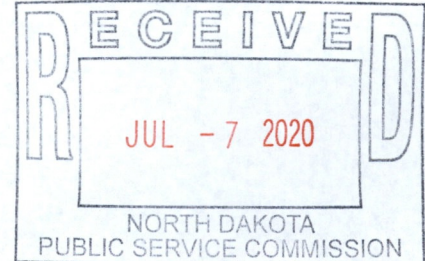




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July 1, 2020



Mr. Steve Kahl
Executive Secretary, Director of Administration
North Dakota Public Service Commission
600 East Boulevard Avenue – State Capitol
Bismarck, ND 58505-0480

Dear Mr. Kahl:

Enclosed is an original and 10 copies of Great River Energy's (GRE) North Dakota Ten-Year Plan Report, 2020-2029 (Report) to the North Dakota Public Service Commission (Commission) as required by Chapter 49-22-04 of the North Dakota Century Code (NDCC).

In accordance with Chapter 69-06-02-02 of the NDCC, GRE has provided a copy or notice of the Report to the necessary parties.

GRE has included an extra copy of the Report and a self-addressed stamped envelope and requests that the Commission provide GRE with a file stamped copy.

Please contact me at (763) 445-6114 or gpadding@greenergy.com if you have any questions or comments.

Sincerely,

Greg Padden
Director, Resource Planning and Regulatory Affairs
GREAT RIVER ENERGY

Enclosures (11)

c: NDPSC (10)
County Auditors (4)
ND State Agencies and Officials (Letters of Confirmation only)



2020-2029 NORTH DAKOTA TEN-YEAR PLAN

Submitted to the
North Dakota Public Utilities Commission
July 1, 2020



INNOVATE, COLLABORATE AND LEAD TO COMPETITIVELY POWER THE FUTURE

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INTRODUCTION

This report was prepared in accordance with the North Dakota Public Service Commission's (Commission) Guidelines (Guidelines) for compliance with the requirements of Chapter 49-22-04 of the North Dakota Century Code.

Great River Energy (GRE) has concluded that some information that would be provided under Sections E and F and Exhibits 1 and 2 pursuant to the Guidelines qualifies as Critical Energy Infrastructure Information (CEII) and, therefore, has not included the information in these pages. GRE offers to provide the information to the Commission upon request.

SECTION A: Owned Energy Conversion Facilities

GRE's power supply portfolio is currently comprised of coal, natural gas, wind purchases, hydro purchases and oil-fired units. The coal-fired units are located at Jamestown and Underwood, North Dakota. Stanton Station, a 189 MW coal-fired generating station located in Stanton, ND, was retired from GRE's portfolio in 2017. Elk River Station, a 30 MW refuse derived fuel generating station located in Elk River, MN was retired from GRE's portfolio in 2019. In May of 2020, the GRE board approved a plan to shut down Coal Creek Station in the second half of 2022. GRE has not received any offers to purchase Coal Creek Station. Unless we receive an offer that is in the best interest of our member-owner cooperatives, GRE will continue plans to shut down and decommission the plant.

GRE and our member-owners have installed 20 solar installations across Minnesota, including a 250 kilowatt (kW) installation at GRE's Maple Grove, Minnesota headquarters. Nineteen more GRE-owned 20 kW arrays were installed at our member-owner locations, and nine of those sites were expanded to include member-owner community solar projects.

Table 1 shows the summer season ratings and location of GRE's owned generating plants. The ratings are Net Dependable Capacity as determined in the North American Electric Reliability Corporation (NERC) Generating Availability Data System (GADS).

Table 1- GRE's Owned Energy Conversion Facilities

Unit Name	Summer Capacity (MW)	Location
Owned Resources	2020/2021 UCAP	
Arrowhead Emergency Generating Station (Diesel)	n/a	Colvill, MN
Cambridge CT (Peaking)	20.6	Cambridge Township, MN
Cambridge CT2 (Peaking)	148.1	Cambridge Township, MN
Coal Creek Station (Diesel)*	3.0	Underwood, ND
Coal Creek Station (Diesel)*	3.0	Underwood, ND
Coal Creek Station 1 (Coal)*	567.4	Underwood, ND
Coal Creek Station 2 (Coal)*	565.9	Underwood, ND
Elk River CT (Peaking)	189.0	Elk River, MN
Lakefield (Diesels)	2.0	Trimont, MN
Lakefield Junction (Peaking)	478.3	Trimont, MN
Maple Grove Solar	0.25	Maple Grove, MN
Maple Lake CT (Peaking)	19.4	Maple Lake, MN
Pleasant Valley Station (Peaking)	408.9	Dexter, MN
Rock Lake CT (Peaking)	20.0	Pine City, MN
Spiritwood (Coal, CHP)	89.2	Jamestown, ND
St. Bonifacius CT (Peaking)	53.1	St. Bonifacius, MN

* Expected shutdown by end of 2022

SECTION B: Energy Conversion Facilities Under Construction

No new energy conversion facilities are under construction by GRE.

GRE has completed decommissioning of Stanton Station, and has nearly completed restoration of the site to a preindustrial state with native vegetation. Facility deconstruction was completed in the fall of 2019, and the remaining restoration of the site was delayed in the same time period due to weather. GRE anticipates that site work will be complete by the end of summer 2020, weather permitting.

GRE intends to convert Spiritwood Station from a primarily coal burning generation facility to a natural gas-fired generation facility. The conversion project is intended to be complete by the end of 2022. GRE plans that Spiritwood Station will remain a full-time generating facility and burn natural gas as its primary source of fuel beginning in 2023.

The GRE board approved a plan to shut down Coal Creek Station in the second half of 2022. Coal Creek Station will be decommissioned unless GRE receives and accepts an offer to purchase the plant that is in the best interest of GRE's members. If the facility is decommissioned, GRE will pursue deconstruction of

the existing generating facilities at the site. A final plan for the future of the generating units is still pending, however, GRE will no longer operate or take energy from the units after 2022.

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

GRE has identified no specific facilities for construction in the next five years in North Dakota. GRE will continue to evaluate future needs as part of our resource planning process.

SECTION D: Proposed Energy Conversion Facilities on Which Construction is Intended Within the Next 10 Years

GRE has identified no specific facilities for construction in the next 10 years in North Dakota. GRE will continue to evaluate future needs as part of our resource planning processes.

SECTION E: Existing Transmission Facilities (Electric)

GRE has concluded that our existing transmission facilities qualify as Critical Energy Infrastructure Information (CEII). A map of transmission facilities owned and operated by GRE in North Dakota will be made available upon request as noted in Exhibit 1, subject to the requirements applicable to CEII. Summary information for GRE's North Dakota transmission facilities is provided in Table 2.

Table 2 – GRE's Existing Electric Transmission Facilities in North Dakota

Facility	Voltage	AC/DC	Install Year
Stanton – Leland Olds	230	AC	1966
Stanton – McHenry Tap	230	AC	1966
McHenry Tap – McHenry	230	AC	1966
McHenry – Balta	230	AC	1966
Balta – Ramsey	230	AC	1966
Ramsey – Prairie	230	AC	1966
Stanton – Square Butte	230	AC	1966
McHenry Tap – Coal Creek	230	AC	1979
Stanton – Coal Creek	230	AC	1979
Coal Creek – Dickinson, MN	± 410	DC	1978

With the announcement of Coal Creek Station's shutdown, GRE is analyzing the future of GRE's Coal Creek – Dickinson, MN HVDC transmission system. Both selling the system and continued ownership by GRE are being contemplated. GRE fully expects the HVDC system will remain an important asset for the efficient and reliable operation in the MISO market following the closure of Coal Creek Station. The HVDC system can enable future energy development in the area, which would promote economic development.

GRE is not planning to retire any other existing transmission facilities in North Dakota within the next 10 years.

SECTION F: Existing Transmission Facilities (Pipeline)

GRE has a water pipeline and accompanying pumping station located near Coal Creek Station that have been in service since August 1, 1979. If Coal Creek Station is not sold to another party, then the water pumping station and pipeline will be decommissioned in conjunction with the decommissioning of Coal Creek Station generating facilities at the end of 2022. GRE concludes that the information on the pipeline and pumping station qualifies as CEII and has not provided it in this document. However, specific information on the facilities and a map will be provided upon request.

SECTION G: Proposed Transmission Facilities on Which Construction is Intended Within the Next Five Years (Electric)

GRE has identified no specific facilities for construction in the next five years in North Dakota. GRE will continue to evaluate future needs as part of our resource planning processes.

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

GRE has identified no specific facilities for construction in the next five years in North Dakota. GRE will continue to evaluate future needs as part of our resource planning processes.

SECTION I: Proposed Transmission Facilities on Which Construction is Intended Within the Next 10 Years (Electric and Pipeline)

None beyond those projects identified above in Section G.

SECTION J: Regional Coordination

The electric grid is heavily interconnected and must be evaluated, operated and expanded in a coordinated manner to assure reliability and cost-effectiveness. GRE's transmission planning is closely coordinated with other organizations. GRE is a member of and directly participates in several regional transmission planning entities:

- ▶ The Midcontinent Independent System Operator (MISO), which administers a tariff providing for regional transmission services, energy and ancillary services markets, and resource adequacy requirements. MISO also has responsibilities for regional transmission planning, coordination and expansion. GRE is a transmission owning member and market participant in MISO. Further

information about MISO is available on-line at www.misoenergy.org. MISO's transmission expansion plans are also available at their web site under the "Planning" tab and contained in the "MTEP" menu item. The most recent plan is MTEP19 (2019).

- ▶ MISO conducts Sub-regional Planning Meetings (SPMs) to encourage an open and transparent planning process and to provide a forum for coordination and discussion of transmission issues and proposed projects among utilities and other interested stakeholders.
- ▶ The Midwest Reliability Organization (MRO) is a non-profit organization of regional utilities established to develop regional reliability standards and ensure compliance with standards of the North American Electric Reliability Corporation (NERC) as well as its own standards. Further information about MRO is available on-line at www.mro.net. Further information about NERC can be found at www.nerc.com.
- ▶ The Minnesota Transmission Owners (MTO) group, a consortium of 16 sponsoring utilities and three participating government agencies, fulfills the utilities' statutory obligations for transmission planning in the state of Minnesota. These obligations include the development of the Minnesota Biennial Transmission Plan, as well as studies associated with meeting the Minnesota Renewable Energy Standard (RES) requirements. Further information about the MTO group is available at www.minnelectrans.com.
- ▶ CapX2020, a joint initiative of 10 regional transmission utilities to develop a long-range vision and transmission expansion projects to ensure that load in the region can be served reliably, provide outlet capability for renewable and other generation additions and supports regional reliability of the transmission system. In March 2020, the CapX2020 utilities issued a report identifying the critical elements necessary for continued safe, reliable and affordable electric grid operation as well as the long-term policies and procedures needed to transition to a future with more non-dispatchable generation resources. The report, which is called the CapX2050 Transmission Vision Report, highlights the challenges transmission planners and operators may face to maintain a safe and reliable system as energy production in the region evolves.

Further information about CapX2020, their past projects, studies, and reports are available on-line at www.capx2020.com.

Recommended Measures for Regional Coordination:

None beyond the activities described.

SECTION K: Environmental Information

Acid Rain Program. The Acid Rain Program (ARP) under Title IV of the Clean Air Act requires nationwide reductions of sulfur dioxide (SO₂) and nitrogen oxides (NO_x) emissions by allocating allowances under a cap-and-trade mechanism to electric generation facilities. Coal Creek and Spiritwood stations, as well as several of GRE's combustion turbine stations, are regulated by the ARP.

Each unit under the ARP is required to hold one SO₂ allowance for each ton of SO₂ emissions on a calendar year basis. The EPA allots a pre-determined number of SO₂ allowances to specified legacy units

for each year. Excess allowances from these legacy units can be used for compliance by other affected units in a utility's fleet. Excess allowances can also be sold into the market created by the ARP. However, with significant nationwide reductions in SO₂ emissions since the program's inception, the current market is virtually non-existent.

GRE's generation units have been performing better than ARP requirements for many years. Therefore, GRE has an excess of SO₂ allowances that guarantees compliance with the program requirements by all its affected units with no additional investment.

The ARP regulations limit NO_x levels at Coal Creek Station to 0.40 lb/MMBtu at each unit. The units operate well within the applicable limits.

Regional Haze. EPA published final regional haze regulations in 1999. The goal of these regulations is to improve visibility in Class I areas, such as national parks and wilderness areas, by gradually reaching "natural conditions" in 2064. The first phase of this rule required certain power plants to install Best Available Retrofit Technology (BART) to control SO₂, NO_x and particulate matter (PM) emissions. Both units of GRE's Coal Creek Station were BART-eligible units and subject to BART requirements. In December 2009, North Dakota Department of Health (NDDH) issued its final BART determinations for public comment as part of its regional haze state implementation plan (SIP). These emission controls were required to be installed and operational no later than five years after EPA's approval of North Dakota's SIP or finalization of its own federal implementation plan (FIP). EPA's final BART SIP/FIP determinations for North Dakota were published on April 6, 2012. EPA approved North Dakota's SIP relative to Coal Creek Station with the exception of NO_x. As a result, SO₂ and PM controls necessary to comply with the approved BART limits were installed by the required deadline of April 2017.

In 2012, EPA also finalized its FIP for Coal Creek Station NO_x emissions. GRE disagreed with EPA's FIP, which would have required selective non-catalytic reduction (SNCR) technology. GRE filed a petition for review with the Court of Appeals for the Eighth Circuit. North Dakota also filed a petition with the court. On September 23, 2013, the court vacated EPA's FIP, stating that EPA was arbitrary and capricious in issuing the FIP by not looking at all the factors. In particular, EPA's failed to consider the existing pollution controls. On April 26, 2018, after further review, EPA published its proposed rule to approve NDDH's revised SIP for Coal Creek Station's BART NO_x limit. Given several adverse public comments on EPA's proposed approval in addition to the time passed since its original BART submittal, GRE agreed to update the BART NO_x evaluation, which was submitted on Sept. 12, 2019. North Dakota Department of Environmental Quality (NDDEQ, formally NDDH) has completed their draft BART NO_x SIP and is currently awaiting EPA comment before proceeding with public notice. Final EPA public notice and approval is not expected until early 2021.

On a parallel track, NDDEQ has started their second round of regional haze reduction analysis. GRE submitted its four-factor analysis on December 23, 2019. These round 2 SIPs are due to EPA no later than July 31, 2021. Cost-effective controls and associated visibility improvements will again be determined for all emission sources in the state, with an expected compliance date of no later than five years after EPA's approval of a SIP or finalization of its own FIP.

Mercury and Hazardous Air Pollutants. Since the early 2000s, GRE has been an industry leader in researching mercury reduction technologies at our plants. We worked with Electric Power Research Institute, U.S. Department of Energy, Lignite Research Council and University of North Dakota's Energy &

Environmental Research Center, among others, to identify and test novel mercury reduction technologies. As a result of more than a decade of collaborative research, GRE was uniquely positioned to respond to EPA's Mercury and Air Toxics Standards (MATS) rule, which became effective in 2015.

Specifically, Coal Creek Station engineers identified a novel scrubber additive to control mercury in conjunction with boiler chemical additives, which was made possible by the reductions from GRE's novel DryFining™ technology. This research ultimately saved capital costs associated with installing a more traditional activated carbon injection system. These Coal Creek Station emission controls have been working successfully since 2015. Spiritwood Station installed a carbon injection system and has been using it to comply with the MATS limits.

With respect to other non-mercury hazardous pollutants, Coal Creek and Spiritwood stations meet acid gas requirements through inherently low chlorine coal (lignite), and as documented through surrogate SO₂ continuous emission monitoring. With respect to non-mercury metals, each plant maintains compliance with the particulate matter limit of 0.03 lb/MMBtu through existing highly efficient particulate controls such as baghouses and electrostatic precipitators. Both GRE plants received low emitting EGU (LEE) status after 3 years of quarterly stack tests demonstrating particulate matter emissions well below the regulatory threshold.

Carbon Dioxide Emissions.

On June 19, 2019, EPA issued the final Affordable Clean Energy (ACE) rule as the replacement to the Clean Power Plan rule. The ACE rule will establish carbon dioxide (CO₂—a greenhouse gas) emission limits for existing coal-fired power plants. Great River Energy participated in the development of the rule and supported comments through several industry associations. Coal Creek Station and Spiritwood Station are both designated and affected facilities under the rule.

GRE continues to track this regulatory program regarding greenhouse gas emissions (GHG). We are working with NDDEQ to gather heat rate improvement options for our coal-fired power plants. It is expected that NDDEQ will be issuing their draft ACE SIP sometime in late 2021 to allow it to submit its proposed SIP to the EPA by July 8, 2022

The expected CO₂ emissions directly attributed to GRE's portfolio are expected to drop more than 90 percent relative to 2005 levels as a result of the portfolio changes underway.

Coal Combustion Residuals. GRE has actively pursued beneficial reuse opportunities for the coal combustion products generated at Coal Creek and Spiritwood stations.

As a by-product of coal combustion, GRE generates approximately 500,000 tons of fly ash per year at Coal Creek Station. Historically, fly ash was stored in landfills. However, for over two decades, GRE has been very successful in finding alternative uses for it. It is primarily used as a partial replacement for cement, which makes the concrete stronger and more durable. It has also been used in other products and for other purposes.

Beneficial use of ash, in lieu of landfilling, avoids cement production, reducing CO₂ emissions in the cement production process. For each ton of fly ash that is used as a cement replacement, greenhouse

gas emissions are estimated to be reduced by approximately 0.8 tons. Since 1998, more than 3.5 million cumulative tons of CO₂ have been avoided through beneficial use of GRE ash.

Through the beneficial use of ash, GRE also avoids storing the ash in landfills, resulting in cost savings of over \$10 per ton of ash generated. Since 1998, approximately \$46 million in cumulative landfilling costs have been avoided through beneficial use.

In October 2015 a final rule to regulate coal combustion residuals as a non-hazardous waste under Subtitle D of the Resource Conservation and Recovery Act became effective. Known as the Coal Combustion Residuals (CCR) rule, it establishes national regulations for the management and disposal of ash from power plants in landfills and surface impoundments.

In December 2016, the Water Infrastructure Improvements for the Nation Act was signed into law. The act allows states to submit to EPA, for its review and approval, a state permitting program that regulates the management and disposal of coal combustion residuals. If the state program is approved by EPA, then permitting and primary enforcement will be the responsibility of the state, and it will operate in lieu of EPA's rule.

To date, compliance with the CCR rule has not caused significant operational cost increases. If CCS is sold, any future landfill expansions would be built to comply with the revised regulations. Staff continue to advocate for an alternative liner demonstration, which, if approved by EPA, would reduce operational costs by not requiring new landfill construction at Coal Creek prior to its shutdown or sale. EPA is expected to finalize their alternative liner demonstration submittal timeline in fall of 2020. Staff are working with contractors to prepare the submittal within 30 days of EPA's final rule.

Aquatic Life Protection at Cooling Water Intake Structures. Section 316(b) of the Clean Water Act requires that the location, design, construction and capacity of a cooling water intake structure reflect the best available technology for minimizing environmental impact, primarily by reducing the amount of fish that are impinged or entrained at a cooling water intake structure.

The rule applies only to facilities that withdraw at least two million gallons per day of cooling water from "waters of the United States" and use 25 percent or more of the water withdrawn exclusively for cooling purposes. It requires facilities to use one of seven compliance alternatives to reduce impingement, all of which are considered equivalent to or better than a national performance standard based on "modified traveling screens" with fish returns. Coal Creek Station received permit approval in 2019 that it has met EPA's 316b requirements through existing infrastructure, namely closed cycle cooling and maintaining <0.5 feet per second through screen velocity.

SECTION L: Projected Demand for Service

Projected Demand. GRE's forecasted peak demands and energy requirements are provided in Exhibit 3.

Manner and Extent of Meeting Projected Demand. In addition to GRE's current generation capacity, GRE has entered into transactions of various types and durations with other utilities, which help utilize GRE's resources more efficiently. GRE is a transmission owner and market participant in the

Midcontinent Independent System Operator (MISO). MISO operates the short-term energy and ancillary services markets that provide economic dispatch of generation and transmission congestion management over a broad region and administers resource adequacy requirements to ensure that there is sufficient capacity available to meet expected demand requirements within its footprint.

After the shutdown of Coal Creek Station and given the current forecast of future demand and energy over the next 10 years, GRE does not project the need for new thermal generation resources to address peak demand on our system. GRE plans to procure 1,100 MW of new wind or other renewable resources by the end of 2023.

GRE continues to evaluate capital improvements to existing generation facilities, other non-wind renewables, bilateral market purchase, and energy storage (both utility-side and customer-side).

Load Centers. The service areas of GRE's 28 member-owners, shown in Figure 1 on page 15, are located mainly in Minnesota, with a small number in Wisconsin. Twenty member-owners are All-Requirements members that purchase all of their power and energy requirements from GRE, subject to limited exceptions. Eight member-owners are Fixed Requirements members that purchase a fixed amount of power and energy requirements from GRE and purchase all additional requirements from other energy suppliers.

Fuel Sources and Transportation. Coal Creek Station's generating units burn beneficiated lignite that is mined at the adjacent Falkirk Mine and transported to the plant via trucks and conveyor belts where it is beneficiated via GRE's DryFinishing™ technology.

Beneficiated Lignite produced at Coal Creek Station is also transported via rail from Coal Creek Station to Spiritwood Station, where it serves as the primary fuel for that facility. GRE is also using natural gas at Spiritwood Station to maximize multi-fuel optionality for the purpose of both economics and reliability. In conjunction with the shutdown of Coal Creek Station, Spiritwood Station will be converted to use natural gas as its primary fuel.

GRE has two combustion turbine peaking facilities (Pleasant Valley and Lakefield Junction) located in southern Minnesota. These facilities use natural gas as their primary fuel which is transported by pipelines. The facilities also have fuel oil as a back-up fuel, which is transported by truck.

GRE has six combustion turbine peaking facilities (Cambridge I, Cambridge II, Rock Lake, Maple Lake, St. Bonifacius, and Elk River Peaking Station) located in central Minnesota. Cambridge II is fueled with natural gas only. The Elk River Peaking Station can use either natural gas or fuel oil. The remaining facilities use fuel oil, which is transported by truck. St. Bonifacius is also connected to a fuel oil pipeline, which adds a fuel transport option.

July 1, 2020

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Exhibit 1

U.S. Department of Energy Form EIA-923

(Forms supplied upon request.)

July 1, 2020

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Exhibit 2

Federal Energy Regulatory Commission Form FERC-714

(Forms supplied on request.)

Exhibit 4

Location of the Coal Creek Station Water Intake Pipeline

(Map supplied upon request.)

