

215 South Cascade Street
PO Box 496
Fergus Falls, Minnesota 56538-0496
218 739-8200
www.otpco.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

For your information, we have enclosed a copy of Otter Tail Power Company's Ten-Year Plan, which has been filed with the South Dakota Public Utilities Commission.

Sincerely,

/S/ NATHAN JENSEN
Nathan Jensen
Manager, Resource Planning

sjw
Enclosure

2 **PU-22-273** Filed: 7/8/2022 Pages: 21
South Dakota 2022 Ten Year Plan

Otter Tail Power Company
Nathan Jensen

**SOUTH DAKOTA
TEN-YEAR
BIENNIAL PLAN**



**Report RP22
Resource Planning Department
June 2022**

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INTRODUCTION

In accordance with the rules and regulations of the South Dakota Public Utilities Commission Energy Facility Plans ARSD 20:10:21, Otter Tail Power Company (Otter Tail or the Company), hereby files its Biennial Ten-Year Plan. This filing is structured to coincide sequentially with the Commission rules as defined in the Form for Plans, ARSD 20:10:21:25 Section 4 through Section 18, therefore, coincide with ARSD 20:10:21:04 to ARSD 20:10:21:18, respectively.

Notice of Filing of the plan is being sent to each of the state agencies and officers designated in Section 23 of the Energy Facility Plans.

SECTION 4 -- EXISTING ENERGY CONVERSION FACILITIES

Otter Tail filed its Integrated Resource Plan (2021 IRP) in September 2021. The 2021 IRP provides further details related to our existing energy generating units.

A. Coal Generation Facilities

Otter Tail has partial ownership of two active coal-fired generators. The table below provides the information required by South Dakota Administrative Rule 20:10:21:04 for the coal units.

Table 1 – Coal Facilities

20:10:21:04	Big Stone Plant	Coyote Station
1.	Grant County, SD	Near Beulah, ND
2.	Westinghouse turbine generator 475 MW	Westinghouse turbine generator 427 MW
3.	2020: 1,650,135 MWh (OTP Share) 2021: 1,640,593 MWh (OTP Share)	2020: 2,385,726 MWh 2021: 2,464,175 MWh
4.	Big Stone Lake 2020: 2,175 acre-feet 2021: 3,447 acre-feet	Missouri River 2020: 5,232 acre-feet 2021: 3,547 acre-feet
5.	Sub-bituminous coal 2020: 1,140,869 tons 2021: 1,104,061 tons	Lignite coal 2020: 1,969,501 tons 2021: 2,022,579 tons
6.	Otter Tail does not have a Commission-approved projected date of removal for these units.	
7.		
Notes	Big Stone Plant is jointly owned by Otter Tail, Montana-Dakota Utilities Co., and Northwestern Public Service. Otter Tail serves as the operating agent for the unit and owns 53.9%.	Coyote Station is jointly owned by Otter Tail, Northern Municipal Power Agency, Montana-Dakota Utilities, and Northwestern Public Service. Minnkota Power Cooperative acts as the agent for Northern Municipal Power Agency. Otter Tail serves as the operating agent for the unit and owns 35%. 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.

B. Hydroelectric Facilities

Otter Tail has six units located at five dams on the Otter Tail River near Fergus Falls, Minnesota. The table below provides the information required by South Dakota Administrative Rule 20:10:21:04 for the hydroelectric facilities.

Table 2 – Hydroelectric Facilities

20:10:21:04	Otter Tail Hydros
1.	Fergus Falls, MN
2.	Hydro 2.6 MW
3.	2020: 22,591 MWh 2021: 14,299 MWh
4.	Otter Tail River and Lake Bemidji Outlet 2020: 970,780 acre feet 2021: 614,456 acre feet
5.	See 4.
6.	Otter Tail does not have a projected date of removal for these units.
7.	

C. Peaking Facilities

Otter Tail has a number of peaking units on the system. Some are internal combustion units, but most of the capacity is comprised of combustion turbines. The table below provides the information required by South Dakota Administrative Rule 20:10:21:04 for the peaking facilities.

Table 3 – Peaking Facilities

20:10:21:04	Astoria Station	Jamestown Combustion Turbines	Lake Preston Combustion Turbine	Solway Combustion Turbine
1.	Astoria, SD	Jamestown, ND	Lake Preston, SD	Solway, MN
2.	Natural Gas 248 MW	Fuel Oil Unit 1: 20.7 MW Unit 2: 21.1 MW	Fuel Oil 20.4 MW	Natural Gas / Fuel Oil 42.5 MW
3.	2020: 0 2021: 27,758 MWh	2020: 183 MWh 2021: 1,608 MWh	2020: 108 MWh 2021: 1,282 MWh	2020: 51,707 MWh 2021: 110,461 MWh
4.	Not applicable (NA)	NA	NA	NA
5.	2020: 0 2021: 3,465,044 MMBTUS	2020: 55,394 gallons 2021: 230,920 gallons	2020: 33,294 gallons 2021: 178,039 gallons	2020: 529,650 MMBTUS/260gallons 2021: 1,147,300 MMBTUS/8,807gallons
6.	Otter Tail does not have a projected date of removal for these units.			
7.				

D. Renewable Facilities

Otter Tail owns 288 MW of wind generation. The table below provides the information required by South Dakota Administrative Rule 20:10:21:04 for Otter Tail’s owned renewable energy facilities.

Table 4 – Renewable Facilities

20:10:21:04	Langdon Wind	Ashtabula Wind	Luverne Wind	Merricourt Wind
1.	Langdon, ND	Barnes County, ND	Steele County, ND	McIntosh & Dickey Counties, ND
2.	27 1.5 MW GE turbines 40.5 MW	32 1.5 MW GE turbines 48 MW	33 1.5 MW GE turbines 49.5 MW	75 2 MW Vestas turbines 150 MW
3.	2020: 141,294 MWh 2021: 144,103 MWh	2020: 143,736 MWh 2021: 139,379 MWh	2020: 173,806 MWh 2021: 174,859 MWh	2020: 49,788 MWh 2021: 501,570 MWh
4.	Not applicable (NA)	NA	NA	NA
5.	NA	NA	NA	NA
6.	Otter Tail does not have a projected date of removal for these units.			
7.				

SECTION 5 -- PROPOSED ENERGY CONVERSION FACILITIES

The Company currently has one generation project under construction and one existing renewable facility that we intend to exercise the option to purchase.

1. A 49.9 MW solar facility near Fergus Falls, Minnesota. This project is being built to serve Otter Tail’s Minnesota jurisdiction and is projected to be in-service in Q3 2023.
2. Otter Tail is anticipating exercising its option to purchase the 39 turbine 62.4 MW Ashtabula III Wind Energy Facility for which it currently purchases power through an agreement as described in South Dakota Docket No. EL22-013. Otter Tail expects to own this facility beginning January 2023.

SECTION 6 -- EXISTING TRANSMISSION FACILITIES

Otter Tail currently owns ten high-voltage transmission line sections in South Dakota described as follows:

1. A section of the Canby – Toronto North 115 kV line starting from a point on the South Dakota line in Section 34, Township 114, Range 47, terminating at the Toronto North Switching Station in Section 24, Township 113, Range 49 (one mile north of Toronto, SD). This line section is 11.7 miles all in Deuel County. This is a wood-pole, H-frame line. No date has been projected for the removal of this line.

2. A 115 kV line from Toronto North to Hetland, starting at the Toronto North Substation in Section 24, Township 113, Range 49 (approximately 1 mile north of Toronto, SD) and continuing generally south and west terminating at the Hetland Substation in Section 28, Township 111, Range 53 (approximately 1 mile east and 1 mile north of Hetland), a total distance of 40.7 miles, with about 5 miles in Deuel County, 32 miles in Brookings County, and 4 miles in Kingsbury County. This is a single pole line composed of both wood and steel structures. No date has been projected for the removal of this line.
3. A 115 kV line from Hetland to Lake Norden, starting at the Hetland Substation in Section 28, Township 111, Range 53 (approximately 1 mile east and 1 mile north of Hetland) and continuing generally north terminating at the Lake Norden substation in Section 20, Township 113, Range 53 (approximately 0.25 miles west of Lake Norden), a total distance of 14.3 miles, with about 3.2 miles in Hamlin County and 11.1 miles in Kingsbury County. This is a single pole line composed of steel structures. No date has been projected for the removal of this line.
4. A 115 kV line from Lake Norden to Astoria, starting at the Lake Norden Substation in Section 20, Township 113, Range 53 (approximately 0.25 miles west of Lake Norden), generally heading east to terminate at Astoria Substation in Section 22, Township 115, Range 48.
5. A section of the Big Stone – Blair 230 kV line starting from a point 0.76 miles north of County Road #18 in Section 4, Township 118, Range 47, to a 230 kV substation 4 miles north of Gary in Section 16, Township 116, Range 47, a distance of 14.96 miles, 5.76 miles in Grant County and 9.2 miles in Deuel County. This is a wood-pole, H-frame line. No date has been projected for the removal of this line.
6. A section of the Big Stone – Hankinson 230 kV line starting at a point on the South Dakota line in Section 26, Township 129, Range 50, to a point 0.3 miles north of Roberts County Highway #23 in Section 11, Township 127, Range 50, a distance of 22.62 miles, all in Roberts County. This is a wood-pole, H-frame line. No date has been projected for the removal of this line.
7. A percentage of the CapX2020 Brookings County – Hampton 345 kV line starting on the South Dakota line in Section 34, Township 112, Range 47, and continuing generally south and then west terminating at the Brookings County Substation in Section 25, Township 111, Range 48, a total distance of 10.75 miles, all in Brookings County. This is a single pole line composed of steel structures with double circuit capability. No date has been projected for the removal of this line.
8. Two parallel 230 kV lines from Big Stone Plant to Big Stone South, starting at the Big Stone Plant substation in Section 12, Township 121, Range 47, and continuing south and terminating at the Big Stone South substation in Section 24, Township 121, Range 47, a total distance of 1.7 miles, all in Grant County. Both of these lines are comprised of steel-pole, H-frame structures. No date has been projected for the removal of this line.

9. A percentage of the CapX2020 Big Stone South – Brookings 345 kV line starting at the Big Stone South substation in Section 24, Township 121, Range 47 (approximately 2 miles west of Big Stone City) and continuing generally south, terminating at the Brookings County substation in Section 25, Township 111, Range 48 (approximately 11 miles east and 5 miles north of Brookings), a total distance of 71.6 miles, with about 22 miles in Grant County, 37 miles in Deuel County, and 13 miles in Brookings County. This is a single pole line composed of steel structures; a portion of which include double circuit capability from Big Stone South to a location near Gary. No date has been projected for the removal of this line.
10. A percentage of the Big Stone South – Ellendale 345 kV line starting at the Big Stone South substation in Section 24, Township 121, Range 47 (approximately 2 miles west of Big Stone City) and continuing generally west and north, terminating at the Ellendale (ND) substation in Section 9, Township 129, Range 63 (approximately 2 miles west of Ellendale, ND), a total distance of approximately 163 miles with 152.7 miles in South Dakota, with about 41.4 miles in Grant County, 51.0 miles in Day County, and 60.3 miles in Brown County. This is a single pole line composed of steel structures. No date has been projected for the removal of this line.

SECTION 7 -- PROPOSED TRANSMISSION FACILITIES

Generation Interconnection Projects

Otter Tail continues to see steady activity within South Dakota related to on-going interests in new wind generation development. Otter Tail is planning to upgrade its portion of the Big Stone – Blair 230 kV line, as well as both of the Big Stone Plant – Big Stone South 230 kV lines in 2023 to allow for additional transmission capacity driven by new wind generation development.

Additional wind and solar projects are currently being evaluated as part of the interconnection process that is administered by the Midcontinent Independent System Operator (MISO). If these projects are developed, it is likely that additional transmission projects will be required. Future transmission projects identified through MISO's interconnection process will be included in future biennial reports.

Load Expansions/New Load

Otter Tail is regularly contacted by customers that have an interest in adding new load to its transmission system. Most load requests are usually 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 oftentimes identify that the existing transmission system needs to be reinforced in order to continue providing reliable service with the new load addition. To date, several new load additions have been

evaluated, but have not come to fruition. In the event that a future load addition does proceed and requires a new transmission project, Otter Tail will include that transmission project in future biennial reports.

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 41.6 kV line improvement projects in SD under either the Extenda-Life or Rebuild Program over the next three years:

- Milbank Northwest – Milbank South Jct. 41.6 kV line
- Wilmot – Peever 41.6 kV line
- Grenville – Veblen 41.6 kV line

As Otter Tail's transmission system continues to age, Otter Tail expects more projects under both the Extend-Life and Rebuild Programs in the future. Otter Tail will plan to identify future projects of this nature that are being done to improve the reliability performance of its transmission system in future biennial reports.

Regional Expansion

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 Big Stone South 345 kV substation in South Dakota to Missouri River Energy Services (MRES) Alexandria 345 kV substation in Minnesota. A portion of this new 345 kV line will be located in South Dakota with the remaining portion located in Minnesota.

MISO is expected to bring the proposed Tranche 1 portfolio to its Board of Directors for approval on July 25, 2022. If the Tranche 1 portfolio is approved, Otter Tail and MRES are planning to move forward with the development and construction of the new Big Stone South - Alexandria 345 kV line with an anticipated completion date between 2030 and 2032.

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. MISO intends to identify additional tranches of projects over the next 2 years. At this time, it is uncertain if additional transmission projects in South 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 South 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 South Dakota.

SECTION 8 -- COORDINATION OF PLANS

Otter Tail conducts transmission planning in a coordinated environment involving neighboring utilities, load serving entities, state regulatory commissions and members of the public. 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 MISO, Otter Tail 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 process is designed to ensure the most efficient and cost-effective transmission expansion plan is developed with input from all stakeholders.

Local planning of Otter Tail facilities less than 100 kV 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.¹ 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 a 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 above, 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.

SECTION 9 -- SINGLE REGIONAL PLANS

The proposed facilities mentioned in Section 7 comprise a part of the MISO Transmission Expansion Plan (MTEP).

¹ [CapX2050 TransmissionVisionReport FINAL.pdf \(gridnorthpartners.com\)](#)

SECTION 10 -- SUBMISSION OF REGIONAL PLAN

MISO compiles a MTEP report on an annual basis. The regional planning process within MISO concludes with a final report that is ultimately approved by the MISO Board of Directors. Currently, MTEP22 is underway with MTEP21 being the last approved report available on the MISO website for public viewing at:

[MTEP21 Full Report including Executive Summary611674.pdf \(misoenergy.org\)](#)

SECTION 11 -- UTILITY RELATIONSHIPS

Refer to Section 8 for a listing of the coordinated efforts in which Otter Tail is involved.

As mentioned previously, Otter Tail either had, or currently has, Integrated Transmission Agreements (ITA) with several utilities. These agreements resulted in a highly integrated system and provided for a common transmission system in overlapping service territories. These agreements require joint studies and coordination of transmission planning activities and facility additions to provide high reliability of service at the minimum cost. Otter Tail has interconnections and transmission agreements in South Dakota with the following utilities: NorthWestern Energy, Montana-Dakota Utilities Co., East River Electric Power Cooperative, Great River Energy, Missouri River Energy Services, Xcel Energy and Western Area Power Administration.

SECTION 12 -- EFFORTS TO MINIMIZE ADVERSE EFFECTS

Big Stone Plant was required to install Selective Catalytic Reduction and separated over-fire air to reduce NO_x emissions, dry flue gas desulfurization to reduce SO₂ emissions, and a new baghouse for particulate matter control to comply with the Regional Haze Rule. Concurrent with the Regional Haze controls, activated carbon injection was installed to comply with the Mercury and Air Toxics Standards (MATS) Rule. The Big Stone Plant compliant AQCS equipment was placed into commercial operation on December 29, 2015.

Condenser cooling at Big Stone is accomplished by using a 340-acre closed-cycle cooling pond. Use of such a pond eliminates any plant thermal discharges to public bodies of water.

Dikes surround oil storage tanks and larger chemical storage facilities to prevent contamination of large areas of soil or water should rupture of a storage tank occur. All underground petroleum storage tanks have been removed and replaced where

necessary with above ground storage tanks. All above ground tanks are in compliance with existing requirements of the South Dakota Department of Agriculture and Natural Resources (SD DANR).

The SD DANR has issued Big Stone Plant a permit for disposal of coal combustion residuals and other solid wastes. Additionally, on December 19, 2014, EPA announced a final rule to further regulate coal 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 this rule, during a fall 2018 outage, a new bottom ash conveyor dry handling system was installed, and Otter Tail completed clean closure of the lone plant surface impoundment by removing all CCR from the impoundment.

Otter Tail continues to cooperate with the South Dakota Public Utilities Commission (SDPUC) and the SD DANR in an effort to site and operate future power plants and transmission lines in an environmentally acceptable manner, contingent with the needs of a reliable supply of electrical energy. To that end, Otter Tail worked extensively with the SDPUC to obtain an Energy Conversion Facility Permit for Astoria Station, which culminated in the plant achieving commercial operation in April 2021.

Social and Economic Effects

Social and economic effects are very closely related. In fact, they are often referred to as "socioeconomic" effects. Because of their close relationship, the socioeconomic effects will be discussed jointly.

From experience gained in past construction projects, such as Big Stone Plant and Coyote Station located near Beulah, North Dakota, Otter Tail has been made aware of the socioeconomic effects of large construction projects. Pre-construction and post-construction socioeconomic monitoring was conducted in the vicinity of Big Stone in order to evaluate the effect of a large construction force on such things as the business community, housing, and essential services such as hospital and dental care. This type of monitoring was also employed in conjunction with the construction of Coyote Station. For Astoria Station, prior to construction, a socioeconomic study was performed for the area by a Local Review Committee. Otter Tail took the Local Review Committee's recommendations into account when preparing for and during construction.

Health Effects

Various governmental regulations, including, for example, primary and secondary ambient air quality standards and water quality standards, have been promulgated to protect the public health and welfare. Otter Tail will comply with these regulations. In addition, Otter Tail contributes to organizations, such as the Edison Electric Institute, which work to identify potential health and environmental problems as they relate to the electric utility industry.

Public Safety

Otter Tail is very concerned about public safety. All readily accessible substations and major plant sites are fenced to prevent unescorted access by the public who might be unfamiliar with electric energy or associated generation facilities.

In addition, Otter Tail complies with all applicable construction codes for the construction of electrical transmission lines and generation facilities.

Otter Tail also inspects its facilities periodically to help safeguard against failures of vital components and prevent any unnecessary exposure to the general public. Included in the inspections are electric transmission lines, circuit breakers, capacitors, and transformers.

Otter Tail also coordinates as needed with local law enforcement, emergency responders, and local governments.

Historic or Aesthetic Preservation Effects

Aesthetic effects have been considered in the design of transmission lines and power plants and will be considered in the design of future facilities. Transmission line routing considerations include visual effect on surrounding terrain. The design of Big Stone Plant included the choice of a color scheme that would blend with the surrounding countryside.

In addition to considering aesthetic effects, before construction began at Astoria Station, Otter Tail commissioned a detailed Cultural Report to document any historical or archeological sites of significance at the site and consulted with the South Dakota State Historical Preservation Office.

SECTION 13 -- EFFORTS RELATING TO LOAD MANAGEMENT

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 under Module E with the MISO. 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 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

“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 2020 through May 2021. 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 the Company's 2022 annual update to the South Dakota Phase-In Rider, the Company included costs associated with Advanced Metering Infrastructure (AMI) and a Demand Response (also known as Load Management) replacement system. This is Otter Tail's first major step towards 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 facilitate by two-way communications; finetuned response to MISO trigger prices to better respond to price fluctuations, and more accurately identify its MISO capacity accreditation, implement direct control of smart devices such as commercial building energy control systems, smart thermostats, or smart appliances, and 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. As a company, 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 were filed with the Minnesota, North Dakota, and South Dakota Public Utilities Commissions.

SECTION 14 -- LIST OF REPORTS

Otter Tail is not aware of any reports or studies filed or proposed to be filed with federal or other state agencies relating to proposed energy conversion or transmission facilities other than those required for the transmission projects noted above in Section 7.

SECTION 15 -- CHANGES IN STATUS AT FACILITIES

Otter Tail's Hoot Lake Coal Plant was retired May 2021. Big Stone Plant and Coyote Station recently adopted a process to allow economic dispatch status to be adopted when all co-owners are in agreement. In the past the unit was considered must-run and was online every available hour regardless of what the locational marginal price (LMP) was. When placed into economic dispatch, Big Stone Plant will now cycle offline when it is economically justifiable. Lake Preston continues to be operated during peak demands and line stability conditions.

SECTION 16 -- PROJECTED ELECTRIC DEMAND

For the 2019 winter season, Otter Tail had an unmanaged system peak of 924 MW on January 31, 2019, for the hour ending at 9 a.m. This was Otter Tail's highest peak to date. The projected unmanaged winter season demand for the Otter Tail system is shown in Table 5. 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.

Table 5: Projected Unmanaged Winter Season Peak Demand¹ for Otter Tail System

Year	Unmanaged Peak (MW)
2022	908
2023	912
2024	916
2025	920
2026	924
2027	927
2028	931
2029	935
2030	939
2031	943

¹ Peak values are prior to new conservation program impacts.

Table 6 on the next page shows the projected unmanaged winter season peak demand for the South Dakota portion of Otter Tail's system. Again, in Table 6, 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.

Because the South Dakota portion of the Otter Tail system demand is not metered, Table 6 unmanaged peak demand was estimated by applying the ratio of projected South Dakota energy sales and projected system energy sales to projected system peak demand.

Table 6: Projected Unmanaged Winter Season Peak Demand¹ for SD Portion of Otter Tail System

Year	Unmanaged Peak (MW)
2022	93
2023	93
2024	94
2025	94
2026	94
2027	95
2028	95
2029	96
2030	96
2031	96

¹ Peak values are prior to new conservation program impacts.

Otter Tail has registered its load management system with the MISO as a Demand Response Resource. The MISO has certified Otter Tail’s load management system for 18 MW during the summer season.

As a company, Otter Tail will continue to use a combination of load management and purchase agreements with other utilities to meet any future deficits. Otter Tail also continues to study and assess the potential for future additions to its generation resources.

Further detailed information may be obtained from Otter Tail’s 2021 IRP filed with the South Dakota Public Utilities Commission on September 1, 2021.

SECTION 17 -- CHANGES IN ELECTRIC ENERGY

The projected increase of winter season unmanaged peak demand for Otter Tail’s system and South Dakota is shown in Table 7.

Table 7: Projected Increase of Winter Season Unmanaged Peak Demand¹ for Otter Tail System and South Dakota Portion

Year	System Load Increase (MW)	South Dakota Load Increase (MW)	South Dakota Percent Increase
2023	3.82	0.39	0.42%
2024	3.82	0.39	0.42%
2025	3.82	0.39	0.42%
2026	3.82	0.39	0.42%
2027	3.84	0.39	0.42%
2028	3.84	0.39	0.41%
2029	3.87	0.40	0.42%
2030	3.89	0.40	0.42%
2031	3.90	0.40	0.42%

¹ Load values are consistent with those included in the 2021 IRP and are prior to new conservation program impacts.

SECTION 18 -- MAP OF SERVICE AREA

A map of the Otter Tail service area is shown in Figure 1 below.

Figure 1: Otter Tail Service Area

