

215 South Cascade Street  
PO Box 496  
Fergus Falls, Minnesota 56538-0496  
218 739-8200  
[www.otpco.com](http://www.otpco.com) (web site)



July 1, 2016

Mr. Darrell Nitschke  
Director of Administration/Executive Secretary  
North Dakota Public Service Commission  
State Capitol  
600 East Boulevard, Dept. 408  
Bismarck, ND 58505-0408

**RE: OTTER TAIL POWER COMPANY'S TEN-YEAR PLAN – JUNE 2016**

Dear Mr. Nitschke:

Enclosed are an original and ten (10) copies of Otter Tail Power Company's North Dakota Ten-Year Plan in accordance with North Dakota Century Code 49-22-04. A copy of the plan is being filed pursuant to Article 69-06-02-02 of the North Dakota Administrative Code with the County Auditor of each county in which any part of a site or corridor is proposed to be located. Notice of the filing of the plan is being sent to each agency and officer as designated in Article 69-06-01-05.

Should you have any questions, please feel free to contact me at (218) 739-8989 or [njensen@otpco.com](mailto:njensen@otpco.com).

Very truly yours,

*/s/ NATHAN JENSEN*  
Nathan Jensen  
Senior Resource Planner

nlo

Enclosures

By electronic filing and U.S. mail

c: Cass County Auditor – Michael Montplaisir  
Dickey County Auditor – Beverly Kuska  
Mountrail County Auditor – Stephanie Pappa  
Pierce County Auditor – Karin Fursather  
Sargent County Auditor – Pamela Maloney  
Stutsman County Auditor – Casey Bradley

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## NOTICE OF FILING

July 1, 2016

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**RE: OTTER TAIL POWER COMPANY'S TEN-YEAR PLAN – JUNE 2016**

In accordance with the rules and regulations of the North Dakota Public Service Commission governing the siting of energy conversion and transmission facilities pursuant to NDCC 49-22-04, Otter Tail Power Company hereby gives notice that on July 1, 2016, they filed their Ten-Year Plan with the North Dakota Public Service Commission. This Notice of Filing is being sent to the agencies and officers designated in Article 69-06-01-05 of the North Dakota Administrative Code.

# **NORTH DAKOTA TEN-YEAR PLAN**



**Report RP 16-\_\_\_\_  
Resource Planning  
June 2016  
By: Nathan Jensen**

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## **INTRODUCTION**

In accordance with the rules and regulations of the North Dakota Public Service Commission (Commission) governing the siting of energy conversion and transmission facilities pursuant to Chapter 49-22 of the North Dakota Century Code, Otter Tail Power Company (Otter Tail or the Company), hereby files this Ten-Year Plan.

Ten copies of this Ten-Year Plan are being filed with the Commission. Notices of the filing of this report have been given to those agencies and officers designated in Article 69-06-01-05 of the Administrative Code. A copy of the plan is being filed pursuant to Article 69-06-02-02 of the North Dakota Administrative Code with the County Auditor of each county in which any part of a site or corridor is proposed to be located.

## **SECTION A: Existing Energy Conversion Facilities**

1. Otter Tail owns 35 percent of the 427 MW rated (Net Dependable Capacity) Coyote power generating station. Otter Tail is the operating agent and provides the filing of the appropriate federal forms. Other co-owners include Northern Municipal Power Agency (Minnkota Power Cooperative (MPC) acts as the agent for Northern Municipal Power Agency), Montana Dakota Utilities (MDU), and Northwestern Energy (NWE). The Coyote facility was commissioned for commercial operation May 1, 1981.
2. Otter Tail owns 100 percent of two combustion turbines located at Jamestown, North Dakota. These combustion turbines have a combined Net Dependable Capacity rating of 41 MW. These facilities were commissioned for commercial operation in 1976 and 1978.
3. Otter Tail is contracted to receive energy from a customer owned waste sunflower hull fired cogeneration facility in Enderlin, North Dakota. No energy was received in 2013 from this facility.
4. Otter Tail purchases energy from a number of customer owned wind and solar powered generating facilities in North Dakota. These facilities have a combined capacity rating of approximately 3.6 MW and delivered 5,776 MWh of energy to Otter Tail in 2015.
5. Otter Tail purchases energy from the 21,000 kW FPL Energy ND Wind II (a wind farm owned by NextEra Energy) that delivered 57,278MWh to Otter Tail in 2015.
6. Otter Tail purchased the output of 19,500 kW of wind turbines from Langdon Wind, LLC that delivered 75,422 MWh in 2015.
7. Otter Tail purchases peaking capacity from one customer-owned diesel generator with a nameplate capacity of 1,900 kW.
8. Otter Tail owns 40.5 MW of the Langdon Wind Energy Center located 6-12 miles south of Langdon, North Dakota. The portion owned by Otter Tail began commercial operation in January 2008.
9. Otter Tail owns 48 MW of the Ashtabula Wind Energy Center located in Barnes County. The portion owned by Otter Tail began commercial operation in December 2008.
10. Otter Tail owns 49.5 MW of the Luverne Wind Energy Center located in Steele County. The portion owned by Otter Tail began commercial operation in August 2009.
11. Otter Tail began purchasing energy from the 62,400 kW Ashtabula Wind III (a wind farm owned by NextEra Energy) in October 2013 that delivered 208,295 MWh to Otter Tail in 2015.
12. No unit retirements of Otter Tail facilities in North Dakota are planned within the next ten years.

## **SECTION B: Energy Conversion Facilities Under Construction**

None.

## **SECTION C: Proposed Energy Conversion Facilities on Which Construction Is Intended Within the Ensuing Five Years**

The 2016 Otter Tail preferred resource plan includes the addition of 4 energy conversion facilities in the next 5 years.

1. A 100 MW Utility Scale wind farm in 2018. The location is yet to be determined.
2. A 100 MW Utility Scale wind farm in 2020. The location is yet to be determined.
3. A 30MW Utility Scale solar farm. The location is yet to be determined.
4. A 248 MW Frame Natural Gas CT located outside of North Dakota.

## **SECTION D: Proposed Energy Conversion Facilities during the Next Ten-Year Time Period**

The 2016 Otter Tail preferred resource plan does not include any generation additions after the ensuing five year period.

## **SECTION E: Existing Transmission Facilities (Electric)**

In-service dates for existing transmission facilities, located entirely within or partially in North Dakota, and owned (or jointly owned) by Otter Tail and operated above 115 kV include:

<u>Transmission Line</u>	<u>In-Service Date</u>
Wahpeton – Fergus Falls 230 kV	1967
Hankinson – Wahpeton 230 kV	1967
Forman – Hankinson 230 kV	1967
Ellendale – Oakes – Forman 230 kV	1967
West Fargo (Sheyenne) – Audubon 230 kV	1969
Drayton – Grand Forks (Prairie) 230 kV	1970
Big Stone – Browns Valley – Hankinson 230 kV	1974
Center – Jamestown 345 kV	1980
Underwood – Harvey 230 kV	1986
Harvey – Balta – Rugby 230 kV	2002
Luverne – Pillsbury 230 kV	2009
Alexandria – Bison 345 kV	2015

No transmission facilities rated above 115 kV are scheduled for retirement within the next ten years.

## **SECTION F: Existing Transmission Facilities (Pipeline)**

None.

## **SECTION G: Proposed Transmission Facilities on Which Construction Is Intended Within the Ensuing Five Years**

Due to generation interconnection projects proposed on the Otter Tail system within various stages of the Mid-Continent Independent System Operator, Inc. (MISO) interconnection process, Otter Tail anticipates that upgrades to existing transmission lines in North Dakota may be required to reliably interconnect future projects. In consideration of the uncertainty of future projects in the region, it is possible that operating guides and/or special protection schemes could be implemented as a short-term interim solution in lieu of actual transmission upgrades until other future projects are confirmed and a regional transmission plan is formulated and energized. This regional plan would be coordinated with the local utilities and the MISO.

### **Transmission Projects Related to Reliability Concerns**

#### *Casselton – Buffalo 115 kV Line*

The Casselton – Buffalo 115 kV project was approved as a Baseline Reliability Project (BRP) within Appendix A of the 2011 MISO Transmission Expansion Plan (MTEP11) by the MISO Board of Directors in December of 2011 under project 3481 (facility numbers 6432, 6433, and 6434). The project involves the construction of 16 miles of 115 kV line, upgrades to existing 115 kV line, and substation modifications at Buffalo.

Transmission planning studies performed by Otter Tail have identified this project as the preferred plan for serving the increased load in eastern North Dakota. MISO confirmed the results of the Otter Tail studies through the MTEP11 process and designated this project as a Baseline Reliability Project with regional cost sharing. Along with the Casselton – Buffalo 115 kV line, other underlying upgrades required on the transmission system include replacement of the Buffalo 345/115/41.6 kV transformer and reconductoring a portion of the Mapleton – Sheyenne 115 kV line. These underlying upgrades have been included in the MISO approval for this project. In addition to the regional reliability benefits offered to eastern North Dakota, this project will also directly benefit the Casselton area and provide back-up service to the Tharaldson Ethanol Plant.

The Buffalo to Casselton 115 kV line was put into service in December of 2013 and the Mapleton – Sheyenne 115 kV line reconductor was completed in December of 2014. The Buffalo 345/115/41.6 kV transformer replacement is scheduled to be completed during the summer of 2017.

### *NERC Facility Ratings Alert*

In October of 2010, NERC issued a recommendation to the industry to identify discrepancies between design and actual field conditions of transmission lines. This recommendation stemmed from an unnamed utility's over-head line contacting vegetation within a right-of-way due to insufficient clearance. The recommendation included requirements for transmission owners to prioritize their transmission facilities and complete an evaluation of their lines within various time frames depending on their priority. After Otter Tail's assessment of their facilities, it was determined that most of Otter Tail's lines fall into the "low" priority category and was verified with field calculations at the end of 2013.

Otter Tail has completed all mitigation engineering for the associated Bulk Electric System (B.E.S.) transmission lines. Based on Otter Tail's current construction progress with this effort so far, it is expected that mitigations (structure modifications and/or replacements, adding insulated guy wires, etc.) will result in amended clearances along various transmission facilities throughout the Otter Tail service territory. By completion of the project, Otter Tail will have obtained NERC FAC 008-3 compliance. The construction mitigation plan for all of Otter Tail's B.E.S. lines is expected to be complete by September 30<sup>th</sup>, 2016.

### *Parshall Area Upgrade*

Western North Dakota is experiencing a large amount of load growth due to the exploration of oil drilling and recovery. Most of this load growth is occurring on the transmission system owned, operated, and maintained by load serving cooperatives in western North Dakota, which receive their transmission service and generation capacity from Western Area Power Administration (WAPA) and/or Basin Electric Power Cooperative (BEPC). As a result of this load growth, an extensive system of existing 41.6 kV and 69 kV lines in western North Dakota are planning to be upgraded to 115 kV in order to increase the load serving capability of the transmission system. The upgrade of the existing 69 kV system to 115 kV impacts an existing 69/41.6 kV connection between Otter Tail and Mountrail – Williams Electric Cooperative (MWEC) near Parshall, North Dakota. After detailed studies of the transmission system in this area, with the consideration of different transmission alternatives, Otter Tail prefers to re-establish a connection near Parshall by installing a new 25/41.6 kV transformer. This new 25/41.6 kV connection at Parshall will allow a back-up source to this area in the event the primary source to the 41.6 kV system (Max 115/41.6 kV transformer) is out of service. Otter Tail is working on an interconnection agreement with MWEC and WAPA in order to install a new 25/41.6 kV transformer. Otter Tail is expecting that the project will be completed in the late 2016 or early 2017 timeframe.

The Parshall 25/41.6 kV transformer project was submitted by OTP and approved by MISO as an Appendix A project during the 2013 MISO Transmission Expansion Planning (MTEP13) efforts.

### *Big Stone South – Ellendale 345 kV Line*

As part of the MTEP11 approval, the MISO Board of Directors endorsed a portfolio of transmission projects across the MISO footprint called the Multi-Value Projects (MVPs).

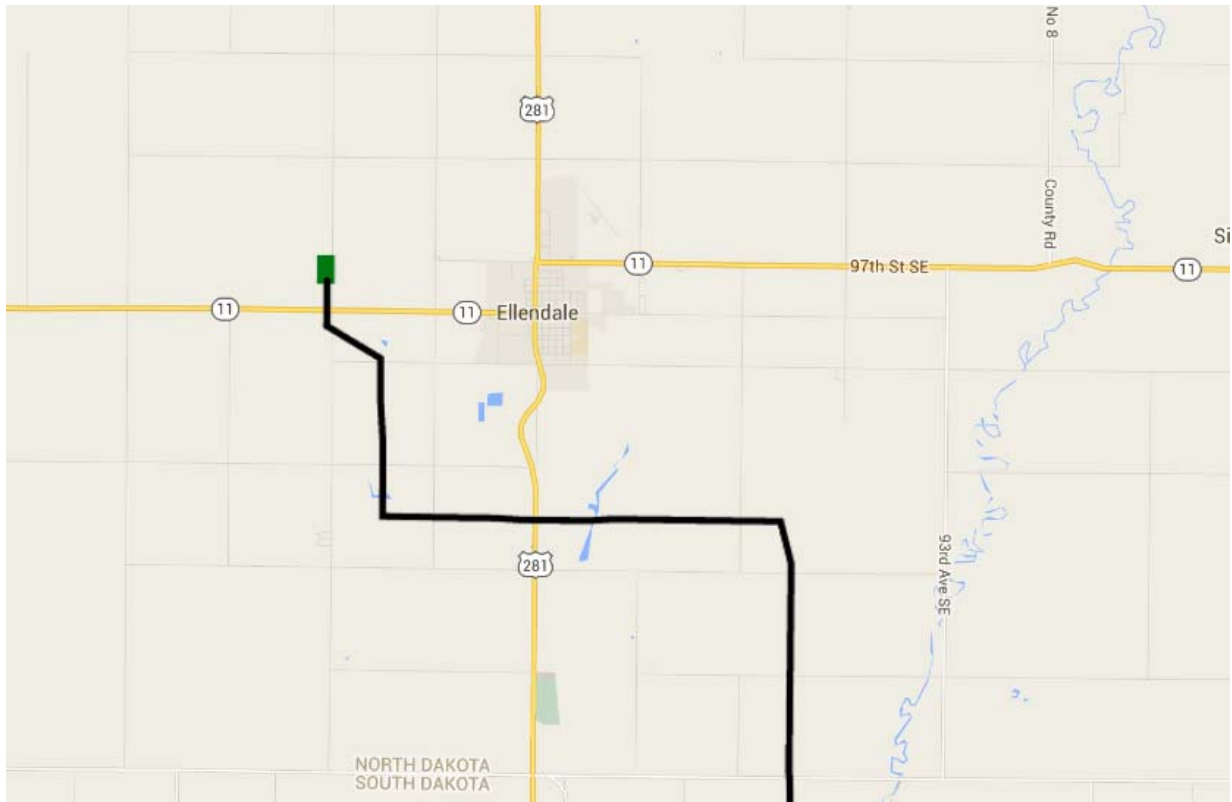
The MVPs have been identified and recommended to meet public policy requirements within the MISO states through 2026.

The MVP portfolio approved by the MISO Board of Directors includes 18 distinct transmission projects across MISO, with Otter Tail being involved in three of these projects, namely: Brookings – Hampton 345 kV line, Big Stone – Ellendale 345 kV line, and Big Stone – Brookings 345 kV line. The MTEP11 report included a total portfolio cost of these 18 MVPs of approximately \$5.2 Billion.

Otter Tail and MDU worked collaboratively to develop one of the new 345 kV MVP transmission projects that will be from Big Stone South to Ellendale (BSSE). The 170-mile transmission line project will connect the Big Stone South Substation near Big Stone City, South Dakota, and the Ellendale Substation near Ellendale, North Dakota. Refer to docket number PU-13-273 for further information related to this project.

The MTEP11 also includes details about this project and can be referenced under MISO project number 2220. Construction on this project kicked off in June of 2016 and completion is expected by the end of 2019.

**Figure 1: ND Section of Proposed 345 kV line from Big Stone to Ellendale**



### *SPP Related Projects*

Central Power Electric Cooperative recently became a member of the Southwest Power Pool (SPP) for which Otter Tail is not a member. This has exposed Otter Tail to the higher SPP tariffs and therefore Otter Tail is currently investigating various options including potential transmission projects to help mitigate these additional costs,

### **Transmission Projects Related to Generator Interconnection Requests**

#### *Jamestown 345 kV Substation*

Otter Tail has agreed to terms and signed the Generation Interconnection Agreement (GIA) with Xcel Energy for two interconnections to the Otter Tail Jamestown 115 kV bus. These interconnections are designated queue numbers J262 and J263 in MISO interconnection queue and titled jointly as the Courtenay Wind Farm. The full system impact study and conclusions can be found on the [interactive queue](#) on MISO's website. The current schedule calls for this wind farm is to be commercially operational in November of 2016.

Due to the connection of the 200 MWs of wind in total to the Otter Tail Jamestown 115 kV bus, significant upgrades are required to the Jamestown 345/115 kV substation. With the addition of the GRE Spiritwood generator, existing Otter Tail generation at Jamestown, and the new wind farm generation, there is approximately 350 MWs of generation connected at Jamestown. This creates an overload on both of Otter Tail's 345/115/41.6 kV transformers which will need to be replaced. To accommodate the new transformers, Otter Tail is expanding both the 115 kV and 345 kV stations. Otter Tail has started work on the project and expects substantial completion of all network upgrades prior to the generators commercial operation.

Otter Tail continues to see a lot of activity within North Dakota related to increased interests in new wind generation development, large load expansions related to the ag-processing industry and energy transport industry (oil pipelines). As these projects are further developed, it is possible that additional transmission will be required. Further study analysis will be required to determine the optimum transmission plan and will be coordinated through local and regional transmission planning processes in place at MISO.

**SECTION H: Proposed Transmission Facilities on Which Construction Is Intended Within the Ensuing Five Years (Pipeline)**

**SECTION H: Proposed Transmission Facilities on Which Construction Is Intended Within the Ensuing Five Years (Pipeline)**

None.

**SECTION I: Proposed Transmission Facilities during the Next Ten-Year Time Period (Electric and Pipeline)**

Otter Tail continues to be actively engaged in regional transmission planning efforts. Through these transmission planning activities, it is hard to predict what future transmission projects will be identified and built in the next 10 years. However, as the transmission system approaches its full capability, and with the numerous proposed generation projects within North Dakota, it is inevitable that additional transmission, as well as upgrades to the existing system, will be required to meet the needs of the system. Otter Tail continues to participate in transmission studies looking at the adequacy of the transmission system throughout North Dakota.

**SECTION J: Regional Coordination**

Otter Tail conducts transmission planning in a coordinated environment, involving neighboring utilities, load serving entities, state regulatory commissions and members of the public to collaborate in the planning process.

There are several different transmission initiatives underway within the region that are investigating the feasibility of expanding the capability of the transmission grid. Otter Tail continues to actively participate in these efforts to ensure that a reliable and economic transmission system is built across the region in a coordinated manner.

## **Regional Coordination through the MISO Process**

As a transmission-owning member of the MISO, Otter Tail actively participates in various transmission planning efforts, the most significant of which is the annual MISO Transmission Expansion Planning (“MTEP”) process. The MTEP process involves a variety of planning analyses to determine the performance of the transmission system for a wide variety of conditions. Through the MTEP process, MISO, with input from various stakeholders, evaluates the system for both reliability and economic needs. The MTEP collaborative process is designed to ensure the most efficient and cost-effective or “best fit” transmission expansion plan is developed, while giving consideration to the inputs from all stakeholders.

Local planning of the Otter Tail facilities is primarily coordinated on a sub-regional level. Otter Tail’s locally planned projects are then reviewed by MISO and become part of the MTEP process. Regional coordination through MTEP of local transmission plans results in study efficiencies by keeping a broader group of utilities, states, and stakeholders informed through the transmission planning process to identify the “best fit” transmission plan.

## **Regional Coordination with non-MISO Transmission Owners**

Non-MISO coordination is necessary because the Otter Tail transmission system is highly interconnected with neighboring non-MISO transmission owners. The Otter Tail transmission system is nearly the farthest, most western border of the MISO footprint; therefore, it is interconnected with several transmission-owning utilities that are not members of MISO

Otter Tail participates in the CapX 2020 (Capacity Expansion by 2020) effort, which is a joint initiative of transmission-owning electric utilities in Minnesota and the surrounding region created on the basis of expanding the electric transmission grid to ensure electric reliability for several years into the future. The CapX 2020 utilities (including cooperatives, municipal utilities and investor-owned utilities) collaboratively assess the current transmission system and plan for the necessary future transmission infrastructure investments. This collaborative process and the planning studies performed as part of this effort are coordinated with MISO.

Otter Tail also has Integrated Transmission Agreements (ITA) with Minnkota Power Cooperative and Great River Energy. These agreements provide for joint use of transmission facilities in common areas of service and require that the utilities jointly plan and coordinate additional facilities required for the common service area. In addition, Otter Tail has agreements for joint use of transmission and interconnection with Xcel Energy, East River Electric Power Cooperative, Montana-Dakota Utilities, Manitoba Hydro, Northwestern Energy, and Western Area Power Administration. These agreements were all precipitated through joint studies and coordination of facilities required to provide high reliability of service at the minimum cost. Facilities proposed and committed to through this local process become part of the MTEP.

As discussed throughout Section J, Otter Tail coordinates extensively with its neighboring utilities to share system plans and identify system enhancements through the MISO, and through local participation in coordinated transmission planning (such as CapX 2020, and the ITAs). Otter Tail’s participation in the MISO study process provides coordinated planning for the entire 15-state MISO footprint. Participation in various working groups and committees (such as the

West Technical Studies Task Force) provides for coordinated planning on a sub-regional basis including both utilities that are MISO members and utilities that are not MISO members.

## **SECTION K: Environmental Information**

Otter Tail employees are involved with other groups in a variety of organizations to keep informed on various environmental issues. Edison Electric Institute (EEI), the Utility Air Regulatory Group, and the Lignite Energy Council all provide information exchange on environmental issues.

Otter Tail generating plants are subject to stringent federal and state standards and regulations regarding, among other things, air, water and solid waste pollution. Otter Tail estimates that operation and maintenance expenditures related to environmental items at Coyote Station in 2015 were \$1,919,343. In addition, there was \$3,304,773 in capital expenditures relating to environmental items at Coyote Station in 2015.

Otter Tail has complied in the past and will continue to comply with all requirements of the Commission in siting, operating and maintaining all proposed energy conversion and transmission facilities located in North Dakota.

### **Air Quality**

Pursuant to the Federal Clean Air Act (the Act), the United States Environmental Protection Agency (EPA) has promulgated national primary and secondary standards for air pollutants. The Coyote Station has sulfur dioxide removal equipment. The removal equipment, referred to as a dry scrubber, consists of a spray dryer, followed by a fabric filter. The Coyote Station is currently operating within all presently applicable federal and state air quality and emission standards.

On December 19, 1996, the EPA adopted nitrogen oxide emissions regulations that are applicable to cyclone-fired boilers such as those used at the Coyote Station. The regulations required that the cyclone boilers meet the emission standards beginning on January 1, 2000 and Coyote Station meets those standards.

On March 14, 2011, the North Dakota Department of Health (NDDOH) issued a construction permit to Coyote Station requiring installation of control equipment to limit its NO<sub>x</sub> emissions to 0.50 pounds per million Btu as calculated on a 30-day rolling average basis. The permit was issued under the North Dakota Regional Haze Implementation Plan, and compliance with the limit must be met beginning on July 1, 2018. This NO<sub>x</sub> control equipment was installed during a spring 2016 outage.

On December 16, 2011, the EPA signed a final rule to reduce mercury and other air toxic emissions from power plants (the MATS rule). MATS was published in the Federal Register on February 16, 2012, became effective on April 16, 2012, and most plants had until April 16, 2015

to comply. Coyote Station meets the requirements by using activated carbon injection for mercury control. Emissions monitoring equipment and stack testing is utilized to verify compliance with the standards.

The two combustion turbines located at Jamestown are not impacted by the Act's emission reduction standards.

### **Greenhouse Gases**

On August 3, 2015 EPA announced final existing source guidelines under Section 111(d) of the Act. On February 9, 2016 the United States Supreme Court granted emergency applications seeking a stay of the rule. The stay will remain in effect until the Supreme Court completes further action on the rule. Oral argument on the merits of the rule at the D.C. Circuit is scheduled for September 27, 2016. The timing of the D.C. Circuit's decision and subsequent action by the Supreme Court are uncertain, but a decision from the Supreme Court is expected in either mid 2017 or 2018.

The specific impact to Coyote Station will be unknown until the litigation is resolved, and if the rule is ultimately upheld, until the NDDOH develops a state plan.

### **Water Quality**

The Federal Water Pollution Control Act Amendments of 1972 and amendments thereto, provide for, among other things, the imposition of effluent limitations to regulate discharges of pollutants, including thermal discharges, into the waters of the United States. The EPA has established effluent guidelines for the steam electric power generating industry. Discharges must also comply with state water quality standards. A water discharge permit for the Coyote Station was renewed on April 1, 2013 for a five-year term.

Section 316(b) of the Clean Water Act requires facilities to install the best technology available (BTA) for minimizing adverse environmental impact caused by cooling water intake structures. Coyote Station utilizes cooling towers that meet the classification of closed-cycle cooling, which has historically been considered to be a BTA. EPA signed a rule on May 19, 2014 that revises Section 316(b). The impact of the final rule on Coyote Station appears to involve providing additional information to the NDDOH related to Coyote's intake structure and the surrounding biological community.

### **Solid Waste**

The EPA has promulgated various solid and hazardous waste regulations and guidelines. These provide for the comprehensive control of various solid and hazardous wastes from generation to final disposal. The NDDOH issued Coyote Station permits for disposal of ash and other solid wastes.

On December 19, 2014, EPA announced a final rule to further regulate coal combustion residuals (CCRs) under the Subtitle D nonhazardous provisions of the Resource Conservation and Recovery Act (RCRA). The rule will require Otter Tail to meet several new requirements, including installing additional groundwater monitoring wells, publishing data on our CCR units

on a website, and developing several new plans. Existing landfill cells can continue to operate as designed, but future expansions will require composite liner and leachate collection systems. EPA is also leaving the door open to a future evaluation of CCRs as hazardous waste.

## **SECTION L: Projected Demand for Service**

### **Historical Growth and Long-Range Forecast**

Otter Tail had an all-time high unmanaged winter peak of 917 MW on January 5, 2015 for the hour ending at 11 a.m. The ten-year historical growth of Otter Tail’s unmanaged annual peak demand is shown in Table 1. For the purposes of Table 1, annual data reflects the MISO Planning Year that begins in May of the listed year and extends through April of the following year.

**Table 1: Historical Unmanaged Annual Peak Demands (MW)**

<b>Year</b>	<b>Peak</b>	<b>Annual Growth %</b>	<b>Cumulative Growth %</b>
2006	714		
2007	787	10.2	10.2
2008	810	2.9	13.1
2009	818	1.0	14.1
2010	831	1.6	15.7
2011	837	0.7	16.4
2012	872	4.2	20.6
2013	883	1.3	21.9
2014	917	3.9	25.8
2015	876	-4.5	21.3

A long-range forecast was made using an econometric model. This model is designed to incorporate a number of different assumptions about variables such as weather, economic growth, and demographics.

Three scenarios were used in this forecast: the Base Scenario, the Upper Scenario, and the Lower Scenario. The Base Scenario represents the best-fit econometric forecast of the statistically significant variables impacting customer load. The Upper and Lower Scenarios are calculated using confidence intervals that effectively describe the uncertainty around the forecast values.

Otter Tail’s projected unmanaged winter peak demand is presented in Table 2 and Otter Tail’s unmanaged summer peak demand is presented in Table 3. In Table 2, winter data reflects the MISO Planning Year in which the winter season begins in November of the listed year and extends through April of the following year. In Table 3, summer begins in May and ends in October of the listed year.

**Table 2: Forecasted Unmanaged Winter Peak Demands (MW)**

Year	Lower	Base	Upper
2016	864	931	997
2017	880	946	1012
2018	897	963	1029
2019	901	967	1034
2020	899	966	1032
2021	915	981	1048
2022	932	999	1065
2023	949	1016	1083
2024	968	1034	1101
2025	975	1041	1108

**Table 3: Forecasted Unmanaged Summer Peak Demands (MW)**

Year	Lower	Base	Upper
2016	722	788	854
2017	737	804	870
2018	753	819	885
2019	770	836	903
2020	774	840	907
2021	773	839	905
2022	788	854	921
2023	805	872	938
2024	823	889	956
2025	841	908	974

It is important to note that the data provided in Tables 2 and 3 does not reflect planned or committed energy efficiency efforts in Minnesota and South Dakota and that some demand savings would be realized from such efforts. Otter Tail anticipates the demand savings could be as much as 39 MW by 2020 based on plans in Minnesota and South Dakota. North Dakota has not approved an energy efficiency plan for implementation.

### **Demand Response Capability**

Otter Tail has two Demand Resources registered under Module E with the MISO. Both resources are load modifying resources that are netted from the demand forecast prior to calculation of the reserve obligation. These resources are obligated to provide sustained load reduction for up to four hours at a time and be available five times in the summer to the MISO in the event of a declared reliability emergency. This obligation does not preclude the Company from relying on these resources to control for capacity events or economic reasons outside of a MISO emergency event.

### *Direct Load Control – The Radio Load Management System*

The first Demand Resource, “Direct Load Control,” represents the Company’s extensive radio load management system that is used to control customer load during economic or capacity events. This resource was accredited with MISO at 18 MW for June 2016 through May 2017. Under MISO’s revised resource adequacy construct that became effective June 1, 2013, demand response is accredited based on its summer capability. Otter Tail has approximately 129,500 customers and approximately 41,000 of those customers have some type of load control. The level of control that is available can vary with temperature, customer behavior, and load control responsiveness. For example, more load control is available during extremely cold temperatures in the winter than during moderate temperatures.

Winter season demand response loads are in several categories and can reach as high as 130 MW. These manageable loads include water heaters, thermal storage, residential demand controllers, commercial time of use rates, small dual fuel heating systems, and large dual fuel (industrial and bulk interruptible loads). The radio load management system also has the capability of interrupting as much as 20 MW of summer peak load in the months of June through September. These summer loads consist primarily of water heaters, irrigation, large dual fuel loads, and air conditioning systems. Otter Tail continues to add customers to cycling control of central air conditioning (15 minutes on, 15 minutes off), and cycling of cooling systems on the dual fuel rate.

### *Firm Service Level – Customer Contracts*

The second Demand Resource registered with MISO is a “Firm Service Level” resource that represents Otter Tail’s contract with a large industrial customer to shed load to a firm service level in the event of a capacity event. This resource was accredited at 14.3 MW for June 2016 through May 2017. Unlike the “Direct Load Control” resource that reduces load when called upon by our load management system, this resource must demonstrate that it did not exceed the registered firm service level during a capacity event.

The Company’s current resource plan forecasts only a slight increase to its demand response capability over the next ten years. .

As a company, Otter Tail will continue to use a combination of Demand Resources, energy efficiency, and purchase agreements with other utilities to help meet future capacity deficits. Otter Tail also continues to study and assess the potential for future additions to its generation.

Further detailed information may be obtained from Otter Tail’s Resource Plan documents that were filed with the Minnesota, North Dakota, and South Dakota Public Utilities Commissions. The Company’s current Resource Plan was filed June 1, 2016.

### **Operational Improvements to Generation Facilities**

Otter Tail continues to explore operating improvements at its generating facilities. These projects are undertaken to increase reliability, increase efficiency, and/or lower the cost of

production. In addition to the specific projects mentioned below, cooling tower fans, air compressors, RO pumps, coal feeders and wash pumps are examples of equipment that have been replaced with more efficient variable speed drives to lower station service (thereby increasing efficiency) at our plants.

*Big Stone Plant:*

In 2015, Big Stone Plant completed the planned overhaul and installation of the AQCS system. During the overhaul, an SO<sub>2</sub> scrubber and baghouse was installed as well as an SCR system for reduction of NO<sub>x</sub>. Additionally, an activated carbon injection system was installed for Hg control. Also, heat transfer surfaces of the boiler were addressed to allow for correct flue gas temperatures into the SCR system. Also, the ID (induced draft) fans were replaced with two new VFD (variable frequency drive) controlled fans which allow for a reduction in station service compared to the older two-speed centrifugal fans. Additional reliability and improvement projects were also completed outside of the AQCS project, such as the replacement of the dust collection system at the rotary dumper.

*Coyote Station:*

In 2016, Coyote completed an overhaul for reliability, efficiency, and environmental control projects. First, an OFA (over-fire air) system was installed to reduce NO<sub>x</sub> levels. Additionally, a new mine coal conveyor was completed from a new mine (the Coyote Creek Mine) from the CCMC mining facility to the live storage area of the plant. While not directly completed by the Coyote owners, the CCM mine is a new mine that will supply fuel to the Coyote station for the next 25 years. The gas recirc fan motors were installed with VFDs to reduce station service and decrease system vibration issues.

*Jamestown, North Dakota, Lake Preston, South Dakota, and Solway, Minnesota Peaking Plants:*

The units continue to be operated during load peaking conditions and to provide transmission stability during emergency conditions and maintenance situations. They have also seen additional run time for reliability reasons in the MISO market. Otter Tail continues to review ways to improve the operational performance of these units.

*Hoot Lake Plant:*

Both Units #2 and #3 continue to maintain high levels of rating capability and performance. Unit #1, a 7.5 MW nameplate unit built in 1948, was retired in 2005. The company was directed by the Minnesota Public Utilities Commission to perform a Baseload Diversification Study for Hoot Lake Plant with a specific focus on evaluating retirement and repower options. The Study was submitted in November 2012. The Minnesota Public Utilities Commission's order dated March 25, 2013 approved Otter Tail's plan to install upgrades to the existing Hoot Lake Plant equipment to meet the MATS (Mercury and Air Toxics Standard) rule by 2015, and plan for the retirement of the Hoot Lake plant by May, 2021. The MATS upgrade project at Hoot Lake was completed in June 2014.

## **Description of Generation Facilities**

Otter Tail owns or is a co-owner of the following generating facilities:

Coyote Station is a coal-fired 427 MW (Net Dependable Capacity) facility located near Beulah, North Dakota. The Coyote Station is a sister unit to Big Stone Plant, but six years newer. The Coyote Station approved outlet rating is only 427 MW, due to transmission limitations. Coyote Station is a mine-mouth fed facility that uses North Dakota lignite for its fuel source. Otter Tail is a co-owner with MDU, MPC, and NWE. Otter Tail has a 35 percent ownership share in Coyote Station and is the operating agent of Coyote Station. The net generation from Coyote Station in 2015 was 1,921,139 MWh.

Big Stone Plant (BSP) is a coal-fired 475 MW (Net Dependable Capacity) facility located near Milbank, South Dakota. In association with using sub-bituminous coal for its fuel source, BSP burned alternative fuels from 1989-2009. Deliveries of alternative fuels peaked in the mid to late 90s. After a thorough review of the BSP's use of alternative fuels, the plant decided to end the program at the end of 2009.

Otter Tail is a co-owner with MDU, MPC, and NWE. Otter Tail has a 53.9 percent ownership share in Big Stone and is also the operator of the BSP. The net generation from BSP in 2015 was 1,498,688 MWh.

Hoot Lake Plant is a coal-fired facility consisting of 2 generators with a combined capacity of 138 MW (Net Dependable Capacity) located in Fergus Falls, Minnesota. Hoot Lake Plant burns sub-bituminous coal as its fuel supply and receives rail shipments from Burlington Northern. Otter Tail is the sole owner/operator of the Hoot Lake facility. Net generation for Hoot Lake Plant in 2015 was 296,202 MWh.

Otter Tail owns and operates 6 run-of-river hydro units in Minnesota. The total Net Dependable Capacity of the six units is about 2.6 MW.

Otter Tail owns two CT units in Jamestown, North Dakota and a single CT unit in Lake Preston, South Dakota. The Net Dependable Capacity rating for Jamestown unit #1 and unit #2 are 20.6 MW and 20.4 MW, respectively. The Net Dependable Capacity rating for the Lake Preston unit is 18.2 MW. All three units burn #2 fuel oil that is delivered by truck and stored in above-ground storage tanks. Net generation for the three combustion turbines totaled 225 MWh in 2015.

Otter Tail also has a 2,000 kW standby diesel generator located at its System Operations Control Center in Fergus Falls, Minnesota.

Otter Tail owns a 42.4 MW (Net Dependable Capacity) LM6000 CT unit and a 1.250 MW diesel unit at Solway, Minnesota. Net generation for Solway in 2015 was 17,660 MWh.

Otter Tail owns 40.5 MW of the Langdon Wind Energy Center located 6-12 miles south of Langdon, North Dakota. The portion owned by Otter Tail had net generation of about 147,666 MWh in 2015. Otter Tail owns 48 MW of the Ashtabula Wind Energy Center located in Barnes

County, North Dakota. The portion owned by Otter Tail had net generation of about 150,954 MWH in 2015. Otter Tail owns 49.5 MW of the Luverne Wind Farm located in Steele County, North Dakota. The portion owned by Otter Tail had net generation of 174,646 MWH in 2015.