



AN ALLETE COMPANY

David R. Moeller  
Senior Attorney  
218-723-3963  
dmoeller@allete.com

June 27, 2018

**VIA EMAIL and U.S. MAIL**

Mr. Darrell Nitschke, Executive Secretary  
North Dakota Public Service Commission  
State Capitol Building  
600 E. Boulevard Ave., Dept. 408  
Bismarck, ND 58505

**RE: Minnesota Power's Ten Year Plan – July 2018**

Dear Mr. Nitschke:

Enclosed is Minnesota Power's North Dakota Ten-Year Plan pursuant to N.D.C.C. § 49-22-04. The original and a copy of the Plan will be sent to the address above with copies filed with the Mercer, Morton and Oliver county auditors.

Further, pursuant to N.D. Admin. Code 69-06-01-05, the enclosed Notice will be sent to the state agencies and officers as designated on the attached Notice Service List.

If you have any questions, or need additional information, please contact me at the number listed above.

Yours truly,

A handwritten signature in black ink that reads 'David R. Moeller' in a cursive script.

David R. Moeller

DRM:sr  
Enc.

1 PU-18-240 Filed 06/27/2018 Pages: 11  
2018 Ten Year Plan  
Minnesota Power & Light  
David Moeller

# **TEN-YEAR PLAN**

**Minnesota Power**  
**An operating division of ALLETE, Inc.**  
**Duluth, Minnesota**

Prepared for the North Dakota Public Service Commission  
Pursuant to Section 49-22-04 of the  
North Dakota Century Code

**July 2018**

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**Minnesota Power's  
TEN-YEAR PLAN**

**INTRODUCTION**

Minnesota Power, an operating division of ALLETE, Inc., provides retail electric service to northeastern Minnesota and wholesale service to 16 municipal customers in Minnesota and a private utility in Wisconsin. Minnesota Power has historically maintained an energy resource portfolio of coal, hydro, and biomass. In an effort to meet Minnesota's Renewable Energy Standard (Minn. Stat. § 216B.1691) and diversify its energy resource portfolio, Minnesota Power has been implementing a renewable development plan that began with 98.6 MW of purchased wind energy from the Oliver I and II Wind Energy Centers in Oliver County, North Dakota and has continued through the Bison 1, 2, 3, and 4 wind projects. Minnesota Power also continues to purchase energy and capacity from Square Butte Electric Cooperative's Milton R. Young Unit 2 plant that is delivered via Minnesota Power's +/- 250kV direct current transmission line ("DC Line") that runs between the Square Butte Substation in Center, North Dakota and Minnesota Power's Arrowhead Substation near Duluth, Minnesota.

## Minnesota Power's Ten-Year Plan

### SECTION A: Existing Energy Conversion Facilities<sup>1</sup>

Bison 1—81.8 MW

Bison 2—105 MW

Bison 3—105 MW

Bison 4—204.8 MW

Hydro Operations—114.6 MW

- St. Louis River System—85.6 MW
  - Knife Falls Hydro Electric Station—1.9 MW
  - Scanlon Hydro Electric Station—1.4 MW
  - Thomson Hydro Electric Station—71.3 MW
  - Fond du Lac Hydro Electric Station—11.0 MW
- Winton Hydro Electric Station—4.0 MW
- Prairie River Hydro Electric Station—0.5 MW
- Mississippi River System—24.5 MW
  - Little Falls Hydro Electric Station—4.4 MW
  - Blanchard Hydro Electric Station—16.5 MW
  - Sylvan Hydro Electric Station—1.9 MW
  - Pillager Hydro Electric Station—1.7 MW

Hibbard Energy Center—54.2 MW (summer), 47.2 MW (winter)

Boswell Energy Center Units 1 and 2—138 MW (retiring December 31, 2018)

Boswell Energy Center Unit 3—350.5 MW

Boswell Energy Center Unit 4—585 MW (468 MW Minnesota Power capacity)

Laskin Energy Center Units 1 and 2—110 MW (natural gas)

Taconite Harbor Energy Center Units 1 and 2—150 MW (currently idled)

Taconite Ridge Wind Energy Center—25 MW

Camp Ripley Solar Facility—10 MW

(Non-regulated) Rapids Energy Center—30.8 MW

Purchases

- Square Butte—Young 2—100 MW in 2018
- Oliver County Wind Energy Centers I and II—98.6 MW

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<sup>1</sup> Nameplate capacity.

- Wing River Wind—2.5 MW
- Manitoba Hydro—50 MW
- Ontario Hydro—100 MW (capacity only)
- U.S. Solar—1.0 MW (community solar garden)
- Blanchard Solar—10.0 MW (approval pending before MPUC)

Minnesota Power’s 2015 Integrated Resource Plan (“2015 Plan”) in Minnesota Public Utilities Commission (“MPUC”) Docket No. E015/ RP-15-690 (available on the MPUC’s eDockets website: <https://www.edockets.state.mn.us/EFiling/search.jsp> or Minnesota Power’s website at: <http://www.mnpower.com/Environment/ResourcePlan>) was filed on September 1, 2015 and approved by the MPUC at its June 9, 2016 agenda hearing with a written order issued July 18, 2016. The filing provides further information on these generation facilities and is available upon request. Based on a MPUC order issued September 19, 2017, Minnesota Power’s next integrated resource plan is now due to be filed with the MPUC by October 1, 2019.

**SECTION B: Energy Conversion Facilities under Construction**

None.

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

With the completion of Bison 1, 2, 3 and 4, Minnesota Power has 496.6 MW of installed wind capacity. Minnesota Power may make individual applications to the North Dakota Public Service Commission (“NDPSC”) for approval of additional North Dakota wind facilities when the timing is determined.

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

See response to Section C.

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

On December 31, 2009, Minnesota Power acquired Square Butte Electric Cooperative’s +/- 250kV DC Line that runs 465 miles between the Square Butte Substation in Center, North Dakota and Minnesota Power’s Arrowhead Substation near Duluth, Minnesota. Minnesota Power also recently upgraded the capacity of the DC Line to assure deliverability of the Bison Wind Projects. To accomplish this upgrade that was completed in 2013, Minnesota Power entered into a transmission service agreement with Square Butte (subject to installation of a \$5.6 million transmission system improvement project at the Square Butte Substation) to increase the DC Line capacity from 500 MW to 550 MW.

In 2009, Minnesota Power placed in-service a 230kV alternating current (“AC”) transmission line (PU-09-587), approximately 22 miles in length that is required to transmit wind generation from the Bison 1 Wind Project substation to the proposed point of interconnection within the existing Square

Butte Substation near Center, North Dakota. This transmission line will also be utilized as a generator outlet for future Minnesota Power wind projects.

To facilitate development of additional wind projects in North Dakota, Minnesota Power constructed additional transmission facilities that interconnect with the 230kV AC transmission line and the Square Butte Substation. Minnesota Power obtained NDPSC approval for an additional 10-mile western extension of the 230kV AC transmission line (PU-11-620) and that line is used for Minnesota Power's Bison 4 Wind Project.

Minnesota Power is a project participant in the CapX2020 transmission initiative, which includes the Twin Cities – Fargo 345kV Project that begins near Fargo, North Dakota and terminates at Monticello, Minnesota.

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

None

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

Minnesota Power may need to construct additional transmission facilities to deliver wind from project sites to the Square Butte Substation. See Section I as well.

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

None

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

Minnesota Power may need to construct additional transmission facilities to deliver wind from project sites to the Square Butte Substation. As set forth in recent State of Minnesota Biennial Transmission Plans, Minnesota Power is evaluating upgrades to the DC Line. The DC terminals were designed by General Electric ("GE") for a 30 year operating lifetime and as of 2017 they have been operating reliably for over 40 years. The main components of the DC terminals include the thyristor valves and cooling, converter transformers, and smoothing reactors to complete the energy conversion. The original vendor, GE, left the DC business in the 1980s and over the past few years it has been increasingly difficult to procure spare parts as the technology is becoming obsolete and the original designers are well into retirement. Minnesota Power has researched reverse engineering solutions to this technology issue, but has had limited results and thus spare and replacement parts for the DC system remain limited. By taking action to modernize the thyristor equipment, Minnesota Power will greatly reduce the likelihood of a line failure. Minnesota Power is evaluating a series of modernization activities for each of the major components of the DC system. Along with the thyristor valves, Minnesota Power can reduce the likelihood of forced outages of the 465 mile transmission line by planning replacement of transformers and smoothing reactors. Minnesota Power continues to evaluate the timing and priority for modernizing each of these components.

There are two alternatives. “Do Nothing” (risk of extended outage due to equipment failure) or implement the HVDC<sup>2</sup> 750 MW Upgrade. Replacement of the existing thyristor valves with modern equipment is the minimum necessary project to maintain the reliability of Minnesota Power’s DC Line and reduce the risk of extended outages due to equipment failure.

The timing of the DC Valve Hall Replacement Project will be identified based on Minnesota Power’s reliability and economic evaluations. Minnesota Power is actively monitoring the project and looking for an opportunity to execute it while balancing system reliability needs with costs to customers and prioritization of all capital projects. Following detailed specification and competitive bidding of the project, the earliest expected in-service date for the project is 2023. The delay is due to manufacturer lead times and Minnesota Power budgetary restrictions.

The modernization of the DC equipment is a prudent and necessary activity to ensure the ongoing operation of this critical piece of transmission for Minnesota Power’s customers, including the reliable delivery of Minnesota Power’s substantial North Dakota wind generation assets.

#### **SECTION J: Regional Coordination**

Minnesota Power’s 2015 Plan in MPUC Docket No. E015/RP-15-690 (available on the MPUC’s eDockets website: <https://www.edockets.state.mn.us/EFiling/search.jsp>) contained extensive transmission and regional coordination information in Appendix F and is available upon request. Further information is available in the Minnesota Transmission Owners’ Biennial Transmission Plan filed in MPUC Docket No. E999/M-17-377 and available at: <http://minnelectrans.com>.

#### **SECTION K: Environmental Information**

Minnesota Power’s 2015 Plan in MPUC Docket No. E015/RP-15-690 (available on the MPUC’s eDockets website: <https://www.edockets.state.mn.us/EFiling/search.jsp>) contained extensive environmental information in Appendix E and is available upon request.

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

Minnesota Power’s 2015 Plan in MPUC Docket No. E015/RP-15-690 (available on the MPUC’s eDockets website: <https://www.edockets.state.mn.us/EFiling/search.jsp>) contained extensive demand and energy forecasting information and is available upon request. Minnesota Power also files annually with the MPUC an Annual Forecast Report in accordance with MPUC rules and that can be made available upon request.

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<sup>2</sup> High voltage direct current.

## **PLAN Service List**

Mr. Darrell Nitschke, Executive Secretary  
**Public Service Commission**  
600 E. Boulevard Ave., Dept. 408  
Bismarck, ND 58505

**Oliver County Auditor**  
P O Box 188  
Center, ND 58530-0188

**Morton County Auditor**  
210 Second Avenue NW  
Mandan, ND 58554-3158

**Mercer County Auditor**  
P O Box 39  
Stanton, ND 58571-0039



AN ALLETE COMPANY

David R. Moeller  
Senior Attorney  
218-723-3963  
dmoeller@allete.com

June 27, 2018

## NOTICE OF FILING

Please take notice that on June 27, 2018, Minnesota Power, 30 West Superior Street, Duluth, Minnesota, filed a Ten Year Plan with the North Dakota Public Service Commission pursuant to N.D.C.C. § 49-22-04. Notice of the filing of this plan is pursuant to N.D. Admin. Code 69-06-02-02 to the following state agencies and officers as designated in N.D. Admin. Code 69-06-01-05:

1. Aeronautics Commission
2. Attorney General
3. Department of Agriculture
4. Department of Career and Technical Education
5. Department of Commerce, Division of Community Service
6. Department of Health
7. Department of Human Services
8. Department of Labor
9. Department of Transportation
10. Economic Development & Finance Commission
11. Energy Development Impact Office
12. Game and Fish Department
13. Geological Survey
14. Governor
15. Indian Affairs Commission
16. Job Service North Dakota
17. Parks and Recreation Department
18. Soil Conservation Committee
19. State Historical Society of North Dakota
20. State Land Department
21. State Water Commission

Yours truly,

A handwritten signature in black ink that reads 'David R. Moeller'.

David R. Moeller

DRM:sr

## NOTICE Service List

Chairman  
**Aeronautics Commission**  
P O Box 5020  
Bismarck, ND 58502-5020

**Attorney General**  
600 East Boulevard Avenue, Dept. 125  
Bismarck, ND 58505

Commissioner  
**Department of Agriculture**  
600 East Boulevard Avenue, Dept. 602  
Bismarck, ND 58505-0020

Director & Exe. Officer  
**Dept. of Career & Tech. Edu.**  
600 East Boulevard Avenue, Dept. 270  
Bismarck, ND 58505-0610

Director  
**Department of Commerce**  
P O Box 2057  
Bismarck, ND 58503

State Health Officer  
**Department of Health**  
600 East Boulevard Avenue  
Bismarck, ND 58505-0200

Executive Director  
**Department of Human Services**  
600 East Boulevard Avenue, Dept. 325  
Bismarck, ND 58505-0250

Commissioner **Department of Labor**  
600 East Boulevard Avenue, Dept. 406  
Bismarck, ND 58505-0340

Director  
**Department of Transportation**  
608 East Boulevard Avenue  
Bismarck, ND 58505-0700

Director  
North Dakota Department of Commerce  
**Economic Develop. & Finance Division**  
P O Box 2057  
Bismarck, ND 58503

**Energy Development Impact Office**  
P O Box 5523  
Bismarck, ND 58505-5523

Director  
**Game and Fish Department**  
100 North Bismarck Expressway  
Bismarck, ND 58501-5095

State Geologist  
**Geological Society**  
600 East Boulevard Avenue  
Bismarck, ND 58505-0840

Governor  
**State of North Dakota**  
600 East Boulevard Avenue  
Bismarck, ND 58505-0001

Executive Director  
**Indian Affairs Commission**  
600 East Boulevard Ave. Rm 117  
Bismarck, ND 58505

Executive Director  
**Job Service North Dakota**  
P O Box 5507  
Bismarck, ND 58506-5507

**Parks & Recreation Department**  
1600 East Century Avenue, Suite 3  
Bismarck, ND 58503-0649

Soil Conservation Specialist  
**State Soil Conservation Committee**  
2718 Gateway Avenue, Unit 104  
Bismarck, ND 58503

Director  
**State Historical Society of North Dakota**  
612 East Boulevard Avenue  
Bismarck, ND 58505-0830

Commissioner  
**State Land Department**  
P O Box 5523  
Bismarck, ND 58505-5523

State Engineer  
**State Water Commission**  
900 East Boulevard Avenue, Dept. 770  
Bismarck, ND 58505-0850