STATE OF NORTH DAKOTA
BEFORE THE
PUBLIC SERVICE COMMISSION

Otter Tail Power Company Advance Prudence – Astoria Gas Application	Case No. PU-17-

APPLICATION FOR ADVANCE DETERMINATION OF PRUDENCE

I. INTRODUCTION

Pursuant to N.D.C.C. § 49-05-16, Otter Tail Power Company (Otter Tail or the Company) respectfully submits this Application for an advance determination of prudence (ADP) for the Company's proposed development, ownership, and operation of the Astoria Simple Cycle Generation Station (Astoria Station or Project), an approximately 250 MW natural gas-fired, frame-style, simple cycle combustion turbine generation facility to be located near Astoria, South Dakota.

Astoria Station will provide capacity, dispatchable energy, and grid support as part of Otter Tail's two-part plan to reliably meet our customers' electric needs, replace expiring capacity purchase agreements, and prepare for the 2021 retirement of the 1950s-era 140 MW Powder River Basin (PRB) coal-fired Hoot Lake Plant near Fergus Falls, Minnesota. The other component of Otter Tail's two-part plan is the construction of the 150 MW Merricourt wind generation facility (the Merricourt Project) in North Dakota, which will provide very competitively priced energy made available by the federal production tax credit (PTC) for wind facilities. Otter Tail is embarking on the addition of Astoria Station and Merricourt Project to meet its customer needs in a least-cost manner.

The Company's analysis of Astoria Station indicates it will be beneficial for Otter Tail's customers because it is the least-cost resource available to meet the Company's needs. More specifically, Otter Tail's 2013 resource planning process determined that the least-cost method of meeting Otter Tail's 2021 capacity needs would be to add a simple cycle generator to Otter Tail's system. Otter Tail's 2016 resource planning process confirmed the results of the 2013 process and specifically identified a simple cycle unit with Astoria Station's size, costs and operating characteristics as the least-cost resource addition. Astoria Station will also provide reliability and hedge value. Thus, Astoria Station is prudent.

This Application and supporting testimony demonstrate that Otter Tail's proposed development, ownership, and operation of Astoria Station is a prudent resource addition; it will provide a cost effective, dispatchable generation resource for the Company's North Dakota electric customers.

II. DESCRIPTION OF APPLICANT

Applicant's full name and post office address are as follows:

Otter Tail Power Company
215 South Cascade Street
P.O. Box 496
Fergus Falls, MN 56538-0496

Otter Tail is a Minnesota corporation duly authorized to do business in the State of North Dakota as a foreign corporation, and it is doing business in North Dakota as a public utility subject to the jurisdiction of, and regulation by, the Commission under N.D.C.C. Title 49, as amended. Otter Tail's certificate of incorporation and amendments to the certificate have previously been filed with the Commission in Case No. PU-09-677. The certificate and amendments are hereby incorporated by reference, as though fully set forth herein. A current certificate of good standing is attached as Appendix 1.

III. COMMUNICATION AND SERVICE

The Company respectfully requests that the following persons be placed on the Commission's official service list for all communications in this case:

Mark Bring
Director of Legislative Affairs and
Associate General Counsel
Otter Tail Power Company
215 S. Cascade Street
Fergus Falls, MN 56538-0496
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Cary Stephenson
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IV. STANDARD OF REVIEW FOR ADVANCE DETERMINATION OF PRUDENCE

Pursuant to N.D.C.C. § 49-05-16(1), the Commission may issue an order approving the prudence of a resource addition if:

a. The public utility files with its application a projection of costs to the date of the anticipated commercial operation of the resource addition;

b. The public utility files with its application a fee … of one hundred seventy-five thousand dollars….;

c. The commission provides notice and holds a hearing, if appropriate, in accordance with [N.D.C.C.] section 49-02-02; and

d. The commission determines that the resource addition is prudent. For facilities located or to be located in this state the commission, in determining whether the resource addition is prudent, shall consider the benefits of having the resource addition located in this state.

V. PROJECT DESCRIPTION

Astoria Station will be an approximately 250 MW[1] natural gas-fired simple cycle combustion turbine near the town of Astoria in Deuel County, South Dakota. The Project includes all associated facilities, including a short segment of natural gas pipeline necessary to interconnect to the Northern Border Pipeline and electric transmission facilities necessary to interconnect to the Big Stone South-Brookings County 345 kV electric transmission line. The Project will be built with quick start capability to serve a load-following function and peak capacity needs. The Project is expected to be in service no later than May of 2021.

Otter Tail acquired land rights near Astoria precisely because that is where the Northern Border Pipeline and the Big Stone South-Brookings County transmission line intersect, which will help the Company avoid significant costs for connecting to these facilities. The generation component will be built on a minimal footprint in the area subject to the Company's land rights, which are being finalized for development. Any necessary natural gas or electric transmission interconnection infrastructure will likely be constructed on a parcel owned by the Company or on rights-of-way acquired from adjacent landowners.

The Project will use natural gas from the Northern Border Pipeline, which transports natural gas from Canada, from North Dakota's Williston Basin, and from the Dakota Gasification Company's facilities near Beulah, North Dakota, to points south and east. The Project will require construction of a gas pipeline estimated to be less than 1000 feet.

The Project will likely interconnect to a new switching station to be constructed by the co-owners of the Big Stone South-Brookings County 345 kV transmission line (i.e., Northern

[1] The actual size of the simple cycle machine will be determined through Otter Tail's sourcing efforts which will seek to purchase the lowest-cost combustion turbine then available on the market, consistent with the size of the Company's capacity needs.

States Power Company-Minnesota and Otter Tail). Final interconnection costs for the Project have not yet been determined. The Project is in the Midcontinent Independent System Operator (MISO) interconnection queue, in the February 2016 study group. The MISO interconnection studies for this study group began in February 2017 and initial identification of facilities necessary to interconnect the Project will be available in the summer of 2017. This study process will ultimately culminate in a generator interconnection agreement (GIA) that the Company expects to execute in 2018. To estimate potential interconnection costs, the Company has completed its own transmission studies that are intended to replicate the MISO generator interconnection process. Otter Tail has also performed transmission deliverability studies to ensure that it can obtain sufficient transmission service for the Project.

The Project will be developed and managed by Otter Tail, which has significant experience in managing large utility projects. Otter Tail expects to engage third parties for detailed engineering contracts, with Otter Tail acting as the general contractor. Otter Tail has currently engaged two engineering firms to perform initial engineering, site evaluation, and initial site environmental analysis.

The Project will require an energy conversion facility permit from the South Dakota Public Utilities Commission. Authorization for the required associated facilities, including a short generation-tie line and the short natural gas pipeline necessary to connect to the Northern Border Pipeline, will be sought as part of the application for this permit. A transmission facility permit may also be required in order for the Big Stone South-Brookings County 345 kV transmission line co-owners to build a common interconnection point for the Project and any other regional generation projects. The Project will also require air and water appropriations permits from the South Dakota Department of Environment and Natural Resources. The

Company plans to ensure that all requisite permits and regulatory approvals (including this application for ADP) have been obtained before commencing the procurement process.

Otter Tail currently estimates the total capital cost of Astoria Station at approximately $165 million, which is an effective cost of $665/kw of installed capacity. The Company's cost estimate consists of **[NOT PUBLIC DATA BEGINS… ...NOT PUBLIC DATA ENDS]** for the generation equipment and its installation; **[NOT PUBLIC DATA BEGINS… ...NOT PUBLIC DATA ENDS]** for the electric transmission component of the Project, including MISO deposits, interconnection facilities, network upgrades, and transmission service; **[NOT PUBLIC DATA BEGINS… ...NOT PUBLIC DATA ENDS]** for Owner's Costs such as Otter Tail's labor, permitting, development, legal fees, land, engineering and other matters; **[NOT PUBLIC DATA BEGINS… ...NOT PUBLIC DATA ENDS]** for the short natural gas pipeline; and **[NOT PUBLIC DATA BEGINS… ...NOT PUBLIC DATA ENDS]** in cost escalators, inasmuch as the Project is not expected to be placed in service until 2021 and procurement will not commence for at least two years.

These initial cost estimates are based on the best information now available and are provided in advance of the commencement of the bidding and procurement process for the Project. Given this stage of development the Company's initial cost estimate includes a reasonable contingency. That said, the Company's analyses indicate that installing simple cycle generation to meet the Company's forward capacity need is the most prudent course of action. As discussed throughout this Application, Otter Tail's selection of the Astoria site mitigates the two largest cost drivers of natural gas generation: natural gas pipeline and electric transmission

infrastructure. Should the Company's cost estimates materially change, Otter Tail submits that the Project will remain a prudent resource addition. The Commission retains oversight of the prudence of the project pursuant to N.D.C.C. § 49-05-16(5). Consistent with N.D.C.C. § 49-05-16(3), Otter Tail will provide Project updates throughout the Project's development as may be directed by the Commission.

VI. NEED FOR AND JUSTIFICATION OF THE RESOURCE ADDITION

As discussed in the Company's most recent Integrated Resource Plan (IRP),[2] Astoria Station is the second component of the Company's two-part plan to meet our customers' electric needs; replace expiring capacity purchase agreements; and prepare for the 2021 retirement of the 1950s-era 140 MW PRB coal-fired Hoot Lake Plant.[3] The other component of this plan is the construction of the Merricourt Project – an approximately 150 MW wind generation facility near Merricourt, North Dakota.[4] Together, the components of the Company's two-part plan exemplify Otter Tail's all-of-the-above energy strategy by securing least-cost wind energy and capacity while bolstering grid reliability with dispatchable energy and load-following capability. This two-part plan includes enough capacity to reliably serve customers during periods of high demand for power, and enough energy to serve customers long term, making these resource additions prudent. As demonstrated in this Application, Astoria Station is prudent as a needed and least-cost capacity resource providing capacity, dispatchable energy and load-following capability, as well as material hedge value.

[2] Otter Tail's most recent IRP was filed with the Commission on June 15, 2016, in Case No. PU-16-308.

[3] The Hoot Lake Plant consists of Unit 2, built in 1959 with a nameplate rating of 53.5 MW, and Unit 3, built in 1964 with a nameplate rating of 75 MW. The units are capable of output greater than their nameplate ratings.

[4] Otter Tail has filed its ADP application for the wind generation facility contemporaneous with this Application.

A. Need Drivers

Otter Tail's development of the Project is being driven by a need for capacity and energy precipitated by three factors: (1) load growth forecasts; (2) the expiration of a series of capacity purchase agreements; and (3) the 2021 retirement of the Company's Hoot Lake Plant Units 2 and 3.

The Hoot Lake Plant is aging. Given the magnitude of investment necessary to keep its units and associated infrastructure operational, and the anticipated cost of potential future environmental compliance upgrades, Otter Tail has been analyzing the plant's ongoing role in the Company's generation portfolio. The Company's analysis began in 2010 when material investments in Hoot Lake Plant were likely to be needed to comply with the Mercury and Air Toxics Standards (MATS) regulations in 2015. To that end, the Company conducted its Baseload Diversification Study in 2012 to determine the most prudent course of action. Based on that work, the Company determined that making minimal investments for MATS compliance and then retiring Hoot Lake Plant Units 2 and 3 in 2021 was the least-cost and most prudent course of action.

Otter Tail's 2012 analysis was sound and this course of action remains least-cost and prudent. The analyses performed as part of the Company's 2013 resource planning cycle also support the retirement of Hoot Lake Plant. While Hoot Lake Plant was designed and constructed as a baseload plant, starting around 2015 low energy market prices caused Hoot Lake Plant Units 2 and 3 to be dispatched infrequently. Unit 2 is now operated primarily in the winter as a source of building heat; Unit 3 has seen only limited operation year-round and is primarily operated only for required environmental testing and when MISO infrequently dispatches the unit. As a

result, Hoot Lake Plant has essentially transitioned to a capacity resource and Otter Tail has been sourcing more of its energy from the MISO market.

Given the significant balance of plant investments needed to keep such aged units and associated infrastructure operational, the potential for future environmental upgrades, and the infrequency with which the units are dispatched, the Company can no longer justify continuing to maintain and operate Hoot Lake Plant. Consequently, it is necessary to replace the plant's generation capacity

Consistent with the Company's plans to retire Hoot Lake Plant in 2021, Otter Tail entered into a series of capacity purchase agreements to meet its obligation to serve customers. The capacity purchased through these agreements was intended to "bridge" the Company's capacity needs until Hoot Lake Plant is retired in 2021 and additional generation could be added to the Company's generation portfolio. Otter Tail timed the expiration of these capacity purchases with the retirement of Hoot Lake Plant, so that it could aggregate its capacity needs to support the addition of new generation, rather than rely on the market. Capacity reserves are declining in MISO and, therefore, it may be difficult to obtain future economical replacement capacity agreements of sufficient size.[5] By aggregating the capacity needs attributable to the retirement of Hoot Lake Plant and the expiration of the capacity purchases, Otter Tail is able to add optimal complements of new generation, providing grid support and a long-term market hedge.

The Company also continues to forecast future load growth, primarily driven by pipeline expansions. While load growth forecasts are inherently uncertain, anticipated load growth is an

[5] MISO has indicated that "supply has declined due to plant retirements in excess of new resource additions" and "continued resource adequacy will depend on uncommitted resources or resources with potential retirements." Midcontinent Independent System Operator, Inc. 2016 OMS SURVEY RESULTS at p. 1 (June 2016).

additional driver of the need for Astoria Station. Otter Tail's energy needs will also increase due to expiration of a 50 MW on-peak energy-only agreement in 2021. This energy-only contract is separate and apart from the capacity purchases referenced in the preceding paragraph.

These events require Otter Tail to take action. The Company's current analysis indicates that without replacement capacity and energy, Otter Tail will have a capacity deficit of approximately 273 MW in 2021, and will need to source between 26% and 31% of its energy from the MISO markets.

B. Developing the Two-Part Plan

When a utility has a simultaneous capacity and energy need for a portion of its load-serving obligations, it traditionally seeks a resource addition that provides both capacity and energy at reasonable pricing. This generally results in combined cycle generation, which has the ability to follow load by ramping up and down throughout the day while providing energy at lower marginal cost than a simple cycle generator and with lower capital cost than a baseload generator. However, a hybrid approach of wind-plus-gas, as in Otter Tail's two-part plan, can more optimally provide these characteristics.

As part of the Company's 2013 resource planning cycle, Otter Tail analyzed potential replacement scenarios in anticipation of Hoot Lake Plant's retirement. The Company used the Strategist resource planning model to aid in this analysis. To conduct its analysis, Otter Tail made available to the model several different resource selection options, including a 311 MW combined cycle generator, three different sized simple cycle generators, the repowering of Hoot Lake Plant to natural gas, and wind and solar resources. Notwithstanding the need for both capacity and energy, the Strategist model indicated that moving forward with a combined cycle plant would not be economic, nor would repowering Hoot Lake Plant to natural gas.

Rather, the results indicated that replacing Hoot Lake Plant's capacity with a simple cycle generator was the most economic choice. The modelling results also indicated that if wind energy was priced at $45/MWh, market purchases should be made to meet the Company's energy needs. However, when wind energy was priced at $30/MWh, Strategist selected wind energy instead of market purchases for energy, signaling that acquiring 150 MW of wind generation in 2021 would be the most economic choice to meet Otter Tail's energy needs. In the Company's 2016 resource planning cycle, Strategist continued to select a wind-plus-gas configuration in all scenarios analyzed. This analysis confirmed the prudence of moving forward with the Company's two-part plan.

Additionally, a combination of wind and natural gas-fired simple cycle generation provides beneficial operating characteristics. The natural gas-fired simple cycle component of the Company's two-part plan, Astoria Station, provides low-cost capacity and dispatchable energy. The addition of dispatchable energy provides both a hedge against high energy market prices and grid support due to its capability of starting quickly and then following load. The wind component provides low-cost energy. Backing wind with gas captures the low-cost energy made possible by the current market for wind generation while helping to ensure sufficient reliability through grid support from dispatchable simple cycle generation (which yields low-cost capacity). Simple cycle gas generation paired with wind is particularly attractive because the Company's service territory has some of the best wind resources in the country. Consequently, a wind-plus-gas configuration can provide many of the same operational and economic benefits of a combined cycle plant.

A wind-plus-gas configuration also has hedge and expansion value. If Otter Tail instead installed a combined cycle plant, the Company and its customers would face significantly more

exposure to fluctuations in natural gas pricing. Because it will use less natural gas, a simple cycle plant mitigates that risk. Moreover, a natural gas simple cycle plant site can include sufficient space and design parameters to accommodate the potential future addition of combined cycle generation, if market conditions later warrant it. The wind component can provide low-cost energy from a zero-cost fuel source, providing both a market and fuel hedge. The Company's service area has excellent wind resources, providing an economical generation resource with low potential for transmission congestion – due to the wind resource's proximity to the Company's customers.

VII. PROJECT SELECTION AND IMPACTS

After the Company confirmed that simple cycle generation is the most economical way to meet its capacity needs, it sought to develop the least-cost simple cycle generator available. This resulted in identification of Astoria Station. To evaluate the cost-effectiveness of Astoria Station, the Company used Strategist resource planning software to analyze the impact of the Project. The Company's analysis indicates that the Project is least-cost and prudent as it provides needed capacity on a least-cost basis, provides operational support for grid reliability, and has significant hedge value against volatile energy market pricing.

A. Least-Cost Resource Selected

Once the Company confirmed that a simple cycle gas fired generator is the most economical way to meet its customer needs, the Company undertook an options assessment. First, Otter Tail determined that long-term ownership, instead of a power purchase agreement, is most appropriate for the simple cycle plant, because long-term ownership affords capacity to meet customer needs well beyond the term of a standard power purchase agreement. Long-term ownership also allows for future expansion of the plant should circumstances warrant.

Additionally, a longer project life drives beneficial project economics. Otter Tail also determined that it should manage project development, since this will eliminate additional third-party costs and is consistent with Otter Tail's management skill set.

After confirming the advisability of the Company's ownership and development of the Project, Otter Tail assessed potential project sites. One of the largest cost drivers of a simple cycle generator is the need to construct pipelines for gas access and electric transmission lines to interconnect to the electric grid. Minimizing these costs reduces the overall cost of the Project, since the cost of the turbine and its installation (the other material cost) are generally the same for any site. The Company originally assessed several sites throughout North Dakota, South Dakota, and Minnesota. Otter Tail then narrowed its consideration to three North Dakota sites,[6] one South Dakota site, and one Minnesota site.

The Company identified the South Dakota site as the preferred site due to its proximity to the intersection of the Northern Border Pipeline and the soon to be completed CapX2020 Big Stone South - Brookings County 345 kV transmission line. The South Dakota site required the least amount of gas and transmission interconnection infrastructure, which reduces capital investment and ensures the Project will be least-cost. Additionally, the South Dakota site was large enough to allow for plant expansion in the future.

None of the North Dakota sites could economically support construction of a pipeline absent additional regional need for natural gas. Therefore, long pipelines would have added significant cost to a gas generator located in North Dakota and impacted significantly more landowners. The Company explored whether there were ways to more economically extend a pipeline for a North Dakota site. The costs for such pipelines could not be justified.

[6] The three North Dakota sites considered were near Wishek, Ellendale and Merricourt, North Dakota.

Otter Tail also explored brownfield development at its existing Solway, Minnesota simple cycle plant. Brownfield development can often reduce overall project costs by maximizing use of existing infrastructure. While the Solway site has several advantages, it lacks sufficient electric transmission infrastructure to support an additional simple cycle generator. Additionally, Astoria Station provides site diversity for the Company's gas-fired generation, allowing Otter Tail to utilize different gas supply lines and prudently hedge against gas supply disruptions.

Otter Tail also assessed the appropriate type of simple cycle generator to purchase for the Project. Two general options are available: (1) frame machines, and (2) aero-derivative machines. The Company currently plans to purchase a larger frame machine to capture economies of scale. A frame machine can operate dynamically and afford load-following and other operating characteristics appropriate for a wind-plus-gas hybrid approach.

Based on Otter Tail's plan to develop and manage construction of the Project, its selection of an economic site to minimize the cost of supporting infrastructure, and its plan to select a larger combustion turbine, Otter Tail submits that Astoria Station is the least-cost resource addition to meet its identified need.

B. Economic Impacts

As discussed above, Otter Tail's current cost estimates for Astoria Station are consistent with the Company's resource plan assumptions, confirming the prudence of moving forward with a simple cycle resource addition. More specifically, Otter Tail's resource plan analysis included a generic unit with the same cost and operating characteristics as Astoria Station as a generating option for Strategist to select. Strategist selected the generic simple cycle generator with Astoria Station's characteristics in every scenario analyzed. Consequently, Otter Tail's

assessment is that Astoria Station is the most economical way to meet its identified needs and is therefore prudent.

To confirm the resource planning analysis, Otter Tail used the Strategist modelling tool to assess the cost impact of Astoria Station when compared to making no resource addition. Otter Tail also analyzed the impact of its two-part plan compared with no resource additions. The table below provides the results of this analysis. As shown, Astoria Station lowers lifetime system costs as compared to scenarios without the resource addition.

Scenario	Present Value Utility Costs (000)	Difference from Base
Base Case (Market energy and capacity purchases)	2,375,341.80	
Base plus Astoria	2,338,913.80	-36,428.00
Base plus Astoria and Merricourt	2,238,187.50	-137,154.30

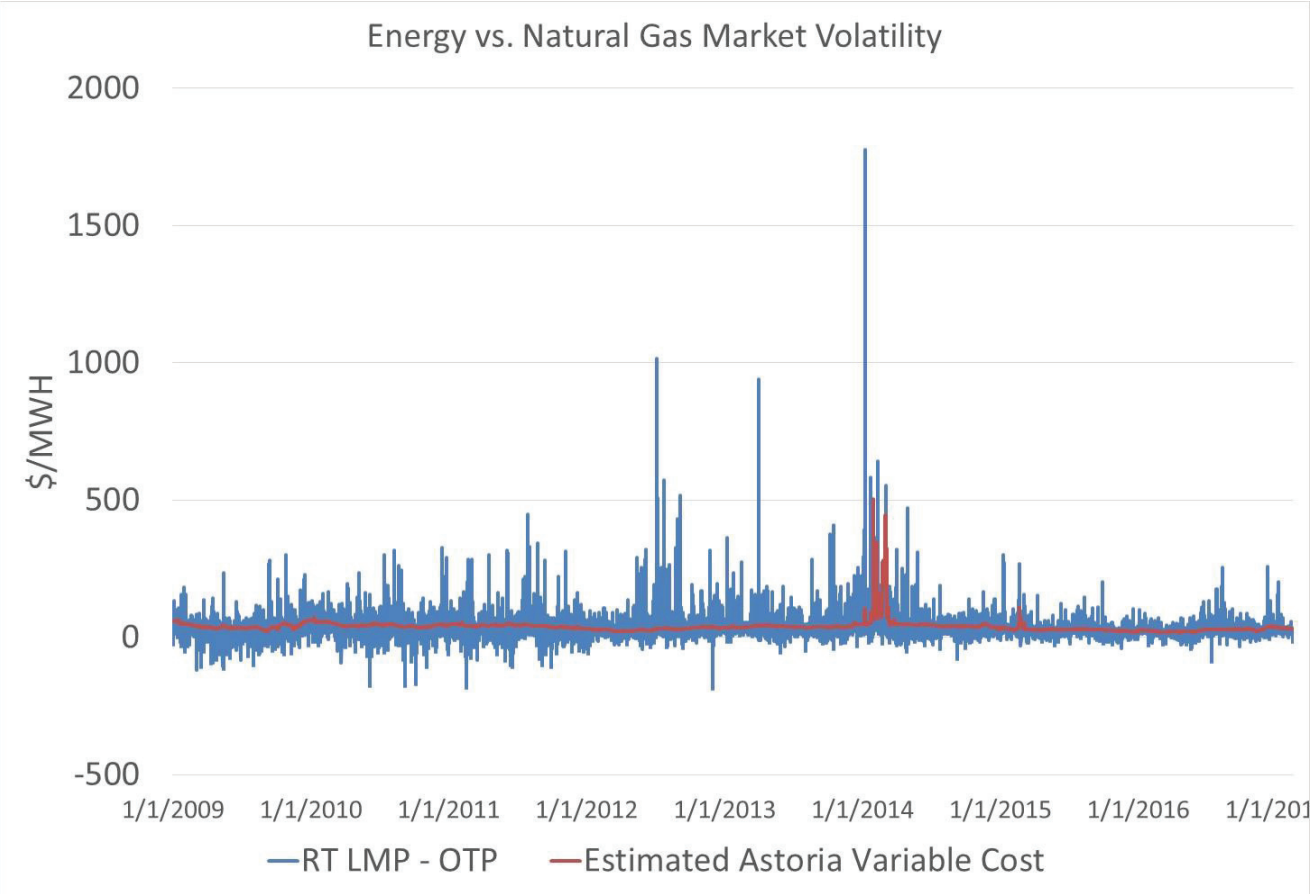
C. Reliability and Hedge Value

The Project will primarily serve as a capacity resource. The Company's Strategist modeling indicates that under forecast market conditions, the Project will have a 10% to 12% annual net capacity factor and provide approximately 5% of our customers' annual energy requirements. These operating characteristics and the Company's ownership of the facility will provide reliability and hedge value for our customers.

While the Project will be subject to natural gas price fluctuations, utilizing a simple cycle peaking resource to meet the Company's capacity needs mitigates Otter Tail's exposure to price volatility by minimizing gas consumption. This is because Astoria Station is expected to have a relatively low net capacity factor when compared to a combined cycle generator. Additionally, Otter Tail is mitigating out-year capacity market risk by owning the resource.

The Project will also establish a ceiling on energy market prices that would otherwise affect the Company's customers, hedging against potentially higher energy market prices. If energy market prices are sufficiently high, the Project will be dispatched and Otter Tail's

customers will pay the unit's production costs rather than higher market pricing. The figure below illustrates how the Project would have performed in the energy markets from January 2009 through January 2017.



The figure shows that the Project would have dispatched at materially lower cost than the market price for those hours when the market price was highest, providing the energy market hedge. Except when necessary for reliability purposes, the Project would not dispatch if energy market prices are lower than its marginal cost.

Additionally, Astoria Station will be constructed with quick start capability, providing load-following capabilities and dispatchable energy when necessary to support reliable operation

of the electric grid when necessary. These characteristics further support the prudence of the Project.

VIII. REASONABLE DEVELOPMENT RISKS

As is typical with any large generating project, there are risks associated with the development of Astoria Station. Otter Tail has performed reasonable due diligence to assess and mitigate development risks. Additionally, Otter Tail is experienced in managing large development projects. Moreover, managing the development of Astoria Station will provide Otter Tail flexibility to directly address issues as they may arise.

The Company's due diligence investigation determined that interconnection cost uncertainty associated with the MISO generator interconnection process is the main risk in moving forward with the Project. The Company believes its selection of simple cycle generation technology is itself a way of addressing interconnection cost uncertainty. Significant wind generation development is expected in Otter Tail's service area, impacting the overall energy supply picture in the MISO region in which the Company operates. Simple cycle generation for peaking needs will be called upon when this wind generation is reduced and market prices are high. Consequently, Otter Tail's judgment is that interconnection costs will primarily be allocated to this new wind generation rather than to peaking resources fueled by natural gas.

Because the Company does not expect to receive results from the interconnection process for some time, Otter Tail performed an internal analysis replicating MISO's interconnection process. Our preliminary analysis suggests interconnection costs will be reasonably consistent with the Project's budget. Further, Otter Tail has investigated the costs necessary for deliverability of the Project (which also hedges interconnection cost uncertainty risk) and has also included those costs in its budget.

Otter Tail's management experience also mitigates construction risks. The Company has a history of successful large project execution. The Company has selected an experienced consulting engineering firm to provide necessary technical support for Otter Tail's development of the Project. The Company will contract directly with the turbine supplier to ensure contractual recourse for performance guarantees and warranties. Prudent terms and conditions will be negotiated to ensure timely completion of the Project. In addition, Project permitting and regulatory approvals will be pursued prior to significant procurements. This approach will minimize exposure to stranded costs and delays.

Overall, Otter Tail has planned to develop the Project in a prudent manner and will implement strategies to reasonably mitigate development risk.

IX. CONCLUSION

Astoria Station is a prudent resource addition to meet capacity needs in a least-cost manner. Together with the 150 MW Merricourt Project, it is an essential part of the Company's two-part plan to meet customers' energy and capacity needs. Otter Tail has taken prudent steps to ensure that a least-cost resource will be developed and to reasonably mitigate the risks inherent with developing this type of generating resource. Therefore, pursuant to N.D.C.C. § 49-05-16, Otter Tail respectfully requests that the Commission issue an advance determination of the prudence for the Company's addition of Astoria Station.

DATED: April 10, 2017

Respectfully submitted,

Mark Bring
Director of Legislative Affairs and
Associate General Counsel
Otter Tail Power Company
215 S. Cascade Street
Fergus Falls, MN 56538-0496
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APPENDIX 1

State of North Dakota

SECRETARY OF STATE

CERTIFICATE OF GOOD STANDING
OF

OTTER TAIL POWER COMPANY

The undersigned, as Secretary of State of the State of North Dakota, hereby certifies that OTTER TAIL POWER COMPANY , a Minnesota corporation, authorized to transact business in the State of North Dakota on February 24, 1914, and according to the records of this office as of this date, has paid all fees due this office as required by North Dakota statutes governing foreign corporations.

ACCORDINGLY the undersigned, as such Secretary of State, and by virtue of the authority vested in him by law, hereby issues this Certificate of Good Standing to

OTTER TAIL POWER COMPANY

Issued: March 28, 2017

Alvin A. Jaeger
Secretary of State

STATE OF NORTH DAKOTA
BEFORE THE
PUBLIC SERVICE COMMISSION

Otter Tail Power Company
Advance Prudence – Astoria Gas
Application

Case No. PU-17-

DIRECT TESTIMONY

OF

BRADLEY E. TOLLERSON

ON BEHALF OF

OTTER TAIL POWER COMPANY

Policy Testimony

April 10, 2017

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I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND TITLE.

A. My name is Bradley E. Tollerson, and I am the Vice President of Planning and Strategy for Otter Tail Power Company (Otter Tail or the Company).

Q. PLEASE DESCRIBE YOUR QUALIFICATIONS AND EXPERIENCE.

A. I have a Bachelor of Science degree in electrical engineering and a Master's degree in business administration from North Dakota State University. I have worked for Otter Tail for 20 years in various positions, including as an Electrical Engineer, Senior Project Engineer, and Manager of Power Services. I have served in my current position as Vice President of Planning and Strategy since June of 2014.

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

A. The purpose of my testimony is to provide support for Otter Tail's request for an Advance Determination of Prudence (ADP) for the Company's proposed development of an approximately 250-megawatt (MW) natural gas-fired simple cycle combustion turbine (Astoria Station or the Project). In my testimony, I address the following topics:

- Our proposed resource addition;
- The prudence of the resource addition; and
- The other witnesses testifying on behalf of the Company.

Additionally, I sponsor the Company's ADP Application and am available to answer questions regarding it.

II. OVERVIEW OF THE PROJECT

Q. PLEASE DESCRIBE ASTORIA STATION.

A. Astoria Station will be an approximately 250 MW natural gas-fired, frame type simple cycle, combustion turbine[1] near the small town of Astoria in Deuel County, South

[1] The actual size of the simple cycle machine will be determined through Otter Tail's sourcing efforts which will seek to purchase the lowest-cost combustion turbine then available on the market, consistent with the size of the Company's capacity needs.

Dakota, approximately 25 miles northeast of Brookings, South Dakota. Otter Tail has purchased real estate for the Project at the intersection of the Northern Border Pipeline and the Big Stone South-Brookings County 345 kilovolt (kV) transmission line. Company witness William Swanson provides more detailed information on the nature of the facilities proposed.

Q. WHAT IS THE TIMELINE FOR THE PROJECT?

A. We anticipate the Project will be permitted, designed, procured, constructed, and placed in service no later than May 31, 2021. This timing is intended to correlate to capacity needs that I discuss below.

Q. WHAT ARE THE ESTIMATED COSTS FOR ASTORIA STATION?

A. The total cost of Astoria Station is estimated to be approximately $165 million or $665/kW of installed capacity. Company witness William Swanson provides additional information regarding the cost of the Project in his direct testimony.

Q. WHY IS THE PROJECT NEEDED?

A. Otter Tail has forecasted a need for both capacity and energy as a result of: (1) forecasted load growth; (2) the expiration of capacity purchase agreements; and (3) the anticipated retirement of the Company's Hoot Lake Units 2 and 3 in 2021. The Company's current analysis shows that without adding replacement capacity and energy, Otter Tail will have a capacity deficit of approximately 273 MW in 2021 and will need to source between 26% to 31% of its energy need from MISO's energy market.

As discussed in the Company's most recent Integrated Resource Plan (IRP), the Project is the second component of the Company's two-part plan to meet our customers' growing needs. The other component of this plan is the Merricourt Project, an approximately 150 MW wind generating facility located in North Dakota. Additional details regarding the need for Astoria Station and supporting resource planning analysis are provided in the Direct Testimony of Brian Draxten and Randy Synstelien.

Q. HOW DID THE COMPANY SELECT THE PROJECT?

A. As part of the Company's 2013 resource planning cycle, Otter Tail analyzed potential replacement scenarios in anticipation of the retirement of Hoot Lake Plant. Several different resource selection options were available in the Strategist model used in this analysis, including a 311 MW combined cycle generator, three different sized simple cycle generators, the repowering of Hoot Lake Plant to natural gas, and wind and solar resources. The Company's analysis indicated that selection of a simple cycle generator was the most economic outcome. In the Company's 2016 resource planning cycle,[2] Strategist selected a wind-plus-gas configuration under updated assumptions in all scenarios analyzed. In fact, Strategist was permitted to select a simple cycle generator with the characteristics of the Project and did so in every scenario analyzed. Said differently, the Company's 2016 analyses confirmed that moving forward with a simple cycle gas-fired generator with the characteristics of Astoria Station was the most economical way to meet Otter Tail's needs. Additional details regarding the Company's resource planning analysis are discussed in the Direct Testimony of Randy Synstelien.

Q. DID THE COMPANY EVALUATE ALTERNATIVES BEFORE SELECTING THE PROJECT AND PROJECT SITE?

A. Yes. In 2015, the Company completed an extensive internal evaluation of both a combined cycle and a "hybrid" simple cycle combustion turbine/wind project, and of the preferred sites for gas generation.

Q. WHAT OPTIONS DID OTTER TAIL CONSIDER REGARDING A COMBINED CYCLE PLANT?

A. In the Company's 2013 resource planning process, we provided Strategist the option of selecting a small 311 MW combined cycle plant to meet load serving needs. This combined cycle configuration was not selected in most scenarios analyzed, indicating it was not the least cost method of serving customers over the thirty-year planning period.

[2] Otter Tail's most recent IRP was filed with the Commission on June 15, 2016, in Case No. PU-16-308.

That said, Otter Tail's analysis identified that the concurrent need for capacity and energy resources could potentially have been met from a larger combined cycle plant that would drive down unit costs through economies of scale. Consequently, Otter Tail sought to determine if there may be partnership opportunities for a larger combined cycle plant. Otter Tail's efforts were ultimately unsuccessful. In light of this, Otter Tail does not believe that it has the opportunity to develop a larger, more economic, combined cycle plant to meet its resource needs. Therefore, since the small 311 MW combined cycle plant was not chosen as economic in the Company's resource planning analysis, Otter Tail did not continue assessing a combined cycle plant.

Q. PLEASE DISCUSS HOW THE COMPANY SELECTED THE PROJECT.

A. First, we considered the ownership structure. We determined that Company long-term ownership, instead of a power purchase agreement, was the most appropriate ownership structure. This is described in more detail in the testimony of Company witness Brian Draxten.

We then considered project sites. The Company determined that a site at the intersection of a natural gas pipeline and electric transmission line was optimal. The Project site is at such an intersection. Because both electric and natural gas transmission are located on the property, interconnection costs for each are projected to be significantly lower than at other sites considered by the Company. Potential future expansion at the Project site is also possible due to superior electric and natural gas transmission capacity. The site selection analysis is described in more detail in the testimony of Company witness William Swanson.

Q. DID THE COMPANY CONSIDER A NORTH DAKOTA SITE FOR THE PROJECT?

A. Yes. Several North Dakota sites were considered. Each of those sites, however, required the construction of one or more lengthy natural gas pipelines, which would have increased the overall cost of the Project.

Q. DID THE COMPANY EXPLORE WAYS TO MAKE SUCH A PIPELINE LESS COSTLY?

A. Yes. Company executives explored ways to make such a North Dakota project viable and met with key stakeholders and decision makers to help develop solutions for pipeline development. In the end, the costs of extending a pipeline could only be justified if more regional need for natural gas existed than would be required for generation from a simple cycle combustion turbine. There was a great deal of uncertainty about the natural gas demand necessary to reduce the costs of extending a pipeline. Additionally, there was uncertainty about the distribution infrastructure necessary for delivery of natural gas in communities that are either underserved or do not presently have natural gas service. Quite simply, the challenges and likely delays associated with a North Dakota site could not overcome the ideal characteristics of the Astoria site.

Q. WHAT OTHER CHARACTERISTICS MAKE A SIMPLE CYCLE COMBUSTION TURBINE A PRUDENT RESOURCE ADDITION?

A. Among other things, the Project will serve to hedge customers' energy needs, so that they are not paying high market prices during periods when wind is not available. The unit will also have quick start, load-following capabilities to support grid reliability. In his Direct Testimony, Company witness Brian Draxten discusses additional considerations that make a simple cycle combustion turbine an attractive option.

III. PRUDENCE OF THE RESOURCE ADDITION

Q. IS THE PROPOSED RESOURCE ADDITION PRUDENT?

A. Yes. Astoria Station will provide significant quantitative and qualitative benefits to our customers, and appropriately balances benefits and risks as a stand-alone capacity resource. When paired with our Company's Merricourt Project proposal, the Project will optimize the delivery of affordable energy and capacity for our customers. It will also cost-effectively allow us to diversify our Company's generation fleet.

Q. PLEASE SUMMARIZE THE QUANTITATIVE BENEFITS OF THE PROJECT.

A. Modeling performed in our last IRP indicated that a simple cycle natural gas combustion turbine paired with a wind project presented a least-cost plan to meet the Company's capacity and energy needs in the future. Updated modeling based on costs and operating characteristics specific to Astoria Station confirmed that this Project represents a least-cost alternative. Otter Tail also compared scenarios with and without the Astoria Project as a complement to the Merricourt wind project. This analysis indicated that the Astoria Project lowers lifetime system costs as compared to scenarios without the resource addition. Additional details regarding this analysis are discussed in the Direct Testimony of Randy Synstelien.

Q. PLEASE SUMMARIZE THE QUALITATIVE BENEFITS OF THE PROJECT.

A. In addition to being a least-cost option to meet capacity needs, the Astoria Project provides significant hedge value to Otter Tail's customers. In particular, if energy market prices are sufficiently high, the Project will be dispatched and Otter Tail's customers will pay the unit's production costs rather than the higher market pricing.

The gas-fueled Astoria Station and wind-fueled Merricourt Project have natural synergies—wind is an intermittent, variable energy resource, while natural gas simple cycle generation provides significant flexibility in addressing wind generation's intermittency and variability, because it is able to start and achieve full output in a manner of minutes and is capable of cycling multiple times per day, providing grid support. Moreover, the addition of Astoria Station will increase the diversity of our resource mix and thereby provide a hedge against potential environmental regulation. Astoria Station, in conjunction with the Merricourt Project, represents remarkable energy value for customers and prudently mitigates the financial risk associated with exposure to the market.

Q. DID THE COMPANY IDENTIFY ANY RISKS ASSOCIATED WITH THE PROJECT?

A. There are risks associated with the Project, just as there are risks with any project. Risks associated with Astoria Station include greater than expected interconnection costs and construction risks. Company witness William Swanson addresses these risks and how the Company plans to address them.

Q. IS THE COMPANY FIT, WILLING, AND ABLE TO ASSUME OWNERSHIP AND OPERATE THE PROJECT?

A. Yes. The Company successfully owns, operates, and maintains similar facilities elsewhere.

Q. THE COMPANY FILED A CONTEMPORANEOUS APPLICATION FOR AN ADP FOR THE MERRICOURT PROJECT. DOES A DETERMINATION WITH RESPECT TO THE MERRICOURT PROJECT IMPACT THE NEED FOR OR PRUDENCY OF ASTORIA STATION?

A. No. While the Company's two-part plan to meet our customers' needs – Astoria Station and the Merricourt Project – provides least-cost capacity and energy for the Otter Tail system in the most prudent fashion, even without the wind component, Astoria Station remains prudent as a needed and least-cost capacity resource which provides dispatchable energy and material hedge value to the Company's customers.

IV. PRESENTATION OF WITNESSES

Q. WHO ARE THE OTHER WITNESSES FOR THE COMPANY IN THIS PROCEEDING?

A. In addition to my policy testimony, the Company sponsors the following witnesses:

- **Brian Draxten** provides an overview of the Company's resource planning and a summary of the need for the Project;

- **Randy Synstelien** addresses Otter Tail's approach to generation resource additions through the Integrated Resource Plan (IRP) process and the rate impact of adding the Project to the Company's integrated system.
- **William Swanson** describes the Project and associated facilities; describes the Company's planned approach to development, engineering, procurement, and construction of the Project; addresses some of the key risks identified by the Company in its analysis of the Project and how the Company intends to address those risks; and explains the Company's efforts to minimize Project-related sales/use and property taxes for the benefit of Otter Tail customers.

V. CONCLUSION

Q. PLEASE SUMMARIZE YOUR TESTIMONY.

A. The Astoria Project is a least-cost generation resource that will use proven technology. It is an essential component of a two-part plan to meet our customers' energy needs, replace expiring capacity purchase agreements, and prepare for the 2021 retirement of Hoot Lake Plant. As demonstrated in the Application for ADP and supporting testimony, the resource addition is prudent because it is least-cost and the risks associated with the Company's development, engineering, procurement, and construction of the Project are being appropriately mitigated. The resource addition also allows us the flexibility to convert to combined cycle generation should that become advantageous in the future. When paired with our Merricourt Project proposal, Astoria Station will optimize the delivery of least-cost and reliable energy and capacity for our customers and diversify our Company's generation fleet during times of political, regulatory, and market uncertainty.

Q. DOES THIS CONCLUDE YOUR PRE-FILED DIRECT TESTIMONY?

A. Yes, it does.

STATE OF NORTH DAKOTA

PUBLIC SERVICE COMMISSION

Otter Tail Power Company
Advance Prudence – Astoria Gas
Application

Case No. PU-17-___

VERIFICATION

STATE OF MINNESOTA)
) ss.
COUNTY OF OTTER TAIL)

BRADLEY E. TOLLERSON, being first duly sworn on oath, deposes and says that he is the Vice President of Planning and Strategy for Applicant Otter Tail Power Company; that the testimony and schedules submitted in the above-captioned matter under his name were prepared under his direction; and that he knows and verifies the contents thereof, and that the same is true and correct to the best of his knowledge and belief.

Dated this 10 day of April, 2017

Bradley E. Tollerson

Subscribed and sworn to before
me on this 10 day of April, 2017.

Notary Public
My Commission expires 1-31-22

KIMBERLY ANN WARD
NOTARY PUBLIC
MINNESOTA
My Commission Expires Jan. 31, 2022

STATE OF NORTH DAKOTA
BEFORE THE
PUBLIC SERVICE COMMISSION

Otter Tail Power Company
Advance Prudence – Astoria Gas
Application

Case No. PU-17-

DIRECT TESTIMONY

OF

BRIAN DRAXTEN

ON BEHALF OF

OTTER TAIL POWER COMPANY

Resource Planning Testimony

April 10, 2017

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I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND TITLE.

A. My name is Brian Draxten. I am Manager of Resource Planning for Otter Tail Power Company (Otter Tail or the Company).

Q. PLEASE DESCRIBE YOUR QUALIFICATIONS AND EXPERIENCE.

A. I have a Bachelor of Arts degree in accounting with a minor in business finance from Moorhead State University. I have worked for Otter Tail for 35 years in various positions, including as a Rates Analyst, Manager of Market Research, and Manager of Budget. I have served in my current position as Manager of Resource Planning since January 2008.

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

A. The purpose of my testimony is to provide support for Otter Tail's application for an Advance Determination of Prudence (ADP) for the Company's proposed development of Astoria Station, an approximately 250 MW simple cycle gas fired generation resource addition. My testimony principally addresses the need for and selection of the Project.

II. NEED FOR AND JUSTIFICATION OF THE RESOURCE ADDITION

Q. PLEASE SUMMARIZE THE COMPANY'S PROPOSED RESOURCE ADDITION.

A. Otter Tail is proposing to develop and construct an approximately 250 MW natural gas-fired simple cycle combustion turbine near the town of Astoria, South Dakota. The Company has obtained land rights to a site for Astoria Station at the intersection of the Northern Border Pipeline and the Big Stone South-Brookings County 345 kilovolt transmission line.

Q. WHY IS THIS RESOURCE ADDITION NEEDED?

A. Otter Tail is forecasting capacity needs of approximately 273 MW by 2021 and energy needs to mitigate reliance on the MISO energy markets. Together, the twin capacity and energy needs argue for the installation of energy and capacity resources by 2021.

Q. HOW IS OTTER TAIL PROPOSING TO MEET ITS NEED FOR ENERGY AND CAPACITY RESOURCES?

A. Otter Tail is proposing a two-part plan to meet its load serving obligations by 2021. Astoria Station is the second part of the plan and will provide low-cost capacity and dispatchable energy to serve customers and support the first part of the Company's two-part plan. Part one of the plan is the construction of the approximately 150 MW Merricourt Wind Farm (Merricourt Project) which will provide low-cost energy.

Together, the Merricourt Project and Astoria Station will, on a least-cost basis, reliably address Otter Tail's capacity deficit and provide energy for Otter Tail's customers, thereby reducing Otter Tail's projected 2021 reliance on the MISO energy markets from approximately 26% to 31% to approximately 16% to 20%.

Q. WHAT IS DRIVING THIS NEED?

A. Several circumstances are driving Otter Tail's need for capacity and energy: (1) overall load growth, including the potential of pipeline load developing in the Company's service territory; (2) expiring capacity purchases; and (3) the anticipated 2021 retirement of the 1950s-era 140 MW Powder River Basin (PRB) coal-fired Hoot Lake Plant in Fergus Falls, Minnesota.

Q. HAS THE COMPANY BEEN ANALYZING THE FUTURE OF HOOT LAKE PLANT?

A. Yes. By way of background, Hoot Lake Plant consists of Unit 2, built in 1959 with a nameplate rating of 53.3 MW, and Unit 3, built in 1964 with a nameplate rating of 75 MW. Unit 1 (which was retired in 2005) and some of the plant site's original infrastructure was constructed in 1948 with a nameplate rating of 7.5 MW.

Given the age and condition of Hoot Lake Plant, the magnitude of investment necessary to keep its units and associated infrastructure operational, and the possible cost of potential future environmental compliance upgrades, the Company has been analyzing the plant's ongoing role in the Company's generation portfolio. The Company's analysis began in 2010 when material investments in Hoot Lake Plant were likely to be needed to comply with the Mercury and Air Toxic Standards (MATS) regulations in 2015. To that end, the Company conducted its Baseload Diversification Study in 2012 to determine the most prudent course of action.

Q. WHAT DID THE COMPANY CONCLUDE IN THE 2012 BASELOAD DIVERSIFICATION STUDY?

A. The 2012 Baseload Diversification Study evaluated three scenarios: (1) retiring Hoot Lake Plant in 2015, (2) adding equipment to comply with the MATS regulations and then retiring the plant in 2020, and (3) refurbishing the plant for long-term operation. The Study concluded that making minimal investments for MATS compliance and then retiring Hoot Lake Plant Units 2 and 3 in 2021 was the least-cost and most prudent course of action.

Q. HOW DOES HOOT LAKE PLANT CURRENTLY OPERATE IN THE MISO MARKET?

A. Unit 2 is available to the MISO market, but market prices have been so low that it has been operated primarily in the winter as a source of building heat. Due to recent low market prices, Unit 3 has seen only limited operation year-round, and is primarily operated only for required environmental testing and as MISO infrequently dispatches the unit.

Q. WHY IS THE COMPANY RETIRING HOOT LAKE PLANT?

A. There are several reasons. First, because of the age of Hoot Lake Plant's infrastructure and its generation technology, it is comparatively expensive to keep operational. The Company can no longer justify additional investment in the existing facilities. Second,

future upgrades and investments could be necessary to comply with existing environmental regulations and the cost of such upgrades could be significant. Third, the plant's age and condition expose Otter Tail's customers to the risk of a major operational disruption at a time when replacement capacity and energy cannot be procured economically. This, in turn, could unnecessarily expose our customers to a volatile and potentially non-economic market for capacity and energy.

For these reasons, Otter Tail has developed a plan to retire Hoot Lake Plant in 2021 and replace it with an optimal complement of generation resources.

Q. WHAT CAPACITY PURCHASES DID THE COMPANY MAKE IN CONJUNCTION WITH ITS PLAN TO RETIRE HOOT LAKE PLANT IN 2021?

A. In conjunction with the Company's plans to retire Hoot Lake Plant in 2021, Otter Tail entered into several capacity purchase agreements to meet its obligations to serve customers:

- A 50 MW capacity-only contract with Great River Energy in 2014, increasing to 100 MW from January 2015 through May 31, 2017;
- A 25 MW capacity-only contract with Great River Energy that begins on June 1, 2017 and runs through May 31, 2019, and increases to 50 MW capacity-only from June 1, 2019 through May 31, 2021; and
- A 55 MW capacity-only contract with Great River Energy that begins on June 1, 2017 and runs through May 31, 2019.

The capacity purchased through these agreements was intended to "bridge" the Company's capacity needs until Hoot Lake Plant is retired in 2021. Otter Tail arranged for this package of capacity purchases to expire coincident with the retirement of Hoot Lake Plant so that it could aggregate its capacity needs to support the addition of new generation, rather than rely on the market.

Q. HOW DO THE COMPANY'S LOAD FORECASTS INFORM DECISIONS RELATED TO ITS RESOURCE NEEDS?

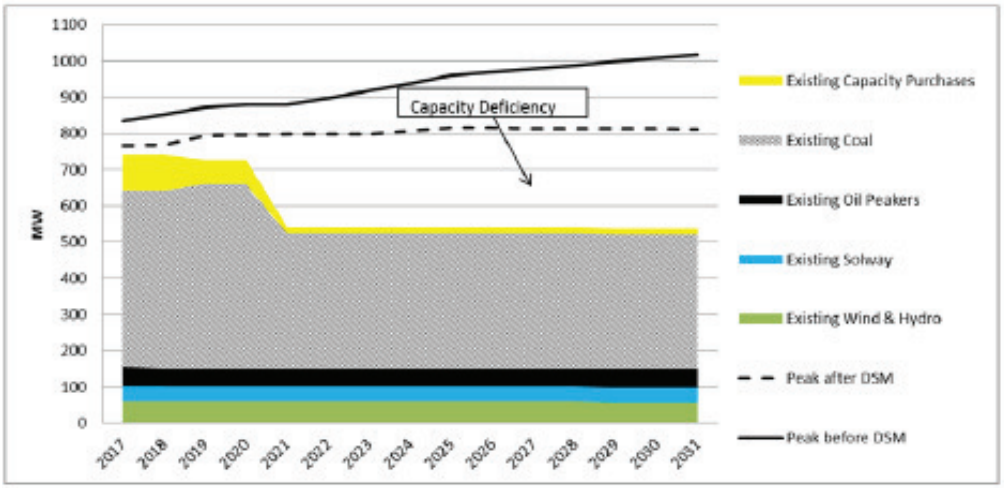
A. Otter Tail forecasts continued load growth. The Company's MISO obligation (non-coincident summer peak demand + transmission losses + reserve margins) for 2017 is 795 MW; this is expected to increase to 938 MW by 2031. A significant portion of this load growth is anticipated to result from expansion of pipelines that transport oil from the Bakken Shale in North Dakota and from Canada. While load growth forecasts are inherently uncertain, the need to reliably serve customers with capacity and energy is an additional driver of the need for the Astoria Station.

Q. ARE THERE AGREEMENTS AFFECTING THE COMPANY'S ANTICIPATED ENERGY NEEDS?

A. Yes. In addition to Otter Tail's capacity needs, energy needs will also increase due to the 2021 expiration of a 50 MW on-peak energy-only contract.

Q. WHAT DOES THIS CONFLUENCE OF NEED DRIVERS MEAN FOR OTTER TAIL?

A. Together, these events require Otter Tail to take action. The Company's current analysis indicates that without replacement capacity and energy, Otter Tail will have a capacity deficit of approximately 273 MW in 2021, and will need to source between approximately 26% to 31% of its energy from the MISO market. This capacity deficit is illustrated below:



In response to these need drivers, Otter Tail must install new generation resources.

III. ANALYSIS OF OPTIONS TO MEET NEEDS

Q. WHAT OPTIONS DID THE COMPANY CONSIDER TO ADDRESS THESE NEEDS?

A. In its 2013 Resource Plan, Otter Tail analyzed a number of potential resources options, including (1) a 311 MW combined cycle generator; (2) three different sized simple cycle generators; (3) conversion of Hoot Lake Plant to natural gas-fired generation; and (4) wind and solar resources. As described more fully in the testimony of Company witness Randy Synstelien, the Company used the Strategist resource planning tool to aid in the examination of the various options.

Q. WHAT DID THE 2013 RESOURCE PLAN MODELLING CONCLUDE WOULD BE THE MOST ECONOMIC CAPACITY RESOURCE?

A. The Strategist model concluded that meeting Otter Tail's 2021 capacity need with a simple cycle generator was the most economic capacity resource.

Q. DID THE COMPANY CONSIDER COMBINED CYCLE GENERATION?

A. Yes. Typically, when a utility has a simultaneous capacity and energy need for a portion of its load-serving obligation, it seeks resource additions that provide both capacity and energy at reasonable pricing, generally combined cycle generation. Combined cycle generation has the ability to follow load by ramping up and down throughout the day while providing energy at lower marginal cost than a simple cycle generator and with lower capital cost than a baseload generator. Therefore, the Company considered combined cycle generation.

The 311 MW combined cycle plant utilized in the Strategist model would have been the smallest unit for Otter Tail to develop on its own consistent with its identified capacity need. As I mentioned, Strategist indicated that this generation addition would not be economic but, rather, that it would be more cost effective to install a capacity resource through a simple cycle generator and source energy elsewhere, either in the MISO markets or through the installation of wind facilities, if pricing was sufficiently attractive.

I note that a hybrid approach of wind-plus-gas can more optimally provide many of the same characteristics as combined cycle generation, which I discuss further later in my testimony.

Q. DID THE COMPANY CONSIDER PARTNERING WITH ANOTHER COMPANY TO JOINTLY DEVELOP A LARGER COMBINED CYCLE FACILITY TO CAPTURE ECONOMIES OF SCALE?

A. Yes. Company representatives reached out to a number of potential co-owners, but these discussions were not fruitful.

Q. DID OTTER TAIL CONSIDER REFURBISHING OR OTHERWISE CONTINUING TO OPERATE HOOT LAKE PLANT TO MEET ITS NEEDS?

A. Yes. Continued operation of Hoot Lake Plant was considered. However, based on the results of the Baseload Diversification Study, Otter Tail did not pursue continued operation.

Q. DID OTTER TAIL CONSIDER REPOWERING HOOT LAKE PLANT TO NATURAL GAS AS AN OPTION TO MEET ITS NEEDS?

A. Yes. Because of its location and infrastructure, the Company seriously considered repowering of Hoot Lake Plant to natural gas-fired generation. The Company analyzed repowering in all of the Strategist modelling scenarios, but Strategist did not pick repowering as a least-cost resource in the majority of scenarios analyzed.

Q. WHAT DID THE COMPANY DO IN RESPONSE TO THE 2013 RESOURCE PLAN'S CONCLUSION TO REPLACE HOOT LAKE PLANT'S CAPACITY WITH A SIMPLE CYCLE GENERATOR?

A. In 2015, the Company completed an extensive evaluation of the preferred sites for gas generation in light of the results of our 2013 resource planning process selecting simple cycle generation as the most economical way for the Company to meet its capacity needs. There were six sites originally under consideration across our three-state service area. We also evaluated the possibility of partnering with another utility to build a larger

simple cycle generating station. The results of the evaluation indicated that developing simple cycle generation at Astoria, South Dakota provided the most benefits at the least cost to our customers. Mr. Swanson discusses this further.

Q. WHY DID THE ASTORIA SITE PROVIDE THE MOST BENEFITS AT THE LEAST COST?

A. A site at the intersection of a natural gas pipeline and electric transmission line is optimal. Fortuitously, the Company was able to obtain land rights to a suitable site near Astoria. Interconnection of the natural gas-fired generation to the new Big Stone South-Brookings County 345 kV transmission line would provide the most robust transmission service of all the sites. Because both electric and natural gas transmission are located on the property, interconnection costs for each are projected to be significantly lower than at other sites, driving down overall Project costs. There is also superior electric and natural gas transmission capacity for potential future expansion at the Astoria site.

Q. DID THE COMPANY CONTINUE TO ANALYZE REPLACEMENT SCENARIOS FOR HOOT LAKE PLANT IN SUBSEQUENT RESOURCE PLANNING CYCLES?

A. Yes. The Company's 2016 Resource Plan again analyzed a number of scenarios, including combined cycle generation, two sizes of natural gas simple cycle generation, wind, and solar. The 2016 resource planning analysis also included generic simple cycle generation with the characteristics of the Company's proposed Astoria Station and a generic low-priced wind project. The 2016 resource planning analysis confirmed the outcome of the 2013 resource planning cycle, especially in light of forecast load growth from the 2013 to the 2016 planning cycles.

Q. WHAT DID THE 2016 RESOURCE PLAN CONCLUDE?

A. The 2016 Resource Plan concluded that the least-cost option was a wind-plus-gas configuration: the 2018 addition of 100 MW of wind and another 100 MW of wind in 2020, plus the 2021 addition of an approximately 248 MW simple cycle natural gas turbine.

Q. HOW DID THIS CONCLUSION RELATE TO THE PROJECT CONTEMPLATED FOR THE ASTORIA LOCATION?

A. For purposes of the 2016 Resource Plan, the gas plant that was analyzed in the modelling was assumed to be located at Astoria and sized consistent with our current plans for Astoria Station. In other words, in 2016 the Strategist modeling system, given quite detailed information about Astoria's characteristics and costs, selected Astoria as part of the least-cost plan.

Q. HOW DOES THE WIND-PLUS-GAS APPROACH COMPARE TO OTHER APPROACHES FOR MEETING A SIMULTANEOUS ENERGY AND CAPACITY NEED?

A. The combination of wind and a natural gas-fired simple cycle generator provides many beneficial operating characteristics. The simple cycle component provides relatively low-cost capacity and dispatchable energy. The wind component provides low-cost energy. Wind and natural gas simple-cycle generation have natural synergies. Wind is an intermittent, variable energy resource. Natural gas simple-cycle generation demonstrates great flexibility in addressing wind generation's intermittency and variability, inasmuch as it is able to start and achieve full-output in a matter of minutes and is capable of cycling multiple times per day. Consequently, a simple cycle generator can provide load-following capability to support a reliable grid. Backing wind with gas captures the low-cost energy made possible by the current market for wind generation while helping to ensure sufficient reliability through grid support from dispatchable simple cycle generation, which includes low-cost capacity. Simple cycle generation paired with wind is particularly attractive to Otter Tail because the Company's service territory has some of the best wind resources in the country, with low potential for transmission congestion due to proximity of the wind resource to Otter Tail load. A wind-plus-gas configuration can provide many of the same economic and operational benefits and operating characteristics of a combined cycle plant.

Q. WHAT ARE SOME OTHER ADVANTAGES OF A WIND-PLUS-GAS CONFIGURATION?

A. A wind-plus-gas configuration also has hedge and expansion value. If Otter Tail installed a combined cycle plant, the Company and its customers would have significant exposure to fluctuations in natural gas pricing. Because it will use less gas, a simple cycle plant mitigates that potential exposure. Moreover, a natural gas simple cycle plant site can include sufficient space and design parameters to accommodate the potential future addition of combined cycle generation, if market conditions later warrant it. The wind component can provide low-cost energy from a zero-cost fuel source providing both a market and fuel hedge. And the Company's service area has excellent wind resources, providing an economic generation resource with low potential for transmission congestion due to the wind resource's proximity to the Company's load.

Q. IN LIGHT OF ITS NEED DRIVERS, WHAT HAS THE COMPANY CONCLUDED?

A. The Company has concluded that its two-part plan – the Merricourt wind project and Astoria Station – provides least-cost capacity and energy for the Otter Tail system in the most prudent fashion.

IV. ASTORIA STATION IS PRUDENT

Q. HAS THE COMPANY CONTINUED ANALYZING THE PRUDENCE OF THE ASTORIA STATION?

A. Yes. After Otter Tail selected Astoria Station as the least-cost resource available, the Company continued its analysis to confirm the prudence of moving forward with the Project. This modelling process and its results are described in more detail in the testimony of Company witness Randy Synstelien.

Q. WHAT CONSIDERATIONS MAKE A SIMPLE CYCLE COMBUSTION TURBINE OPTION, SUCH AS IS CONTEMPLATED FOR ASTORIA STATION, ATTRACTIVE AT THIS TIME?

A. During our continued review, the Company assessed options and analyzed the market dynamics, including sustained low natural gas prices and increasingly inexpensive wind generation. Regardless of political developments and environmental compliance matters, we believe the market dynamics remain largely static. Low-cost wind additions are likely to contribute to increasingly volatile market prices caused by fluctuations in the availability of wind. Astoria Station will serve to hedge customers' energy needs, so that they are not paying high market prices during periods when wind is not available. In addition, it will afford us dispatch flexibility to serve as a price hedge for our customers at times of high energy prices. A simple cycle combustion turbine is also less complicated for permitting and construction purposes. Finally, ownership of the resource will allow flexibility for the Company to convert to combined-cycle in the future if it is deemed prudent to do so.

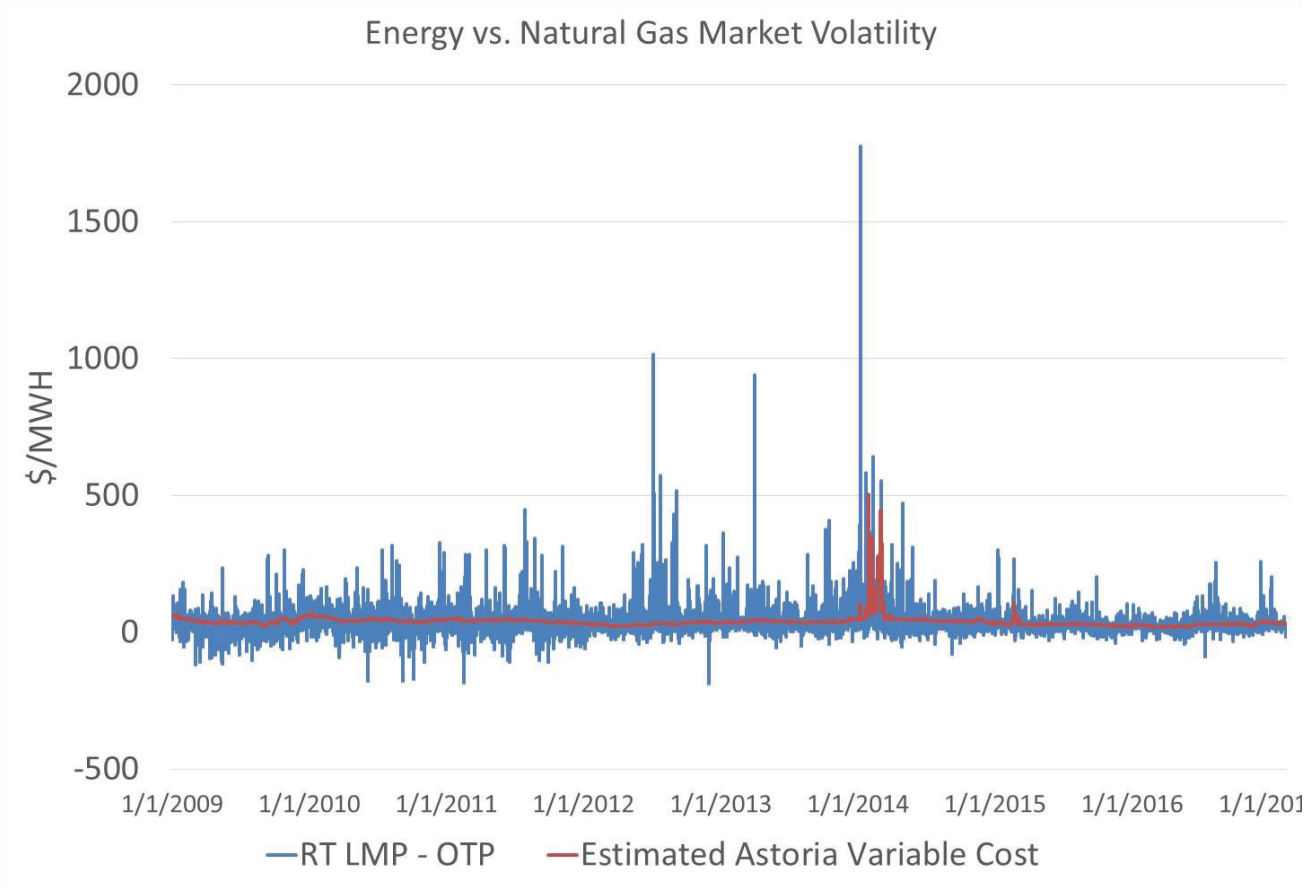
Q. DID THE COMPANY ANALYZE FORECASTS OF THE FUTURE PRICE OF NATURAL GAS?

A. Yes. The Company utilized a natural gas price forecast purchased from Wood Mackenzie. Otter Tail tested the base forecast using ±25%, ±50%, and +100% natural gas pricing scenarios as part of its resource planning process. In all cases, the addition of the 248 MW simple-cycle combustion turbine was a part of the least cost resource mix. This robust testing gives us confidence that simple-cycle generation is the correct addition, even with widely varying natural gas prices.

Q. DOES THE VOLATILITY OF NATURAL GAS PRICES EXPOSE OTTER TAIL'S CUSTOMERS TO UNNECESSARY RISK?

A. While natural gas has been volatile in the past, it is significantly less volatile than the real-time MISO energy market. The following chart represents data from January 1, 2009 to January 1, 2017. The blue line represents the real-time Locational Marginal Price (LMP) at the Otter Tail load zone. The red line estimates what the cost of energy

from the Astoria unit would have been for that historical period of time. It is calculated by multiplying the daily clearing price at the Ventura natural gas trading point—just southeast of Astoria Station on the Northern Border Pipeline—by the heat rate of the unit (9.5 times the natural gas price) and then adding $3.50/MWh as variable O&M. As the chart demonstrates, there have been two times in this period when natural gas exhibited volatility similar to the real-time energy market—namely during the winter of 2013-14 and for a brief period in early-2015. However, these periods are exceptions. The vast majority of the time, Astoria Station would have provided a backstop to the real-time energy markets—limiting the energy market exposure that customers would have experienced.



Q. PLEASE DESCRIBE ANY OTHER ADVANTAGES OF ASTORIA STATION.

A. We believe the Project affords us flexibility in times of political, regulatory, and market uncertainty. A combustion turbine is likely to have less exposure under any future environmental regulatory regime, given that a simple cycle combustion turbine results in

significantly lower carbon dioxide emissions than other options. A simple cycle combustion turbine can also be converted to combined cycle generation in the future if circumstances warrant it. A simple cycle combustion turbine also affords greater dispatch flexibility than does a combined cycle unit. This will allow us to better address the variability of wind generation and energy prices. Finally, a simple cycle combustion turbine is less complicated for permitting and construction purposes.

Q. DOES THE ASTORIA STATION USE GAS FROM NORTH DAKOTA?

A. Yes. The natural gas that will fuel the Project comes from a pipeline partially filled with natural gas recovered in the Williston Basin in North Dakota or produced synthetically at Dakota Gasification Company's plant near Beulah. Inasmuch as our Company incorporated in 1907 and served its first customer in Wahpeton in 1909, it would be a source of pride to use natural gas extracted or produced in energy rich North Dakota.

V. CONCLUSION

Q. DOES THIS CONCLUDE YOUR PRE-FILED TESTIMONY?

A. Yes, it does.

STATE OF NORTH DAKOTA

PUBLIC SERVICE COMMISSION

Otter Tail Power Company
Advance Prudence – Astoria Gas
Application

Case No. PU-17-___

VERIFICATION

STATE OF MINNESOTA)
) ss.
COUNTY OF OTTER TAIL)

Brian Draxten, being first duly sworn on oath, deposes and says that he is the Manager of Resource Planning for Applicant Otter Tail Power Company; that the testimony and schedules submitted in the above-captioned matter under his name were prepared under his direction; and that he knows and verifies the contents thereof, and that the same is true and correct to the best of his knowledge and belief.

Dated this 10th day of April, 2017

Brian Draxten

Subscribed and sworn to before
me on this 10 day of April, 2017.

Notary Public
My Commission expires 1-31-22

KIMBERLY ANN WARD
NOTARY PUBLIC
MINNESOTA
My Commission Expires Jan. 31, 2022

STATE OF NORTH DAKOTA
BEFORE THE
PUBLIC SERVICE COMMISSION

Otter Tail Power Company
Advance Prudence – Astoria Gas
Application

Case No. PU-17-

DIRECT TESTIMONY

OF

RANDY SYNSTELIEN

ON BEHALF OF

OTTER TAIL POWER COMPANY

Economic Analysis Testimony

April 10, 2017

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I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND TITLE

A. My name is Randy Synstelien. I am the Principal Resource Planner for Otter Tail Power Company (Otter Tail or the Company).

Q. PLEASE DESCRIBE YOUR QUALIFICATIONS AND EXPERIENCE.

A. I have a Bachelor of Arts degree in accounting from Moorhead State University. I have worked for Otter Tail Power Company since 1991. My current job responsibilities as the Principal Resource Planner include ensuring that Otter Tail has sufficient capacity and energy resources to reliably and affordably meet customer needs.

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

A. The purpose of my testimony is to support the Company's application for an Advance Determination of Prudence (ADP) in connection with Otter Tail's proposed approximately 250 MW simple cycle gas generation development (Astoria Station or the Project). In particular, I discuss the analyses performed by Otter Tail through its Integrated Resource Plan (IRP) process. I also address the impact of adding the Project to the Company's integrated system.

II. PROJECT DESCRIPTION

Q. PLEASE DESCRIBE OTTER TAIL'S PROPOSED RESOURCE ADDITION.

A. Otter Tail is proposing to develop and construct an approximately 250 MW natural gas-fired simple cycle electric generator near the town of Astoria, South Dakota. The Company has purchased a site for the Project at the intersection of the Northern Border Pipeline and the Big Stone South-Brookings County 345 kilovolt transmission line. As discussed by Mr. Swanson, Otter Tail currently estimates the Project to have capital costs of approximately $165 million.

III. INTEGRATED RESOURCE PLANNING

Q. PLEASE DESCRIBE OTTER TAIL'S RESOURCE PLANNING APPROACH?

A. The Company's integrated resource planning (IRP) process utilizes generic demand-side and supply-side resources (e.g., energy efficiency/conservation and generation from wind, solar, natural gas, or coal) that are identified as potential components of the Company's preferred resource plan. Once a resource is identified as a part of the preferred plan in the IRP process, Otter Tail then seeks to identify the most cost-effective individual components for the preferred plan.

Q. HOW DOES OTTER TAIL UNDERTAKE ITS IRP PROCESS?

A. Otter Tail uses resource planning software called Strategist to aid in the resource planning process. The goal of the resource planning process is to develop a single preferred plan, on an integrated system basis, which reliably and economically meets the capacity and energy needs of customers in the three states we serve, while complying with all legal and regulatory obligations and adequately addressing risk. Otter Tail provides service in three states on an integrated system basis, which affords significant benefits to customers due to the economies of scale achieved from planning and integrating generation assets on a larger scale. The resource planning process incorporates the full complement of the Company's existing fleet of generation, bilateral transactions, and demand-side management (DSM) programs, as well as evaluating new resource alternatives to meet customer demand, expiring bilateral transactions, and the anticipated retirement of existing generation resources. The preferred plan is considered under numerous scenarios relating to forecasted fuel prices (i.e., coal and natural gas), market energy prices, market capacity prices, load growth, and resource costs (including both capital and O&M).

Q. IS THE PROPOSED PROJECT A RESULT OF OTTER TAIL'S IRP PROCESS?

A. Yes. In both our 2013 and 2016 IRP processes, we analyzed the impact of simple cycle generation to meet Otter Tail's anticipated energy needs.

Q. WHAT WERE THE RESULTS OF THE 2013 IRP PROCESS?

A. Our 2013 IRP process indicated that adding simple cycle gas generation would meet the capacity needs Otter Tail anticipated in the 2021 time frame. Mr. Draxten discusses these needs further in his Testimony.

The Company's 2013 IRP process sought to determine the optimal capacity resource to meet Otter Tail's future needs. To do so, several different generic resource additions were provided to Strategist for selection. These included three different size simple cycle generators; a small combined cycle generator; and repowering of Hoot Lake Plant with natural gas. A simple cycle generator was selected in 76 of the 78 scenarios analyzed, indicating that the selection of a simple cycle generator was likely to be the most economic capacity addition.

The 2013 IRP process also analyzed the potential addition of wind resources to meet Otter Tail's energy needs. At the then-prevailing wind pricing, which predated the extension of the federal production tax credit (PTC), Strategist did not select wind as a least cost addition. However, our analysis indicated that if wind prices were at or below $30/MWh, acquiring wind was least-cost and prudent.

Q. WHAT WERE THE RESULTS OF THE 2016 IRP PROCESS?

A. Our 2016 IRP process confirmed the results of the 2013 IRP analyses. Strategist continued to select approximately 250 MW of simple cycle gas generation. Importantly, since the 2013 IRP process had identified simple cycle generation as the most cost effective way to meet Otter Tail's needs, the Company had been working toward developing a simple cycle plant. Consequently, we included a simple cycle option for Strategist to select with the costs and operating characteristics of Astoria Station, in addition to a different generic simple cycle plant, combined cycle plants, and other options. The simple cycle generator with Astoria Station's characteristics was selected in every scenario analyzed. This confirmed the prudence of moving forward with the Project.

Q. ARE THERE OTHER RELEVANT RESULTS OF THE 2016 IRP PROCESS?

A. Yes. Our 2016 IRP process also indicated that it would be economic to meet Otter Tail's energy needs with wind generation if it was priced at or below $30/MWh, confirming the results of the 2013 IRP process.

IV. ECONOMIC IMPACT OF THE RESOURCE ADDITION

Q. HAS OTTER TAIL ANALYZED THE IMPACT OF THE PROJECT?

A. Yes. We analyzed the addition of Astoria Station as compared to the base case, and also analyzed the addition of Astoria Station and the Merricourt Project as compared to the base case.

Q. WHAT WERE THE RESULTS OF OTTER TAIL'S ANALYSIS?

A. The addition of Astoria Station, both alone and with the Merricourt Project, lowered overall system costs when compared to the base case.

Q. HOW WAS THE BASE CASE ESTABLISHED?

A. To assess impacts, Otter Tail established a baseline that assumes the retirement of Hoot Lake Plant in 2021, the expiration of bilateral capacity and energy purchases that the Company currently utilizes, and the addition of no new resources. The resulting plan has a considerable amount of energy and capacity purchased at forecasted market prices.

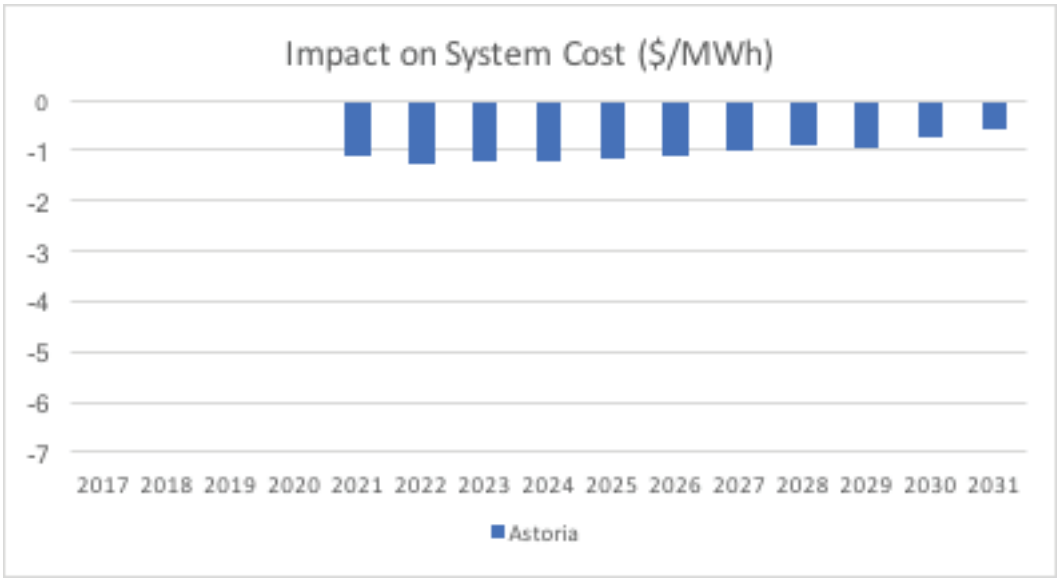
Q. PLEASE SUMMARIZE THE RESULTS OF THE COMPANY'S ANALYSIS.

A. The table below identifies the PVRR impacts of the scenarios analyzed.

Scenario	Present Value Utility Costs (000)	Difference from Base
Base Case (Market energy and capacity purchases)	2,375,341.80	
Base plus Astoria	2,338,913.80	-36,428.00
Base plus Astoria and Merricourt	2,238,187.50	-137,154.30

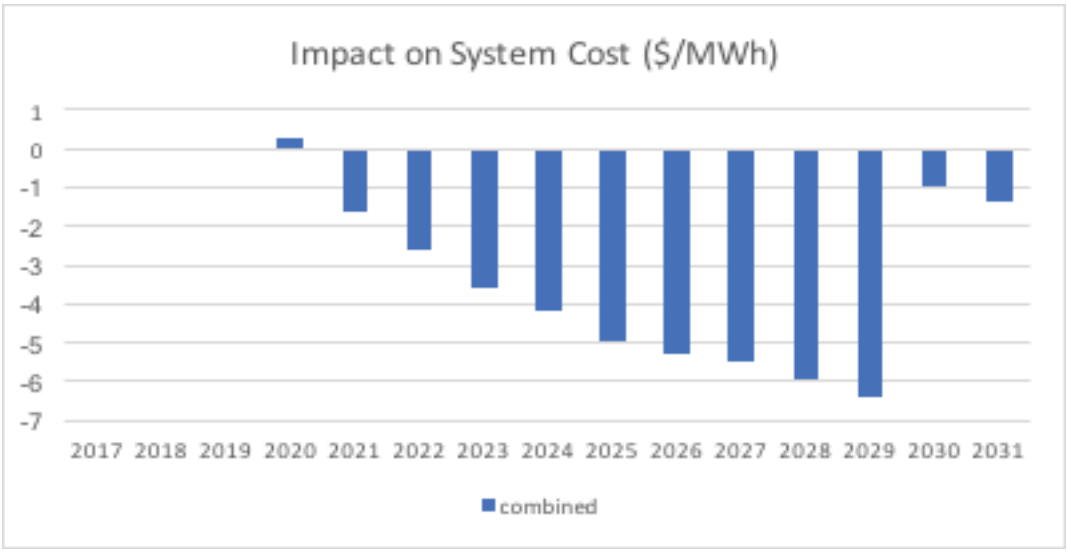
Q. DO THE IMPACTS OF THE PROJECT CHANGE OVER TIME?

A. Yes. The nature of Company ownership of Astoria Station means that the impact to customers will vary over time. However, Astoria Station is expected to produce cost savings compared to the base case upon commencement of commercial operation. The chart below demonstrates the annual cost impact of the Astoria Project.

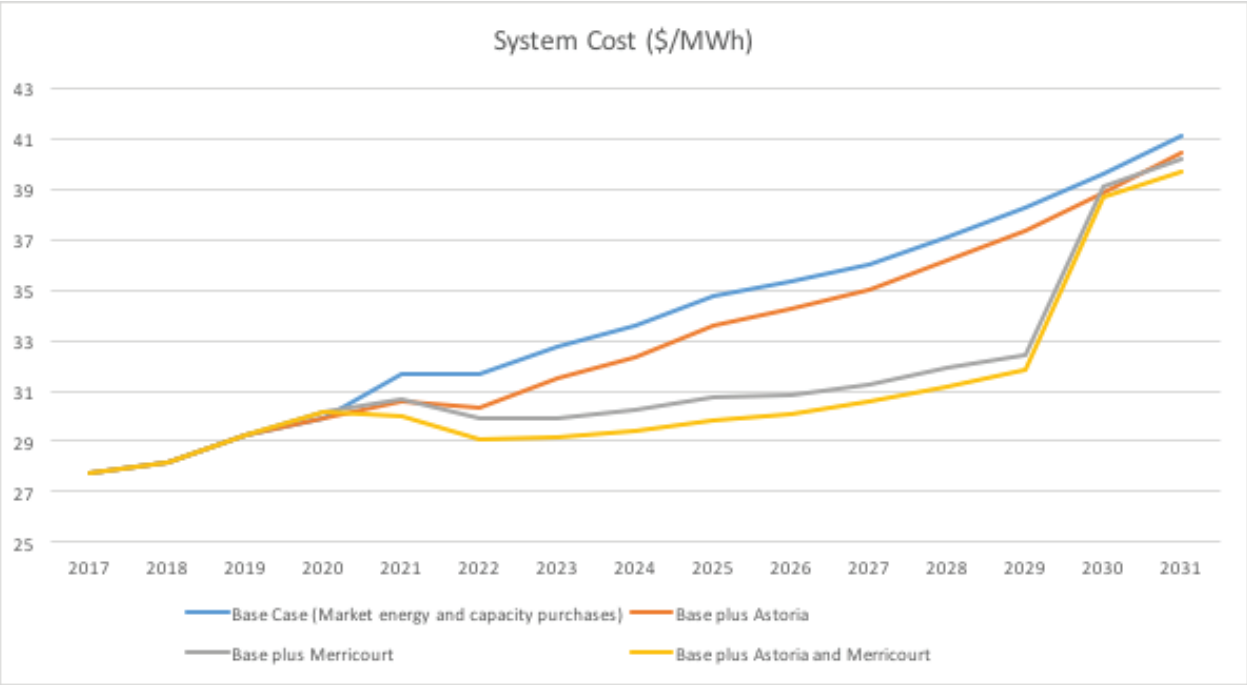


Q. HAS OTTER TAIL ANALYZED THE ANNUAL COST IMPACT FOR ITS TWO-PART PLAN?

A. Yes. The chart below shows the cost savings on an annual basis for the combined addition of Astoria Station and the Merricourt Project when compared to the base case.



The chart below illustrates the cost impact of each scenario analyzed on an annual basis when compared to the base case.



Q. WHAT DO YOU CONCLUDE BASED ON THESE ANALYSES?

A. I conclude that Astoria Station on its own – and as part of the Company's two-part plan – is least-cost in all scenarios analyzed.

V. CONCLUSION

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

STATE OF NORTH DAKOTA

PUBLIC SERVICE COMMISSION

Otter Tail Power Company
Advance Prudence – Astoria Gas
Application

Case No. PU-17-___

VERIFICATION

STATE OF MINNESOTA)
) ss.
COUNTY OF OTTER TAIL)

Randy Synstelien, being first duly sworn on oath, deposes and says that he is the Principal Resource Planner for Applicant Otter Tail Power Company; that the testimony and schedules submitted in the above-captioned matter under his name were prepared under his direction; and that he knows and verifies the contents thereof, and that the same is true and correct to the best of his knowledge and belief.

Dated this 10th day of April, 2017

Randy Synstelien

Subscribed and sworn to before
me on this 10 day of April, 2017.

Notary Public
My Commission expires 1-31-22

KIMBERLY ANN WARD
NOTARY PUBLIC
MINNESOTA
My Commission Expires Jan. 31, 2022

STATE OF NORTH DAKOTA
BEFORE THE
PUBLIC SERVICE COMMISSION

Otter Tail Power Company
Advance Prudence – Astoria Gas
Application

Case No. PU-17-

DIRECT TESTIMONY

OF

WILLIAM SWANSON

ON BEHALF OF

OTTER TAIL POWER COMPANY

Project Development Testimony

PUBLIC DOCUMENT – NOT PUBLIC DATA HAS BEEN EXCISED

April 10, 2017

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I. INTRODUCTION AND QUALIFICATIONS

Q. PLEASE STATE YOUR NAME AND TITLE.

A. My name is William Swanson. I am Manager of Supply Engineering for Otter Tail Power Company (Otter Tail or the Company).

Q. PLEASE DESCRIBE YOUR QUALIFICATIONS AND EXPERIENCE.

A. I have a Bachelor of Science degree in Mechanical Engineering from North Dakota State University. I am a registered professional engineer in the state of South Dakota. I have worked in the Energy Supply area of Otter Tail Power Company for 22 years, holding various positions including Plant Engineer, Engineering Supervisor, and Site Manager (Big Stone II Project). I currently serve as Manager of Supply Engineering.

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

A. The purpose of my testimony is to support the Company's application for an Advance Determination of Prudence (ADP) for the Astoria Station. In particular, I describe:

- The Project and associated facilities;
- Our planned approach to development, engineering, procurement, and construction of the Project;
- The key risks the Company has identified in its analysis of the Project and how we intend to address them; and
- Our efforts to minimize Project-related sales/use and property taxes for the benefit of our customers.

II. DESCRIPTION OF PROJECT

Q. PLEASE DESCRIBE ASTORIA STATION.

A. Otter Tail proposes to develop, own and operate an approximately 250 MW natural gas-fired, frame-style, simple cycle combustion turbine near Astoria, South Dakota. The Project includes all associated facilities, including a short segment of natural gas pipeline necessary to interconnect to the Northern Border Pipeline, and a generation-tie line necessary to interconnect the Project to a switching station to be constructed by the co-

owners of the Big Stone South-Brookings County 345 kV electric transmission line. The Project will be designed with quick-start capability to serve a load-following function and provide for peak capacity needs.

Q. HAS THE COMPANY DETERMINED THE FINAL PROJECT DETAILS?

A. No. The Company has decided on natural gas as a fuel source and a simple cycle combustion turbine as the basic energy conversion technology. Otter Tail has also determined that it will utilize a frame-style turbine in the approximately 250 MW range, equipped with quick-start capability. The final size of the simple cycle turbine and the specific features to be included will be determined through Otter Tail's sourcing efforts, initiated closer to the time of construction. The Company will seek to purchase the lowest evaluated cost combustion turbine then available on the market, consistent with the size of the Company's capacity needs.

Q. WHAT DO YOU MEAN THAT THE COMBUSTION TURBINE WILL BE IN THE APPROXIMATELY 250 MW RANGE?

A. Otter Tail's capacity needs are currently forecast to be approximately 273 MW in 2021, as discussed in Mr. Draxten's testimony. That amount of capacity need indicates that a simple cycle turbine should be sized at approximately 250 MW. Therefore, Otter Tail intends to source a combustion turbine in that size range. However, because different combustion turbine manufacturers have different sized machines in that range, the exact size of the simple-cycle generator will not be known until we select and procure the turbine.

Q. WHEN DOES THE COMPANY PLAN TO COMPLETE THE PROJECT?

A. The Project is expected to be placed in service no later than May 2021, in order to meet the Company's anticipated capacity need at that time.

Q. WHERE WILL THE PROJECT BE LOCATED?

A. As noted, the Project will be located near Astoria in Deuel County, South Dakota. The Company purchased property near the intersection of the Northern Border Pipeline and

the Big Stone South-Brookings County 345 kilovolt transmission line, where the Project is to be developed and constructed. Because of the site's proximity to both natural gas and electric transmission, the site is advantageous for development of natural gas-fired generation. The Company is currently working to finalize the precise location of the generation equipment and associated facilities.

Q. PLEASE DESCRIBE ANY OTHER BALANCE OF PLANT FACILITIES NECESSARY FOR THE PROJECT.

A. The Project will also include an approximately 10-inch diameter segment of natural gas pipeline less than 1000 feet in length to the Northern Border Pipeline in order to access the natural gas needed for the combustion turbine. In addition, the Project will require that a 345 kV generation tie line be built to a switching station to be constructed by the co-owners of the Big Stone South-Brookings County 345 kV electric transmission line at a point designated by MISO in its interconnection process. The costs associated with the natural gas pipeline segment and generation-tie line are included in our cost estimates for the Project.

Q. WHAT IS A SIMPLE CYCLE COMBUSTION TURBINE?

A. A combustion turbine is essentially a type of internal combustion engine. It has an upstream rotating compressor coupled to a downstream turbine, and a combustion chamber in between. In a simple cycle combustion turbine, air is introduced into the front of the unit and is compressed using rows of rotating blades. The compressed air is then sent to a combustion chamber where it is mixed with fuel and ignited. The hot combustion gases are then expanded through rotating turbine blades, delivering mechanical energy that rotates the generator to produce electricity.

Modern simple cycle combustion turbines are generally capable of starting quickly in order to serve peak capacity needs and follow load as necessary. The generator will be air-cooled in order to avoid incurring cost for additional equipment. The unit will be fueled by natural gas only, so that additional equipment for fuel oil or other liquid fuels is unnecessary.

Q. DESCRIBE THE DIFFERENCE BETWEEN SIMPLE CYCLE AND COMBINED CYCLE GENERATION.

A. A simple cycle combustion turbine generator can be a stand-alone facility like the Project, or it can be part of a larger and more complex system at a combined cycle plant. A combined cycle plant captures a simple cycle generator's exhaust energy in a heat recovery steam generator (or HRSG) which, in turn, produces steam to operate a second steam turbine cycle. Combining the steam cycle with the gas cycle improves overall plant efficiency, but requires considerably more capital to build. A simple cycle combustion turbine is the core building block of a combined cycle plant and, therefore, a simple cycle site could be converted to combined cycle at a later date. We are prudently developing Astoria Station with the flexibility to add combined cycle generation if circumstances later warrant it.

Q. WHAT TYPES OF COMBUSTION TURBINE TECHNOLOGIES COULD BE CONSIDERED FOR USE IN THE PROJECT?

A. Simple cycle combustion turbines can be broadly categorized into small aero-derivative and large frame technologies. Aero-derivative turbines are generally characterized by smaller size, quicker starting capability, and modular construction. They are essentially analogous to jet engines. Their electric generation output is less than that of frame turbines. Otter Tail currently owns and operates an approximately 50 MW aero-derivative combustion turbine at its Solway, MN site.

Frame machines, by contrast, are characterized by lower pressure ratios and tend to be physically large. Frame machines can have output capability in excess of 300 MW. On a per kW basis, frame-style combustion turbines are less costly due to economies of scale. Historically, frame turbines required longer starting times than aero-derivative units, but recent frame technology has reduced the start time to less than ten minutes for the purpose of efficiently following load. In addition, recent technical gains by frame manufacturers have improved the efficiency in current frame turbine models.

Q. WHAT TYPE OF SIMPLE CYCLE COMBUSTION TURBINE IS PROPOSED FOR ASTORIA STATION?

A. We are proposing to install a frame machine, which makes it easier to accommodate the 250 MW need that we have identified. This technology is superior to alternative combustion turbine technologies, as it allows Otter Tail to realize economies of scale.

Q. WHAT CRITERIA WERE USED TO EVALUATE THE ASTORIA, SOUTH DAKOTA SITE?

A. The primary considerations for siting a combustion turbine are proximity to reliable and robust natural gas and electric transmission infrastructure. One of the largest drivers of the overall cost for developing simple cycle generation is the need to construct pipeline segments for natural gas access and electric transmission lines to interconnect to the electric transmission grid. Minimizing these costs enables a least-cost project, because turbine and installation costs are generally the same for any site. Other considerations include site suitability for construction, capital costs, availability of water, permitting, local conditions and tax incentives.

Q. HOW DID THE COMPANY UNDERTAKE ITS SITE EVALUATION?

A. The Company reviewed locations within its service area where major natural gas pipelines intersected with significant electric transmission infrastructure. The Company originally assessed several sites throughout North Dakota, South Dakota, and Minnesota. It then narrowed its consideration to three North Dakota sites (near Wishek, Ellendale, and Merricourt), one South Dakota site, and one Minnesota site. The Company reviewed historical and projected locational marginal pricing (LMPs) at each site, site suitability for construction, capital costs (including anticipated interconnection costs under MISO's generator interconnection process), available tax incentives, and required permits. The Company also reviewed the availability of water resources necessary for the Project.

Q. WHAT WERE THE RESULTS OF THE SITE EVALUATION?

A. The Astoria site was identified as the preferred site due to its proximity to the intersection of the Northern Border Pipeline and the CapX2020 Big Stone South-Brookings County

345 kV transmission line. Otter Tail's assessment is that the Astoria site requires the least amount of supporting infrastructure investment, which reduces capital investment and ensures that the project will be least-cost. Moreover, it would impose minimal disruption to landowners, as opposed to a project requiring a long natural gas pipeline segment or electric transmission line to be constructed. Finally, the Astoria site is sufficiently large to allow for plant expansion in the future.

The North Dakota sites considered would have required significant natural gas pipeline segments from the Northern Border Pipeline. Long pipeline segments would impact a far greater number of landowners and would add significant cost to the Project. By contrast, no such significant pipeline segment is required at the South Dakota site. As Mr. Tollerson testified, Otter Tail explored whether there were ways to more economically extend a pipeline segment for a North Dakota site.

The Company also considered its existing Solway, Minnesota site. As a brownfield site, Solway had several advantages. However, unlike the Astoria site, Solway does not have sufficient electric transmission infrastructure to support an additional simple cycle generator and likely would have required additional electric transmission routing and investment. In addition, there would have been more landowner impact.

Further, the Solway site had disadvantages from a reliability perspective in two respects. First, the Solway site already has natural gas electric generation served by the Great Lakes Gas Transmission pipeline. Adding additional generation at that site would increase reliance on natural gas supply from that single pipeline. The Company believes it is prudent to diversify its reliance on natural gas supply to mitigate exposure to fuel supply disruption. Astoria Station will accomplish this by being served by the Northern Border Pipeline. Second, adding natural gas generation in a different part of the Company's service territory provides geographic diversity for our generation resources. Geographic diversity provides benefits by mitigating storm and other site-specific risks.

Q. WHAT IS THE ESTIMATED COST FOR ASTORIA STATION?

A. The estimated cost of the Project is $165 million. This estimated cost includes engineering, procurement, and construction of the generation plant, the natural gas pipeline segment, interconnection facilities, and reasonable contingencies. While the estimate includes escalation, it does not include AFUDC.

Q. PLEASE PROVIDE A HIGH-LEVEL BREAKDOWN OF SIMPLE CYCLE COMBUSTION TURBINE, INTERCONNECTION, AND NATURAL GAS PIPELINE PORTIONS OF THE PROJECT.

A. A high-level breakdown follows:

[**NOT PUBLIC DATA BEGINS…**

…NOT PUBLIC DATA ENDS]

Reasonable contingencies consistent with early-stage generation development are included in the categories above. Escalation is estimated by using an escalation factor based on the timing of when actual expenditures are expected to occur.

Q. HAS OTTER TAIL FINALIZED THESE COST ESTIMATES?

A. No. The cost estimates are preliminary and are based on Otter Tail's market knowledge and preliminary engineering studies. I believe the estimates are reasonable at this stage of development. I discuss drivers for these costs, related risks, and Otter Tail's approach to managing these risks later in my testimony.

Q. IS IT REASONABLE FOR THE COMMISSION TO GRANT AN ADP BASED ON PRELIMINARY ESTIMATES?

A. Yes. In the Application and supporting testimony, the Company has provided a detailed and reasoned justification for moving forward with a simple-cycle combustion turbine. Further, Otter Tail has concluded that ownership, rather than a capacity purchase agreement, is the most appropriate structure for the simple cycle plant, because it would extend the availability of the capacity to meet customer needs materially beyond industry-standard capacity purchase agreement terms and will allow for future expansion of the plant should circumstances warrant. Given these considerations, the biggest cost driver is site selection inasmuch as this drives the two largest variables of simple cycle generation development: electric transmission and natural gas infrastructure. Otter Tail's selection of the Astoria Site mitigates these variables. Consequently, Astoria Station is the least-cost simple cycle generation available to Otter Tail.

III. REASONABLE MITIGATION OF RISKS

Q. WHAT IS THE PURPOSE FOR THIS SECTION OF YOUR TESTIMONY?

A. In this section of my testimony, I provide the Company's assessment of the risks associated with Astoria Station and the Company's efforts to prudently manage those risks. Specifically, this section covers:

a. A description of the MISO Generator Interconnection Process and the Company's efforts to develop the Project despite challenges in estimating interconnection costs under current circumstances;

b. A description of the Company's approach to the development, engineering, procurement and construction of the Project and the potential issues we foresee in that process; and

c. A discussion of how the Company addresses the development and construction risks identified with the Project.

A. Approach to Interconnection Cost Risk

Q. DID OTTER TAIL ANALYZE INTERCONNECTION ISSUES AT THE SITES IT CONSIDERED?

A. Yes. Otter Tail conducted its own internal transmission analyses to determine how much power could be injected into the MISO grid at the likely interconnection points for each of the sites under consideration. The Company has compared this Project and its estimated interconnection costs with other potential sites. Locating the project on the Astoria site is projected to have lower interconnection costs compared to other locations on the grid. The Astoria site can absorb greater power injection into the transmission system compared to the other sites.

Q. PLEASE EXPLAIN THE GENERATOR INTERCONNECTION PROCESS THAT MUST BE FOLLOWED FOR THE PROJECT.

A. The MISO generator interconnection process groups generators for study based on when their interconnection requests were filed. The Project is part of the February 2016 Definitive Planning Phase (DPP) study group. MISO will perform an analysis to determine the feasibility, impacts, and interconnection cost estimates for the Project and its study group. Upon completion of the analysis, a Generation Interconnection Agreement (GIA) for the Project will be negotiated and signed, allowing the Project to interconnect to the transmission system.

The sheer volume of generation projects currently seeking to interconnect in MISO has led to greater uncertainty in interconnection costs than in the past. Previous MISO study groups have typically included approximately 1,500 MW of new generation in a single study. Current study groups include approximately 6,000 MW of new generation in a single study. The large amount of new generation being included in each study group study has created significant cost uncertainty for all potential projects moving through the MISO generator interconnection process.

Q. WHAT IS THE NATURE OF THE COST RISK OF THE MISO GENERATOR INTERCONNECTION PROCESS?

A. Because of the study timelines plus the amount of generation currently in the interconnection queue, it is not possible to know at this time the precise interconnection costs that could be imposed by MISO for this interconnection request. The MISO queue is currently very congested with many potential generation projects with queue positions and rights to be studied for interconnection under the MISO Tariff. If all of the projects in the queue move forward to completion it would result in the need for numerous significant interconnection upgrades to accommodate them. However, the reality is that many of the projects in the interconnection queue may not have offtakers or other outlets for the power from their projects. If, as a consequence of that circumstance, many of these projects drop out of the queue, it will substantially change the required interconnection upgrades, which will affect the costs that may be allocated to the remaining projects.

Q. WHEN DOES THE COMPANY EXPECT GREATER CLARITY ON INTERCONNECTION COSTS FROM THE MISO GENERATOR INTERCONNECTION PROCESS?

A. The Company is expecting MISO's first estimate of interconnection costs for the February 2016 study group in May or June of 2017, with a GIA being signed in 2018. In the meantime, the Company will continue to perform additional analyses to estimate costs, as models and assumptions are refreshed throughout the MISO generator interconnection process.

Q. HOW ELSE IS THE COMPANY ADDRESSING INTERCONNECTION COST RISK?

A. The selection of the generation resource itself was another way of addressing this risk. Astoria Station is expected to operate on-peak at times when there is less wind generation on the system. Further, quick-start natural gas simple cycle generation can mitigate interconnection cost risk because of the flexibility of this generation resource and its ability to coordinate with variable energy resources, such as wind energy.

The Company anticipates significant wind energy development within Otter Tail's footprint. This impacts the overall generation supply picture in our region of MISO. As a result, a simple cycle combustion turbine primarily designed for peaking can be efficiently called on to operate when wind generation is reduced. This is an important premise for our overall resource planning analysis. The Company believes that regional interconnection costs will primarily be allocated to the new wind generation projects rather than to dispatchable, natural gas-fired combustion turbines, whose primary function is as backup generation during times when the wind is not available or peak loads demand increased generation.

B. Approach to Development and Construction Risks

Q. PLEASE EXPLAIN THE ANTICIPATED PROJECT DELIVERY METHODOLOGY.

A. Otter Tail has had a history of successful large project execution. The Company will select an experienced consulting engineering firm to provide necessary technical support for Otter Tail's detailed design of Astoria Station. We intend to competitively bid the turbine and associated equipment, with the assistance of the engineering firm. The Company will contract directly with the turbine manufacturer to ensure contractual recourse. Otter Tail anticipates performance guarantees and warranties will be provided by the turbine manufacturer. Any other balance of plant equipment of significant value, such as the generator step-up transformer, will also be directly procured by the Company. Installation contractors will competitively bid for turbine and balance-of-plant assembly, construction of foundations, piping, electrical, mechanical, painting, insulation, etc. The installation contractors may also supply smaller balance of plant equipment specified by the Company and its consulting engineer. Otter Tail may have separate contracts for a number of other plant site components, such as prefabricated buildings.

Northern Border Pipeline will manage and construct the facilities that will allow for interconnection to the existing natural gas pipeline. The co-owners of the Big Stone South-Brookings County 345 kV electric transmission line will manage and construct the facilities that will allow for interconnection to the existing 345 kV electric transmission line.

Q. WHY DOES THE COMPANY INTEND TO TAKE THIS APPROACH?

A. Selecting an experienced engineering firm to support our efforts will supplement the Company's own expertise with the necessary technical advice to engineer, procure, and construct the Project on time and on budget.

Since a significant portion of the Project cost stems directly from the combustion turbine contract, it is logical to contract directly with the manufacturer, eliminating the markup of an intermediate supplier (i.e., a turn-key project vendor). If the combustion turbine performance guarantees and warranties were placed with an intermediate supplier instead of the manufacturer, overall Project cost would increase as the intermediate supplier would build in additional cost for taking on risk. Our plan to contract directly with the combustion turbine manufacturer will increase value, while addressing cost and schedule risk.

Q. PLEASE EXPLAIN HOW THE COMPANY'S APPROACH WILL ADDRESS CONSTRUCTION COST OVERRUN RISK.

A. The Company's approach makes the engineering firms, manufacturers, and installation contractors responsible for their own specific areas of expertise, under the direct control and supervision of the Company, which is ultimately responsible for project schedule and cost. Detailed design and planning between the consulting engineering firm and the Company will help to ensure least-cost procurement and installation.

C. <u>Approach to Schedule Risk</u>

Q. WHAT IS THE ANTICIPATED SCHEDULE FOR COMMERCIAL OPERATION OF ASTORIA STATION?

A. The anticipated commercial operation date for the Project is no later than May 2021.

Q. PLEASE EXPLAIN HOW THE COMPANY INTENDS TO AVOID PROJECT DELAY RISK.

A. The Company is pursuing Project permitting and regulatory approvals prior to significant procurements. Schedule information from combustion turbine manufacturers has been

obtained to ensure timely delivery of the Project. Equipment supply and installation contracts will likely include delay liquidated damages.

Q. WHAT SITE-RELATED PERMITS AND REGULATORY APPROVALS ARE REQUIRED?

A. There will be a number of Project permits required from federal, state, and local agencies. The primary South Dakota permits required to construct the plant are an Energy Conversion Facility Permit from the South Dakota Public Utilities Commission, and air emissions and water appropriations permits from the South Dakota Department of Environment and Natural Resources.

D. Fuel Risks

Q. PLEASE EXPLAIN HOW FUEL SUPPLY WILL BE ARRANGED FOR ASTORIA STATION?

A. The natural gas fuel supply for the Project is expected to be procured in the same manner as fuel is procured for our existing Solway simple cycle combustion turbine. While the Project will not obtain firm deliverability, it is expected that natural gas will be purchased on the daily spot market and will be frequently delivered on firm transport by gas marketers, consistent with the Company's current practice for its other simple cycle generator.

E. Tax Risks

Q. PLEASE DESCRIBE THE COMPANY'S EFFORTS TO MINIMIZE SALES/USE AND PROPERTY TAXES RELATED TO ASTORIA STATION.

A. The Company applied for sales/use tax relief for the Project under South Dakota's Reinvestment Payment Program. Applications approved under the program allow project owners to receive a reinvestment payment that does not exceed the sales/use tax paid on project costs. The Company's application was approved by the South Dakota Board of Economic Development on February 14, 2017. This results in a nearly $5 million benefit to our customers.

In addition, the Company will pursue a statutory discretionary formula for property taxation purposes. The formula includes, for the five years following construction, all or any portion of the Project's assessed valuation for tax purposes. Under the formulaic model adopted, we believe the Project will be assessed on a graduated scale of 20% assessed value in year one, 40% in year two, 60% in year three, 80% in year four, and 100% in year five (at which time the property value will have decreased due to depreciation). This will yield property tax savings of approximately $3 million to the benefit of our customers.

IV. CONCLUSION

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

STATE OF NORTH DAKOTA

PUBLIC SERVICE COMMISSION

Otter Tail Power Company
Advance Prudence – Astoria Gas
Application

Case No. PU-17-___

VERIFICATION

STATE OF MINNESOTA)
) ss.
COUNTY OF OTTER TAIL)

William Swanson, being first duly sworn on oath, deposes and says that he is the Manager of Supply Engineering for Applicant Otter Tail Power Company; that the testimony and schedules submitted in the above-captioned matter under his name were prepared under his direction; and that he knows and verifies the contents thereof, and that the same is true and correct to the best of his knowledge and belief.

Dated this 10th day of April, 2017

William Swanson

Subscribed and sworn to before
me on this 10 day of April, 2017.

Notary Public
My Commission expires 1-31-22

KIMBERLY ANN WARD
NOTARY PUBLIC
MINNESOTA
My Commission Expires Jan. 31, 2022