

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-

Exhibit\_\_\_\_\_

**ASTORIA STATION PROJECT**

Direct Testimony

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Prefiled Direct Testimony of Nathan R. Jensen  
Otter Tail Power Company  
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1 **I. INTRODUCTION AND QUALIFICATIONS**

2 Q. PLEASE STATE YOUR NAME AND TITLE.

3 A. My name is Nathan Jensen, and I am the Manager of Resource Planning at Otter  
4 Tail Power Company (Otter Tail or Company).

5  
6 Q. PLEASE DESCRIBE YOUR QUALIFICATIONS AND EXPERIENCE.

7 A. I have a Bachelor of Science degree in Electrical Engineering and a Master's degree  
8 in business administration from North Dakota State University. I am also a  
9 licensed professional engineer in the state of Minnesota (license number 52661).  
10 I have worked for Otter Tail for over 12 years with experience as a Substation  
11 Protection Engineer, Senior Energy Marker, Senior Resource Planner, and have  
12 been Manager of Resource Planning since May of 2021.

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

14 Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS PROCEEDING?

15 A. The purpose of my testimony is to provide support for Otter Tail's request for an  
16 Advanced Determination of Prudence (ADP) for the Company's proposed  
17 development of onsite liquefied natural gas fuel storage at Astoria Station  
18 (Project). In my testimony, I discuss aspects of the need and justification for the  
19 Project, focusing on the following:

- 20 • The attributes and value of resilient generation; and  
21 • The relationship between Otter Tail's forecasted load and resilient generation

22 **III. RESILIENT GENERATION**

23 Q. HAS OTTER TAIL EXAMINED RESILIENT GENERATION IN THE CONTEXT  
24 OF RESOURCE ADDITIONS OR MODIFICATIONS?

25 A. Yes, we did so as part of our Integrated Resource Plan now pending before the  
26 Commission in Case No. PU-21-380. In that filing we identified dual fuel (using  
27 fuel oil) at Astoria Station by 2026 as a key part of a resilient generation portfolio

1 that would enable Otter Tail to protect our customers from severe market  
2 disruptions. We noted that dual fuel capability at Astoria Station was a cost-  
3 effective option that would “allow Otter Tail to use natural gas supplied by the  
4 current pipeline as the main source of fuel and use stored fuel oil during rare  
5 instances of pipeline unavailability or volatile natural gas markets.”  
6

7 Q. HAS OTTER TAIL UPDATED ITS PLANS FOR ASTORIA STATION?

8 A. Yes, as noted in our Application for an Advanced (ADP) and in the Direct  
9 Testimony of Mr. Kirk A. Phinney we have determined that the secondary fuel  
10 source best suited for Astoria Station is liquefied natural gas (LNG.) In that sense  
11 the Project is better described as the addition on onsite fuel storage rather than  
12 dual fuel. The analysis regarding resiliency, however, is the same.  
13

14 Q. WHAT IS RESILIENT GENERATION?

15 A. Resilient generation resources have several key attributes, including:  
16 (1) dispatchability, which means that the resource can be expected to generate  
17 when called upon; (2) fuel source reliability, which means the generation resource  
18 has a reliable fuel source including storage and/or alternative means of delivery;  
19 and (3) energy price protection, which refers to the ability to manage the  
20 availability and cost of fuel for during volatile market conditions.  
21

22 Q. WHY IS RESILIENT GENERATION IMPORTANT?

23 A. Resilient generation is important in that it is capable of lessening the likelihood of  
24 electrical outages for customers due to severe weather events, and unavailability of  
25 intermittent resources. Resilient generation limits the scope and impact of outages  
26 when they do occur and allows rapid restoration of power after an outage. Resilient  
27 generation can also limit exposure to volatile market conditions.  
28

1 Q. HOW DOES RESILIENT GENERATION RELATE TO RELIABILITY?

2 A. Resilient generation is synonymous with reliability in terms of a generation  
3 resource being available when it is needed.

4  
5 Q. HAS OTTER TAIL ASSESSED THE RESILIENCY OF GENERATION  
6 RESOURCES?

7 A. Yes. [IRP] Table 3-8 and ADP Table 3.8 in our ADP Application provides a matrix  
8 of generation resources and their related resiliency factors. ADP Table 3.8, which  
9 is provided below, is the same as [IRP] Table 3-8 except we have added battery  
10 storage as one of the considered generation resources.

11  
12 **ADP Table 3-8: Generation Resources & Resiliency Factors**

<b>Generation Resource</b>	<b>Dispatchable</b>	<b>Reliable Fuel Supply</b>	<b>Energy Price Protection</b>	<b>Ranking Factors</b>
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

1  
2  
3 Q. IS ASTORIA STATION A RESILIENT GENERATION RESOURCE?

4 A. As indicated by ADP Table 3-8, Astoria Station is resilient in the sense that it is  
5 dispatchable, but the generator's overall resiliency is limited by the fact that it has  
6 a single fuel source without onsite inventory. The Northern Border Pipeline  
7 serving Astoria is reliable, but all natural gas pipelines are subject to some risk of  
8 disruption, as demonstrated by Winter Storm Uri in 2021, which did not directly  
9 affect Otter Tail, and again in December of 2022 during Winter Storm Elliot, which  
10 did directly affect Otter Tail. Astoria Station, absent onsite fuel inventory, is also  
11 lacking in price protection.  
12

1 Q. HAS OTTER TAIL ASSESSED THE RESILIENCY OF THE COMPANY'S  
2 GENERATION RESOURCES?

3 A. Yes. Please refer to [IRP] Table 3-9 and ADP Table 3.9 in our Application. ADP  
4 Table 3-9, provided below, states the current level of resilient generation in our  
5 generation portfolio assuming onsite LNG storage capability is added at Astoria  
6 Station.

7

8

9

**ADP Table 3-9: 2022 Resilient Generation  
(With Astoria Onsite LNG Storage)**

Resilient Resource	Current Winter	Current Summer	Current + Astoria Onsite Storage Winter	Current + Astoria Onsite Storage Summer
Big Stone	256	256	256	256
Coyote	149	149	149	149
Astoria	0	0	285	245
Solway	46	42	46	42
Oil Peakers	59	59	59	59
Controllable Load <sup>1</sup>	210	115	210	115
<b>Total (MW)</b>	<b>720</b>	<b>621</b>	<b>1,005</b>	<b>866</b>

10

11 Q. WHAT DO YOU CONCLUDE FROM ADP TABLE 3-9?

12 A. ADP Table 3-9 indicates that adding onsite fuel storage capability will significantly  
13 increase the amount of resilient generation available to our customers.

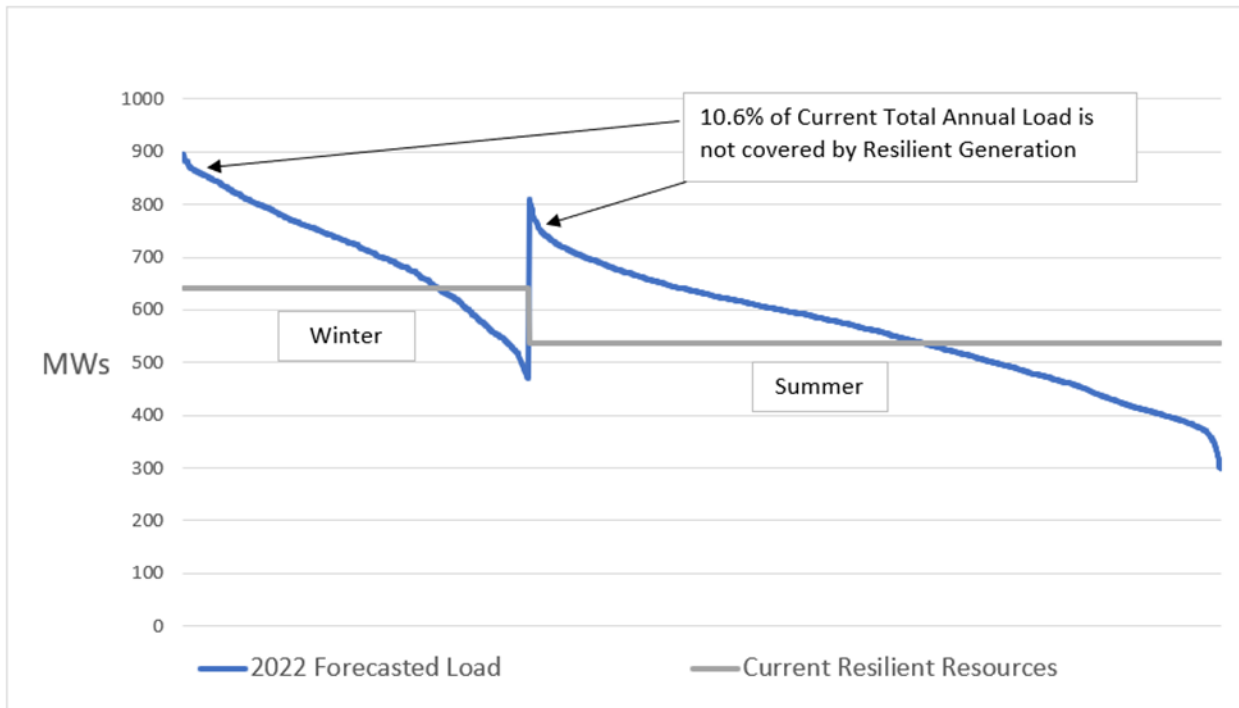
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<sup>1</sup> Otter Tail's current customer base includes those that allow for a considerable amount of control for which the load control is registered as a load modifying resource in MISO. Otter Tail's load forecasts in this filing include the net of customer load and the load modifying resources.

1 Q. HAS OTTER TAIL CONDUCTED AN ANALYSIS OF ITS ANNUAL TOTAL LOAD  
2 COVERED BY RESILIENT GENERATION?

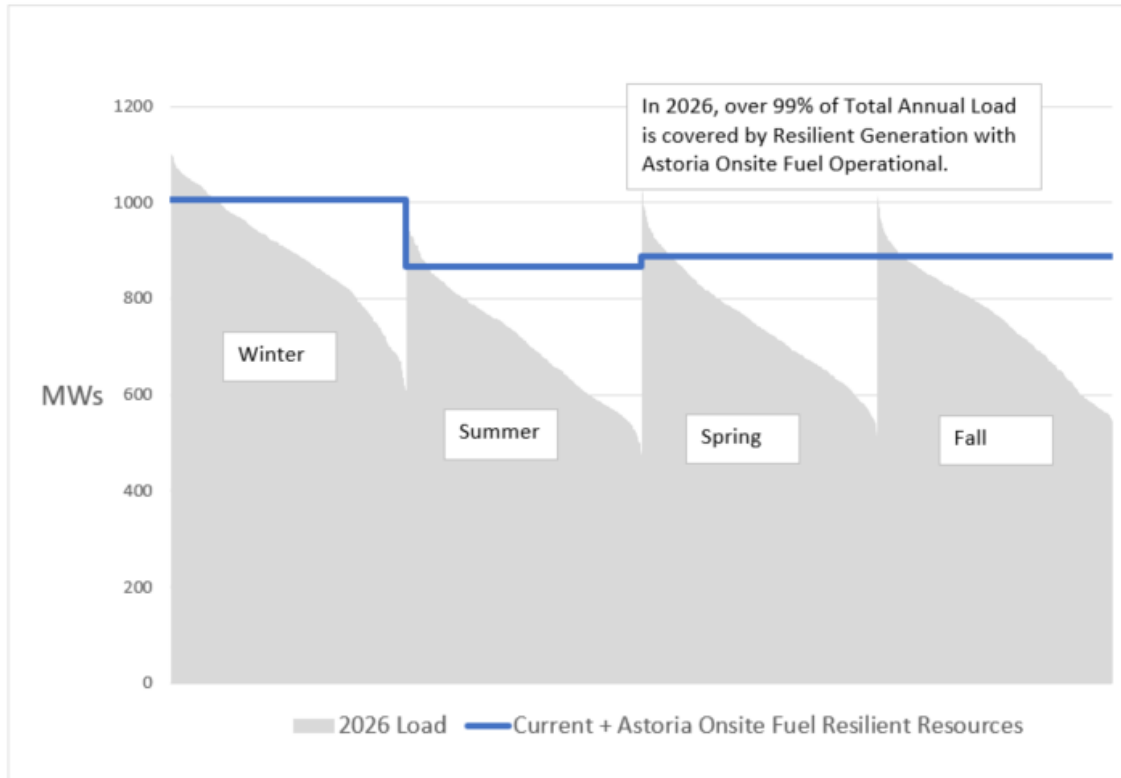
3 A. Yes, this is reflected in [IRP] Figure 3.9 and ADP Figure 3.10 in our Application,  
4 which I have set forth below. In both figures the blue line depicts Otter Tail's  
5 winter and summer load duration curves. The load duration curves illustrate the  
6 total amount of load in each hour of the season arranged in order of magnitude.  
7 From it, we can consider the maximum amount of load we need to be prepared to  
8 serve over the course of a year. The grey line in [IRP] Figure 3.9, and the grey  
9 shading in ADP Figure 3.10 shows the level of our resilient generation resources.  
10 The purpose of these figures is to show the relationship between resilient  
11 generation capabilities and forecasted hourly load and potential market exposure  
12 if variable resources were not generating at the time load exceeded the resilient  
13 generation capabilities.  
14

15 **[IRP] Figure 3-9: 2022 Forecasted Load**  
16 **Relationship with Resilient Generation**



17

1 **ADP Figure 3-10: 2026 Forecasted Load Relationship with Resilient**  
 2 **Generation (Current plus Astoria Onsite LNG Storage)**



3  
4  
5 Q. WHAT DOES [IRP] FIGURE 3-9 INDICATE?

6 A. As shown in the figure, Otter Tail projects that 10.6 percent of its overall  
 7 load will be exposed to market energy prices assuming no variable resource  
 8 generation in 2022.

9  
10 Q. WHAT DOES ADP FIGURE 3-10 INDICATE?

11 A. This figure similarly compares Otter Tail's 2026 forecasted hourly load with  
 12 the resilient generation from current resources plus Astoria onsite LNG  
 13 storage. It illustrates that onsite LNG storage (a/k/a dual fuel) at Astoria  
 14 Station reduces the amount of load not backed by resilient generation from  
 15 10.6 percent to zero percent in the winter and almost zero percent in the  
 16 summer.

1 Q. DO YOU HAVE CONCERNS REGARDING THAT PORTION OF OTTER TAIL'S  
2 ANNUAL LOAD THAT IS NOT COVERED BY RESILIENT GENERATION?

3 A. Yes. Natural gas units tend to be the marginal units in the MISO energy market.  
4 This means that they set the price based on their variable energy cost. High market  
5 price situations are usually accompanied (or caused) by high natural gas prices.  
6 Relying on natural gas units to serve load during volatile market situations will not  
7 provide adequate price protection for customers unless those units have the ability  
8 and fuel on hand to switch to an alternate fuel source when natural gas prices are  
9 elevated. There is also the potential in extreme situations that natural gas might  
10 not be available, in which case the unit would be forced offline and unable to  
11 generate when it is needed most.  
12

13 Q. DOES ONSITE FUEL STORAGE AT ASTORIA STATION MITIGATE THESE  
14 CONCERNS?

15 A. Yes, having five days of stored LNG fuel onsite as described by Mr. Phinney helps  
16 mitigate these risks. The stored fuel provides price protection to our customers  
17 when natural gas prices are elevated. Moreover the stored fuel ensures the unit  
18 can operate in extreme cases when pipeline natural gas may not be available.

19 **IV. CONCLUSION**

20 Q. PLEASE SUMMARIZE THE KEY POINT OF YOUR TESTIMONY.

21 A. Resilient generation resources have several key attributes, including (1)  
22 dispatchability; (2) fuel source reliability, and (3) energy price protection. As we  
23 have indicated in our initial IRP filing and, in this Application, Otter Tail seeks to  
24 increase the amount of resilient generation available to our customers to ensure  
25 reliability and to reduce market exposure. While Astoria Station is dispatchable,  
26 its reliance on a single fuel source limits the unit's overall resiliency. Adding onsite  
27 fuel storage capability addresses this issue. Resilient generation provided by onsite  
28 LNG storage reduces the amount of market energy exposure faced by our  
29 customers and mitigates natural gas price volatility. It also ensures that the unit  
30 can operate in extreme cases when pipeline natural gas may not be available.

- 1 Q. DOES THIS CONCLUDE YOUR TESTIMONY?
- 2 A. Yes, it does.

