

Appendix C: Existing Resources

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Existing Resources

Otter Tail Power Company has a variety of existing resources available to meet the energy needs of its customers, both reliably and economically. These resources consist of existing generating facilities, the radio load management system, the Midcontinent ISO, purchases from other utilities, customer owned generation, the transmission and distribution network, and current Company sponsored conservation programs.

Figure 1-1 shows the composition of the 2016 Planning Year capacity by fuel source for the Company.

Figure 1-1: 2016 Planning Year Accredited Capacity Resources Fuel Source Percent of Total = 766.5 MW

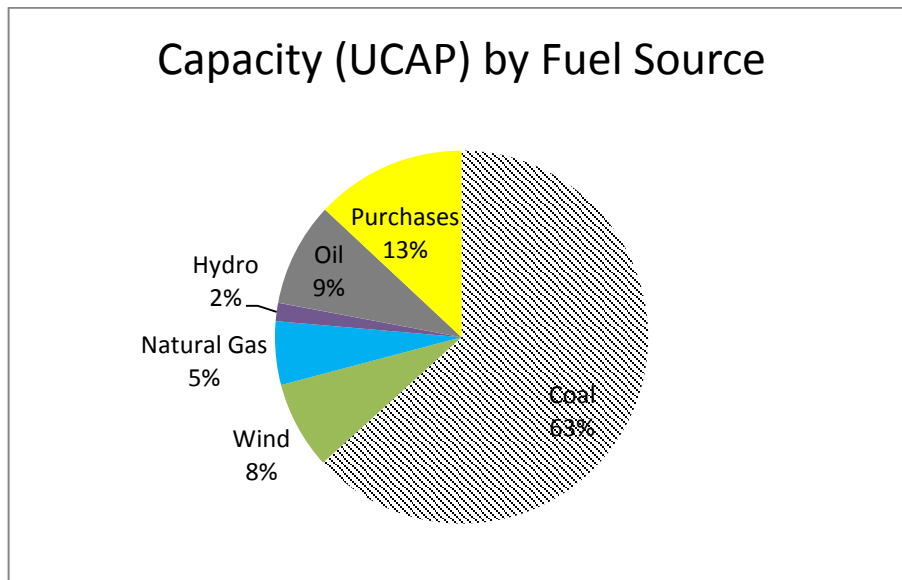


Table 1-1 shows a listing of the Company's resources and their capacity ratings for the 2016 Planning Year. The capacity ratings data provided is based on current Midcontinent ISO ratings under Module E's resource adequacy requirements in effect for the Planning Year June 1, 2016 through May 31, 2017.

Table 1-1: 2016 Company Capacity Resources

Capacity - Owned Resources	ICAP (MW)	UCAP (MW)
COAL		
Big Stone Plant	255.8	236.5
Coyote	149.8	112.5
Hoot Lake #2	58.7	55.2
Hoot Lake #3	81.4	80.8
GAS CT		
Solway 1	42.5	42.2
WIND		
Ashtabula	48.0	11.5
Luverne	49.5	13.5
Langdon	40.5	9.5
HYDRO		
Bemidji Hydro	-	-
Bemidji Hydro 2	-	-
Dayton Hollow Hydro 1	0.5	0.5
Dayton Hollow Hydro 2	0.5	0.5
Hoot Lake Hydro	0.5	0.5
Pisgah Hydro	0.6	0.6
Taplin Gorge Hydro	0.4	0.4
Wright Hydro	-	-
OIL		
Lake Preston	20.4	20.4
Jamestown 1	20.7	20.2
Jamestown 2	21.1	21.1
Big Stone Diesel	1.1	1.0
Fergus Control Center	1.8	1.6
Hoot Lake Diesel 2A	0.3	0.3
Hoot Lake Diesel 3A	0.2	0.2
Solway IC	-	-
Total Owned:	794.3	629.0
Capacity - Purchased Resources		
WIND		
Edgeley (ND Wind II)	21.0	3.6
Langdon	19.5	4.7
Ashtabula III	62.4	15.4
Customer Owned Diesel	4.5	4.1
Short Term Capacity contracts	85.0	85.0
Total Purchased:	192.4	112.8

1.1 Hydroelectric Facilities

Otter Tail Power Company has 6 units located at five dams on the Otter Tail River near Fergus Falls, MN and 2 units located at a dam on the outlet of Lake Bemidji at Bemidji, MN. These hydro units were constructed in the early 1900's and were the backbone of the generating resources for Otter Tail for many years in the early days of the Company. The total capability of all of the hydro units is about 3.7 MW.

The hydro units located on the Otter Tail River are under FERC jurisdiction and were licensed for the first time in 1991. All of these units were built prior to licensing requirements. The units are predominantly operated in run of river mode without pondage capability except for Hoot Lake and Wright Lake behind the Hoot Lake Hydro. Prior to the FERC licensing, there was a small amount of pondage and cycling capability with these units that increased the amount of energy obtained from the water flow. The FERC license required a change to strict run of river operation.

All of the hydro units in run of river mode have had updated reservoir level monitoring systems installed to aid in complying with the operating requirements of the FERC license. Automatic level control systems have also been installed at a number of the units to control the reservoir level using the signal from the reservoir level monitoring system. Significant other equipment upgrades were completed in the past 15 years, to upgrade electrical control and protection equipment.

The FERC re-licensing process is approximately 5 years and OTP has been preparing for submission for license renewal. This submission known as the Notice of Intent (NOI) and Project Application Document (PAD) is being prepared and the process through FERC will begin officially in the summer of 2016.

Bemidji Hydro

The Bemidji Hydro units were built in 1907. These units were authorized by Congress and are not subject to FERC jurisdiction. Otter Tail acquired ownership of these units in the 1940's. The Unit #1 generator stator and rotor field was rewound in 2008.

Dayton Hollow Hydro

Dayton Hollow Dam was built in 1909 with two generators installed. A third generator was added in 1917. One of the original generators was retired and removed in 1964. The Unit #2 turbine and generator were refurbished in 2006 and the turbine also had a major repair in 2008 – 2009. Annual generation from the Dayton Hollow units is about 5,000 – 7,000 MWh.

Hoot Lake Hydro

The Hoot Lake Hydro was built in 1914. The hydro originally had two units, but one unit was retired with the addition of the Hoot Lake #3 steam unit in 1964. The Hoot Lake Hydro is part of a system that was developed to make further use of the Otter Tail River. Diversion Dam was built on the Otter Tail River and part of the water from the river is diverted through an underground tunnel to Hoot Lake that flows into Wright Lake. The two lakes were created from the diverted water. The water from Wright Lake flows through the Hoot Lake structure, and is used in the hydro unit and for cooling water for the Hoot Lake steam units. The arrangement allows the cooling water for the steam plant to be gravity fed, rather than

pumped, through the plant and improves the efficiency of the units. Hoot Lake Hydro has been generating about 3,000 - 4,000 MWh annually. The City of Fergus Falls also makes use of the Diversion Dam system as water supply for the city.

Pisgah Hydro

Pisgah Hydro was built in 1918. The generator stator and rotor was rewound in 2001. The turbine was rebuilt in 2005. This unit provides about 3,500 – 4,500 MWh during normal years.

Taplin Gorge (Friberg) Hydro

Taplin Gorge, also known as Friberg, was constructed in 1925. The structure is well known in the Fergus Falls area because the powerhouse is a replica of the tomb of the former Italian ruler, Theodoric. The generator was rewound in 1999. Annual generation is in the 3,000 – 4,200 MWh range.

Wright (Central) Hydro

Wright Dam (also called Central) is located in downtown Fergus Falls, and has been the location of a dam since the 1880's. It originally provided power via drive belts to industries located nearby. The current structure was built in 1922. The turbine was rebuilt and the generator cleaned and rewedged in 2002 – 2003. Annual generation is in the range of 2,000 – 3,000 MWh.

1.2 Peaking Facilities

Otter Tail Power Company has a number of peaking units on the system. Some are internal combustion units, but most of the capacity is comprised of combustion turbines. Other than Solway, Otter Tail's peaking units operate on a very limited basis annually, either for emergency or extreme peak times, or for testing purposes. Solway is frequently dispatched by the MISO centralized market.

In the summer of 2001, an inlet fogging system was added to each of the three GE Frame 5 peaking units. The inlet fogging system is to be used during the summer months to increase the output of the turbines during the hotter weather conditions by lowering the temperature of the incoming air. Combustion turbine output is impacted by air density, so the denser cooler air allows for higher output capability.

Jamestown Combustion Turbines

Otter Tail has two fuel oil-fired combustion turbines located at Jamestown, ND. These units are of 1976 and 1978 vintage. These units are operated for emergency, peaking, and testing situations, as well as for economy during periods when market prices support it. The Frame 5 units at Jamestown operate a very limited number of hours during the year.

Lake Preston Combustion Turbine

Lake Preston is a third combustion unit, identical to the Jamestown units, located at Lake Preston, SD. This unit was installed in 1978. This unit is also fired with fuel oil and has limited operation. The unit usually operates for emergencies, peak loads, and testing, but is also used for area voltage support under certain transmission line switching and outage scenarios. The Frame 5 unit at Lake Preston operates a very limited number of hours during the year.

Solway Combustion Turbine Plant

Otter Tail brought on-line a General Electric LM6000 dual-fuel combustion turbine just prior to the 2003 summer season. The unit includes inlet chilling to improve the summer rating and efficiency, as well as water injection for NOX control and increased output. Interruptible natural gas is the primary fuel with fuel oil as the back-up fuel supply. The combustion turbine also includes a clutch to allow synchronous condensing service to support the transmission system. The LM6000 is an aeroderivative machine, powered by a Boeing 747 engine.

Hoot Lake Diesels

These diesels were installed as emergency units in case of a blackout, to provide lighting and minimum service to the plants. They are capable of synchronizing with the system and are accredited. Typically these units have only operated for extreme emergency and testing purposes.

Big Stone Diesel

The Big Stone Plant has an internal combustion emergency diesel unit. This unit operates only for extreme emergency or testing purposes, but can synchronize with the system and is submitted as a capacity resource. The unit was installed in 1975 with the construction of the Big Stone Plant.

Fergus Control Center Diesel

A 2,000 kW diesel unit was installed at Otter Tail's System Control Center to serve as a standby generator for the facility, in accordance with NERC reliability criteria. The System Control Center was added to an existing Company building that contains the main business computers for Otter Tail. The system is staffed 24 hours per day and must have firm electric service to keep the System Control Center in operation during outages. The standby generator will supply emergency power, when required, to the total System Control Center and to the computer facilities.

New EPA Emission Standards for Stationary Engines

On March 3, 2010 the U.S. Environmental Protection Agency issued new national emission standards for hazardous air pollutants for existing stationary compression ignition reciprocating internal combustion engines. The new standards include emissions limitations, operating limitations, maintenance requirements, performance tests, recordkeeping requirements, and reporting requirements. By May 1, 2016 all of Otter Tail's engines affected by the RICE Rule will be considered emergency or blackstart in nature and therefore exempt from emissions limitations and performance tests. Only minimal efforts will be needed to comply with the rule.

1.3 Baseload Resources

Otter Tail Power has partial or full ownership of four coal-fired generators located at three plants. Until 1988 Otter Tail's coal-fired units had burned primarily North Dakota lignite. Some early units, long since retired, had used eastern coals, but lignite had been the fuel of choice for many years. Following a fuel switch in 1988 at Hoot Lake Plant and in 1995 at Big Stone Plant to low-sulfur western sub-bituminous coal, Coyote is the only plant still burning lignite coal. The coal-fired units also use fuel oil for startup, and flame stabilization at times. The use of fuels at each facility is discussed in the following sections.

Otter Tail is always reviewing opportunities to improve the efficiency and operation of its units. The improvements and conservation efforts within the generating stations have helped Otter Tail maintain some of the lowest system heat rates in its history.

Hoot Lake Plant

The Hoot Lake Plant, consisting of unit #2 and unit #3, is located in Fergus Falls, MN. Hoot Lake #1 generator, built in 1948 with a nameplate rating of 7,500 kW, was retired at the end of 2005.

Hoot Lake #2, was built in 1959 with a nameplate rating of 53,500 kW. The #2 unit is designed as a base load unit, saw intermediate service during the 1980's and 1990's, and is now available to the MISO market, but recently the market energy costs have been low enough that Unit #2 has been mainly operated in the winter, partly as a source of building heat for both units. The unit is equipped with an electrostatic precipitator for particulate removal and over-fire air and low-NO_x burners for NO_x emissions reduction.

Hoot Lake #3 is a 75,000 kW nameplate unit that was added in 1964. The unit is also equipped with an electrostatic precipitator for particulate removal and over-fire air and low NO_x burners for NO_x emissions reduction. Hoot Lake #3 was designed for base load duty, but saw mostly intermittent use during the 1980's and 1990's. Due to recent low MISO market prices, HLP #3 has had only limited operation year round and is now typically run for needed environmental testing and as MISO calls for the unit.

Both Hoot Lake #2 and #3 were upgraded to meet the MATS rule in 2015. These upgrades included new electrostatic precipitator components, as well as activated carbon injection.. As was directed in the Baseload Diversification study completed in 2013, Otter Tail is planning for the retirement of these units in May 2021 (MISO planning year 2020).

Big Stone Plant

The Big Stone Plant, of which Otter Tail owns 53.9 percent, became commercial on May 1, 1975. Improvements have come about as the result of conservation, operational efforts, and equipment updates within the plant. The current output rating for the Big Stone Plant is 475,000 kw (total plant).

The switch to sub-bituminous coal in late 1995 helped to reduce the plant net heat rate. Other efficiency improvements, and the installation of a new low-pressure rotor in 1996, have also helped to lower the heat rate level at Big Stone Plant. A new high-pressure/intermediate pressure rotor was installed in 2005 and improved efficiency by about 2 percent.

The POET Bio-refining ethanol plant (formerly Northern Lights Ethanol) is located on the Big Stone Plant site. Big Stone Plant supplies steam for ethanol production. The steam is extracted part of the way through the electrical production process, so by serving the ethanol plant, Big Stone is truly a cogeneration plant involving the sequential use of the energy for two different purposes. The cogeneration operation does not impact the plant's ability to generate electricity.

In 2015, the largest capital project in Otter Tail Power history was undertaken as the AQCS project was installed at Big Stone Plant to meet the regional haze rule requirements. The AQCS project was a project to install controls for NO_x (SCR and SOFA), SO₂ (circulating dry fluidized bed scrubber), particulate (baghouse) and Hg control (activated carbon injection to meet MATS rule). The original budget for the AQCS project was \$491 million, and through efforts related to project team management and overall project timing, the final cost of the project was about \$367 million.

Coyote Station

The Coyote Station, located near Beulah, ND is a lignite-fired mine mouth facility. Otter Tail owns 35 percent of this unit. The Coyote Station was declared commercial on May 1, 1981 and is equipped with a flue gas desulfurization unit and a baghouse. Otter Tail became the operating agent of the facility on July 1, 1998. The other co-owners of this facility are Northern Municipal Power Agency, Montana-Dakota Utilities, and Northwestern Public Service. Minnkota Power Cooperative acts as the agent for Northern Municipal Power Agency.

The Coyote Station is a sister unit to Big Stone, but six years newer. The Coyote Station approved outlet rating is limited to 427,000 kW due to transmission limitations. The facility also has two emergency diesel generators that are not accredited in Midcontinent ISO due to the transmission limitations.

Coyote completed a high-pressure/intermediate pressure rotor replacement in 2009 that resulted in about a 2 percent increase in efficiency. It also increased the UCAP rating of the plant by about 6,000 kW.

Coyote completed the installation of activated carbon injection for Hg control in 2015 as well as a SOFA (separated over-fire air) system for NO_x reduction during 2016.

Additionally, the Owners of the Coyote station have entered into a 25 year lignite supply agreement with Coyote Creek Mining Company to begin supplying the Coyote Station with lignite from a new, efficient mine. Supply of lignite coal from CCMC begins approximately June 1, 2016 at the completion of an outage.

1.4 Demand Resources

Otter Tail Power Company has two demand resources registered under Module E with Midcontinent ISO. Both resources are load modifying resources ("LMR") that are netted from the demand forecast and available to Midcontinent ISO in emergency events. These resources are obligated to provide sustained load reduction for up to 4 hours at a time and be available five times a year to Midcontinent ISO in the event of an emergency. This obligation does not preclude the Company from relying on these resources to control for capacity events or economic reasons outside of a Midcontinent ISO emergency event.

Direct Load Control – The Radio Load Management System

The first 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 at 18 MW for Midcontinent ISO planning year 2015/2016 based on summer capability but has proven capability as high as 130 MW during the winter months. Otter Tail has approximately 129,800 customers and approximately 42,000 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 and customers with dual-fuel load may choose to switch to an alternate fuel, particularly during a period of lower prices.

Winter season manageable 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 15 MW of summer peak load in the months of June through September. These summer loads consists primarily of water heaters, irrigation, the large dual fuel industrials and air conditioning. Otter Tail continues to add customers to the newest program that allows cycling control of residential and commercial central air conditioning (15 minutes on, 15 minutes off).

Although measurement data shows the load management system as able to achieve higher levels than the level accredited, those higher levels related to peak control levels during a minimum number of hours and were impacted by weather and load diversity. Those higher levels do not represent the typical levels of control that Otter Tail is confident can be sustained. The measurement and verification requirements for continued accreditation and the risk of potential penalties were also significant factors in the lower accreditation level registered by the Company.

Firm Service Level – Customer Contracts

The second demand resource registered with Midcontinent ISO 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 certified at 14.3 MW for Midcontinent ISO planning year 2016/2017. 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 load level during a capacity event.

1.5 Transactions

- A capacity-only contract with Great River Energy for 50 MW capacity in 2014 and increases to 100 MW from January 2015 through May 31, 2017.
- A capacity-only contract with Great River Energy that begins with 25 MW on June 1, 2017 through May 31, 2019 and increases to 50 MW for June 2019 through May 31, 2021.
- A capacity-only contract with Great River Energy for 55 MW that begins on June 1, 2017 and goes through May 31, 2019.
- An energy-only contract with Xcel Energy for 50 MW on-peak 5 X 16 energy for calendar years 2016-2020.

Otter Tail has a number of large commercial customers that are shared loads with local rural electric cooperatives. These loads are in areas that may be in one utility's service territory, but are located where the other utility already had the necessary facilities to handle the load. In order to reduce costs and avoid duplication of facilities, these loads have been shared. In the accounting process, these loads are usually served as if they are Otter Tail customers, and then 50 percent of the energy is purchased wholesale from the other utility at the retail rate used to serve the customer. All of the retail energy shows up as Otter Tail energy with a 50 percent wholesale energy purchase, even though Otter Tail only served half of the load.

WAPA Allocation to Native American Tribes

The Western Area Power Administration (“WAPA”) is a federal Power Marketing Agency that provides capacity and energy from hydroelectric facilities located on the Missouri River to preference customers. Otter Tail does not qualify as a preference customer. Native American tribes are preference customers eligible to receive the federal power. The tribes, however, are not utilities in the same manner as typical WAPA preference customers such as municipals and rural electric cooperatives. The tribal lands are typically served by a combination of existing utilities.

In order to facilitate the delivery of the electricity to the tribes, or the economic benefits of the low-cost federal electricity, WAPA developed a process in which the electricity is delivered to the utilities providing electric service on tribal lands. Each tribe has the right to determine which tribal entities receive the benefits. For the customers designated by the tribe as receiving the benefits, WAPA delivers the electricity to Otter Tail at the WAPA rate, and then Otter Tail provides a bill credit to the customer. The bill credit is essentially equal to the difference in cost between the WAPA power and the embedded Otter Tail cost of generation, less expenses to administer the program. Otter Tail has filed the appropriate information with and received approval from the state regulatory commissions in the states involved.

Otter Tail has five tribes that receive the benefits of the WAPA power. The current capacity amount varies monthly from a low of 4.3 MW to a high of 5.6 MW, with annual energy of 32,158,236 kWh. Otter Tail also receives the load based reserve margin benefit with the capacity. Because the tribes have the right to change who receives the benefit and such changes may move benefits from tribal customers served by Otter Tail to tribal customers served by another utility, the amount of capacity and energy received for the tribal loads may vary over time. The current amount of tribal allocation that is received through Otter Tail is included in all analysis scenarios. None of the WAPA power qualifies for compliance with the Minnesota Renewable Energy Objective, as all of the WAPA hydroelectric facilities are greater than 100 MW when considering all units at a specific location.

Customer Owned Generation

Otter Tail has worked with several customers who desired to install small diesel generators for back-up emergency power. These units are owned by the customers and capable of being interconnected to Otter Tail's system. The capacity from these units is purchased by Otter Tail and submitted as behind the meter capacity resources registered with Midcontinent ISO. Currently the NDC rating of these units is 4,500 kW in total and the UCAP rating is 4,100 kW in total.

On March 3, 2010 the U.S. Environmental Protection Agency issued new national emission standards for hazardous air pollutants for existing stationary compression ignition reciprocating internal combustion engines. The new standards include emissions limitations, operating limitations, maintenance requirements, performance tests, recordkeeping requirements, and reporting requirements. By May 1,

2016 all of Otter Tail’s engines affected by the RICE Rule will be considered emergency or blackstart in nature and therefore exempt from emissions limitations and performance tests. Only minimal efforts will be needed to comply with the rule.

Otter Tail also has power purchase agreements with several wind generation facilities as described in the following section.

1.6 Wind Generation Resources

Otter Tail has more than 246 MW of wind generation on the system, including utility owned and contracted wind generation. The Company owns 138 MW of wind generation. This wind generation accounted for 18% of the Company’s energy needs in 2015.

Langdon Wind Energy Center

Otter Tail owns 40.5 MW of wind generation located south of Langdon, ND consisting of 27 1.5MW GE wind turbines. This facility began operation in January 2008.

Ashtabula Wind Energy Center

Otter Tail owns 48.0 MW of wind generation located in Barnes County, ND consisting of 32 1.5MW GE wind turbines. This facility began operation in November 2008.

Luverne Wind Energy Center

Otter Tail owns 49.5 MW of wind generation located in Steele County, ND consisting of 33 1.5MW GE wind turbines. This facility began operation in September 2009.

Approximately 108 MW of wind generation is purchased by Otter Tail from customers or other entities and is identified in Table 1-2. Customer owned units do not have the ownership name included to protect customer information. Often generation from smaller, customer owned units is used to serve the customer and only the surplus generation is sold to Otter Tail.

Table 1-2: Contracted Wind Generation Facilities

Name and Owner	State	kW Rating
FPL Energy ND Wind II - NextEra	ND	21,000
Hendricks Wind I	MN	900
Borderline Wind	MN	900
Dakota Wind Exchange	SD	90
Langdon Wind Energy Center – NextEra	ND	19,500
Ashtabula III – NextEra	ND	62,400
Various Small Wind Producers	ND	3,234
Various Small Wind Producers	MN	2,200
Various Small Wind Producers	SD	8

As shown in Table 1-2, Otter Tail has contracts for roughly 110 MW of wind generation. Often generation from smaller, customer owned units is used to serve the customer and only the surplus generation is sold to Otter Tail.

1.7 Energy Efficiency Programs

Otter Tail Power Company operates a number of Demand-Side Management Programs in its service territory. In Minnesota, some of these projects are part of the Company's Conservation Improvement Program ("CIP") filing, Docket No. E017/CIP-13-277. The Company also operates an energy efficiency program in South Dakota. The Company's MN and SD energy efficiency results have been on target with the energy efficiency goals in historical integrated resource plan filings.

Otter Tail's 2014-2016 CIP triennial, filed on June 1, 2013, supports energy efficiency objectives in the Company's 2014-2028 Integrated Resource Plan, Docket No. E017/RP-13-961 and in the proposed 2017-2031 resource plan. Due to timing and baseline year differences, the annual energy savings resource plan objective of 1.5 percent energy savings will not exactly match the annual energy savings goal in the 2014-2016 CIP triennial plan, which slightly exceeds 1.5 percent annual energy savings. Table 1-3 reflects approved annual energy and demand savings goals for Minnesota's CIP 2014-2016. For 2014 and 2015, Otter Tail's CIP results have met the annual energy and demand savings goals.

Table 1-3: Planned MN Energy Efficiency Goals

Year	Annual MW Savings Goal (Summer)	Annual MWH Savings Goal
2014	8.4	31,405,290
2015	8.4	31,762,333
2016	8.6	32,476,419

The 2014-2016 Plan builds upon lessons learned from more than two decades of offering energy efficiency programs. The entire portfolio can be reviewed in Docket No. E017/CIP-13-277. On June 1, 2016, Otter Tail will file its 2017-2019 CIP triennial plan with the Minnesota Department of Commerce. This proposed plan will target annual energy saving achievements of 1.5 percent, similar to the 2014-2016 CIP triennial.

1.8 Midcontinent Independent Transmission System Operator ("Midcontinent ISO")

Otter Tail continues to play an active role in the regional transmission planning efforts. While Otter Tail still leads and conducts studies to ensure the adequacy of the transmission system to serve its customers, all transmission planning activities related to regional transmission are coordinated with the Midcontinent ISO and the surrounding non-Midcontinent ISO transmission owners.

Transmission planning occurs through the course of performing transmission studies at several different levels, from individual utility plans, to joint utility plans with utility neighbors, to broad regional studies. Regardless of the type of studies, the forum for which these studies are discussed is through a regional transmission planning process. Otter Tail actively participates in several Midcontinent ISO study groups, such as which is the West Subregional Planning Meetings (SPM) and the Western Technical Studies Task Team (“WTSTT”). These groups provide forums for regional transmission planners to discuss the needs and projects related to the transmission system in the Otter Tail and surrounding area that are within the western footprint of the Midcontinent ISO region.

Otter Tail closely coordinates its transmission planning efforts with the Midcontinent ISO. For transmission planning purposes, Midcontinent ISO performs three primary functions. The first two are federally mandated processes established by FERC, generator interconnection and delivery service, and the third process is related to expansion planning.

Midcontinent ISO administers and processes requests to use the transmission system of the Midcontinent ISO transmission owners. Midcontinent ISO has established procedures for processing generation interconnection and delivery service transmission requests of generators and market participants. Through this FERC mandated process, Midcontinent ISO offers the area utilities opportunities to participate in “ad-hoc” study groups to provide input and review of the technical studies completed for generation interconnection or delivery service. In addition to these FERC mandated requirements, Midcontinent ISO also performs expansion planning studies on an annual basis. These expansion planning studies are referred to as the Midcontinent ISO Transmission Expansion Plan (“MTEP”) and focuses on a variety of studies, from reliability assessments to targeted studies focused on a particular issue or item. Otter Tail’s transmission system falls within the Midcontinent ISO West region. Through the MTEP process, Midcontinent ISO completes a reliability analysis assessing the transmission system performance against the regional reliability criteria. Otter Tail also participates in the MN TACT (Minnesota Transmission Assessment Compliance Team) group which also performs a reliability assessment of the western transmission system. In the event that standards are not met, additional analysis is completed to find mitigation to a particular system issue. Otter Tail actively participates in the MTEP, MN TACT, generator interconnection, and delivery service efforts by attending meetings, reviewing study results and providing input into the study process.

Midcontinent ISO has also sponsored targeted studies in the region as part of the MTEP process. Otter Tail actively participates in many of these targeted studies, including the Northern Area Study (NAS), Market Efficiency Projects (“MEP”), Manitoba Hydro Wind Synergy Study (“MWHSS”), as well as other targeted studies. Through these various study efforts, Otter Tail attends meetings, reviews study results and provides input into the study processes.

In addition to the specific study opportunities, the Midcontinent ISO conducts meetings of several stakeholder groups, which include the Planning Subcommittee (“PSC”), the Planning Advisory Committee (“PAC”), the Regional Economic and Criteria Benefits Task Force (“RECB TF”), the Interconnection Process Task Force (“IPTF”), among several others. These meetings are attended by various representatives of the different stakeholder groups at Midcontinent ISO. These meetings act as a forum between Midcontinent ISO staff and the stakeholders to provide input into the processes of the

Midcontinent ISO. Otter Tail regularly attends several of these meetings to stay engaged within the Midcontinent ISO transmission planning process as well as provide input and feedback to the Midcontinent ISO.

Otter Tail has been an active participant in the CapX 2020 effort. The CapX 2020 sponsoring companies embarked on a transmission study developing a long-term transmission plan to ensure reliable service to customer loads in the year 2020. The CapX 2020 utilities are currently engaged in construction and operation of what is termed as the “Group 1” projects, which include three 345 kV projects and one 230 kV project within Minnesota. The efforts of the CapX 2020 studies have been closely coordinated with the Midcontinent ISO planning process.

In addition to these previously mentioned planning-related activities, Otter Tail is also monitoring other regional transmission development initiatives, such as the Clean Line HVDC projects, and the Eastern Interconnection Planning Collaborative (“EIPC”). Otter Tail is a regular participant in meetings and conference calls related to these study initiatives.

All of these transmission planning activities are then combined into, and are consistent with, the MN state transmission planning process.

Transmission Interconnections

On May 9, 2002, the Commission gave conditional authority to Otter Tail to transfer operating control of certain transmission facilities to the Midcontinent ISO. Since joining Midcontinent ISO and transferring operational control of its high voltage transmission facilities to Midcontinent ISO, Otter Tail has seen positive benefits in this relationship regarding the generator interconnection processes.

Since Otter Tail joined Midcontinent ISO, several generators have successfully interconnected to the Otter Tail electric system under Midcontinent ISO’s generator interconnection procedures. Under Midcontinent ISO’s Open Access Transmission and Energy Markets Tariff (“TEMT”), all generator interconnection requests (regardless of generator size or interconnecting voltage level) are required to abide by the Midcontinent ISO generator interconnection process if the generator intends on engaging in wholesale transactions. The Midcontinent ISO, as an independent system operator, ensures comparable treatment for all customers and it is staffed to provide and administer this service. Otter Tail receives value and efficiencies from the Midcontinent ISO process given that Midcontinent ISO is staffed to administer its procedures and, as an independent organization, ensures comparable treatment to all parties involved. Additionally, Otter Tail stays actively engaged in several Midcontinent ISO studies and provides information regarding the transmission system when reviewing study results and giving direction for future studies. This is an efficient process and a benefit to all parties since Otter Tail has ultimate knowledge and familiarity with its system and most efficiently and effectively provides this service. Project coordination, administration, and filing requirements fall upon Midcontinent ISO, thus freeing up Otter Tail’s resources to focus on its key priority of providing clean, efficient, and low cost energy to its customers.

Locational Marginal Pricing (LMP) Energy Market and Ancillary Services Market (ASM)

The Midcontinent ISO Locational Marginal Pricing (“LMP”) energy market was introduced on April 1, 2005. The Midcontinent ISO subsequently introduced the Ancillary Services Market (“ASM”) on January 6, 2009. Both market introductions went well, but utility operations and market functions have changed significantly.

Many of the key preparations and day-to-day activities since commencement of the markets include:

- Development of software interfaces and procuring or developing new software systems.
- Training of employees.
- Developing after-the-fact data flows to ensure a seamless transition in the accounting and regulatory areas.
- Active involvement in filings related to the Energy Market at the Federal Energy Regulatory Commission ("FERC") and state commissions. This includes settlement proceedings for the non-Midcontinent ISO Load Serving Entities located within the Otter Tail Power Company Control Area.
- Nominating and receiving Auction Revenue Rights ("ARRs") and Financial Transmission Rights ("FTR") allocations to safeguard Otter Tail's native load.
- Developing business practices, strategies and risk management policies to accommodate an LMP and ASM Market.
- Actively participating in the numerous Midcontinent ISO committees seeking to ensure that Otter Tail's best interests and the interests of its customers were not adversely impacted by decisions and policies resulting out of these committees.

Market operations continue to go smoothly, and the company is generally pleased with the transition to the centralized energy and ancillary services markets.

Midcontinent ISO Resource Adequacy (Module E)

Otter Tail's reserve requirements are established by Midcontinent ISO under Module E of the Midcontinent ISO Tariff. For planning year 2016 (June 2016 – May 2017) the Midcontinent ISO reserve margin requirement is 7.6 percent.

MISO currently operates in an annual construct with a system wide coincident peak occurring in the summer months. The Company's coincident peak demand diversity factor is approximately 8 percent of its non-coincident peak demand. For modeling purposes, Otter Tail used a zero cost capacity transaction within Strategist to reflect the impact of the coincident peak demand on reserve requirements.

MISO is discussing with stakeholder the possibility of moving to a two season capacity construct starting in planning year 2018. Upon initial review, the Company does not see this being a concern from a capacity perspective. Although the Company has a winter peak of roughly 100 MWs higher than its summer peak, there will also be an additional 100 MWs of winter demand response resources available to offset the increase in peak load.

Resource accreditations change annually and are based on summer ratings. Ratings for non-wind generators are based on historic generator availability data or, if that is unavailable, class averages are used.

Wind generation is accredited based on unit specific historical capacity factors. Accreditation for the 2016 planning year for the Company's wind farms varied from 27 percent at the Luverne Wind Farm to 17 percent at the Edgeley Wind Farm.

Otter Tail has successfully registered the load management system and retail firm service level contracts under Module E as Demand Resources. The accredited capability of these resources is subtracted from the Company’s forecast demand prior to calculation of the planning reserve margin. Otter Tail’s accredited Demand Resources for planning year 2016 totaled 32.3 MW. This accreditation is based on its summer capability which is when Midcontinent ISO experiences its annual peak demand.

1.9 Transmission Facilities

Otter Tail serves many very small communities located in a geographical area about the size of the State of Wisconsin. The characteristics of the customer loads and locations have required an extensive transmission system. When compared to many investor-owned utilities, Otter Tail's customer count per mile of transmission facilities is quite small. To minimize cost, Otter Tail has become party to several integrated transmission agreements. The Company participates in many shared networks with other investor owned utilities, municipals, G & T cooperatives, and rural electric cooperatives. In many cases, a 41.6 kV or 69 kV transmission line will serve an equal number of non-Otter Tail and Otter Tail distribution substations.

These agreements have resulted in over 200 points of interconnection with other utilities. Such a network adds to the complexity of operating the electrical system, but also adds the capability for the facilities of one utility to provide either full time or emergency service to another utility. The ultimate result is reduced cost and increased reliability for the customer. Table 1-4 lists the mileage of various voltage classes of transmission lines. All of these lines are overhead lines except for less than one mile of underground cable in the 41.6 kV class.

Table 1-4: Circuit Miles of Transmission by Voltage

Voltage (kilovolts)	Circuit length
345 kV	*657 miles
230 kV	*491 miles
115 kV	*876 miles
69 kV	209 miles
41.6 kV	3763 miles

**Mileage includes Otter Tail Power Company joint ownership in CapX2020 transmission projects. See CapX2020.com for more information.*