a natural gas generator without a secondary fuel source backup. Over the past decade, there have been three events that caused high gas prices, the most recent of which was Winter Storm Uri. Figure 3-11 below depicts the gas market prices since January 2009. "

Figure 3-11: Historic Ventura Hub Natural Gas Prices



Otter Tail provides Supplemental Figure 3-11 below depicting the gas market prices since January 2009 up to those most currently available. Note also that the "Y" axis values have been reduced to better illustrate the market variability over the period. Note also that during the January 2022 event, gas settlements were above the highest point of the "Y" axis of Supplemental Figure 3-11.

Supplemental Figure 3-11: Historic Ventura Hub Natural Gas Prices



> "With increased reliance on variable renewable resources and natural gas generation to fill short term electrical demand needs, history has shown that natural gas prices can be volatile, and we expect that to continue. But the advent of fracking has made the long-term price of gas more stable."

Since the Initial Filing, world events have caused volatility in the gas markets. This is due to a variety of events including the world's response to the war in Ukraine, and as detailed above, it has caused gas prices to more than double, on average, in the near term compared to those forecasted in our Initial Filing.

> "Analyzing the economic benefits of dual fuel (or on-site backup fuel oil) at Astoria when considering the intra-day pricing risk has focused on three primary factors:
>
> - *Protection against intraday natural gas pricing deltas* – During extreme and volatile pricing conditions, like what was seen in February 2021, the natural gas market can vary dramatically between the time a generation offer is given to MISO and when MISO clears the offer. If the quantity of MWs cleared varies from expectations, and the price to procure or liquidate additional natural gas fuel supply varies from expectations, the generator can be exposed to significant pricing risk. Dual fuel capability mitigates if not eliminates this risk by providing a known and stable fuel supply during extreme natural gas pricing events.
>
> - *Energy hedge value* – Without the ability to call on Astoria Station for dual fuel capability (and therefore run the facility at a pre-determined energy price), Otter Tail has utilized energy purchases at the Otter Tail load zone to hedge against high priced, natural gas-driven markets during the winter months of December, January, and February. This winter energy hedge purchase could likely be significantly reduced or eliminated with installation of dual fuel. While not directly related to intraday pricing risk, this value can be considered in the analysis. "

Otter Tail will continue to evaluate the appropriateness of hedging strategies going forward in order to help address the uncertainty of the higher and volatile energy market being a rising tide or transient event. We continue to focus on appropriately protecting our customers from price volatility.

> - *"Changing MISO capacity construct* – It is not yet certain if a change to the capacity construct within MISO will occur, but the issue is being seriously considered."

As provided in the October Letter:

"On August 31, 2022, FERC approved MISO Tariff revisions that include the adoption of a seasonal resource adequacy construct and capacity requirements.[6] These changes allow MISO to move forward with seasonal capacity auctions with each season having its own capacity requirement based on seasonal coincident peak loads and a seasonal reserve margin. The changes also allow MISO to accredit resources based on their historic availability during Resource Adequacy (RA) hours rather than on the forced outage rate methodology where all hours are treated equally. These changes will be implemented in the 2023/2024 planning year.

The following continues Section 3.10 from the Initial Filing:

"Using Winter Storm Uri as an example, Otter Tail has been able to back cast the value of having dual fuel available at Astoria Station.[7] The data below provides insight on the potential, historical, financial implications. The following analysis assumes the value of avoiding intraday natural gas forecasting uncertainty. This includes intraday pricing deltas, and timing challenges associated with procurement of natural gas, offering generation, and commitment/dispatch by the MISO market.

The analysis is based on historical energy and natural gas pricing data during Winter Storm Uri. Despite the historical data, numerous assumptions were required, complicating the analysis, including timely gas nominations, intraday purchase pricing and liquidation pricing, and changing market conditions. Sensitivity analysis was completed based on varied natural gas timely nominations and energy market pricing.

Table 3-12: February 2021 LMP Pricing Scenario

				Gas Only		Duel Fuel Integration			Net Benefit Delta	
LMP Pricing Scenario	Timely Gas Purchase: % of Daily Capacity	Timely MMBtu Purchase (MMBTu)	Intraday Purchase (MMBTu)	Net Benefit: Average Gas Case	Net Benefit: Worst Gas Case	Fuel Oil Dispatch (MWh)	Net Benefit: Average Gas Case	Net Benefit: Worst Gas Case	**Net Benefit: Average Gas Case**	**Net Benefit: Worst Gas Case**
Historical Astoria LMPs	0%	0	43,696	($545,053)	($2,388,478)	20,825	$2,736,879	$2,736,879	**$3,281,932**	**$5,125,357**
	10%	72,098	(28,402)	($2,158,476)	($5,394,416)	20,825	$2,801,247	$2,710,305	**$4,959,723**	**$8,104,721**
	15%	108,148	(64,452)	($3,016,393)	($7,449,380)	20,825	$2,833,431	$2,697,018	**$5,849,825**	**$10,146,398**
	25%	180,246	(136,550)	($4,834,641)	($12,663,298)	20,825	$2,897,799	$2,670,444	**$7,732,440**	**$15,333,742**
	50%	360,492	(316,796)	($9,391,184)	($25,720,761)	20,825	$3,047,796	$2,581,341	**$12,438,980**	**$28,302,102**
	100%	720,984	(677,288)	($18,547,966)	($51,926,357)	20,825	$3,304,092	$2,312,466	**$21,852,058**	**$54,238,823**
Historical Astoria LMPs X2	0%	0	281,293	($3,059,285)	($16,700,630)	35,525	$8,991,457	$8,868,562	**$12,050,742**	**$25,569,192**
	25%	180,246	101,047	($6,509,090)	($18,603,269)	35,525	$9,326,478	$9,244,548	**$15,835,568**	**$27,847,817**
MISO LMP Price Cap $3,500/MWh	0%	0	720,984	$173,912,028	$95,423,088	64,680	$216,278,628	$216,114,768	**$42,366,600**	**$120,691,680**
	25%	180,246	540,738	$172,612,885	$113,746,180	64,680	$216,613,650	$216,490,755	**$44,000,764**	**$102,744,574**
Historical SPP Big Stone LMPs	0%	0	494,311	$35,155,620	($13,818,038)	38,710	$66,852,204	$66,708,827	**$31,696,585**	**$80,526,865**
	25%	180,246	314,065	$33,105,452	($4,972,881)	38,710	$67,187,226	$67,084,813	**$34,081,774**	**$72,057,694**

[6] 180 FERC ¶ 61,141 Order Accepting Proposed Tariff Revisions Subject to Condition, August 31, 2022. FERC Docket Nos. ER22-495-000, ER22-495-001.

[7] During Winter Storm Uri Otter Tail had not yet retired Hoot Lake and Astoria Station was still in the testing phase. As such, these costs were not incurred by Otter Tail or its customers.

The possible benefits of having dual fuel at Astoria Station varied significantly based on the given sensitivity. In the cases where February 2021 historical Astoria LMP data was utilized, the net benefit of dual fuel capability ranged from $3.2 million to $21.8 million, depending on the amount of timely gas nominations. The net benefit nearly doubles under a "worst" natural gas scenario where natural gas is either purchased at the high trading mark of the day or liquidated at the low trading mark of the day.

Additional scenarios considered the possibility of increased LMP prices above and beyond what was historically experienced during Winter Storm Uri. Under these scenarios, the net benefit ranged from $12.1 million - $44.0 million. While some of these scenarios have a very remote possibility of occurrence, it is prudent to mitigate these risks and increase our fleet resiliency by adding dual fuel capability at Astoria Station."

Otter Tail's analysis in developing the on-site storage project identified that the delivery of additional fuel is uncertain. For this reason, Supplemental Table 3-12 is an update to the Initial Filing Table 3-12 and caps the dispatch of the unit at five-days.[8] It also updates the output of Astoria Station from 245 MW to 285 MW and allows for unit commitment in the real-time energy market. Assuming 285 MW of output, a five-day supply of on-site fuel would allow for generation output of 34,200 MWh from the stored dual fuel resource. This theoretical event contains simplified assumptions for the purpose of providing a guideline for possible futures. It also allows for utilization and optimization of a relatively low-cost, stored fuel resource within a high priced, volatile market.

Supplemental Table 3-12: February 2021 LMP Pricing Scenario

				Gas Only		LNG Dual Fuel Integration (5 Day Invty)			Net Benefit Delta	
LMP Pricing Scenario	Timely Gas Purchase: % of Daily Capacity	Timely MMBtu Purchase (MMBTu)	Intraday Purchase (MMBTu)	Net Benefit: Average Gas Case	Net Benefit: Worst Gas Case	LNG Dispatch (MWh)	Net Benefit: Average Gas Case	Net Benefit: Worst Gas Case	**Net Benefit: Average Gas Case**	**Net Benefit: Worst Gas Case**
Historical Astoria LMPs	0%	0	70,950	($840,795)	($5,346,120)	31,350	$3,862,028	$3,826,553	**$4,702,823**	**$9,172,673**
	10%	74,923	(3,973)	($2,313,096)	($6,226,902)	31,350	$3,962,974	$3,892,932	**$6,276,069**	**$10,119,834**
	15%	112,385	(41,435)	($3,102,458)	($7,240,915)	31,350	$4,013,447	$3,926,121	**$7,115,905**	**$11,167,036**
	25%	187,308	(116,358)	($4,943,698)	($12,246,128)	31,350	$4,100,203	$3,953,336	**$9,043,901**	**$16,199,464**
	50%	374,616	(303,666)	($9,678,766)	($25,815,180)	31,350	$4,256,076	$3,860,743	**$13,934,842**	**$29,675,922**
	100%	749,232	(678,282)	($19,194,308)	($53,047,505)	31,350	$4,522,414	$3,581,333	**$23,716,723**	**$56,628,838**
Historical Astoria LMPs X2	0%	0	337,722	($3,727,217)	($28,119,827)	34,200	$10,403,895	$10,276,185	**$14,131,112**	**$38,396,012**
	25%	187,308	150,414	($6,957,434)	($25,620,066)	34,200	$11,075,987	$10,990,847	**$18,033,421**	**$36,610,913**
MISO LMP Price Cap $3,500/MWh	0%	0	749,232	$208,816,344	$127,252,224	34,200	$245,272,001	$245,101,721	**$36,455,656**	**$117,849,497**
	25%	187,308	561,924	$207,466,301	$146,293,211	34,200	$247,740,255	$247,612,545	**$40,273,954**	**$101,319,334**
Historical SPP Big Stone LMPs	0%	0	533,544	$45,673,869	($9,688,416)	34,200	$71,788,382	$71,639,387	**$26,114,513**	**$81,327,803**
	25%	187,308	346,236	$43,969,076	$4,875,626	34,200	$72,460,473	$72,354,048	**$28,491,398**	**$67,478,423**

[8] 5 days x 24 hours x 285 MWs = 34,200 MWh. The 285 MW is the winter capacity as reflected in Supplemental Table 3-9 above.

In Supplemental Table 3-12, the benefits of having dual fuel at Astoria Station varied significantly based on the given sensitivity. In the cases where February 2021 historical Astoria LMP data was utilized, the net benefit of dual fuel capability ranged from $4.7 million to $23.7 million, depending on the amount of timely gas nominations. Similar to the Initial Filing analysis, the net benefit nearly doubles under a "worst" natural gas scenario where natural gas is either purchased at the high trading mark of the day or liquidated at the low trading mark of the day.

Under the additional scenarios considering the possibility of increased LMP prices above what was historically experienced during Winter Storm Uri, the net benefit ranged from $14.1 million - $40.3 million.

Astoria Station's location on the Northern Border Pipeline is advantageous. It is located between the Canadian and North Dakota supplier injection points and the higher load centers to the southeast. It is important to note that natural gas was always available for Astoria Station during Winter Storm Uri in February 2021. However, while the deliverability of gas was stable, the price for the delivered gas was high. Even if one believes gas deliveries would remain stable in a future event (which cannot be guaranteed, of course), dual fuel capability still mitigates the risk of intraday pricing volatility and overall energy pricing risks that were experienced by some other utilities during the February 2021 event.

Propensity for an Event

Figure 3-11 above can be used as a guideline to determine the propensity for future Winter Storm Uri-type events, but it cannot be concluded that the propensity for such events will not grow in the future. In fact, there are reasons to conclude the propensity will in fact grow. In any event, in Figure 3-11, natural gas prices rose significantly three separate times, for different durations, over a 12-year span, or roughly once every four years. Given this history and recent world events, for the sake of creating price stability and reducing unknowns for our customers, we analyzed the net benefits in Supplemental Table 3-12 with likelihood of events of similar magnitude occurring with a frequency of once every four years into the future.

We calculated the net present value financial benefit of on-site fuel inventory by including the net benefits delta from Supplemental Table 3-12 into a table with an event occurring once every four years and discounting future events back to present day dollars.[9] Using Supplemental Table 3-12 and a four-year propensity, the net present

[9] Astoria Station was commissioned in 2021 with a 35 year life to 2056. Astoria Station dual fuel will be commissioned in 2026.

value of the financial benefits for many of the scenarios could offset a significant portion of the cost of the project while also increasing reliability and reducing rate volatility.

IV. UPDATED INFORMATION SUPPORTING ON-SITE FUEL INVENTORY AT ASTORIA STATION

A. Fuel Type

As provided in the October Letter:

> "Our development work has allowed us to refine the plan for dual fuel at Astoria Station. Our Initial Filing proposed fuel oil as the secondary on-site fuel. Since then, our analysis shows the most cost-effective secondary fuel source for Astoria Station is most likely liquified natural gas (LNG.) This is based on LNG having lower initial capital cost, lower O&M costs, and lower fuel cost as compared to fuel oil. In addition to lower overall costs, LNG does not have the emissions, capacity, or operational drawbacks or limitations that have been identified with fuel oil as a secondary fuel source."

To determine the most cost-effective fuel source for Astoria, conceptual designs and cost estimates were developed for a fuel oil project and an LNG project. Otter Tail retained Sargent & Lundy to develop the fuel oil design and cost estimate and to complete the economic analysis between fuel oil and LNG. For LNG, Otter Tail retained HDR, Inc., to develop the design and cost estimate. HDR, Inc., has experience in estimating and supporting recent LNG projects. After the conceptual designs and cost estimates were completed a net present value comparison was used to determine which fuel source would have the lowest cost over a 30-year life.

Similar to all peak shaving natural gas facilities, Astoria will utilize an LNG storage tank and the required pumps and vaporizers to convert the liquid to a gas. The vaporized gas will be delivered to the turbine via the same onsite route as pipeline natural gas. Since vaporized LNG is like pipeline natural gas, combustion turbine modifications will not be required and combustion turbine operation will remain the same. One difference between Astoria's LNG project and large peak shaving natural gas facilities is that Otter Tail does not intend to install equipment to liquify pipeline natural gas onsite. Otter Tail evaluated onsite liquefaction and could not justify the added cost. This is mainly due to the frequency at which Otter Tail assumed LNG would be used. LNG will be trucked to site and will be procured under a long-term agreement that will be competitively bid.

This dual fuel option offers more flexibility in how the unit is offered into the energy market creating even greater value than stored fuel oil for protecting customers from severe events.

B. Costs/Revenue Requirements updates

As stated in our October Letter:

> "Our Initial Filing sought approval to advance the dual fuel project with a preliminary estimated cost of **[PROTECTED DATA BEGINS…**
>
> **…PROTECTED DATA ENDS.]** For reference, the estimated cost of converting Astoria Station to dual fuel using **[PROTECTED DATA BEGINS… …PROTECTED DATA ENDS.]** The benefits for adding dual fuel to Astoria, as described in our Initial Filing, still exist despite the revised cost estimate."

The basis of the preliminary estimated cost of **[PROTECTED DATA BEGINS… …PROTECTED DATA ENDS.]** was a generic dual fuel retrofit project. As stated in the Initial Filing, Otter Tail engaged an engineering firm and initiated dialogue with the combustion turbine supplier to develop a more refined cost estimate and preliminary schedule. The current cost estimate is based on information and design specific to Astoria. There are three factors that contribute to the increase of **[PROTECTED DATA BEGINS…**

…PROTECTED DATA ENDS.]

Otter Tail had not contemplated an LNG option at the time of the Initial Filing. However, Otter Tail reviewed alternatives to fuel oil at Astoria and completed an analysis of LNG per above. The result is that LNG is a lower cost option with better emissions, capacity, and operational characteristics as compared to fuel oil.

V. OUR REQUEST MEETS THE IRP CRITERIA FOR COMMISSION APPROVAL.

As stated above, these Supplemental Comments reiterate and expand on our Initial Filing and October Letter to provide the Commission a record upon which it should approve on-site fuel inventory at Astoria Station. Along with these Supplemental Comments, Otter Tail will file supplemental responses to information requests in this proceeding related to the dual fuel project.

Our request that the Commission not defer consideration of dual fuel at Astoria Station reflects the preceding resiliency analysis. Also, by acting now the Commission will permit Otter Tail to maintain the current project schedule, which anticipates

commercial operation in early 2026. Maintaining the current project schedule allows Otter Tail to mitigate risks for its customers associated with increasingly complex supply chain issues, inflationary pressures, and corresponding cost increases that would not be in the public interest.

As stated in the October Letter,

> "By addressing dual fuel at Astoria Station without delay, the Commission does not presuppose the outcome of any other part of our preferred plan, including possible revisions premised on the updated modeling that we have proposed. Indeed, the Astoria dual fuel proposal is justified by the resiliency analysis in our Initial Filing, and therefore the updated assumptions to be included in our modeling will not impact the analysis supporting the dual fuel proposal. The dual fuel proposal stands on its own merits."

The addition of dual fuel at Astoria Station maintains and enhances system resiliency, the importance of which has been demonstrated by events such as the recent Winter Storm Uri. Specifically, adding dual fuel capability at Astoria Station substantially increases the level of resilient generation provided by Otter Tail's generation portfolio during all seasons and mitigates natural gas market volatility, to the benefit of customers. It allows Otter Tail to preserve an important on-site fuel inventory attribute associated with our retired Hoot Lake generation unit. Until we add the capability for on-site fuel inventory at Astoria, we will be without an important dispatchable-market-hedge attribute that was lost when Hoot Lake was retired. Without this attribute, our customers are exposed to market disruptions and reliability and economic risks as described in these comments.

Minnesota Rules 7843.0500, subpart 3, identifies five factors (lettered "a" through "e") that should be used to evaluate requests in an IRP proceeding. Such requests should be evaluated based on their ability to:

a. maintain or improve the adequacy and reliability of utility service;
b. keep the customers' bills and the utility's rates as low as practicable, given regulatory and other constraints;
c. minimize adverse socioeconomic effects and adverse effects upon the environment;
d. enhance the utility's ability to respond to changes in the financial, social, and technological factors affecting its operations; and
e. limit the risk of adverse effects on the utility and its customers from financial, social, and technological factors that the utility cannot control.

As described in this request, these factors are satisfied for the dual fuel (on-site fuel) project. This project is squarely aimed at maintaining the *adequacy and reliability* of our service (at levels comparable to what our customers have had historically) (factor "a"), *mitigating risks of higher rates* due to market disruption (factor "b"), *enhancing our ability to respond to financial and technological changes* that affect our operations (factor "d"), and *limiting risks of adverse effects on OTP and its customers* due to larger financial and technological factors outside our reasonable control (factor "e"). Also, as described in these Comments, this request is intended to preserve on-site inventory of fuel like we had at Hoot Lake. It is also consistent with *minimizing adverse socioeconomic effects and effects on the environment* (i.e. transitioning from coal-fired Hoot Lake Plant to Merricourt Wind Energy Center and Astoria, a natural gas-fired resource that emits approximately 50 percent less carbon dioxide than a coal-fired resource), and for which it is critical we not lose important generation attributes in the process of that transition (factor "c"). For these reasons, our proposal is well supported under the factors that are to be considered and we therefore ask that our request be granted.

VI. CONCLUSION

Based on the foregoing, Otter Tail respectfully requests that the Commission authorize Otter Tail to develop and install dual fuel at Astoria Station.

Dated: November 4, 2022

Respectfully submitted,

OTTER TAIL POWER COMPANY

Sincerely,

/s/ NATHAN JENSEN

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CERTIFICATE OF SERVICE

RE: In the Matter of Otter Tail Power Company's 2022-2036 Resource Plan
Docket No. E017/RP-21-339

I, Kim Ward, hereby certify that I have this day served a copy of the following, or a summary thereof, on Will Seuffert and Sharon Ferguson by e-filing, and to all other persons on the attached service list by electronic service or by First Class Mail.

Otter Tail Power Company
Supplemental Comments

Dated this **4th** day of **November, 2022**.

/s/ Kim Ward
Kim Ward, Regulatory
Lead Regulatory Filing Coordinator
Otter Tail Power Company
215 South Cascade Street
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