

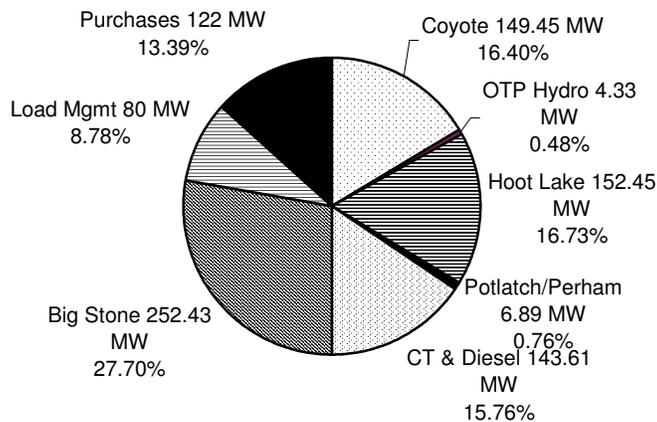
# 6 Existing Resources

## GENERAL DISCUSSION

Otter Tail 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 Mid-Continent Area Power Pool/Midwest ISO, purchases from other utilities, customer owned generation, qualifying facilities, the transmission and distribution network, and current Company sponsored conservation programs.

Current Otter Tail capacity resources are about 60% coal-fired in the winter and 65% in the summer. Graph 6-1 shows the composition of the 2004-05 winter season capacity for the Company. The 2004 summer season capacity is shown in Graph 6-2. Almost two-thirds of the purchased summer season capacity was hydroelectric capacity from Manitoba Hydro. Graphs 6-3 and 6-4 show the capacity resource breakdowns by fuel type. Capacity resources that were resold to other utilities under wholesale transactions are included in the data. (Percentages may not add to 100% due to rounding.)

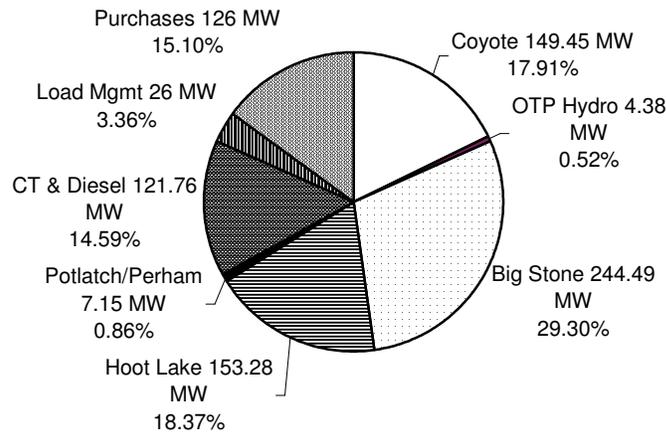
**Graph 6-1**  
**2004-2005 Winter Season**  
**Capacity Resources - 911.2 MW**



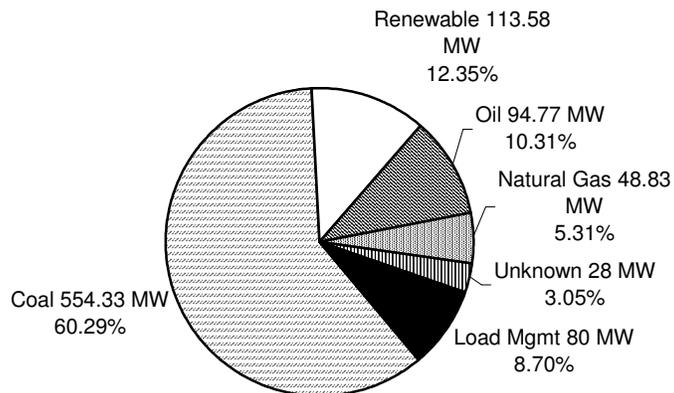
## 6-2 Existing Resources

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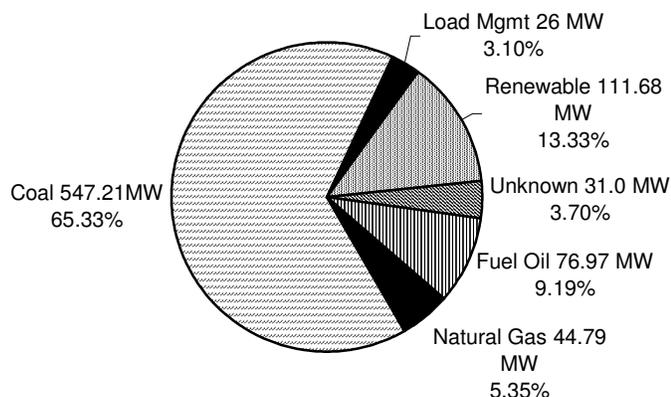
**Graph 6-2**  
**2004 Summer Season**  
**Capacity Resources - 834.2 MW**



**Graph 6-3**  
**2004-05 Winter Season**  
**Capacity Resource by Fuel Type**



**Graph 6-4**  
**2004 Summer Season**  
**Capacity Resource by Fuel Type**



The sources of energy used to serve customer loads in 2004 are shown in Graphs 6-5 and 6-6. The data in the graphs include all sources of energy, including wholesale energy that was sold to other utilities under economy transactions. Approximately 5% of the Company's identified retail load in Minnesota, on an energy basis, is actually load of other utilities. Otter Tail makes the final delivery of the energy to the customer. Under energy accounting procedures, this energy becomes identified as Otter Tail load. The sources of this energy are not under the control of Otter Tail, but the energy is included in the data shown in the graphs.

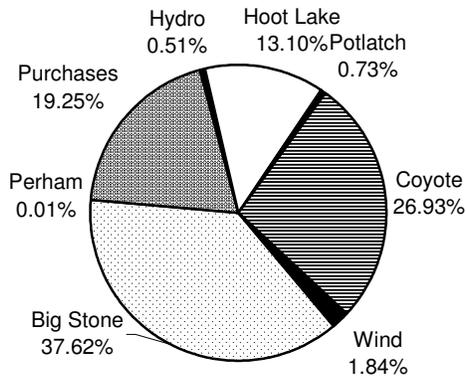
The data indicates that about 10.2% of the total energy generated or purchased in 2004 was known to be from renewable resources. About 12.3% of the 2004 energy was purchased from entities where the energy source is unknown. Some may have been renewable. In the data, the energy classified as renewable includes energy from biomass, hydro, wind, and waste.

The following subsections include information and discussions of Otter Tail's existing resources.

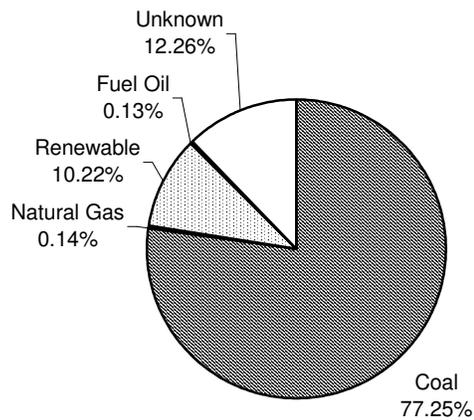
## 6-4 Existing Resources

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**Graph 6-5**  
**2004 System Input by Resource**  
**4,075,272 MWh**



**Graph 6-6**  
**2004 System Input by Fuel Type**  
**4,075,272 MWh**



### **HYDRO**

Otter Tail 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 Power for many years in the early days of the Company. The total capability of all of the hydro units is about 4.3 MW.

The hydro units located on the Otter Tail River are under FERC jurisdiction and were licensed for the first time in 1991. The cost of the licensing process exceeded 1.3 million dollars. 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 units have a FERC classification of low hazard status.

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.

### **Bemidji**

The Bemidji Hydro units were built in 1907. These units were authorized by Congress and are not subject to FERC jurisdiction. OTP acquired ownership of these units in the 1940's. The #2 unit has a nameplate rating of 500 kW. URGE testing in 2004 resulted in a rating of 600 kW. Unit #1 has a nameplate rating of 240 kW and is accredited at 190 kW. Typical annual generation for these two units is about 1,800 - 2,200 MWh depending on water availability. One of the two turbine runners that drive the unit #2 generator was rebuilt in 2001. In 2004, the #1 unit suffered a catastrophic failure of one of the turbine runners as well as some bearing damage, all of which was repaired.

### **Dayton Hollow**

Dayton Hollow Dam was built in 1909 with two generators installed. A third generator was added in 1917.

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One of the original generators was retired and removed in 1964. The current Dayton Hollow #1 unit has a nameplate rating of 520 kW and its 2004 URGE rating is 538 kW. The #2 unit, accredited at 478 kW, has a nameplate rating of 450 kW. Unit #2 had the original 1917 equipment replaced in 1928. Annual generation from the Dayton Hollow units is about 4,500 - 6,000 MWh.

### **Hoot Lake**

The Hoot Lake Hydro, built in 1914, has a nameplate rating of 1,000 kW with an accredited 2004 rating of 790 kW. 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, and has exceeded 5,000 MWh in years when water flow is quite high. The City of Fergus Falls also makes use of the Diversion Dam system as water supply for the city.

### **Pisgah**

Pisgah Hydro, with a nameplate rating of 520 kW, was built in 1918. This unit is currently accredited at 708 kW, and provides about 2,500 - 3,500 MWh during normal years. Generation has exceeded 5,000 MWh in high water flow years.

### **Taplin Gorge (Friberg)**

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. Taplin Gorge has a nameplate rating of 560 kW and a MAPP 2004 URGE rating of 520 kW. Annual generation is in the 2,500 - 3,200 MWh range, but has exceeded 4,000 MWh some years.

### **Wright (Central)**

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 generator, with a nameplate rating of 400 kW, is currently accredited at 503 kW. Annual generation is in the range of 1,800 - 2,500 MWh, but has exceeded 4,000 MWh in some years.

### **PEAKING FACILITIES**

Otter Tail has a number of peaking units on the system. Some consist of internal combustion units, but most of the capacity is comprised of combustion turbines. Generally, Otter Tail's peaking units operate on a very limited basis annually, either for emergency or extreme peak times, or for testing purposes.

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 severely 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, of 1976 and 1978 vintage, are accredited at 28,800 kW each during the coldest winter months and at approximately 21,500 kW during the hottest summer months. The rating is based on ambient temperature, and the ratings for other months are somewhere in between these maximum and minimum ratings. These units operate a limited number of hours annually. These units are operated for emergency, peaking, and testing situations.

#### **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 and is rated at 28,800 kW winter and at approximately 19,740 kW summer. 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.

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### **Solway Combustion Turbine Plant**

Otter Tail brought on-line a new General Electric LM6000 dual-fuel combustion turbine just prior to the 2003 summer season. The unit is rated at just over 49 MW winter and just under 44 MW summer. 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 and delay area transmission upgrades for a period of years. The LM6000 is an aeroderivative machine, powered by a Boeing 747 engine, and is one of the most fuel-efficient simple cycle turbines in the world. A 1250 kW emergency diesel generator was included to provide emergency service and black start capability in the event of a regional outage. That unit is expected to be able to synchronize with the system and provide accredited capacity beginning about the summer of 2005. When ready for MAPP operation, the site rating will be 50 MW in the winter and about 45 MW summer. The winter rating is limited by the MISO/MAPP approved transmission outlet capability of 50 MW. The site permit also restricts the site to a total operating level of less than 50 MW.

### **Hoot Lake Diesels**

There are two internal combustion diesel units located at the Hoot Lake Steam Plant. Unit #2 - A is rated 263 kW, and unit #3 - A is rated 175 kW. The 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 as well. Otter Tail's 53.9% ownership of this unit amounts to 625 kW of capacity. This unit also operates only for extreme emergency or testing purposes, but can synchronize with the system and is accredited. 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. This unit is accredited in MAPP at 2,100 kW.

### **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 accredited in MAPP. Currently about 7.2 MW are accredited with Otter Tail. Some of the units are associated with load management situations, and Otter Tail can only purchase the surplus capacity above the requirements needed to support the controlled load.

### **BASELOAD RESOURCES**

Otter Tail Power has partial or full ownership of five coal-fired generators located at three plants. Until 1995, Otter Tail 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, except for Hoot Lake #1, 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 has been taking steps to improve the efficiency and operation of its units. The improvements and conservation efforts within the generating stations have helped Otter Tail lower its overall system heat rate to its lowest point in history in recent years.

### **Hoot Lake Plant**

The Hoot Lake Plant, consisting of three units, is located in Fergus Falls, MN. Hoot Lake #1, built in 1948 with a nameplate rating of 7,500 kW, is accredited at 7,525 kW. This unit operated on North Dakota lignite for many years, before test burning and switching to western sub-bituminous coal 1988. The operating permit for this unit will now only allow the use of sub-bituminous coal. Hoot Lake #1 is

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equipped with a fabric filter for particulate removal. Hoot Lake #1 is a bottom grate type unit, and has no alternate fuel use for startup. The boiler is lit-off by starting by a fire, using wood, on the grate feed. This unit, because of its small size and less efficient heat rate, sees limited hours of operation. As reported in the Company's 2002 resource plan filing, this unit will be retired by the end of 2005.

Hoot Lake #2, accredited at 60,925 kW in 2004, was built in 1959 with a nameplate rating of 53,500 kW. The unit has experienced improved efficiencies in recent years as a result of efforts to reduce station service requirements. This unit also switched to burning sub-bituminous coal in the late 1980's. Part of the improved efficiencies is associated with burning sub-bituminous coal, and part is due to improvements made in reducing station service requirements. Efficiency measures have included replacing the original lighting with new lighting technologies, improved control systems, variable speed drives, and other measures. The switch to sub-bituminous coal has reduced the usage of fuel oil for flame stabilization. The #2 unit is designed as a base load unit, saw intermediate service during the 1980's and 1990's, and is now typically operated in base load service again. The unit is equipped with an electrostatic precipitator.

Hoot Lake #3 is the largest of the three Hoot Lake units, with an accreditation of 84,000 kW. This 75,000 kW nameplate unit was added in 1964, and is also now burning sub-bituminous coal. The unit is equipped with an electrostatic precipitator for particulate removal. Hoot Lake #3 was designed for base load duty, but saw mostly intermittent use during the 1980's and 1990's. The unit now operates most of the time. The current URGE rating on unit #3 is an all-time high and due to the same reasons cited for unit #2. Here again, the use of sub-bituminous coal has reduced the need for fuel oil usage for flame stabilization.

The following data is provided relative to the Company's future expectations for the Hoot Lake Plant units.

**Hoot Lake #1** – Otter Tail has decided to retire the #1 unit by the end of 2005. This unit became operational in 1951, and is now more than 50 years old. Although the unit is still capable of operating and maintains its accreditation within MAPP, there are a number of operational considerations.

- The unit has been relegated to very limited service since the early 1980's, typically operating only a few hours per year due to operating cost. In this duty mode, Otter Tail does not have a dedicated operating staff for the unit. When required to operate, staff are borrowed from the #2 & #3 units.

While this arrangement can be used for a few weeks, long-term operation would require the addition of staff.

- The unit is equipped with a single pass condenser that uses water from the Otter Tail River system for cooling. This is a very inefficient condenser, requiring much more water on a per kilowatt basis than the other two units. Otter Tail must operate within temperature restrictions for the river temperature downstream, resulting in this unit impacting the performance and efficiency of the other two units at times during the summer.
- The turbine-generator set has not had a major overhaul for many years. On a steam flow/kWh basis, the unit is 50% less efficient than the original design specifications.
- Unit #1 is equipped with a fabric filter baghouse for particulate collection. While the unit passed emissions testing in the fall of 2001, the baghouse filters continue to deteriorate as a result of the intermittent operation of the facility. Even though filters could be replaced, the new filters would experience the same deterioration due to the intermittent operation.

Unit #1 is contained within the building that is an integral part of the whole facility. Decisions have not been made as to the extent of equipment removal that will be accomplished at retirement, however it is planned to remove all asbestos at that time.

The #1 turbine-generator set may be a good match for use in a combined cycle facility with a combustion turbine in the 35 – 45 MW size range. A major overhaul of the turbine would be needed to improve efficiency. Conversion to combined cycle operation for Otter Tail at the Hoot Lake site does not appear to be economic at this time or in the near future. Some of the issues resulting in retirement would still remain, and the nearest natural gas pipeline with available capacity and pressure is approximately 135 miles away.

**Hoot Lake #2 & #3** - Otter Tail and Duke Engineering & Services, Inc. conducted a review of the condition of various plant components associated with these units. The review included visual inspection, interviews with plant personnel, and review of the available plant design documentation and maintenance and operating records and reports. The current retirement date for accounting purposes is December 31, 2017.

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The most significant risks to continued operation of these units appear to be compliance with any new environmental initiatives. Low sulfur coal is now being used in these units and there have been burner upgrades on Unit #3 to comply with the NOX requirements of the 1990 Clean Air Act Amendments. The units are allocated SO<sub>2</sub> allowances, but the amount of the allowances each unit receives will be reduced in 2010. The physical plant site is constrained for space. Any new environmental compliance requirements that would cause the need to add significant physical equipment may be problematic. There simply isn't sufficient room at the site for the addition of certain environmental control technologies. Unless and until any new requirements are established, it is unknown what technologies would be required for compliance and whether those technologies would be economic.

The Hoot Lake Plant site is a valuable brown field site, having approximately 155 MW of transmission outlet capability. Units #2 & #3 provide voltage control for the western Minnesota area, where there is a lack of any other significant generation capable of supporting the system. Future possibilities include conversion to natural gas, although the closest suitable natural gas line is approximately 135 miles away. At a 70% annual capacity factor and a heat rate of 10,000 btu/kWh the natural gas requirement would be approximately 8.9 million mcf annually. This is assuming operation as a boiler based facility, replacing coal burners with gas burners. Combined cycle operation would require much more significant investment and removal of existing equipment, but would result in a lower heat rate thus reducing fuel consumption. A third alternative might be to replace the existing two boilers with a fluidized bed boiler that would be capable of meeting tighter environmental requirements. This would still leave a substantial amount of very old equipment at the site. Given the 2017 accounting retirement date, a more likely possibility might be integrated gasification combined cycle (IGCC) on the site at that time, provided that technology development continues and is a suitable fit at that time or sooner, including the use of western coals.

### **Big Stone Plant**

The Big Stone Plant, of which Otter Tail owns 53.9%, is a cogeneration facility that became commercial on May 1, 1975. Montana-Dakota Utilities and Northwestern Public Service are co-owners in this unit, with Otter Tail serving as the operator. The unit has a nameplate rating of 414,000 kW, but is currently accredited at 468,330 kW (OTP share is 252,430 kW) in the coldest winter months and 453,600 kW (OTP share is 244,490 kW) in the hottest summer months. Improvements have come about as the result of conservation, operational efforts, and equipment updates within the plant. Station service represented 6.44% of gross generation in 1988. That level has been reduced every year since 1988 to where station

service represented 4.90% of gross generation in 2004.

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 is being installed in 2005 and is expected to improve efficiency by more than 2%.

Big Stone Plant, located near Milbank, SD, had been fueled primarily with North Dakota lignite. Following the expiration of the lignite coal contract in 1995, a switch to western sub-bituminous was made. The switch to sub-bituminous coal has reduced sulfur dioxide emissions, improved plant heat rate, and resulted in fuel cost savings. Big Stone Plant is equipped with the first of a kind advance hybrid particulate collector, which is a combination of a fabric filter and an electrostatic precipitator. The U.S. Department of Energy granted 49% funding to Otter Tail and the co-owners for the installation of a new Advanced Hybrid (AH) unit for particulate emissions control at Big Stone Plant. The AH was installed in September 2002, making the Big Stone Plant a world leader in particulate emissions controls. The AH's cutting-edge technology enables the new emission-control system to remove up to 99.99 percent of fine particulates from the flue gas stream at Big Stone Plant.

Big Stone has been involved in the consumption of other fuels in recent years. Plant startup is done with fuel oil, but the use of fuel oil for flame stabilization has been reduced through the burning of tire derived fuel (TDF). In addition to TDF, the following alternative fuels are also burned at the plant:

- Renewable Resource Fuel (primarily agricultural waste such as seed corn)
- Mineral Oil Dielectric Fluid
- Waste Toner

In anticipation of using larger volumes of alternative fuels in the future, fuel-handling facilities designed specifically for blending these fuels with coal have been added. The exact amount of alternative fuels to be used in the future will depend on cost and availability. The infrastructure for development and delivery of these fuels is improving, but is not yet fully mature. Usage could potentially increase to over 100,000 tons annually if price and availability are not barriers.

Summer season ratings are about 10,000 kW less than winter season ratings for Big Stone. This is a result

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of the unit experiencing cooling capability limitations at the higher ratings.

In 2001, Northern Lights Ethanol and Northern Growers Cooperative began construction of a \$48 million ethanol plant on the Big Stone Plant site. The facility is currently in operation, and Big Stone Plant supplies steam for ethanol production. The steam is extracted part of the way through the electrical production process, so it 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.

### **Coyote Station**

The Coyote Station, located near Beulah, ND is a lignite fired mine mouth facility. Otter Tail owns 35% of this 414,000 kW nameplate unit. Coyote is currently accredited at 427,000 kW. Otter Tail Power's share amounts to 149,450 kW. The Coyote Station was declared commercial on May 1, 1981 and is equipped with a flue gas desulfurization unit and a baghouse. Otter Tail Power 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 only 427,000 kW, due to transmission limitations. The unit has consistently exceeded this level in its URGE test the past few years. The facility also has two emergency diesel generators that are not accredited in MAPP due to the transmission limitations. The co-owners are considering the feasibility of increasing the transmission outlet capacity of Coyote. Approval by the MAPP Design Review Committee or the Midwest ISO would be required for any increase in rating. As of today, no formal study has been completed towards this project.

### **RADIO LOAD MANAGEMENT SYSTEM**

Otter Tail has an extensive radio load management system that is used to control annual peak demands and reduce the need for new generating capacity. Otter Tail has approximately 127,000 customers and 40,000+ of those customers have some type of load control. Normally, the system has the capability to control

about 14% of unmanaged peak load during a winter cold spell. This is the time period when the Company is most likely to set a new all-time peak demand.

It is necessary however to use caution when talking about the capability of the radio load management system. This level of control is only available at extreme cold temperatures, assuming that customers have not already controlled their own loads. A number of the customers are dual-fuel loads that have the capability to switch to an alternate fuel at the owner's discretion. If fuel oil, natural gas, or propane prices fall low enough, some of these customers will already have switched to their alternate fuel. This type of situation adds another uncertainty into operating and planning the system. It is extremely difficult to determine the exact amount of load shedding that may have occurred, due to the complex nature of the load control system.

Winter season manageable loads are in several categories. These include water heaters, thermal storage, residential demand controllers, commercial demand controllers, dual fuel heating systems, dual fuel industrial (bulk interruptible), and a small number of time clock controlled loads.

The radio load management system also has the capability of interrupting about 25-28 MW of summer peak load. This load consists primarily of water heaters, irrigation, and the dual fuel industrials. Since the 2002 filing, Otter Tail has added a program for control of residential central air conditioning under the Minnesota CIP. To date approximately 283 units are in the program with an expected control capability of about 0.64 kW per unit.

The latest load management capability forecast was developed in 2002. Since that time Otter Tail has undertaken a multi-year project to replace all load management equipment, transmitters and receivers. The reasons for replacing the load management equipment include:

- Many of the receivers and associated equipment were 20 or more years old, and difficulty was being experienced in obtaining compatible equipment for new installations.
- Even though more and more control receivers were being installed, the effective amount of control was declining, primarily because of the high rate of receiver failures. The loss of control capability negatively affected the ability to control peak demands and reduce capacity needs.

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It is projected that the new equipment will restore control capability that has been lost. However, because the control signals will be transmitted across the service territory through an entirely new system with transmitters located at different locations than the old system, radio coverage will be different and the effectiveness of the new system will not be accurately known until it is fully operational. An updated forecast of load management capability cannot be completed until that time. Currently, Otter Tail is operating both the old and new systems simultaneously, but the exact amount of control capability is unknown.

Otter Tail continues to see growth in the number of controlled load installations, but is also seeing a number of customers leave the programs and convert to an alternate system or convert to full-time electric service. The key element behind this trend is the significant number of hours of control, as peak demands have risen to the point where Company capacity resources are fully utilized. In the development of the analysis for the resource plan for future years, Otter Tail has had to limit the number of hours of use of the system for capacity reasons to no more than 300 hours per year. The system is also used to reduce fuel costs at times of high prices, and excessive control will drive customers off the system onto full-time rates. The Company is already seeing some customers leave programs, but participation totals are still increasing.

### **TRANSACTIONS**

The Company receives 2 MW of capacity as payment from Minnkota Power Cooperative for control area services provided by Otter Tail. This capacity and the associated energy are from the Center #1 unit in North Dakota.

A capacity purchase of 50 MW from Manitoba Hydro has previously been executed in 1997 for the May 1, 2000 to April 30, 2010 time period. An earlier Manitoba Hydro 50 MW capacity purchase for the 1997 – 2005 time period expired on April 30, 2005. Otter Tail just recently executed a one-year 50 MW capacity purchase from Manitoba Hydro for May 1, 2005 – April 30, 2006.

Otter Tail has a number of large commercial customers that are shared loads with the local rural electric cooperative and Minnkota Power Cooperative. 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% of the energy is purchased from the other utility at the retail rate used to serve the customer. 100% of the retail kWh show up as Otter Tail energy with a 50% wholesale energy purchase, even though Otter Tail only served half of the load. The amount of energy received by Otter Tail for serving such customers in 2004 was about 90,600 MWh. About 4.6% of Otter Tail's reported 2004 Minnesota retail kWh load is actually load of Minnkota Power and the local cooperative.

### **WAPA Allocation to Native 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 Power does not qualify as a preference customer. WAPA customers have been purchasing under long-term contracts that were due for renewal at the end of 2000. In the process of renewing the agreements, WAPA reduced the amount of power allocation that existing customers were able to receive in order to add new preference customers.

Native American tribes are included within the new group of 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, 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 4.111 MW to a high of 5.324 MW, with annual energy of 28,576,335 kWh. The

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transactions are Firm Power transactions, and therefore Otter Tail also receives the 15% reserves 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 60 MW when considering all units at a specific location.

### **QUALIFYING FACILITIES & COGENERATION**

Otter Tail customers own qualifying facilities that are fueled with wind, agricultural waste, and wood waste. The annual energy provided to the Company from these facilities represents less than 1.0% of the Company's total retail sales. In addition, Otter Tail has purchase power agreements (PPAs) with several wind facilities.

#### **Municipal Solid Waste**

During 2002 the City of Perham refurbished a closed municipal solid waste facility and added generating capability. Otter Tail was receiving just over 2 MW of capacity from the facility. About half of the capacity was fueled with municipal solid waste in a baseload operation, and the other half of the capacity was peaking capacity fueled by natural gas. In early 2004 the City acquired a steam customer and the City ceased baseload electricity generation. Otter Tail still purchases about 1200 kW of natural gas peaking from the facility.

#### **Wind**

The number of customer owned wind powered generators on the Otter Tail system has declined over the years. The reason for the decline appears to be due to the high maintenance costs. Typically the units have operated for about five years, and then are not repaired when failures occur. Some of the original units have become obsolete and repair parts are not available. Lac Qui Parle Valley School owns a 225 kW unit. The school uses most of the generation on site, but sold about 31,000 kWh of energy to Otter Tail Power in 2004. In March 2005, the University of Minnesota-Morris commissioned a new 1.65 MW wind turbine that is tied directly to the campus. It is expected that most of the energy will be used on campus, with Otter Tail receiving some excess energy. The Turtle Mountain Band of Chippewa expect to begin

operation of a 660 kW wind turbine in 2005 located at the Turtle Mountain Community College. Most of this energy will remain on campus, with Otter Tail purchasing the excess. The Spirit Lake Casino near Devils Lake, ND has a 100 kW turbine, but all of the output is used on the site.

Hendricks Wind I, LLC provides all of the energy from a single 900 kW wind turbine to Otter Tail for sale under the **TailWinds** green pricing tariff. Borderline Wind is another 900 kW turbine at the same site under contract to Otter Tail. This unit began operation December 31, 2003. The 21 MW FPL Energy North Dakota Wind II facilities began operation in the fall of 2003, and are located in SE North Dakota. All of the output of this wind farm is delivered to Otter Tail. Otter Tail also has a PPA with a 90 kW wind turbine located in Gary, SD and owned by Energy Maintenance Service. The PPA for this facility has recently been renegotiated and will also become part of the **TailWinds** supply.

### **Cogeneration**

Otter Tail Power has two significant customer-owned cogeneration plants located on the system that provide energy to the Company. Archer Daniels Midland owns a sunflower hull fueled cogeneration facility located at Enderlin, ND. Two 4.5 MW units generate electricity and provide steam to a sunflower processing plant. Otter Tail does not buy capacity from this facility because of intermittent fuel supply, but does purchase excess energy.

A second cogeneration plant on Otter Tail's system is the 11.6 MW facility located near Bemidji, MN. The facility is fueled with about 150,000 tons of wood waste per year. The cogeneration plant was constructed to consume the wood waste from an oriented strand board (OSB) manufacturing facility and a lumber mill, and to provide steam for processing, and generating electricity. The retail load is jointly served by Otter Tail and Beltrami Electric Cooperative. The total electrical output of the cogeneration facility is purchased by Otter Tail and Minnkota Power Cooperative. Each utility receives about 5.8 MW of capacity and about 30,000,000 kWh of energy annually from the facility. This facility was previously owned by Potlatch Corporation, who sold the cogeneration plant and the OSB facility to Ainsworth Engineered (USA), LLC in September 2004. The previous PPA expired December 31, 2004 and the new owners chose to sign only a one-year PPA. The new facility owners are determining whether they can use the steam to offset higher cost natural gas usage in the OSB process. Depending upon the study results, this facility may cease generating electricity.

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### DSM PROGRAMS

Otter Tail Power Company operates a number of Demand-Side Management Programs in its service territory. In Minnesota, many of these projects are part of the Company's Conservation Improvement Program (CIP) filing with the Department of Commerce. The Company's CIP has been more effective than planned in the 2002 resource plan filing.

<b>Table 6 – A Actual Conservation versus 2002 IRP Planned Conservation</b>		
<b>Year</b>	<b>Cumulative Planned MW Savings</b>	<b>Cumulative Actual MW Savings</b>
2002	1.8	1.936
2003	3.6	4.920
2004	5.3	8.474

Otter Tail has obtained almost 60% more conservation demand savings over the three-year period than was indicated in the 2002 resource plan filing.

The following sections detail CIP projects in effect in Minnesota, and those planned for implementation in 2004 and 2005.

#### **Hotpacks**

Residential customers who install a new water heater receive a Hotpack. The Hotpack consists of a water-saver showerhead, water flow tester, a kitchen and bath aerator, pipe wrap insulation, and water temperature gauge card. An educational piece describing the Hotpack components, appropriate installation instructions, and how to benefit from efficient water heating is also included.

#### **House Therapy**

House Therapy is a project designed to address the energy efficiency of residential and multifamily homes. The project emphasizes one-on-one customer education and housing thermal integrity, including weatherization. The project also provides other services such as replacing water heaters and older,

inefficient refrigerators and freezers, as well as installing low-flow showerheads and compact fluorescent bulbs. This project also includes Habitat for Humanity and other low-income housing projects.

### **Residential Demand Control (RDC)**

The Residential Demand Control (RDC) project is primarily a load management project that is close to a real-time pricing environment. The RDC project gives electric space heating customers a significant degree of control over the size of their electric service bill. The RDC allows customers to choose which portion of the household energy use, such as water heaters and dryers, will be controlled by Otter Tail Power Company in peak periods. Customers receive a lower rate for allowing the company to control their load. The RDC project allows Otter Tail Power Company to shed a portion of the electric load during peak periods, and provides the utility significant load management capabilities. Ultimately, the customer is the entity that chooses the level of control commensurate with the resulting electrical costs that is best for the customer.

### **Commercial/Industrial Lighting**

Otter Tail Power Company promotes the installation of energy-efficient lighting to commercial and industrial customers by offering rebates for retrofit and new construction applications. The Electric Power Research Institute indicates that commercial building operators can reduce energy costs as much as 40% by using cost-effective lighting technologies, indicating that energy-efficient lighting system designs can be a highly strategic means to enhance overall operating profitability. The program provides rebates for the purchase of technologies such as T8 lamps, compact fluorescent fixtures and lamps, efficient HID lighting, induction lighting systems, electronic ballasts, and occupancy sensors.

### **Efficient Motor Rebate Project**

Otter Tail's commercial and industrial sectors show great potential for improvements in efficiency and conservation. Motors are estimated to consume almost half of all electrical use in the United States and over 70% of all electricity in the industrial sectors. The primary objective of the Company's efficient motor rebate project is to encourage customers to move to higher efficiency motors and lower overall energy usage, thereby reducing the utility's system peak demand. Otter Tail has adopted the NEMA Premium efficiency requirements for the project.

## **6-22 Existing Resources**

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### **Commercial & Industrial Grants**

The C&I Grant Project is designed to tap the conservation and efficiency potential of commercial and industrial customers by partially funding cost-effective conservation projects. Customized grant awards are made based on Otter Tail's analysis of the calculated benefits to be derived from proposals developed and submitted by the customer. All grants must pass both the societal and utility tests of 1.0.

### **Energy Analysis and Recommissioning**

The Energy Analysis is the on-site analysis of commercial/industrial buildings, and of buildings operated by non-profit entities such as schools and government offices. The objective is to educate customers and provide specific information about how to improve the energy efficiency of their building operations. Recommissioning will ensure cooling and mechanical system functionality by optimizing equipment operations and the interactions between individual equipment components that must function together as a complete system. The project will also include compressed air audits where needed. Otter Tail's rebate and grant projects are promoted to support the completion of work identified during the Energy Analysis.

### **Heat Pumps**

This project targets customers with inefficient electric resistance heating and cooling systems. Customers will be offered an incentive to move to the more efficient electric air-source or geothermal heat pump. The project is designed to reduce both winter and summer peak demands as well as over all energy usage.

### **Commercial Cooking**

The Commercial Cooking Project is designed to promote high-efficiency electric cooking by offering rebates for new and retrofit installation in commercial kitchens of electric cooking equipment such as solid state electric fryers, griddles, vacuum steamers, range tops with convection ovens, convection ovens, Quartz infrared ovens, induction cook tops, microwave/convection ovens, and food warmers.

### **Commercial Refrigeration**

The Commercial Refrigeration Project is designed to promote high-efficiency refrigeration technologies by offering rebates for new and retrofit installation into commercial business operations of compressor systems, condenser systems, sub cooling systems, refrigerated display cases, and air circulation.

### **Advertising and Education**

The Advertising and Education Project is designed to promote customer awareness of energy-saving practices through newspaper, radio, and television campaigns, and thereby increase participation in Otter Tail's CIP Projects. This also includes residential education. The primary purpose of the project is educational outreach targeting Minnesota customers across economic groups in the customer base. The project includes an Internet based on-line home energy audit available to customers 24 hours per day, 7 days per week. Customers can access additional information through an on-line library.

### **Financing**

The Customer Financing Project is designed to provide low interest loans for energy-efficiency improvement projects included in the Conservation Improvement Program. These improvements include, but would not be limited to, lighting, motors, variable speed drives, and heat pumps.

### **Adjustable Speed Drives**

Adjustable speed drives (ASDs) are motor-control devices that match an electric motor's speed to its output. In certain applications, energy savings from ASDs can exceed 50%. Other benefits of ASDs include improved process precision, improved power factor, extended tool life, and increased production flexibility. Otter Tail offers incentives under the Commercial & Industrial Grant project to encourage customers to install ASDs on their electric motors.

### **Technical Research**

Technical Research will assist industrial customers in researching new technologies such as infrared drying, new manufacturing procedures, and other cutting edge processes and equipment. Information gained from the research will compliment the commercial and industrial grant project. This project also includes market research, which will identify and support demand-side management opportunities. It is designed to enhance CIP projects and DSM efforts by gathering information that may be used across multiple DSM project lines. In addition, the project provides for a means to secure and use end-use metering and data-logging devices for a variety of CIP and DSM projects.

### **Air Conditioning Control**

This project offers customers a monthly billing credit for allowing the Company to cycle their central air conditioners during peak periods. Air conditioning loads will be controlled in 15 minute increments (15

## **6-24 Existing Resources**

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minutes on, 15 minutes off) for up to 8-hours. Customers must enroll in the project for a minimum of one year. Control can take place in the months of June, July, August, and September. During these months the customer receives a \$5 credit on their account for allowing the control.

### **Change A Light**

Otter Tail participates in the 2004 and 2005 Change a Light, Change the World project. The program is designed to offer residential customers the opportunity to purchase compact fluorescent light bulbs at a significantly discounted price.

### **Plan Review**

This project is designed to encourage building owners, architects, and design engineers to incorporate energy efficient designs into new building construction. The project reviews proposed building plans and specifications during the preliminary design process. The review is free to customers and offers incentives for energy efficient improvements.

## **MID-CONTINENT AREA POWER POOL/MIDWEST RELIABILITY ORGANIZATION**

Otter Tail is a member of the Mid-Continent Area Power Pool (MAPP). MAPP is one of the reliability regions of the National Electric Reliability Council (NERC). The structure and function of MAPP has changed dramatically in the past few years. Until recently, MAPP was an integrated reliability region and a power pool. The Federal Energy Regulatory Commission (FERC) has promulgated a number of rules in recent years that have brought about the changes. The first of these rule changes opened up the bulk transmission system to a variety of new players in the electric industry. More recently, FERC has pushed to have the bulk transmission system operated by independent parties typically known as Independent System Operators (ISO) or Regional Transmission Organizations (RTO).

MAPP members voted against having MAPP perform the transmission operation function. Meanwhile, a group of utilities banded together to begin the formation of the Midwest ISO (MISO), based out of Indianapolis, IN. As a result of the formation of MISO, many FERC jurisdictional utilities (including Otter Tail) have joined MISO. The result at this point in time is that while MAPP still exists, the function of operating the transmission system has primarily been turned over to MISO. MAPP has modified itself

even further in recent months. MAPP no longer serves as the regional reliability organization, having chosen instead to form a new Midwest Reliability Organization (MRO). The MRO is separate from the Generation Reserve Sharing Pool, which allows the MRO to expand beyond the original MAPP borders. A number of utilities that were formerly members of MAIN have joined the MRO. Discussions are underway with other regional reliability organizations, seeking ways to reduce the number of regional entities in larger entities.

MAPP still includes the Generation Reserve Sharing Pool (GRSP), a function that implements both planning (Reserve Capacity Obligation – RCO) and operating reserves on MAPP members. The current RCO in MAPP is 15% of annual peak. The MAPP GRSP is one of four areas within the U.S. that enforce planning reserves with a financial obligation for failure to comply. The other three are PJM, the New York ISO, and ISO-New England.

MISO is in the process of attempting to develop a supply adequacy mechanism that would require all MISO members to carry a planning reserve. While the process is not close to completion, there are already indications that MISO will be doing reserves planning and requirements significantly different than MAPP. It is unknown at this time what the potential implications will be for Otter Tail.

### **MIDWEST INDEPENDENT TRANSMISSION SYSTEM OPERATOR (MISO)**

#### **Transmission Planning**

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 MISO and the surrounding non-MISO transmission owners.

Transmission planning occurs at several different levels from individual utility plans, to local joint utility plans to broad regional studies. Regardless of the type of studies, the forum for which these studies are carried out is through a regional transmission planning process. Otter Tail actively participates in the Northern MAPP sub-regional planning group, which is a forum for regional transmission planners to discuss the needs and projects related to the transmission system.

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Otter Tail closely coordinates its transmission planning efforts with the MISO. For transmission planning purposes, MISO 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.

MISO administers and processes requests to use the transmission system of the MISO transmission owners. MISO has established procedures for processing generation interconnection and delivery service transmission requests of generators and market participants. Through this FERC mandated process, MISO offers the area utilities opportunities to participate in “ad-hoc” study groups to provide adequate input and review of the technical studies completed for generation interconnection or delivery service. In addition to these FERC mandated requirements, MISO has formed Reliability Study Groups (RSG) to assess the transmission system in different regions throughout the MISO footprint. Otter Tail’s transmission system falls within the MAPP RSG. Through the RSG process, MISO completes a Baseline Reliability study assessing the transmission system against the regional reliability criteria. In the event that standards are not met, additional analysis is completed to find a “fix” to the system. Otter Tail actively participates in the RSG efforts, by attending meetings, reviewing study results and providing input into the study process.

MISO has also sponsored exploratory studies in the region as part of the expansion planning process. Otter Tail has actively participated in the Northwest Exploratory study sponsored by the MISO. The purpose of this study was to develop a transmission plan for the purpose of significant generation additions in the Dakota’s area for delivery to loads in the region including Minnesota. Similar to the RSG study efforts of MISO, Otter Tail attended meetings, reviewed study results and provided input into the study process.

In addition to the specific study opportunities, the MISO conducts bi-monthly meetings of the Planning Committee. The Planning Committee is made up of various representatives of the different stakeholder groups at MISO. These meetings act as a forum between MISO staff and the stakeholders to provide input into the processes of the MISO. There are other working groups underneath the Planning Committee that address other specific issues. Otter Tail regularly attends these meetings to provide input and feedback to the MISO transmission planning process.

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. This study will provide the framework for developing future projects in the region. The efforts of the CapX 2020 studies have been closely coordinated with the MISO planning process.

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 Midwest Independent Transmission System Operator, Inc. (“MISO”).<sup>1</sup> Since joining MISO and transferring operational control of its high voltage transmission facilities to MISO, Otter Tail has seen positive benefits in this relationship regarding the generator interconnection processes.

Since Otter Tail joined MISO, several generators have successfully interconnected to the Otter Tail electric system under MISO’s generator interconnection procedures.<sup>2</sup> Under MISO’s Open Access Transmission and Energy Markets Tariff (TEMT)<sup>3</sup>, all generator interconnection requests (regardless of generator size or interconnecting voltage level) are required to abide by the MISO generator interconnection process if the generator intends on engaging in wholesale transactions. The MISO, 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 MISO process given that MISO is staffed to administer its procedures and, as an independent organization, ensures comparable treatment to all parties involved. Additionally, for interconnection projects on Otter Tail’s system, MISO contracts with Otter Tail to have Otter Tail perform all required study work. 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 MISO, thus

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1 Docket No. E-017/PA-01-1391

2 Attachments R and X of the MISO’s TEMT delineate MISO’s generator interconnection procedures

3 FERC Docket No. ER04-691-000, et al

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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**

On April 1, 2005 the Midwest ISO initiated its Locational Marginal Pricing ("LMP") Energy Markets ("Energy Markets"). For over a year leading up to the Energy Markets start up, Otter Tail was intently involved in preparations to ensure that its transition to an Energy Markets was a success. Virtually all areas within Otter Tail Power Company were impacted in one way or another in the preparations leading up to the Energy Markets. Focus was directed towards areas such as:

- 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-MISO Load Serving Entities located within the Otter Tail Power Company Control Area.
- Nominating and receiving FTR allocations to safeguard Otter Tail's native load.
- Developing business practices, strategies and risk management policies to accommodate an LMP Energy Market.
- Actively participating in the numerous Midwest 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.

Just barely into the operation of the Energy Markets, Otter Tail can report that its preparations have paid off. While the initial start of operations in an infant LMP Energy Market have not been without incident, the transition has been accomplished. MISO continues to make changes in the structure and operation of the marketplace and it is still too early to tell what the net impact will be to Otter Tail and its customers.

**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 and sub-transmission system. When compared to many investor-owned utilities, Otter Tail's customer count per mile of transmission and sub-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 sub-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 6-A lists the mileage of various voltage classes of transmission and sub-transmission lines. All of these lines are overhead lines except for 0.57 miles of underground cable in the 41.6 kV class.

<b>Table 6-B Circuit Miles of Transmission by Voltage<sup>1</sup></b>	
<b>Voltage (kilovolts)</b>	<b>Circuit length</b>
345 kV	48 miles
230 kV	404 miles
115 kV	796 miles
69 kV	216 miles
41.6 kV	3,830 miles

<sup>1</sup> Source: Otter Tail Power 2004 FERC Form 1

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