



Before the North Dakota Public Service Commission  
State of North Dakota

In the Matter of the Application of Otter Tail Power Company  
For Advance Prudence on the Astoria Station Onsite  
Fuel Inventory System in North Dakota

Case No. PU-23-066  
OAH File No. 202300080

Exhibit \_\_\_\_\_

**ASTORIA STATION PROJECT**

Rebuttal Testimony

**RYAN D. RETZLAFF**

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October 16, 2023

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1 **I. INTRODUCTION AND QUALIFICATIONS**

2 Q. PLEASE STATE YOUR NAME AND EMPLOYER.

3 A. My name is Ryan D. Retzlaff. I am employed by Otter Tail Power Company (Otter  
4 Tail or Company) as its Manager of Power Services.  
5

6 Q. PLEASE SUMMARIZE YOUR CURRENT RESPONSIBILITIES.

7 A. The primary responsibility of Power Services is to implement wholesale energy  
8 market strategies that optimize Otter Tail's generation resources with other  
9 resource alternatives to meet customer needs in a low-cost, reliable manner, all  
10 while maintaining an appropriate level of risk tolerance. I oversee the Company's  
11 wholesale energy market functions, including daily submission of generation offers  
12 and load bids, procurement of natural gas fuel for our generation resources,  
13 oversight of the Company's Auction Revenue Rights and Financial Transmission  
14 Rights portfolios, procurement of forward energy, capacity, and natural gas  
15 contracts, and accounting of wholesale energy market financial settlements.

16 **II. PURPOSE AND OVERVIEW OF DIRECT TESTIMONY**

17 Q. HAVE YOU PREVIOUSLY PROVIDED TESTIMONY IN THE PROCEEDING?

18 A. Yes, I filed Direct Testimony supporting Otter Tail's application for an advanced  
19 determination of prudence for the Company's Astoria Station fuel storage project.  
20

21 Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY?

22 A. In my Rebuttal Testimony I respond to several of Mr. Heidell's conclusions and  
23 recommendations that are inaccurate, incorrect or require additional context.  
24

25 Q. PLEASE EXPLAIN HOW YOUR TESTIMONY IS ORGANIZED.

26 A. In Section III (A) of my testimony I explain why Mr. Heidell is incorrect in his  
27 assessment that Astoria Station lacked fuel during Winter Storm Elliott because of  
28 insufficient transport service. I explain that the reason for the lack of fuel and the  
29 forced outage at Astoria Station was lack of fuel supply. Related to this I explain  
30 the difficulty of procuring timely (day ahead) gas for Astoria Station, especially  
31 during a winter storm event where it is practically impossible for Otter Tail to  
32 predict all the variables necessary to forecast gas purchases.

33 In Section III (B) of my testimony I explain why Mr. Heidell's assessment  
34 of the financial benefits of having stored fuel at Astoria Station is incorrect. This

1 relates to my Direct Testimony where I provided a financial assessment of the  
2 potential cost effectiveness of fuel storage based on the conditions present during  
3 Winter Storm Uri. I explain that Mr. Heidell's analysis and conclusions do not  
4 recognize daily energy and natural gas logistical scheduling constraints and  
5 associated intra-day pricing risks. Failure to account for these factors causes Mr.  
6 Heidell to understate the value of having stored fuel at Astoria Station.

7 In Section III (C) of my testimony I respond to Mr. Heidell's assessment  
8 regarding hedging utilizing forward energy purchases and call options and whether  
9 these instruments could provide an adequate substitute for stored fuel at Astoria  
10 Station. I concur with Mr. Heidell on several points but take issue with the part of  
11 his testimony that fails to recognize the inadequacy of these instruments during  
12 extreme system events; something fuel storage is intended to address.

13 **III. RESPONSE TO DIRECT TESTIMONY OF JAMES HEIDEL**

14 **A. FUEL SUPPLY TRANSPORT RELIABILITY & PROCUREMENT**

15 Q. DID YOU PROVIDE AN ANALYSIS OF WINTER STORM ELLIOT IN YOUR  
16 DIRECT TESTIMONY?

17 A. Yes.

18  
19 Q. WHAT DID THAT ANALYSIS INDICATE?

20 A. The review of Winter Storm Elliot highlights the considerable difficulty in  
21 predicting unit commitment, gas consumption, and reliability needs associated  
22 with an extreme system event. It also illustrates the volatility of the gas and energy  
23 markets during extreme operating conditions. Perhaps most importantly it  
24 demonstrates the inherent uncertainty associated with timing of fuel procurement  
25 decisions and actual operations. In the case of Winter Storm Elliot, onsite fuel  
26 storage as we have proposed would have provided Astoria Station a stable fuel  
27 resource at a known cost, certainty of fuel supply, and avoidance of a multi-day  
28 forced outage due to natural gas production freeze offs. The review of Winter  
29 Storm Elliot further clarifies that fuel supply delivered to Astoria Station utilized  
30 highly reliable transport. It also highlights the forced outage at Astoria Station was  
31 not due to transport curtailment or priority but due to a lack of fuel supply caused  
32 by gas production freeze-offs.  
33

1 Q. DO YOU HAVE CONCERNS WITH MR. HEIDELL'S DESCRIPTION OF THE  
2 ASTORIA STATION FORCED OUTAGE DURING WINTER STORM ELLIOT?

3 A. Yes, I do. Beginning on page 21 line 12, Mr. Heidell's testimony examines the  
4 Winter Storm Elliot Astoria forced outage. Mr. Heidell states, in part, "Tenaska  
5 Marketing Ventures, the asset manager for Astoria, holds firm transportation  
6 rights on Northern Border, but delivery to Astoria is secondary firm, not primary.  
7 Therefore, Astoria was unable to receive gas during this time." Mr. Heidell is  
8 suggesting the reason Astoria was unable to receive gas was due to insufficient  
9 transport service.

10

11 Q. IS THIS AN ACCURATE STATEMENT?

12 A. No. This assessment is inaccurate. The forced outage at Astoria Station during  
13 Winter Storm Elliot was not a result of transport priority or transport curtailment,  
14 it was due to lack of fuel supply. Furthermore, in an alternative scenario where  
15 transport curtailment might be required, Mr. Heidell's testimony suggests  
16 Astoria's firm secondary in-path transport service would be insufficient as  
17 compared to primary firm transport service, to ensure reliable fuel deliveries to  
18 Astoria Station. This assessment is a generalized and imprecise application of  
19 transport curtailment practices on Northern Border Pipeline (NBPL). In the vast  
20 majority of cases, the current secondary in-path service would be equivalent to  
21 primary firm service for delivery of fuel to Astoria.

22

23 Q. PLEASE EXPLAIN THE DIFFERENCE BETWEEN A FORCED OUTAGE DUE TO  
24 LACK OF SUPPLY AND A FORCED OUTAGE DUE TO LACK OF TRANSPORT.

25 A. Lack of transport occurs when there is insufficient capability of the pipeline  
26 infrastructure to move nominated gas volumes. For example, this may occur  
27 during the outage of a pipeline compressor station. Lack of supply occurs when  
28 production facilities are unable to inject enough natural gas into the pipeline to  
29 meet the desired demand for natural gas fuel supply. Lack of supply occurred  
30 during Winter Storm Elliot due to production facility freeze offs and their inability  
31 to inject gas molecules into the pipeline infrastructure. To be clear, the forced  
32 outage of Astoria Station associated with the Winter Storm Elliot event was not an  
33 issue of transport availability or curtailment.

34

1 Q. WAS THERE SUFFICIENT TRANSPORT CAPACITY TO SERVE ASTORIA  
2 STATION DURING WINTER STORM ELLIOT?

3 A. Yes. If additional gas supply could have been secured, there was ample transport  
4 capacity to flow that gas supply to Astoria Station.  
5

6 Q. WAS GAS FLOWING ON NORTHERN BOARDER PIPELINE DURING WINTER  
7 STORM ELLIOT?

8 A. Yes. The pipeline was flowing at approximately 50 percent of its available  
9 capability.  
10

11 Q. PLEASE EXPLAIN WHY ASTORIA STATION WAS UNABLE TO ACCESS THIS  
12 GAS SUPPLY.

13 A. While I am unable to comment on the exact purpose and delivery schedules of this  
14 gas supply, it is highly probable it was procured in advance of the intra-day  
15 nomination cycles. Despite reductions in supply caused by production freeze offs,  
16 supply that was available was likely utilized to meet previously scheduled  
17 nominations. During the evening of December 23, 2022, Otter Tail did not know  
18 if or when MISO would choose to dispatch Astoria Station. When MISO chose to  
19 commit and dispatch Astoria Station in real time, Otter Tail sought to acquire  
20 additional intra-day (or spot market) gas supply. Per our gas supplier, Tenaska  
21 Marketing Ventures (Tenaska), incremental intra-day gas was not available at any  
22 price. If additional supply would have been available, utilization of such gas would  
23 not have been dependent on availability or priority of transport.  
24

25 Q. WHY DIDN'T OTTER TAIL PROCURE ADDITIONAL GAS IN ADVANCE OF  
26 DECEMBER 23<sup>RD</sup> AND DECEMBER 24<sup>TH</sup>?

27 A. The decision to procure timely (day ahead) gas, can be incredibly difficult to  
28 determine, especially during a winter storm event. Numerous factors can create  
29 uncertainty when considering whether to make a timely gas purchase. Some of  
30 these factors include the gas nomination timeline paired with the energy market  
31 clearing timeline, delays in providing generation offers and receiving cleared  
32 awards, volatile gas markets, unknown MISO commitment and dispatch  
33 considerations, system reliability needs, varying wind and weather forecasts, and  
34 the intermittent nature of a simple cycle combustion turbine.  
35

1 Q. CAN YOU PROVIDE AN ILLUSTRATION OF THE DIFFICULTY OF  
2 FORECASTING GAS PURCHASES?

3 A. The below table demonstrates the volatility of MISO pricing, paired with  
4 generation output, at Astoria Station from December 23 through 24.  
5

6 **[PROTECTED DATA BEGINS...**

7  
8 **...PROTECTED DATA ENDS]**  
9

10 Please note day ahead pricing for both December 23 and 24 would not have  
11 suggested commitment and dispatch of Astoria Station, especially considering the  
12 very high cost to procure timely gas during this period. Given the high cost of gas  
13 and the day ahead clearing indications, a decision was made to abstain from  
14 purchasing timely (day ahead) gas.

15 It's also important to note the extreme swings in RT pricing at Astoria  
16 Station. Moving into the evening hours of December 23<sup>rd</sup>, Astoria LMP pricing  
17 reached a low of \$2.32/MWh. Only two hours later it jumped to \$1,474.24/MWh.  
18 By hour ending 24 on December 23<sup>rd</sup>, prices were significantly below zero.

1 Negative pricing continued well into December 24<sup>th</sup>. Despite continued hours of  
2 negative pricing and an Astoria Station offer price exceeding

3 **[PROTECTED DATA BEGINS... ... PROTECTED DATA**  
4 **ENDS]**, MISO continued to commit and dispatch the unit at approximately  
5 minimum output until hour ending 7 on December 24<sup>th</sup>. At that time, Otter Tail  
6 had exhausted all available fuel resources, requiring the unit to be placed on forced  
7 outage for lack of fuel. Given the negative LMP pricing, Otter Tail assumes that  
8 MISO felt it necessary to keep the unit online as long as possible for reliability  
9 purposes. Forecasting such conditions in advance would be nearly impossible.

10  
11 Q. DO YOU AGREE WITH MR. HEIDELL'S TESTIMONY CONCERNING THE  
12 RELIABILITY OF FUEL SUPPLY TRANSPORT SERVICE UTILIZED AT  
13 ASTORIA STATION?

14 A. Yes and no. Mr. Heidell's testimony correctly defines primary firm transport,  
15 secondary in-path transport, and secondary out-of-path transport priority.  
16 However, his testimony generalizes the curtailment process and does not correctly  
17 apply NBPL curtailment practices for Astoria Station under a theoretical transport  
18 constraint.

19  
20 Q. HOW IS CURTAILMENT CONDUCTED ON THE NBPL?

21 A. Curtailment on NBPL is applied based on the priority of transport at the point of  
22 the constraint, not necessarily the final delivery point. In the case of Astoria  
23 Station, the plant's gas manager Tenaska maintains primary firm transport  
24 contracts on NBPL that originate at various points upstream from Astoria and  
25 terminate at various points downstream from Astoria. Tenaska utilizes this  
26 primary firm transport to deliver gas from the production fields, down the pipeline,  
27 through compressor stations, and downstream past Astoria. If transport  
28 curtailment were to occur upstream from the Astoria delivery point, the gas  
29 supply nominated to Astoria Station on a secondary in-path transportation  
30 contract would be allocated at the primary firm priority level, the highest level of  
31 firm transport.

32  
33 Q. WHEN WOULD GAS BE CURTAILED AT ASTORIA STATION UNDER ITS  
34 TRANSPORT SERVICE LEVEL?

35 A. The gas delivered into the Astoria delivery point utilizes secondary in-path  
36 transport. The only time Astoria Station's gas supply would be curtailed based on  
37 utilization of lower priority secondary in-path service would be if there was a

1 transport constraint directly at the Astoria delivery point. Since the design  
2 capacity of the Astoria meter is set in excess of the unit's maximum daily  
3 consumption rate, and Otter Tail is the only entity scheduling gas deliveries to this  
4 meter, curtailment based on secondary in-path service should not occur. For all  
5 practical purposes, natural gas fuel supply is delivered to Astoria utilizing Tenaska  
6 contracted primary firm transport, the highest available transport priority.

7 **B. WINTER STORM URI FINANCIAL ANALYSIS/INTRADAY**  
8 **PRICING RISK**

9 Q. DID YOU PROVIDE A FINANCIAL IMPACT ANALYSIS OF HAVING ONSITE  
10 FUEL STORAGE AT ASTORIA STATION BASED ON WINTER STORM URI?

11 A. Yes. This analysis is found at pages 4 through 7 of my Direct Testimony.

12  
13 Q. PLEASE BRIEFLY DESCRIBE THAT ANALYSIS

14 A. Otter Tail's Winter Storm Uri financial analysis sought to quantify the possible  
15 financial impacts that might have occurred if Astoria had been online and  
16 operational during that period. The analysis utilized historical data while varying  
17 two different variables: system LMP pricing and timely natural gas purchases.  
18 Otter Tail considered four LMP pricing scenarios: historical Astoria LMP pricing,  
19 x2 historical Astoria LMP pricing, LMP pricing at VoLL (MISO's maximum  
20 allowed LMP price), and historical SPP pricing (utilizing Big Stone Plant as a near  
21 proxy). Timely natural gas purchases ranged from 0 percent to 100 percent of  
22 Astoria's daily fuel consumption.

23  
24 Q. WHAT DO YOU CONCLUDE FROM THAT ANALYSIS?

25 A. I concluded there are many possible scenarios where onsite LNG storage would  
26 have provided significant financial benefits. Using the analysis and a four-year  
27 propensity for similar extreme system events, the net present value of the financial  
28 benefits for many of the studied scenarios offsets a significant portion of the cost  
29 of the project while also increasing reliability and reducing rate volatility. I also  
30 gained a greater appreciation for the variability and unpredictability of extreme  
31 and volatile system events, and also the advantages associated with onsite fuel  
32 availability and flexibility.

33

1 Q. DID MR. HEIDELL CONDUCT AN ASSESSMENT OF THAT ANALYSIS?

2 A. Yes. Beginning on page 28 of his Direct Testimony. Mr. Heidell offers an  
3 assessment of the Astoria Station Winter Storm Uri financial analysis, had it been  
4 online and operational during that period.

5

6 Q. WHAT DID MR. HEIDELL CONCLUDE?

7 A. Mr. Heidell concluded that Otter Tail's estimation of cost savings, in a scenario  
8 where Astoria would have operated during Winter Storm Uri, with and without  
9 availability to onsite LNG stored fuel, were over-stated. Specifically, Mr. Heidell  
10 concluded that in the high financial loss scenarios the timely (day ahead) natural  
11 gas purchase assumptions were not reasonable. His conclusion led to a  
12 recommendation where only cases that assume no timely (day ahead) natural gas  
13 purchases should be considered valid.

14

15 Q. DO YOU AGREE WITH HIS ASSESSMENT?

16 A. I do not.

17

18 Q. PLEASE EXPLAIN WHY YOU DISAGREE.

19 A. Mr. Heidell's conclusion and recommendation is to discard all scenarios where  
20 timely gas is purchased. Such a recommendation eliminates a wide range of  
21 possible, and valid, financial outcomes that should be considered in valuing the  
22 financial benefits of onsite fuel. In my review of his testimony, it appears this  
23 recommendation is based on a misunderstanding of daily energy and natural gas  
24 procurement logistics and timelines.

25

26 Q. WHY DO YOU BELIEVE MR. HEIDELL'S CONCLUSION AND  
27 RECOMMENDATION IS BASED ON A MISUNDERSTANDING OF DAILY  
28 ENERGY AND NATURAL GAS PROCUREMENT LOGISTICS AND TIMELINES?

29 A. Starting on page 28, line 26, Mr. Heidell's testimony states:

30 *"All but the 0% Timely Purchase scenarios assume that various*  
31 *amounts of gas are bought day ahead on February 11, 2021, thru*  
32 *February 20, 2021. However, given the actual Day Ahead prices*  
33 *Otter Tail's bids into MISO would not have been picked up based*  
34 *upon the expectation of gas prices. **If the bids were not***  
35 ***selected, then Otter Tail would not have purchased day***  
36 ***ahead gas and then liquidated the gas intra-day at a***  
37 ***loss.**" (emphasis added)*

1 The above statement is incorrect. Otter Tail is not able to procure timely gas, at the  
2 timely quoted price, after the Astoria day ahead generation clearing awards are  
3 made known. In practice, Otter Tail is required to make timely gas purchases by  
4 8:30 AM the day prior to the operating day. Otter Tail is required to supply our  
5 generation offers to MISO (utilizing an estimated natural gas pricing quote) by  
6 9:30 AM prior to the operating day. It isn't until approximately 12:30 PM, prior  
7 to the operating day, that Otter Tail receives generation day ahead clearing results.  
8

9 Q. WHY IS THAT AN ISSUE?

10 A. Based on the sequence of events, given that the timely (day ahead) natural gas  
11 purchase deadline and the MISO generation offer submission deadline are due well  
12 before the release of day ahead clearing awards, it is impossible for Otter Tail to  
13 know how MISO will clear day ahead generation, how much gas we should have  
14 bought, how much additional gas we will need to procure, or how much gas we will  
15 need to liquidate. Furthermore, after 4 hours has passed from the timely gas  
16 purchase deadline, and 3 hours has passed from the generation offer submittal  
17 deadline, the price for procuring or liquidating additional gas could be significantly  
18 different, especially during an extreme or volatile system event. This scheduling  
19 and logistical disconnect is what Otter Tail refers to as intra-day pricing risk. For  
20 these reasons it is necessary to study varying levels of timely gas purchases in order  
21 to develop a full range of financial impacts.  
22

23 Q. CAN YOU FURTHER DESCRIBE INTRA-DAY PRICING RISK?

24 A. Yes. I described this risk at page 4 of my Direct Testimony:

25 *“During volatile pricing conditions the natural gas market can*  
26 *vary dramatically between the time a generation offer is given to*  
27 *MISO and when MISO clears the offer. If the quantity of MWs*  
28 *cleared varies from expectations, and the price to procure or*  
29 *liquidate additional natural gas fuel supply varies from*  
30 *expectations, the generator can be exposed to significant pricing*  
31 *risk. Onsite fuel inventory mitigates if not eliminates this risk by*  
32 *providing a known and stable fuel supply during extreme natural*  
33 *gas pricing events.”*

34 To further clarify, intra-day pricing risk occurs when a generation offer is made to  
35 MISO, but the clearing of the offer, or the commitment of the unit, occurs at a later  
36 time. During the delay, volatile natural gas markets can change considerably. If  
37 the gas initially purchased does not match the required fuel for the

1 cleared/committed unit, then Otter Tail must procure additional gas (or liquidate)  
2 at a price which could be significantly different than was expected at the time the  
3 offer was submitted to MISO.

4  
5 Q. DOES MR. HEIDELL MAKE OTHER STATEMENTS THAT REFLECT A  
6 MISUNDERSTANDING OF INTRA-DAY PRICING RISK?

7 A. Yes. On page 21 of Mr. Heidell's testimony he states the following:

8 *"Q. If Astoria were needed for system reliability but was not bid*  
9 *into the market due to expectations regarding gas and electric*  
10 *prices, would Otter Tail be compensated for the gas costs?*

11 *A. Yes, if gas were available and MISO directed Astoria to run,*  
12 *then Otter Tail would be compensated under MISO's Price*  
13 *Volatility Make-Whole Payments."*

14  
15 Q. WHY DOES THAT STATEMENT REFLECT A MISUNDERSTANDING OF  
16 INTRA-DAY PRICING RISK?

17 A. I would first note that Otter Tail does not have the option to withhold Astoria  
18 Station from the market as Mr. Heidell implies. As a MISO capacity accredited  
19 resource, Otter Tail is required to offer Astoria Station into the market whenever  
20 it is not on outage. This applies during even the most volatile market days. Second,  
21 Mr. Heidell's answer is only partially correct as it ignores intra-day pricing risk and  
22 associated delays between submission of a generation offer and receiving clearing  
23 awards or commitment instructions. Specifically, MISO will only issue make  
24 whole payments based on the Astoria offer price, not the actual costs of the fuel  
25 required for the cleared commitment.

26  
27 Q. CAN YOU PROVIDE AN EXAMPLE TO ILLUSTRATE YOUR POINT?

28 A. Yes. Consider a situation where at 9:30 AM Otter Tail submits a generation offer  
29 to MISO utilizing \$15/MMBtu gas. At that same time, Otter Tail utilizes their best  
30 market insight to predict a future, MISO directed, 8-hour commitment, and  
31 procures the required fuel for such a commitment. Three hours later, at 12:30 PM,  
32 MISO releases their day ahead commitment awards. The MISO commitment calls  
33 for Astoria to be dispatched for 20 hours utilizing the original \$15/MMBtu gas  
34 offer. However, Otter Tail did not procure enough fuel to cover the 20-hour  
35 commitment period so they must now acquire additional gas at a new price of  
36 \$50/MMBtu (due to a highly volatile gas market). In this case, MISO make whole

1 payments would only make Otter Tail whole to a 20-hour commitment utilizing  
2 the \$15/MMBtu gas price, far short of the actual cost of fuel to operate Astoria.

3  
4 Q. CAN YOU PROVIDE A TIMELINE OF THE TIMELY (DAY AHEAD) NATURAL  
5 GAS AND ENERGY TRADING DAY.

6 A. Yes. Consider the following:

7 Prior to 8:30 AM Otter Tail is required to notify Tenaska of requested timely  
8 natural gas purchases. These purchases are settled at the daily Ventura index price  
9 which isn't posted until much later in the day.

10 Post 8:30 AM, any Otter Tail gas purchases are considered intra-day purchases at  
11 a quoted, fixed, price, not tied to the timely index.

12 During the 8:30 to 9:30 AM hour Tenaska secures timely gas on behalf of Otter Tail  
13 (and other customers). After approximately 9:30 AM, the timely gas market  
14 becomes illiquid.

15 9:30 AM is the MISO submission deadline for generation offers for the following  
16 day's day ahead market.

17 At approximately 12:30 PM the MISO day ahead clearing results (generation  
18 awards) are posted. Additional intra-day gas purchases are available to Otter Tail.

19 Additional timely purchases are not available to Otter Tail.

20 1:00 PM is the deadline for Tenaska (and others) to submit their timely  
21 nominations, for the next day, to NBPL. Nominations must be tied to actual gas  
22 procured with intention to deliver.

23  
24 Q. WHAT IS THE SIGNIFICANCE OF THIS TIMELINE?

25 A. When considering the daily market activities timeline, it is necessary to realize the  
26 1:00 PM timely nomination deadline is for suppliers (Tenaska) to provide their  
27 nominations (or schedules) to NBPL. This nomination process doesn't include the  
28 actual procurement of gas. Instead, it's simply informing NBPL what gas a  
29 supplier/transporter has acquired and will be transporting on the system for the  
30 next day. The actual trading and procurement of timely gas generally occurs every  
31 trading day between 8:30 AM and 9:30 AM. After approximately 9:30 AM, the  
32 timely gas market becomes illiquid, and may not be tradable at all. It is important  
33 to again highlight the daily MISO generation offer submission deadline occurs at  
34 9:30 AM every morning. Otter Tail is required to have our daily offer submitted to  
35 the market well in advance of knowing the next day's clearing awards or pricing.  
36 At that time, we utilize our best market insight to forecast future commitment and  
37 procure timely fuel supply accordingly. Under volatile market conditions, gas

1 pricing can substantially change between 9:30 AM and 12:30 PM. Similarly, MISO  
2 cleared awards can vary significantly from expectations, requiring procurement of  
3 additional fuel, or conversely, liquidation. It is possible to procure additional gas  
4 at 12:30 PM, but it would be at a quoted, fixed, intra-day price. This price could  
5 be significantly different than the price utilized to craft the daily generation offer.  
6

7 Q. PLEASE SUMMARIZE WHY YOU DISAGREE WITH MR. HEIDELL'S  
8 ASSESSMENT OF THE WINTER STORM URI FINANCIAL IMPACT ANALYSIS.

9 A. I disagree because the assessment does not recognize daily energy and natural gas  
10 logistical scheduling constraints and associated intra-day pricing risks.  
11 Specifically, it does not acknowledge that timely natural gas purchases and  
12 generation offer submittals must be made hours in advance of knowing MISO day  
13 ahead market clearing results. Additional gas purchases, or liquidation, must then  
14 be made at pricing different from submitted generation offers, resulting in a  
15 mismatch between MISO make whole payments and actual fuel costs.  
16 Furthermore, in his assessment, Mr. Heidell suggests all cases that include timely  
17 natural gas purchases should be excluded. Exclusion of such cases removes  
18 numerous plausible, and perhaps likely, economic outcomes, greatly  
19 underestimating the financial benefits of onsite fuel storage during extreme system  
20 events. Given the conditions of Winter Storm Uri, Otter Tail believes it is  
21 reasonable to assume 25 percent to 50 percent of Astoria's gas needs would have  
22 been purchased utilizing timely nominations. Under such a scenario, the  
23 calculated net benefit of onsite fuel storage would have ranged between  
24 approximately \$9M and \$13.9M.

25 **C. HEDGING ANALYSIS**

26 Q. HAS OTTER TAIL PROVIDED AN ANALYSIS OF HEDGING UTILIZING  
27 FORWARD NATURAL GAS PURCHASES, CALL OPTIONS, AND STORAGE  
28 ALTERNATIVES AND WHETHER THEY COULD PROVIDE AN ADEQUATE  
29 SUBSTITUTE FOR STORED FUEL AT ASTORIA STATION?

30 A. Yes, Otter Tail provided a discussion on hedging utilizing forward natural gas  
31 purchases, call options, and storage alternatives in data request ND-PSC-2.09  
32 under Docket Number PU-23-066. This discussion was originally provided in  
33 Otter Tail's supplemental comments filed in the company's Minnesota IRP Docket  
34 No. E017/RP-21-339 on June 23, 2023.  
35

1 Q. CAN YOU BRIEFLY SUMMARIZE OTTER TAIL'S FINDINGS ON THIS TOPIC?

2 A. Yes. First and foremost, forward natural gas purchases, natural gas call options,  
3 and natural gas storage alternatives would serve as financial hedges, but not as  
4 reliability hedges. While these products can provide considerable financial  
5 benefits against changing monthly and daily market movements, they can be  
6 lacking in other aspects, including complexity in sizing, scheduling constraints,  
7 reduced flexibility and availability as compared to onsite LNG storage, long-term  
8 liquidity and price certainty, and intra-day pricing risk hedging capability. These  
9 hedging options may also only be available at considerable expense.

10

11 Q. DID MR. HEIDELL'S DIRECT TESTIMONY INCLUDE AN ASSESSMENT OF  
12 OTTER TAIL'S HEDGING ANALYSIS

13 A. Yes. Mr. Heidell addresses Otter Tail's hedging analysis at pages 11 through 16 of  
14 his Direct Testimony.

15

16 Q. DO YOU AGREE WITH THAT ASSESSMENT?

17 A. I agree in part. Much of Mr. Heidell's testimony accurately describes the pros and  
18 cons of hedging utilizing forward natural gas purchases and natural gas call  
19 options. There are other areas where Otter Tail takes exception with his  
20 assessment, as discussed below.

21

22 Q. DO YOU AGREE THAT FINANCIAL HEDGING DOES NOT HEDGE AGAINST  
23 OPERATIONAL RELIABILITY?

24 A. Yes. I agree that hedging utilizing forward natural gas purchases or natural gas  
25 call options are only capable of providing a financial hedge, not a reliability hedge.  
26 If the flow of natural gas fuel supply is disrupted, a financial hedge would not  
27 ensure physical fuel deliverability. Under such conditions, Astoria Station would  
28 be required to go on forced outage.

29

30 Q. DO YOU AGREE WITH MR. HEIDELL'S ASSESSMENT OF FORWARD  
31 NATURAL GAS PURCHASES AND NATURAL GAS CALL OPTIONS?

32 A. I agree with Mr. Heidell's acknowledgement that the sizing of both forward  
33 purchases and call options can be difficult considering Astoria is a low-capacity  
34 factor generation resource which is seeking to hedge against shorter duration  
35 system events. As Mr. Heidell correctly notes regarding call options, "*the option*  
36 *would need to be oversized to adequately carry Astoria through a winter storm*

1 *event.*” (Heidell Direct, p. 16 lines 5-6). I would further note the same holds true  
2 for a forward purchase.

3 Mr. Heidell’s testimony also correctly notes that a forward purchase, “could  
4 provide some level of protection against commodity price volatility, but that  
5 protection could be outweighed by losses realized in having to sell excess gas on  
6 the spot market if the full contract quantity is not needed. However, my  
7 perspective is that the rationale for hedging is to provide insurance against high  
8 prices. A hedge, versus speculation, reduces uncertainty and does not have to be  
9 profitable just as there are no guarantees that investing in onsite LNG will provide  
10 financial benefits that outweigh the costs.” (Heidell Direct p. 12 line 21-24). On  
11 this point I would add that the cost of utilizing a forward purchase as a hedging  
12 instrument is not financially insignificant. In a theoretical case where Astoria were  
13 to purchase a winter season (November through March) forward natural gas  
14 contract covering 75 percent of the unit’s daily output capability, there would be a  
15 **[PROTECTED DATA BEGINS... ..PROTECTED DATA ENDS]**  
16 hedge premium for every \$1/MMBtu that the contract price exceeded the daily  
17 delivered gas price.

18  
19 Q. WHERE DO YOU DISAGREE WITH MR. HEIDELL’S ASSESSMENT?

20 A. Mr. Heidell concludes his remarks on forward natural gas contracts, as compared  
21 to onsite LNG fuel storage, by stating the following, “*I disagree that financial*  
22 *hedges may not be a more cost-effective way to manage gas price volatility*  
23 ***outside of extreme events.***” (emphasis added) (Heidell Direct, p. 15 lines 1 –  
24 2). I would agree that financial hedges may be a more cost-effective way to  
25 manage changing natural gas pricing **outside of extreme events**. However, the  
26 primary financial benefits associated with onsite LNG fuel storage occur during  
27 extreme and volatile system events. These benefits occur through mitigation of  
28 intra-day pricing risk and maintaining a low-cost, stable, fuel supply during  
29 volatile market conditions. These factors are demonstrated in the Winter Storm  
30 Uri financial analysis.

31  
32 Q. WHAT ADVANTAGES DOES ONSITE LNG FUEL STORAGE PROVIDE OVER  
33 OTHER HEDGING OPTIONS?

34 A. Onsite LNG fuel storage is the only hedging option that provides increased fuel  
35 supply assurance and operational reliability in the event of both pipeline transport  
36 disturbances and supply disturbances. From a financial standpoint, onsite LNG  
37 fuel storage provides the best protection against intra-day pricing risk during

1 extreme system events. It also provides the most operational flexibility and  
2 accessibility. Forward purchases, call options, and storage contracts are subject to  
3 scheduling constraints associated with the daily natural gas markets. For example,  
4 an Astoria commitment occurring after the last intra-day gas nomination cycle, at  
5 7:00 PM, would not be able to nominate additional fuel supply from the pipeline  
6 until the following morning. Onsite LNG fuel storage would not be subject to any  
7 scheduling constraints or production reductions. Onsite LNG storage would have  
8 immediate access to its stored fuel resources allowing the plant to operate at full  
9 output up to five days.

10  
11 Q. DO YOU EXPECT FUTURE EXTREME SYSTEM EVENTS TO BE SIMILAR TO  
12 WINTER STORM URI AND WINTER STORM ELLIOT?

13 A. I would agree with Mr. Heidell's testimony that "extreme" events, regardless of  
14 their frequency, should be considered unique. While there inevitably will be future  
15 'extreme' events, they may not be like Winter Storm Uri." (Page 30 lines 23-25).  
16 However, I would emphasize that future extreme system events could be  
17 potentially even more extreme than Winter Storm Uri or Winter Storm Elliot.

18  
19 Q. WHAT LEADS YOU TO BELIEVE FUTURE EVENTS COULD BE POTENTIALLY  
20 EVEN MORE EXTREME THAN WINTER STORM URI OR ELLIOT?

21 A. Throughout North Dakota and South Dakota there is considerable overlap of the  
22 MISO and SPP footprints. During Winter Storm Uri (February 10, 2021, through  
23 February 20, 2021) MISO day ahead LMP pricing at Astoria averaged  
24 \$136.15/MWh (real time \$114.78/MWh). During the same period, day ahead  
25 pricing in SPP at Big Stone Plant (near Astoria Station) averaged \$1,173.33/MWh  
26 (real time \$408.21/MWh). If system conditions would have been different, it is  
27 plausible that MISO could experience pricing levels like SPP.

28 MISO is also considering redefining its Value of Lost Load (VoLL). VoLL is  
29 meant to represent the price customers are willing to pay to avoid an interruption  
30 of electric service and is the hard price cap for market pricing within MISO.  
31 Currently the MISO VoLL is set at \$3,500/MWh but ongoing discussions have  
32 included proposals to raise it as high as \$25,000/MWh.

33 It should also be noted that as dispatchable resources are retired from the  
34 grid, the need for natural gas fired generation will grow, increasing demand on  
35 existing natural gas supply and pipeline infrastructure. One could reasonably  
36 expect increased demand for natural gas supply would amplify the volatility of both  
37 the electric and natural gas markets during extreme system events.

1 Q. ARE THERE OTHER CONSIDERATIONS ABOUT EXTREME EVENTS?

2 A. There are many variables that make extreme system events unique. These  
3 variables include, but are not limited to, natural gas transport disruption, lack of  
4 natural gas supply, loss of electrical transmission, forced generation outages,  
5 extreme volatility in the natural gas market, intra-day pricing risk, changing wind  
6 and weather patterns, changing load profiles, and system reliability needs. These  
7 ever-changing conditions lend further support to the availability, reliability, and  
8 flexibility provided by onsite fuel storage.

9

10 Q. DO YOU BELIEVE ASTORIA STATION ONSITE FUEL STORAGE IS A PRUDENT  
11 INVESTMENT FOR OTTER TAIL POWER AND ITS CUSTOMERS?

12 A. Yes, I do. Astoria Station onsite LNG fuel storage ensures fuel assurance during  
13 extreme system events. It enhances system reliability. Furthermore, through its  
14 24-hour availability and flexibility it is best suited to protect against volatile gas  
15 markets and associated intra-day price risk when compared against other hedging  
16 options.

17 **IV. CONCLUSION**

18 Q. DOES THIS CONCLUDE REBUTTAL TESTIMONY?

19 A. Yes, it does.

20

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