

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

July 1, 2022



Mr. Steve Kahl  
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 2022**

Dear Mr. Kahl:

Enclosed is 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@otpc.com](mailto:njensen@otpc.com).

Sincerely,

*/s/NATHAN JENSEN*  
Nathan Jensen  
Manager, Resource Planning

sjw

Enclosures

By electronic filing and U.S. mail

- c: Cass County Auditor – Brandy Madrigga
- Dickey County Auditor – Wanda Sheppard
- Mountrail County Auditor – Stephanie Pappa
- Pierce County Auditor – Karin Fursather
- Sargent County Auditor – Pamela Maloney
- Stutsman County Auditor – Jessica Alonge

1 PU-22-273 Filed 07/01/2022 Pages: 21  
2022 Ten Year Plan  
Otter Tail Power Company  
Nathan Jensen

# **NORTH DAKOTA TEN-YEAR PLAN**



**Report RP22  
Resource Planning  
June 2022**

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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 Generation Units**

Otter Tail filed its Integrated Resource Plan (2021 IRP) in September 2021 in Case No.<sup>1</sup> The 2021 IRP provides further details related to our existing energy generating units.

1. Coyote Station is a coal-fired 427 MW (Net Dependable Capacity) electric generation unit located near Beulah, North Dakota. The Coyote Station is a sister unit to Big Stone Plant and was commissioned for commercial operation on May 1, 1981. 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 the operating agent. Other co-owners are Northern Municipal Power Agency (Minnkota Power Cooperative (MPC) acts as the agent for Northern Municipal Power Agency), Montana-Dakota Utilities Co. (MDU), and Northwestern Corporation d/b/a NorthWestern Energy (NWE.) The net generation from Coyote Station in 2021 was 2,464,175 MWh.

In Otter Tail's 2021 IRP, Otter Tail requests authority to commence the process of withdrawal from our 35 percent ownership interest in Coyote Station.

2. Otter Tail owns 53.9 percent of the jointly-owned 475 MW rated (Net Dependable Capacity) Big Stone Plant (BSP) electric generation unit located in Grant County, South Dakota. Otter Tail is the operating agent. Other co-owners are MDU and NWE. Big Stone Plant became operational on May 1, 1975. The net generation from BSP in 2021 was 1,640,593 MWh.
3. Hoot Lake Plant was a coal-fired facility consisting of two generators with a combined capacity of 140 MW (Net Dependable Capacity) located in Fergus Falls, Minnesota. Otter Tail was the sole owner/operator of the Hoot Lake facility that was retired in May 2021. Net generation for Hoot Lake Plant in 2021 was 125,032 MWh.
4. Otter Tail owns two combustion turbines at Jamestown, North Dakota. These combustion turbines have a combined Net Dependable Capacity rating of 41.8 MW. These facilities were commissioned for commercial operation in 1976 and 1978 and generated 1,608 MWh in 2021.
5. Otter Tail's Solway Combustion Turbine is located near Solway, Minnesota. This 42.5 MW unit is a dual fuel unit operating on natural gas or fuel oil. Net generation for Solway in 2021 was 110,461 MWh.
6. Otter Tail owns the 20.4 MW fuel oil Lake Preston Combustion Turbine located near Lake Preston, South Dakota. Lake Preston produced 1,282 MWh in 2021.
7. Otter Tail purchases energy from a customer-owned waste sunflower hull fired cogeneration facility in Enderlin, North Dakota. No energy was received from this facility in 2021.
8. Otter Tail purchases energy from a number of customer-owned wind and solar powered generating facilities in North Dakota. These facilities have a combined

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<sup>1</sup> Otter Tail's September 1, 2021 filing *In the Matter of Otter Tail Power Company's Submittal of its 2022-2036 Integrated Resource Plan* in Case No. PU-21-380.

capacity rating of approximately 3.3 MW and delivered 2,787 MWh of energy to Otter Tail in 2021.

9. Otter Tail purchases energy from the 21 MW FPL Energy ND Wind II (a wind farm owned by NextEra Energy) that delivered 43,487 MWh to Otter Tail in 2021.
10. Otter Tail purchased the output of 19 MW of wind turbines from Langdon Wind, LLC (a wind farm owned by NextEra Energy) that delivered 69,898 MWh in 2021.
11. Otter Tail purchases peaking capacity from one customer-owned diesel generator with a nameplate capacity of 1.7 MW through May 2023.
12. Otter Tail owns 40.5 MW of the Langdon Wind Energy Center located 6-12 miles south of Langdon, North Dakota and had net generation of 144,103 MWh in 2021. The portion owned by Otter Tail began commercial operation in January 2008.
13. Otter Tail owns 48 MW of the Ashtabula Wind Energy Center located in Barnes County that had net generation of 139,379 MWh in 2021. The portion owned by Otter Tail began commercial operation in December 2008.
14. Otter Tail owns 49.5 MW of the Luverne Wind Energy Center located in Steele County that had net generation of 174,859 MWh in 2021. The portion owned by Otter Tail began commercial operation in August 2009.
15. Otter Tail began purchasing energy from the 62.4 MW Ashtabula Wind III (a wind farm owned by NextEra Energy) in October 2013. This facility delivered 195,064 MWh to Otter Tail in 2021. Otter Tail anticipates exercising its option to purchase the wind farm from NextEra. Otter Tail expects to own this facility beginning January 2023.
16. Otter Tail's 248 MW Astoria Station located near Astoria, South Dakota is a natural gas electric generation unit. Astoria began commercial operation in early 2021 and had net generation of 327,758 MWh in 2021.
17. Otter Tail's 150 MW Merricourt Wind Energy Center located in Dickey and McIntosh Counties near Merricourt, North Dakota had net generation of 501,570 MWh in 2021. Merricourt began commercial operational in late 2020.
18. Otter Tail has six hydroelectric facilities located at five dams on the Otter Tail River near Fergus Falls, Minnesota and two units located at a dam on the outlet of Lake Bemidji at Bemidji, Minnesota. The total Net Dependable Capacity of the six units is about 2.6 MW and they generated 14,299 MWh in 2021.
19. No unit retirements of Otter Tail owned facilities are planned within the next ten years. As discussed in the 2021 IRP, Otter Tail requests authority to commence the process of withdrawing from its ownership interest in Coyote Station with the intent to complete withdrawal by the end of 2028. As noted in that filing, the Company's modeling forecasts benefits from withdrawal under the scenarios and sensitivities it has considered; however, we cannot rule out the possibility that some combination of factors, including developments not contemplated, could produce different results in the future. Otter Tail's preference is to divest its share to a co-owner or third party.

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

Otter Tail currently has one energy conversion facility under construction.

- 49.9 MW solar facility located near Fergus Falls, MN, with a scheduled commercial operation date of July 2023. This project is being built to serve Otter Tail’s Minnesota jurisdiction as discussed in North Dakota Case No. PU-21-443.

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

In the 2021 IRP, Otter Tail requested authority to begin construction on the following two facilities in the next five years:

- The addition of dual fuel capability at Astoria Station
- The addition of 150 MW of solar generation in 2025

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

In addition to the key aspects of the five-year plan listed in Section C above, the 2021 IRP identifies the addition of 100 MW of wind generation in 2027.

## **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
Browns Valley – New Effington – Hankinson 230 kV	1974
Center – Jamestown 345 kV	1980
Coal Creek – Underwood – Harvey 230 kV	1980
Harvey – Balta – Rugby 230 kV	2002
Luverne – Pillsbury 230 kV	2009
Alexandria – Fargo (Bison) 345 kV	2015
Big Stone South – Ellendale 345 kV	2019

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**

### **New Jamestown 115/41.6 kV Delivery**

Otter Tail and Central Power Electric Cooperative (CPEC) serve several rural communities and customers along a co-owned 41.6 kV transmission loop southwest of Jamestown including the communities of Eldridge, Medina, Streeter, Gackle and Millarton. CPEC is removing an interconnection of its 41.6 kV line to Otter Tail's system that currently serves this 41.6 kV loop from Otter Tail's Jamestown 345/115/41.6 kV substation.

As a result, Otter Tail is adding a new 115/41.6 kV source to this 41.6 kV loop by installing a new 115/41.6 kV transformer to its existing Jamestown Downtown 115 kV substation with a new 1.5-mile, 41.6 kV line from the Jamestown Downtown Substation to a new interconnection along the existing 41.6 kV loop. This new transmission plan has been identified as the least cost plan that is required to re-establish and maintain a reliable transmission system for the rural communities and customers served off the 41.6 kV loop.

The Midcontinent Independent System Operator, Inc. (MISO) has reviewed this project through its stakeholder process and approved this project through its 2019 MISO Transmission Expansion Plan (MTEP19). Additionally, this project has been reviewed and approved by the Jamestown city council given that a portion of the new 1.5-mile 41.6 kV line will be routed through city limits. This project is expected to be completed in 2023.

### **Northeast North Dakota Transmission Project: Lake Ardoch 230/115 kV Substation, Lake Ardoch – Oslo 115 kV Line and Oslo 115 kV Switching Station**

Otter Tail is proceeding with a jointly owned transmission project with Minnkota Power Cooperative (MPC) in northeastern North Dakota to reliably support load growth that is occurring in northwest Minnesota. The new transmission project consists of a new Lake Ardoch 230/115 kV Substation that will be located east of Ardoch, ND and will tap the existing Drayton – Grand Forks (Prairie) 230 kV line. A new, approximately 5-mile, 115 kV line will also be constructed between the new Lake Ardoch Substation and a new

Oslo 115 kV Switching Station. The new Oslo 115 kV Switching Station will be located west of Oslo, MN on the North Dakota side of the Red River. MPC is planning to construct the Lake Ardoch 230/115 kV Substation while OTP is planning to construct the Lake Ardoch – Oslo 115 kV line and Oslo 115 kV Switching Station. All of the components of this new transmission project are planning to be energized in 2024.

### **Casselton 115 kV Capacitor Bank**

Otter Tail has plans to interconnect a new 10 MW soybean processing plant to its existing Casselton, ND 115 kV Substation. This load addition is driving the need to expand the existing substation to allow for the addition of a new capacitor bank on the 115 kV system. This capacitor bank addition is expected to occur in the 2024 timeframe and will ensure that the reliability of the transmission system is maintained when serving this new customer.

### **Generation Interconnection Projects**

Currently, Otter Tail does not have any planned transmission projects as a result of new generation interconnection projects. However, there are numerous generation projects that are currently being evaluated as part of MISO's interconnection process. If these new generation projects are developed, it is likely that new transmission projects will be required either in the form of upgrades to existing transmission lines or substations, or new transmission lines or substations. Transmission projects required for new generation interconnections become part of MISO's regional plan once they are included within a generator interconnection agreement. Transmission projects identified through MISO's interconnection process and committed through a generator interconnection agreement will be included in future biennial plans.

### **Load Expansions/New Load**

Otter Tail is regularly contacted by customers that have an interest in adding new load. Most contacts are related to commercial load expansions at existing sites, ag processing facilities, pipelines, or data mining facilities. These load additions are evaluated carefully by Otter Tail and frequently reveal that the existing transmission system needs to be reinforced in order to continue providing reliable service. Otter Tail will include any new transmission projects stemming from a future load expansion or new load addition in future biennial plans.

### **Transmission Line Rebuild Program and Extenda-Life Program**

Otter Tail has approximately 5,800 miles of transmission lines across its service territory. Of those, approximately 3,800 miles are 41.6 kV transmission lines and are a

core part of Otter Tail's delivery network to serve customers. Just over one-third of the Company's transmission poles are older than 55 years, which leaves a large portion of the poles either at or reaching the end of their useful life.

In light of this growing concern, Otter Tail has undertaken a multi-year effort called the System Infrastructure and Reliability Improvement (SIRI) Initiative. As part of this initiative, Otter Tail has put a focus on assessing overall asset health conditions, which has led to the development of two new programs being put in place at Otter Tail called "Extenda-Life" and "Line Rebuild" programs. Otter Tail has always had projects that involved refurbishment and replacement of existing lines, but it was not until 2019 when more targeted efforts were undertaken through the SIRI initiative.

#### Line Rebuild Program

Otter Tail's O&M and capital programs seek to extend the life of line sections to the greatest extent possible; however, once the overall condition and performance of a line reaches certain deterioration levels, it needs to be replaced. Factors that go into determining when a replacement is needed include line framing style and pole height, reliability performance, hard to access areas (i.e., water), conductor condition, and overall line vintage.

#### Extenda-Life Program

Prior to deeming a line in need of a total replacement, refurbishing the line is first considered. Refurbishing of line sections includes any combination of activities including, but not limited to, changing out rotten cross arms, replacing failed insulators, replacing poles that have failed strength tests, applying ground treatment for poles that pass strength tests, mitigating any vegetation issues, and reattaching guy wires. Otter Tail refers to these refurbishment projects internally as "Extenda-Life" projects. The "Extenda-Life" Program is a valuable cost saving measure that can be used to replace select equipment along existing lines to maintain a high level of reliability for customers.

Although the Extenda-Life and Rebuild programs are different, each improves the reliability of Otter Tail's transmission system. Any time that replacement of certain equipment along an existing line, or replacement of the entire line occurs, the line has inherently better performance not only because of new assets performing better but also because it allows Otter Tail to implement its updated construction and material standards that now include new framing styles. More specifically, Otter Tail's new standards include higher rated insulators (72 kV rather than 45 kV), different conductors, more spacing between energized conductors, as well as a static wire above

the energized conductors. This static wire provides for shielding protection against interruptions caused by weather events; specifically, lightning. Lastly, the current standard for Otter Tail's 41.6 kV lines is T2 (twisted pair) conductor that improves the line's performance during icing and frost conditions over the standard single conductor utilized in older lines. The ability to employ Otter Tail's current construction and material standards to existing lines results in improved reliability of the lower voltage (41.6 kV) transmission system.

At the current time, Otter Tail has identified the following line improvement projects in North Dakota under either the Extenda-Life or Rebuild Program over the next three years:

- Alice – Enderlin 115 kV
- Wahpeton – Fairmont 115 kV
- Rollette – Rolla 69 kV
- Pickert – McVile 41.6 kV
- Michigan – Mapes 41.6 kV
- Parshall – Wabek 41.6 kV
- Devils Lake – New Rockford 41.6 kV
- Jamestown – Gackle 41.6 kV
- Pekin – McVile 41.6 kV

Otter Tail expects more projects under both the Extenda-Life and Rebuild Programs in the future. Otter Tail will identify additional projects in future biennial plans.

#### **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)**

In response to the resource transformation, MISO initiated a multi-year Long Range Transmission Planning (LRTP) effort in 2020 that seeks to identify the transmission investments needed to enable the reliable delivery of energy across the region. Through this effort, MISO has proposed a Tranche 1 portfolio of 18 transmission projects throughout the MISO north subregion. One of the proposed Tranche 1 transmission projects is a new 345 kV line from Otter Tail's Jamestown 345 kV substation to

Montana-Dakota Utilities' Ellendale 345 kV substation. This entire 345 kV line would be located in North Dakota. Otter Tail and Montana-Dakota Utilities Co. provided an informational notice to the North Dakota Public Service Commission on May 27, 2022, indicating their willingness and ability to construct, own and operate the proposed Jamestown to Ellendale 345 kV project.

MISO is expected to bring the proposed Tranche 1 portfolio to the MISO Board of Directors for approval on July 25, 2022. If the Tranche 1 portfolio is approved, it is currently estimated that the new Jamestown – Ellendale 345 kV line would be completed in the 2028 timeframe. Otter Tail and Montana-Dakota Utilities are in the initial stages of development efforts for the Jamestown – Ellendale 345 kV line and will update the Commission through future correspondence and/or filings.

Following the MISO Board approval of the Tranche 1 projects in July, MISO intends to continue its LRTP efforts and will commence Tranche 2 in the third quarter of 2022 and MISO intends to identify additional tranches of projects over the next 2 years. At this time, it is uncertain if additional transmission projects in North Dakota will be identified in MISO's upcoming LRTP efforts.

In addition to MISO's LRTP efforts, Otter Tail continues to be actively engaged in regional transmission planning efforts. It is hard to predict what future transmission projects will be identified and built in the next 10 years. However, as new North Dakota generation projects are developed and the transmission system approaches its full capability, it is inevitable that additional transmission and transmission upgrades will be required to maintain reliability. 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 fashion, involving neighboring utilities, load serving entities, state regulatory commissions, and members of the public. In addition, Otter Tail continues to actively participate in a variety of different planning 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 under a wide variety of conditions. Through the MTEP process, MISO, with input from various stakeholders, evaluates both reliability and economic needs. The MTEP process is designed to ensure the most efficient and cost-effective transmission expansion plan is developed with input from all stakeholders.

Local planning of the Otter Tail system is primarily coordinated on a sub-regional level with neighboring utilities. Otter Tail's locally planned projects are then reviewed by MISO and become part of the MTEP process. Transmission projects identified and reviewed through the MTEP process are approved by the MISO Board of Directors in December of each year.

Otter Tail is also a member of the Grid North Partners (GNP), formerly called CapX2020. GNP consists of transmission-owning electric utilities in Minnesota and the surrounding region (including cooperatives, municipal utilities, and investor-owned utilities). The GNP members released the CapX2050 Transmission Vision Report in 2020, which highlights the challenges transmission planners and operators may face to maintain a safe and reliable system as energy production in the region evolves to include more non-dispatchable resources.<sup>2</sup> The GNP collaboration and the resulting planning studies performed as part of this effort are coordinated with MISO.

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

Since Otter Tail's transmission system is highly integrated with several neighboring non-MISO transmission owners, additional coordination occurs outside of the annual MTEP process.

Otter Tail is continually coordinating with several non-MISO transmission owners, such as Manitoba Hydro, Minnkota Power Cooperative, East River Electric Power Cooperative, Western Area Power Administration – Upper Great Plains Region and Central Power Electric Cooperative, on various transmission-related activities to identify least cost transmission plans needed to maintain reliability.

### **Summary of Regional Coordination**

As discussed throughout Section J, Otter Tail works extensively with its neighboring utilities – both MISO transmission owners and non-MISO transmission owners - to develop system plans and coordinates future system enhancements through MISO, which is Otter Tail's Planning Authority.

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<sup>2</sup> [CapX2050 TransmissionVisionReport FINAL.pdf \(gridnorthpartners.com\)](https://www.gridnorthpartners.com/Portals/0/CapX2050_TransmissionVisionReport_FINAL.pdf)

## **SECTION K: Environmental Information**

Otter Tail employees are involved with a variety of organizations, including the Edison Electric Institute (EEI) and the Lignite Energy Council, to keep informed on various 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 2021 were \$2,311,909 (Total Plant.) There were no capital expenditures relating to environmental items at Coyote Station in 2021.

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

### **Air Quality**

Pursuant to the federal Clean Air Act (CAA), the United States Environmental Protection Agency (EPA) has promulgated national primary and secondary national ambient air quality standards for criteria air pollutants. The Coyote Station was originally constructed with a spray dryer to control sulfur dioxide (SO<sub>2</sub>) and particulate matter, and a fabric filter was later added to enhance control. Subsequently, activated carbon injection for mercury control was added to meet EPA's mercury and air toxics standards (MATS) rule.

On March 14, 2011, the North Dakota Department of Environmental Quality (NDDEQ) issued a construction permit to Coyote Station requiring installation of control equipment to limit its nitrogen oxides (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 for the first planning period, and compliance with the limit was required by July 1, 2018. This NO<sub>x</sub> control equipment was installed during a spring 2016 outage.

The NDDEQ is currently working on the second planning period for Regional Haze focusing on making continued reasonable progress towards a national visibility goal. To date, NDDEQ has not proposed any additional Regional Haze controls for Coyote Station.

## **Greenhouse Gases**

In recent years, the EPA has proposed differing regulations for greenhouse gases (GHGs) at existing power plants, but neither the Clean Power Plan (CPP) nor the Affordable Clean Energy Rule (ACE Rule) have made it into effect. In mid-2022 the U.S. Supreme Court is expected to issue a ruling that will help determine the extent of EPA's authority in this area, and a new rule is possible in the coming years.

## **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, 2018, for a five-year term.

## **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 NDDEQ has 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 has required 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. Also, in response to the rule, during a Spring 2019 outage, a new bottom ash conveyor dry handling system was installed, and Otter Tail completed clean closure of three surface impoundments by removing all CCR from the impoundments.

## **Wildlife**

At the Merricourt Wind Energy Project, we have implemented procedures to monitor avian and bat fatalities and monitor for Whooping Cranes. Avian and bat fatality monitoring occurred for one year after the completion of construction, while Whooping Crane monitoring will occur during the spring and fall migration seasons for the life of the project. If Whooping cranes are sited within two miles of the site, Merricourt will temporarily cease operations on all turbines. To-date this has not occurred.

## SECTION L: Projected Demand for Service

### Historical Growth and Long-Range Forecast

Otter Tail had an all-time high unmanaged winter peak of 924 MW on January 31, 2019, for the hour ending at 9:00 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 June of the listed year and extends through May of the following year. Tables 1, 2, and 3 below are provided based on Otter Tail's 2021 IRP energy and demand forecasts.

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

Year	Peak	Annual Growth %	Cumulative Growth %
2011	837		
2012	872	4.2%	4.2%
2013	883	1.3%	5.5%
2014	917	3.9%	9.6%
2015	897	-2.2%	7.2%
2016	876	-2.3%	4.7%
2017	917	4.7%	9.6%
2018	911	-0.7%	8.8%
2019	924	1.4%	10.4%
2020	845	-8.5%	1.0%

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
2022	849	908	968
2023	853	912	972
2024	856	916	976
2025	860	920	979
2026	864	924	983
2027	868	927	987
2028	872	931	991
2029	875	935	995
2030	879	939	999
2031	883	943	1,003

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

Year	Lower	Base	Upper
2022	726	785	844
2023	729	789	848
2024	733	793	852
2025	737	796	856
2026	741	800	860
2027	744	804	864
2028	748	808	868
2029	752	812	872
2030	756	816	876
2031	759	819	880

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 will be realized from such efforts.

Since filing its 2021 IRP Otter Tail has added a large new customer that is not reflected in the demand and energy forecast for the IRP. Information on this large customer can be found in North Dakota Case No. PU-21-366. The ability to curtail this customer is advantageous to the system and, therefore, this large customer does not impact our capacity position and the addition of this customer does not change Otter Tail's preferred resource plan as described in its 2021 IRP.

## **Demand Response Capability**

Load Management programs are core Company service offerings utilized by approximately one-third of Otter Tail customers. This strong customer participation makes Otter Tail's Load Management portfolio one of the largest in the country by customer adoption.

Otter Tail registers its Direct Load Control with the MISO under Module E. Direct Load Control resources are netted from the demand forecast prior to calculation of the reserve obligation. This resource is obligated to provide sustained load reduction for up to four hours at a time and to be available to the MISO five times in the summer 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*

“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 2021 through May 2022. 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 132,000 customers and approximately 43,000 radio receivers used to control customer loads. 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 120 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 21 MW of summer peak load in the months of June through September. These summer loads consist primarily of water heaters, large dual fuel loads, and cooling 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 and deferred load rates.

Otter Tail's existing Load Management system only provides one way communication with customer locations. Additionally, much of the hardware and software used to

support the existing Load Management system is antiquated and/or obsolete. Most of the software that supports the Load Management system was procured in 2003 and is currently operating with limited support from the vendor.

In 2021, the Commission approved the Company's request for an Advance Determination of Prudence for an Advanced Metering Infrastructure project. This is Otter Tail's first major step toward modernizing systems customers will interact with regularly. The communications network that will be installed with the AMI project will, in the future, be utilized to support the continued long-term functionality of the Company's Load Management programs and enable its improvement and expansion.

Upgrading the load management system control software and end use devices will provide an opportunity to implement new approaches to load control, such as opt-in and opt-out events facilitated by two-way communications; finetuned response to MISO trigger prices to better respond to price fluctuations, and more accurately identify its MISO capacity accreditation; to implement direct control of smart devices such as commercial building energy control systems, smart thermostats, or smart appliances; and to refine the management of control event duration and recovery times to ensure customer comfort.

The Company's current resource plan forecasts only a slight increase to its demand response capability over the next ten years. Otter Tail will continue to use a combination of Load Management, energy efficiency, and purchase agreements with other utilities to help meet future capacity deficits. Further detailed information may be obtained from Otter Tail's 2021 IRP that was filed with the Commission and with the Minnesota and South Dakota Public Utilities Commissions.

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

Otter Tail continues to explore operational 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, reverse osmosis pumps, coal feeders, and wash pumps are examples of equipment that has been replaced with more efficient variable speed drives to lower station service (thereby increasing efficiency) at our plants.

### *Big Stone Plant:*

In 2020, Big Stone Plant made the transition to economic dispatch mode and the unit has been cycled off/on with input from the plant owners. The Plant also lowered its economic minimum load to 150 net MW and more recently to 125 net MW. Other improvements made in the last two years include:

- Installed flow baffles in boiler outlet ductwork to reduce ash accumulation from low load operation
- Replaced air preheater sector plate controls
- Replaced glycol/steam heat exchangers
- Upgraded electro-hydraulic pumps
- Replaced demineralizer controls
- Replaced selective catalytic reactor catalyst layer
- Upgraded forced draft fan condensate level controls
- Replaced automatic voltage regulator
- Replaced brine concentrator vapor compressor rotating element
- Completed numerous boiler expansion joints, insulation, lagging projects

### *Coyote Station:*

Because 2020 and 2021 were non-outage years, the projects were more routine in nature. Most projects were fairly straightforward equipment replacements which were done due to reliability factors. Vibration online monitoring for large rotating machinery was replaced, flame scanners for the boiler, air compressors, fuel oil pumps and heaters, SO<sub>2</sub> monitor, sump pumps, and fire system valves. We also replaced a large section of underground air line and spent capital dollars on a couple large projects that will not be implemented until after the major outage in 2022, including the cooling tower, PLC 5 replacements and the water cannon.

### *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.