MINNESOTA
PUBLIC UTILITIES COMMISSION

Staff Briefing Papers

Meeting Date	March 7, 2024		**Agenda Item **3**
Company	Great River Energy (GRE)		
Docket No.	ET2/RP-22-75		
	In the Matter of Great River Energy's 2023 - 2037 Integrated Resource Plan		
Issues	Should the Commission accept or reject GRE's 2023-2037 IRP?		
	Should the Commission require GRE to update its IRP with revised modeling?		
	Should the Commission advise GRE to include the Department's suggested modeling changes into the Cooperative's next IRP?		
	When should GRE file its next IRP?		
Staff	Sean Stalpes	sean.stalpes@state.mn.us	651-201-2252

✓ **Relevant Documents**	**Date**
Great River Energy, Initial Filing (Public and Trade Secret)	March 31, 2023
Great River Energy, Appendices A-H (Public and Trade Secret)	March 31, 2023
CURE, Comments	August 8, 2023
IUOE Local 49 and Carpenters, Comments	August 8, 2023
G. Tolley, Comments (Parts 1 and 2)	August 8, 2023
Sierra Club, Comments and Attachment A (Public and Trade Secret)	August 8, 2023
Department of Commerce, Comments	August 8, 2023
LIUNA, Comments	August 9, 2023
Great River Energy, Reply Comments	October 3, 2023
G. Tolley, Reply Comments	October 17, 2023
CURE, Reply Comments	October 17, 2023

BACKGROUND

I. Procedural Background

On March 31, 2023, Great River Energy (GRE) filed its 2023-2037 Resource Plan Application (Initial Filing). For context, Staff provides a summary of relevant filings leading up to the Initial Filing.

GRE's last IRP (the 2018 IRP), which covered the 2018-2032 planning period, was accepted by the Commission's November 28, 2018 Order in Docket No. 17-286. The Commission found that the 2018 IRP reasonably met the evaluation criteria under Minn. R. 7843.0500, subp. 3, which include reliability, rates and bills, socioeconomic and environmental impacts, flexibility, and risk, and set an April 1, 2021 filing date for GRE to file its next IRP. The order also set an expectation that GRE should fully collaborate with interested stakeholders in preparing its next plan.

Additionally, the Commission required GRE to, among other things, "evaluate the cost-effective retirement of each of its coal plants, including Coal Creek and Spiritwood," and "include Commission-approved externality costs and carbon dioxide regulatory costs in its analysis."[1]

On June 26, 2020, GRE requested a one-year extension to file its next IRP, which delayed the IRP filing date to until April 1, 2022. GRE stated that additional time was needed to provide analysis to account for what was at the time recently announced plans to shut down Coal Creek Station (CCS). The Commission approved GRE's request on September 15, 2020.

On January 21, 2022, GRE requested another one-year extension, which asked the Commission to delay GRE's next filing date until April 1, 2023. The Commission approved the request, but this time required that GRE file an interim update by October 3, 2022:

> 2. Great River Energy shall file an interim update on issues impacting its future integrated resource plan by Monday, October 3, 2022. At a minimum, the interim update should provide updated information concerning changes in fixed members' demand and energy purchases from Great River Energy, along with stakeholder and member engagement regarding the resource plan.

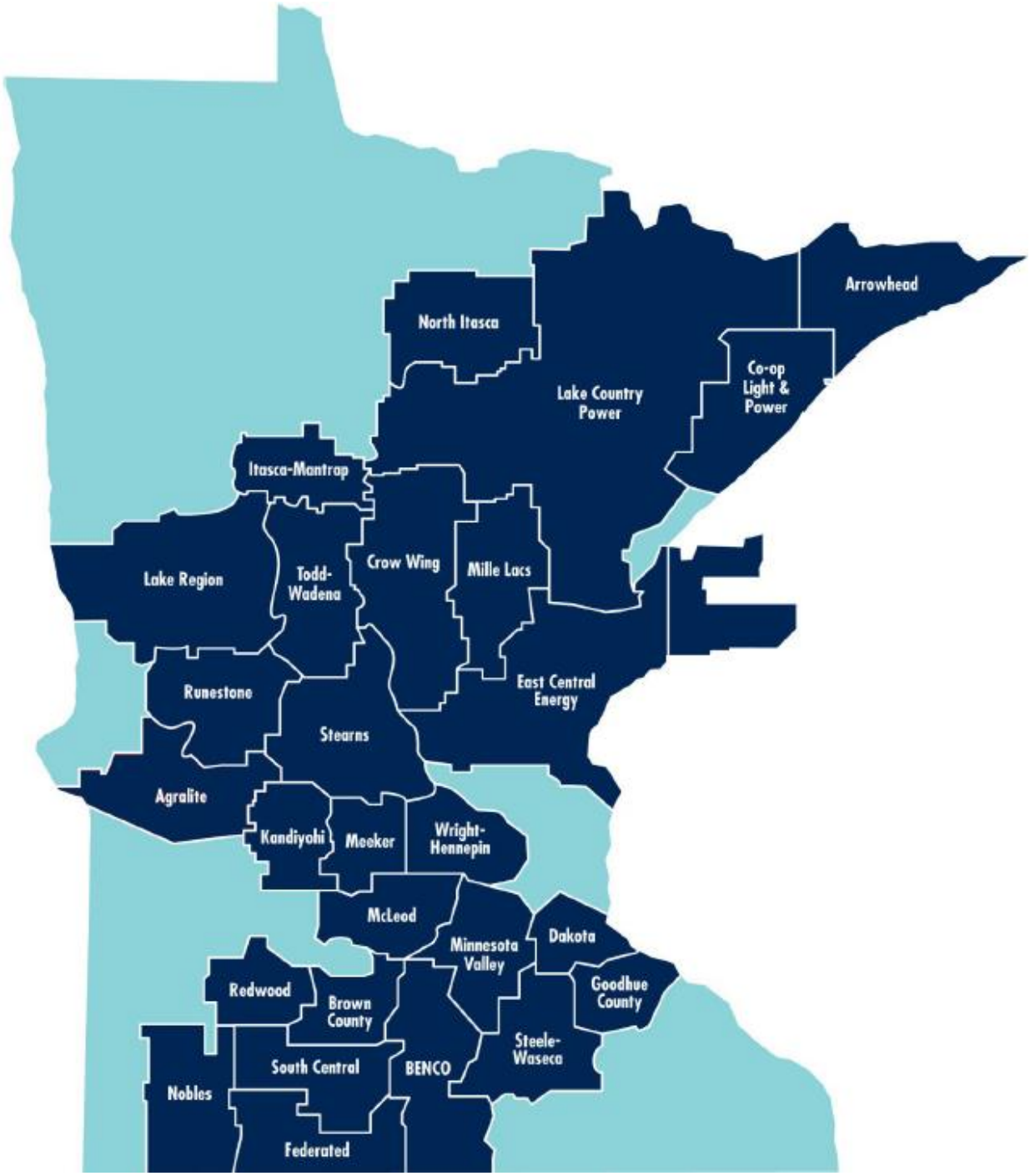
On October 3, 2022, GRE filed its Interim Update, which is generally consistent with the "Preferred Plan" proposed for Commission acceptance here.

[1] Order Point 4.a.

II. GRE Background

GRE is a wholesale electric power cooperative serving 27 member-owner distribution cooperatives. Through its member-owners, GRE provides electricity to approximately 1.7 million people across two-thirds of Minnesota geographically; as shown in the map below, GRE's members range from the suburbs of the Twin Cities to the Arrowhead region in northern Minnesota and to farming communities in the southwest corner of the state.

Figure 1 – GRE Member-Owner Cooperatives



GRE is the second-largest power supplier in Minnesota by peak demand. For comparison purposes, the table below compares GRE's winter and summer peak load to the investor-owned utilities operating in Minnesota:

Table 1. 2022 Summer and Winter Peak by Utility[2]

Utility	Summer Peak (MW)	Winter Peak (MW)
GRE	2,562	2,273
Minnesota Power	1,533	1,663
Otter Tail Power	809	1,002
Xcel Energy	9,245	6,453

GRE provides service to two types of members: All-Requirements (AR) members and Fixed Obligation (Fixed) members. GRE's 19 AR members purchase all of their power and energy requirements from GRE (with some exceptions). GRE's eight Fixed members buy a fixed portion of their power and energy requirements from GRE, and supplemental requirements are purchased from an alternate power supplier. Tables 2 and 3 below list GRE's AR and Fixed members, respectively, along with the location of their headquarters:

Table 2. All-Requirements Members

No.	All-Requirements Member	Location
1	Arrowhead Electric Cooperative	Lutsen, MN
2	BENCO Electric Cooperative	Mankato, MN
3	Brown County Rural Electric Association	Sleepy Eye, MN
4	Cooperative Light & Power	Two Harbors, MN
5	Dakota Electric Association	Farmington, MN
6	East Central Energy	Braham, MN
7	Goodhue County Cooperative Electric	Zumbrota, MN
8	Itasca-Mantrap Cooperative Electrical Association	Park Rapids, MN
9	Kandiyohi Power Cooperative	Spicer, MN
10	Lake Country Power	Cohasset, MN
11	Lake Region Electric Cooperative	Pelican Rapids, MN
12	McLeod Cooperative Power Association	Glencoe, MN
13	Mille Lacs Energy Cooperative	Aitkin, MN
14	Nobles Cooperative Electric	Worthington, MN
15	North Itasca Electric Cooperative, Inc.	Bigfork, MN
16	Runestone Electric Association	Alexandria, MN
17	Stearns Electric Association	Melrose, MN
18	Steele-Waseca Cooperative Electric	Owatonna, MN
19	Todd-Wadena Electric Cooperative	Wadena, MN

[2] Data from each utility's Annual Forecast Reports in Docket No. 23-11.

Table 3. Fixed Obligation Members

No.	Fixed Obligation Member	Location
20	Agralite Electric Cooperative	Benson, MN
21	Crow Wing Power	Brainerd, MN
22	Federated Rural Electric Association	Jackson, MN
23	Meeker Cooperative Light & Power Association	Litchfield, MN
24	Minnesota Valley Electric Cooperative, Inc.	Jordan, MN
25	Redwood Electric Cooperative	Clements, MN
26	South Central Electric Association	Saint James, MN
27	Wright-Hennepin Cooperative Electric Association	Rockford, MN

Of note, on August 30, 2022, Connexus Energy (Connexus) ended its membership in GRE. Connexus, GRE, and member-owners approved new long-term power supply and transmission service agreements that will allow GRE to serve as energy market participant for all Connexus needs for at least 10 years, and Connexus will participate in all existing and committed GRE resources identified in the supply agreement. The agreements extend through 2045.

As a cooperative, GRE is governed by a board of directors that includes 22 directors, each of whom represents one of GRE's AR members. GRE's electric rates are established by GRE's contracts with its member-owners and therefore not subject to review by the Commission. Under Minn. Stat. §216B.2422, subd. 2, the Commission's role in IRP proceedings for a generation and transmission cooperative such as GRE shall be advisory.

III. Existing Resources

A. Supply-Side Resources

1. Owned Resources

GRE stated that it "owns and maintains $2.9 billion in assets that include nine power generating stations and over 4,400 miles of transmission lines."[3] Table 4 below shows GRE's owned generation assets:

[3] GRE Initial Filing, p. 5.

Table 4. Owned Resources

Existing Station	Nameplate Capacity (MW)	Primary Fuel / Secondary Fuel	In-service year	Location
Arrowhead Emergency Generating Station	18	Diesel	2009	Cook County, MN
Cambridge 1	21	Fuel oil	1978	Cambridge, MN
Cambridge 2	170	Natural gas (NG)	2007	Cambridge, MN
Elk River Peaking Station	175	NG/fuel oil	2009	Elk River, MN
Lakefield Junction	488	NG/fuel oil	2001	Martin County, MN
Maple Lake Station	20	Fuel Oil	1978	Maple Lake, MN
Pleasant Valley Station	421	NG/fuel oil	2001-'02	Mower County, MN
Rock Lake Station	28	Fuel oil	1978	Pine City, MN
St. Bonifacius Station	75	Fuel oil	1978	Saint Bonifacius, MN
Spiritwood Station	99	Coal/NG	2014	Spiritwood, ND
Total	***1,515***			

Recently, GRE has taken the follows actions at these facilities:

- **Cambridge Unit 2 dual-fuel conversion:** On March 11, 2022, in Docket No. 22-122, GRE filed an application seeking to add ultra-low sulfur diesel (ULSD) generation backup capabilities to Cambridge 2. On December 7, 2023, the Commission issued an order authorizing the project; the Commission also required that if Cambridge 2 operates on ULSD for more than 24 hours in a year, GRE shall file a report identifying total hours operated on ULSD and explaining what necessitated its usage.[4]

- **Spiritwood natural gas conversion:** In 2020, GRE converted Spiritwood Station to a natural gas and coal generation facility, so Spiritwood is now capable of generating electricity with 100% natural gas. GRE co-fires the boiler with natural gas and coal based on daily economics.

- **Surplus Interconnection Service (SIS) at three existing sites:** FERC Order No. 845 defined SIS as "any unused portion of Interconnection Service established in a Large Generator Interconnection Agreement, such that if Surplus Interconnection Service is utilized the Interconnection Service limit at the Point of Interconnection would remain

[4] In its minor alteration application, GRE proposes adding fuel oil generation backup capabilities to the Cambridge 2 turbine to enhance generation reliability, grid resiliency, and operational flexibility when natural gas is curtailed or cost prohibitive (the Project). The Project requires two primary modifications to the existing facility: (1) replacing the Cambridge 2 natural gas burners with gas/fuel oil combined burners, and (2) constructing associated fuel oil storage, water storage, pipes, pumps, and controls.

the same."[5] GRE and three wind developers are currently seeking SIS designation at Coal Creek Station (CCS), Pleasant Valley Station (PVS), and Lakefield Junction Station (LJS) to develop three new wind projects—Discovery Wind (at CCS), Dodge County Wind (at PVS), and Three Waters Wind (at LJS). PVS and LJS are low-capacity factor, peaking plant generators, and locating wind at these sites will avoid network upgrade costs and MISO queue issues. These projects will be discussed later in the briefing papers.

2. Purchased Power

GRE also has several existing capacity and/or energy contracts, which include both sales and purchases. A complete list is in Appendix B of the Initial Filing. Among these PPAs are GRE's contracts with Rainbow Energy to purchase output from the 1,151 MW, coal-fired CCS. The Rainbow PPA will step down incrementally over time. As GRE explained, the sale included:

> an initial 1,050 MW PPA with Rainbow for the sale to GRE of financially settled energy in Minnesota, and capacity in the form of MISO Zonal Resource Credits (ZRCs) . . . The PPA steps down 500 MW from the original 1,050 in 2023, and an additional 200 MW in 2025 before the final 350 MW amount is eliminated in 2031 at the expiration of the agreement.[6]

In reply comments, GRE mentioned that it recently negotiated a third, short-term PPA with Rainbow for the sale of financially settled energy in Minnesota. The energy-only PPA was executed on June 15, 2023, and the terms include 50 MW of 7x24 energy delivered to GRE from July 1, 2023 to December 31, 2025. No capacity is included in this agreement. Table 5 lists all of GRE's PPAs with Rainbow.

Table 5. Rainbow Energy PPAs[7]

Contract	Max. Capacity (MW)	Dispatch	Contract Start Date	Contract End Date
Rainbow - Capacity	350 (1,050 through 5/31/2023)	-	6/1/2022	5/31/2031
Rainbow - Energy	350 (1,050 through 5/31/2023)	100%	6/1/2022	2/28/2031
Rainbow 2 – Energy	200	100%	3/1/2023	8/31/2025
Rainbow 3 – Energy	50	100%	7/1/2023	12/31/2025

GRE also purchases approximately 977 MW of wind energy produced from eight projects. GRE's existing wind PPAs, along with their contract size and duration, is shown in Table 65.

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[5] FERC Docket No. RM17-8-000; Order No. 845, Reform of Generator Interconnection Procedures and Agreements (Issued April 19, 2018).

[6] GRE Initial Filing, p. 13.

[7] The first three rows is from Appendix B, while the last row (Rainbow 3) is based on GRE's reply comments.

Table 6. GRE Existing Wind Resources

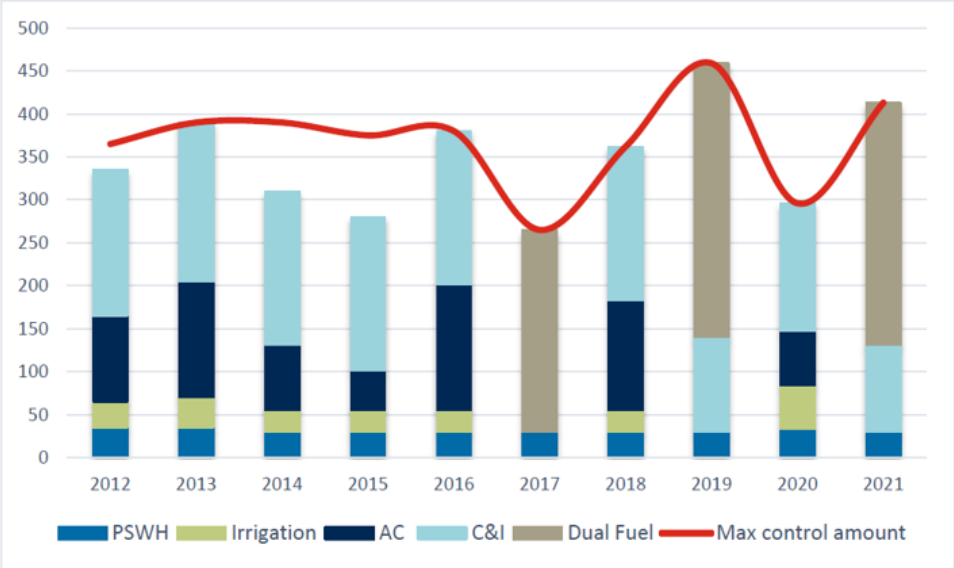
Existing PPAs	Nameplate Capacity (MW)	Installation / Contract Start	Retirement / Contract End
Ashtabula	51	2010	2039
Buffalo Ridge	105	2023	2045
Deuel Harvest	200	2023	2047
Elm Creek	100	2008	2027
Emmons-Logan	216	2020	2049
Endeavor	100	2011	2041
Prairie Star	100	2008	2027
Trimont Repower	105	2021	2049
Total	***977***		

B. Demand-Side Resources

1. Demand Response

GRE's demand response (DR) capability can exceed 400 MW of overall maximum control in the winter and can approach 400 MW during the summer. As shown in the figure below, GRE maintains five types of DR: peak shave water heating, irrigation, cycled air conditioning, winter dual fuel, and C&I interruptible load.

Figure 2. Maximum annual demand response (MW) impacts by year, 2012-21



2. Energy Savings

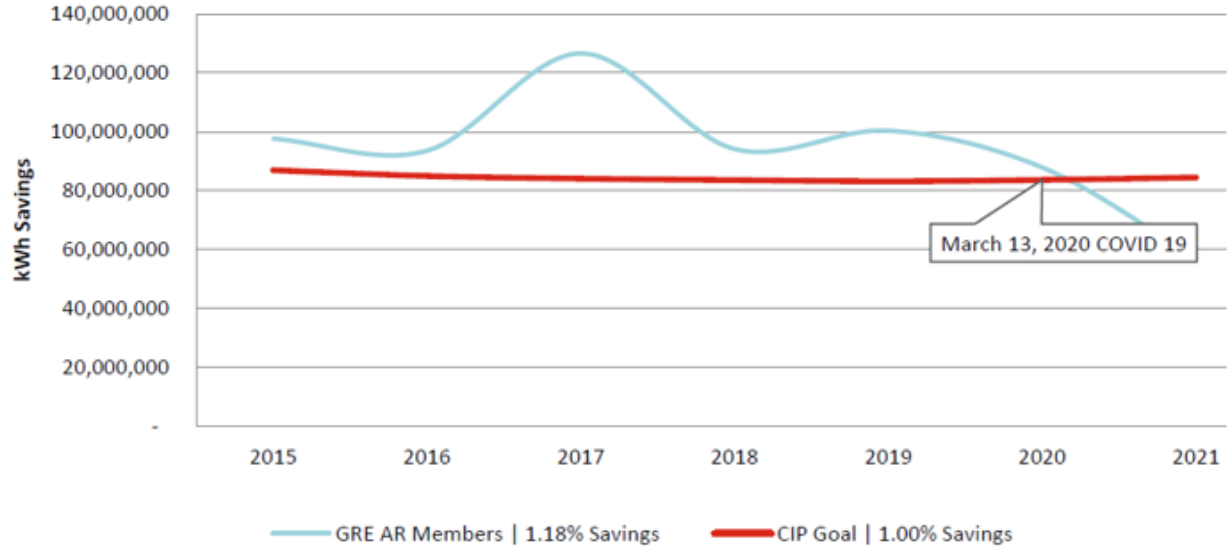
GRE characterized its energy efficiency programs as an "all of the above" approach that is made up of five components:

1. Equipment incentive programs
2. Consumer behavior programs
3. Supply-side efficiency
4. Market transformation
5. Demand response

GRE stated that "since 2015, members have realized collective results that exceed the 1.0% energy conservation goal that has been set by the Minnesota Legislature, with the exception of 2021 and the unprecedented effects of COVID-19."[8]

GRE's exceedance of the 1% energy savings goal is shown in the figure below. The blue line represents the Minnesota demand-side realized kilowatt-hour (kWh) savings achievements, and the red line represents the 1% savings goal by year.

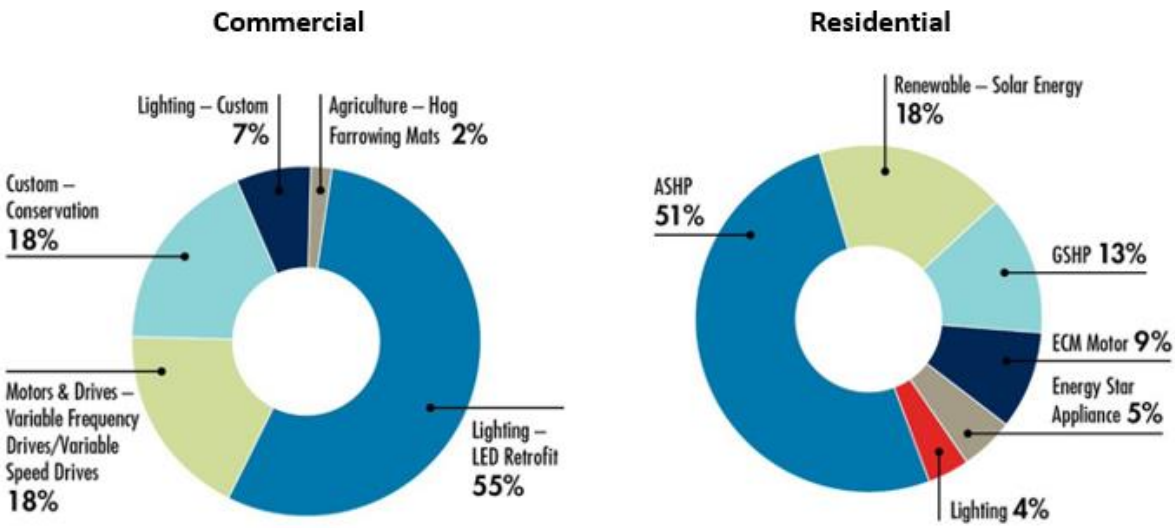
Figure 3. Historical AR member achievements 2015-21



GRE noted that its system is comprised mostly of residential end-use consumers, and most of GRE's members have residential sales higher than 60% of total electricity sales. According to GRE, residential energy savings programs require significantly more coordination than commercial and industrial (C&I) programs. As shown below, lighting has been the primary driver of C&I energy savings (55% of C&I savings in 2021), while air source heat pumps (ASHPs) have been the primary driver for residential savings (51% of residential savings in 2021).

[8] GRE Initial Filing, p. 50.

Figure 4. 2021 Top Energy Savings Programs



IV. Pre-Filing Stakeholder Engagement

A. Feedback from Member-owners

GRE emphasized the Cooperative's commitment to engaging stakeholders in advance of filing its IRP, which both helped develop the plan as well as communicate the planning process. For example, GRE discussed a member-consumer survey it conducted in 2021 that solicited feedback from member-owners on energy issues most important to those consumers. Some key takeaways were:[9]

- When asked to name the highest priority initiatives for GRE, most member-consumers included increasing renewable energy and keeping costs as low as possible.
- 57% of member-consumers want GRE to use renewable energy for at least two-thirds of its energy supply by 2050; however, only 22% agreed that 90% to 100% renewable energy was their preferred goal for 2050.
- 85% of member-consumers supported GRE's efforts to reduce carbon dioxide (CO_2) emissions, achieving Minnesota's 80% greenhouse gas (GHG) goal by 2032, and providing 50% renewable power to cooperative members by 2030.

To gather feedback on the IRP proposal, GRE held strategic planning meetings member-owners:

> As a cooperative, power supply decisions are made by and for the members. Throughout this resource planning process, GRE has continued to provide regular portfolio updates to member staff and the GRE board of directors. The member-owner cooperatives continue to provide valuable input surrounding all issues

[9] A full summary of 2021 GRE's Member-Consumer Survey can be found in Appendix E of the Initial FIling.

impacting GRE's long-term capacity, energy and transmission plans.

GRE held regional meetings in August 2022 to further inform member-owners and solicit additional feedback. At these meetings, GRE staff presented the strategic planning process used to ensure future energy reliability, sustainability, and affordability. These meetings were held at McLeod Cooperative Power in Glencoe, Lake Country Power in Cohasset, and Stearns Electric Association in Melrose. Additional meetings were also held with GRE member advisory groups as requested. Member-owners were supportive of GRE's long-range portfolio plans, and reliability and resiliency efforts. Additional presentations and discussions regarding GRE's IRP and portfolio strategy were held in September of 2022 at member-manager and board-of-director strategy sessions. The resulting IRP Preferred Plan was presented to GRE's board of directors in February of 2023.[10]

B. External stakeholder engagement

In addition to discussions with member-owners, GRE hosted a meeting on August 18, 2022 at Cambridge Station to discuss the Form Energy battery pilot and "solicit initial feedback on its IRP planning process and portfolio changes to date."[11] According to GRE, attendees included "member-owner distribution cooperatives, energy and environmental advocacy groups, and organized labor representatives."[12]

GRE participated in continued discussions with CURE and Public Employees for Environmental Responsibility (PEER) regarding the sale of CCS to Rainbow, and GRE met with Fresh Energy, CURE, and other clean energy organizations in November and December of 2022 to discuss IRP capacity expansion modeling.

In January 2023, GRE met with the Department to review GRE forecasting methodology, and GRE met with Commission Staff, Minnesota Center for Environmental Advocacy, Clean Grid Alliance, Fresh Energy, CURE, and LIUNA in February 2023 to present modeling results and the Preferred Plan.

C. Tribal Nations

GRE also described its plan to work with Tribal Nations within their members-owners' service territories to support carbon reduction and carbon-free generation plans:

Beginning in 2020, GRE, along member-owner Dakota Electric Association (DEA), partnered with Prairie Island Indian Community (PIIC) to assist in their net-zero

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[10] GRE Initial Filing, p. 21.

[11] GRE Initial Filing, p. 22.

[12] The list of attendees included Clean Grid Alliance, Clean Up the River Environment (CURE), East Central Energy, Form Energy, Fresh Energy, the International Union of Operating Engineers Local 49, Laborers' International Union of North America, MREA, PEER, and Todd-Wadena Electric Cooperative.

goal. The collaboration involved discussions on future low carbon power supply planning, with a focus on electrification and energy efficiency investments that offer financial benefits to PIIC.

As part of this partnership, DEA and GRE, in conjunction with PIIC, initiated the development of a 5.4 MW (DC) solar installation near the Treasure Island Resort and Casino. DEA will purchase the energy generated by this solar installation and sell it to PIIC. This project, expected to be operational in 2024, aims to deliver carbon-free energy to the local electric grid serving PIIC and surrounding community.

Additionally, in June 2022, GRE member-owner East Central Energy (ECE) and Mille Lacs Corporate Ventures (MLCV) commissioned a 3 MW(DC) solar installation near Grand Casino Hinckley. ECE will purchase the energy from this system and sell it to MLCV.

These collaborative efforts with PIIC and MLCV demonstrate a commitment to supporting carbon reduction initiatives and aligning with Minnesota's goal of achieving 100% carbon-free generation by 2040. Great River Energy and its member-owners will continue to collaborate with tribal nations in those initiatives.[13]

PREFERRED PLAN

I. Summary

GRE does not expect a capacity deficit until 2031, and as a result, the capacity expansion modeling software used to conduct the analysis, EnCompass, did not select any new resources in the near-term. The generic EnCompass units proposed in GRE's Preferred Plan include:

- 200 MW of battery storage in 2030;
- 200 MW of solar in 2031; and
- 400 MW of wind in 2032.

As mentioned above, GRE is currently taking steps to acquire new wind resources and phase out of the Rainbow PPA, and these actions were embedded in EnCompass. In other words, the acquisition of new wind and step down of the Rainbow PPA were not optional resource decisions. Rather, EnCompass selected resources later in the planning period that coincide with GRE's capacity need.

Table 7 below is a 15-year outline of GRE's generating resource additions and subtractions (i.e., not transmission activities). As noted, the 2023-2026 activities are considered existing units in the modeling, and the storage, wind, and solar additions in 2030-2032 are generic EnCompass units. Staff further notes that this table is an updated version of a table from the Initial Filing;

[13] GRE response to PUC Information Request No. 1 (February 1, 2024).

because GRE's reply comments provided a narrative of updates that changed the timing of some resource additions and added a third Rainbow PPA, Staff asked GRE to produce a new table reflecting these changes. New resources that were not in the Initial Filing are highlighted in yellow.

Table 7. Preferred Plan Summary

	Preferred Resource Plan		
	Year	**MW**	**Type**
Planning period	2023	105	Buffalo Ridge Wind
		-500	Rainbow Energy Center, LLC PPA reduction
		200	Deuel Harvest Wind
		50	Rainbow PPA (new)
	2024		
	2025	259	Dodge County Wind
		207	Three Waters Wind
		1.5	Form Energy battery storage pilot project
		-200	Rainbow Energy Center, LLC PPA reduction
		-50	Rainbow PPA (new)
	2026	400	Discovery Wind
	2027		
	2028		
	2029		
	2030	200	Storage resource
	2031	-350	Rainbow Energy Center, LLC PPA reduction
		200	Solar resource
	2032	400	Wind resource
	2033		
	2034		
	2035		
	2036	300	300 Wind resource (new addition)
	2037		

II. Five-Year Action Plan

As noted, Table 7 above includes resource additions and subtractions only. However, GRE's five-year action plan also includes investments in new transmission lines, expansion of member-owned renewable resources, and feasibility studies of new technologies that could meet future capacity and energy needs. Below is a complete list of GRE's five-year action plan:

- Continue operation of all generation units and the PPA with Rainbow Energy Center, LLC
- Step down the Rainbow PPA from 1,050 MW to 350 MW by 2025
- Convert Cambridge Unit 2 to dual-fuel operation (the Commission approved the conversion on December 7, 2023)
- Add up to 866 MW of wind PPAs
- Add a 1.5 MW Form Energy multi-day storage pilot project at Cambridge Station
- Continue operation and maintenance of the Nexus HVDC transmission line

- Invest in MISO's Long-Range Transmission Plan (LRTP)
- Begin a pumped hydro energy storage feasibility study
- Increase GRE's Renewable Member Resource Option from 5% to 10%

In the section below, Staff will provide a brief summary of these actions.

- **Rainbow PPAs**

GRE explained that it began the accelerated depreciation of all coal-fired generation facilities in 2013, which allowed the Cooperative to divest itself of CCS in the most beneficial way to member-owners. Importantly, the sale of CCS and the HVDC system to Rainbow and Nexus, respectively, was predicated on GRE's ability to deliver 400 MW of wind energy to load at the Dickinson terminal, which resulted in the development of Discovery Wind.

Moreover, the sale of CCS included an initial 1,050 MW PPA for energy and Zonal Resource Credits (ZRCs). The energy will provide a market price hedge, and ZRCs are needed for resource adequacy requirements while carbon-free technologies mature.[14] The PPA stepped down to 550 MW in 2023 and will step down to 350 MW in 2025 before expiring in 2031.

- **Add up to 866 MW of wind PPAs**

In the Initial Filing, GRE stated that it plans to expand wind generation through five large wind facilities: Buffalo Ridge Wind, Deuel Harvest Wind, Discovery Wind, Dodge County Wind, and Three Waters Wind. However, because GRE began purchasing output from Buffalo Ridge and Deuel Harvest in 2023, Staff considers the five-year action plan to consist of three new wind facilities—the Discovery, Dodge County, and Three Waters. In total, these three projects amount to 866 MW of incremental wind generation, which is summarized in Table 8 below:

Table 8. Wind additions

Wind facility (State)	MW	COD[15]
Discovery (ND)	400	2026
Dodge County (MN)	259	2025
Three Waters (MN)	207	2025
Total	**866**	

As mentioned above, Discovery, Dodge County, and Three Waters are MISO SIS projects, meaning they will share interconnection rights with GRE's existing, owned thermal generating resources. Additional details of the wind projects include:

[14] GRE Initial Filing, pp. 13-14.

[15] In the Initial Filing, the CODs for these projects were all one-year sooner than listed in Table 7. The CODs in Table 7 reflect GRE's update discussed in their reply comments. As Staff understands it, the delay is in part driven by awaiting certainty on funding from the New ERA program in the Inflation Reduction Act.

- **Discovery Wind** will be an approximately 400 MW wind project near the CCS site, which will utilize the high voltage direct current (HVDC) system connecting CCS to the Twin Cities area. On September 9, 2022, the developer, Apex Clean Energy, filed a SIS request with MISO on behalf of Discovery Wind, LLC. The project has an estimated 2026 commercial operation date (COD).

- **Dodge County Wind** is a 259 MW wind project that will be located in southeast Minnesota and interconnect at Pleasant Valley Station, which is a low-capacity factor, natural gas combustion turbine (CT). GRE stated that it had hoped for the facility to be operational by 2024, although the project has experienced regulatory delays. GRE explained that "[t]he interconnection necessitates a dedicated transmission tie line from the wind facility to PVS," and the "Certificate of Need, site permit, and transmission route permit are currently in the regulatory process at the PUC."[16]

- **Three Waters Wind** is a 207 MW project that will be located in southwest Minnesota and interconnect via GRE's Lakefield Junction Station, which is another low capacity factor CT. According to GRE, "Interconnection applications are in progress with MISO, and this project is anticipated to be commercially operational in 2024,"[17] although GRE stated in reply comments that it now anticipates a 2025 COD.

In reply comments, GRE mentioned that it plans to develop another 300 MW wind project, in addition to Three Waters Wind, that will also seek SIS to interconnect at Lakefield Junction Station. GRE stated that it is working closely with local landowners and state and county officials to plan this project.

Importantly, GRE's reply comments discussed a funding request to the U.S. Department of Agriculture (USDA) Rural Utilities Service (RUS) under the New Empowering Rural America Act (New ERA). The New ERA program is a $9.7 billion program that is part of the Inflation Reduction Act (IRA). To be considered for funding, on September 14, 2023, GRE and 20 Participating member owners submitted a Letter of Interest (LOI) pursuing both Project and System Awards. Discovery, Dodge County, and Three Waters are included in GRE's New ERA LOI.

- **Add 1.5 MW Form Energy multi-day storage pilot project at Cambridge Station**

GRE described its Cambridge Energy Storage Project as a "multi-day storage (MDS) resource [that] could provide dispatchable energy over a period of days, not hours, helping with reliability while also providing the benefits of shifting renewable energy on a daily, weekly, or seasonal basis."[18] Discharging a battery over several days could outlast most periods of

[16] GRE Initial Filing, p. 17.

[17] GRE Initial Filing, p. 17.

[18] GRE Initial Filing, p. 4.

extreme weather.[19] In the Initial Filing, GRE expected that Cambridge Energy Storage Project to "break ground during the first quarter of 2024 with a commercial operation date target of December 2024,"[20] but in reply comments GRE stated that manufacturing delays have moved the in-service date from December 2024 to December 2025.

- **Continue operation and maintenance of the Nexus HVDC transmission line**

Upon the sale of CCS to Rainbow and the HVDC system to Nexus, Rainbow owns and operates CCS, while GRE operates and maintains the HVDC system for Nexus under a 20-year agreement. GRE explained that the sale was predicated on GRE's ability to deliver 400 MW of wind, which led to Discovery Wind:

> Discovery Wind . . . will have 400 MW generation capability and utilize the HVDC system connecting CCS to the Twin Cities area. The utilization of the HVDC line delivers Discovery Wind directly to load in the Twin Cities and surrounding area without the need for additional AC transmission construction.[21]

- **Invest in MISO's Long-Range Transmission Plan**

The Initial Filing described the first phase of LRTP, in which MISO approved 18 projects across its Midwest subregion; GRE will have partial ownership in two of the 18 projects.

First, the Iron Range – Benton County – Big Oaks project is a double-circuit 345-kilovolt (kV) transmission line that will span approximately 150 miles from northern to central Minnesota. GRE explained that it plans to build the line jointly with Minnesota Power:

> Planning for the approximately $970 million transmission line is in its early stages. Subject to board approval, the two utilities intend to seek a Certificate of Need and Route Permit from the PUC in late 2023. The PUC will determine need and the final route. Subject to regulatory approvals, the transmission line is estimated to be in service by 2030.[22]

The Iron Range – Benton County – Big Oaks line will run from Minnesota Power's existing Iron Range Substation in Itasca County to GRE's Benton County Substation. It will replace an existing GRE transmission line from the Benton County Substation to a new substation in Sherburne County (Big Oaks) and an existing GRE transmission line from Benton County to Xcel Energy's Sherburne County Substation. The Big Oaks Substation will be built as part of a separate project.

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[19] Appendix F of GRE's Initial Filing is a whitepaper on the value of MDS to future C&I loads.

[20] GRE Initial Filing, p. 14.

[21] GRE Initial Filing, p. 17.

[22] GRE Initial Filing, p. 20.

Second, the Big Stone South – Alexandria – Big Oaks project is an estimated 239-mile project extending from eastern South Dakota to central Minnesota, and it will consist of:

1. a single circuit 345-kV transmission line from Otter Tail Power's existing Big Stone South Substation in South Dakota to Missouri River Energy Services' existing Alexandria Substation near Alexandria, Minnesota;
2. a second 345-kV circuit on the open position on existing transmission line structures between the Alexandria and Monticello substations; and
3. a crossing of the Mississippi River where it will interconnect at the new Big Oaks Substation.

GRE noted that planning for the estimated $574 million project is in the very early stages.

- **Pumped hydro energy storage feasibility study**

GRE's Preferred Plan includes 200 MW of energy storage in 2030. GRE is evaluating several possible storage options, including electrochemical, thermal, mechanical, and pumped hydro. For the pumped hydro option, GRE is evaluating idled mine pits and rock and overburden stockpiles on Minnesota's Mesabi Iron Range. GRE has partnered with Barr Engineering to begin "a new concept-level screening" of pumped hydro on the Mesabi Iron Range to determine if a deeper feasibility study is appropriate.

- **Increase Renewable Member Resource Option from 5% to 10%**

AR members may self-supply up to 5% of their energy needs with local renewable member resources (RMRs). GRE stated that the RMR Option has been in place without significant modification since 2008. However, in 2022, GRE's AR members began discussing possible updates to the RMR Option, including expanding the scope from 5% to 10%. GRE explained that GRE management, the GRE Board, and AR members' general managers recommended that the RMR Option be updated to include the following provisions:

1. Renewable member resources. RMRs must qualify as renewable generation under Minnesota law. An AR member's RMRs collectively can provide up to 10% (as opposed to the previous 5%) of the AR member's expected annual energy purchases from GRE. An RMR may incorporate a storage resource. RMRs may be aggregated and shared by more than one AR member.

2. Storage member resources. AR members may install storage member resources (SMRs) up to 10% of their average hourly energy requirements from GRE. SMRs may be grid charged and/or charged by an RMR.

3. MISO participation. If an AR member determines that a member resource will participate in MISO, GRE will request the appropriate registration, accreditation, or other qualification and will serve as the MISO market participant for the member resource.

The proposed changes to the RMR Option necessitated an amendment to the GRE 2008 AR Power Purchase Contract (PPC). Per the terms of the PPC, the proposed amendment was approved by the GRE Board in January 2023 and offered and accepted by each of the GRE's AR members in March 2023. At the time of the Initial Filing, the new RMR option was expected to be effective by August 1, 2023.

III. New ERA Funding

As noted above, as part of the IRA, the USDA made $9.7 billion available for member-owned rural electric cooperatives under the New ERA program. To be considered for funding, on September 14, 2023, GRE and 20 Participating member owners submitted a Letter of Interest (LOI)—GRE and five member-owners are requesting Project Awards and 15 participating member-owners are requesting System Awards.[23] If invited to apply to the New ERA Program by receipt of an Invitation to Proceed,[24] GRE and the Participating member-owners commit to developing a proposal that achieves the greatest reductions in GHG emissions.

GRE explained that the strategic vision advanced in its New ERA proposal is built around three "Strategies of Actions":

1. deliver wind energy over regionally-coordinated transmission,
2. coordinate member-owner renewable energy resource deployment, and
3. advance smart grid technologies that enable a virtual power plant (VPP).

These actions are briefly summarized below:

- ***Wind Energy:*** Discovery, Dodge County, and Three Waters Wind are all part of both this IRP and the New ERA LOI. Notably, GRE stated that Discovery Wind "will use an innovative, community-based lease to share financial benefits of the project broadly in

[23] In the LOI, an eligible entity must provide a statement as to whether the New ERA Application will provide a request for a Project Award or System Award.

Project Award is an Award secured by a security interest in the assets and revenues of the Project and supporting credit enhancements relating to the Project rather than by a security interest in all of the assets of the Applicant's electric system. Any Award to a Applicant that is not a current operating utility shall be a Project Loan.

System Award is where the Awardee will provide or has already provided RUS with a perfected senior lien in all its assets, both real and personal property, including intangible personal property and any property acquired after the date of the loan. Awards must be secured by all, or substantially all, of the system assets, including the Project to be financed with a System Award. System Awards are only available to operating electric cooperative utilities.

[24] Applicants must submit an LOI in order to be considered for an Invitation to Proceed. An Eligible Entity that is invited by RUS to proceed will receive an Invitation to Proceed and will have sixty (60) days to complete and submit a New ERA Application beginning from the date the Invitation to Proceed is emailed to the Applicant. If the sixty (60)-day deadline to submit the completed application falls on Saturday, Sunday, or a Federal holiday, the application is due the next business day. RUS may extend the sixty (60)-day deadline upon the written request of the Applicant if the Applicant demonstrates to the satisfaction of the Administrator that exceptional circumstances exist to warrant the extension. New ERA Awards will be made as soon as possible following the submission of a New ERA Application, and all New ERA funds must be fully disbursed on or before September 30, 2031.

rural North Dakota. GRE will act as the project's sponsor to monetize elective pay tax credits, including an Energy Community adder." For Three Waters Wind, GRE will act as the sponsor to monetize "elective pay tax credits."[25]

- ***Member-Owner Renewable Energy Resource Deployment:*** After the announcement of the New ERA program, GRE worked with its member-owners to launch a competitive request for proposals (RFP) for distribution-connected solar projects to help member-owners assess the opportunity to utilize New ERA funding to build distributed renewable projects on their systems. GRE explained:

> Nineteen Participating member owners are collectively scoping 255.5 MW of new renewable energy resources to replace purchases of coal generation, including 129 MW of distributed solar energy, 11.5 MW of wind and solar-wind-storage hybrid projects, and 115 MW of member-directed, transmission-connected renewable energy.[26]

- ***Virtual Power Plant:*** GRE is also seeking funding to utilize demand-side resources as a virtual power plant (VPP) on 15 participating member owners' distribution systems. GRE stated its proposal:

> includes investments to modernize GRE and 13 participating member-owner load management systems, deploy digital grid control software (advanced distribution management systems, distributed energy resources (DER) management systems, distributed energy storage, and other grid-edge control technologies) on GRE and 4 participating member-owners' systems, and deploy distributed energy storage on 3 participating member-owner systems to allow for deeper integration and orchestration of DERs."[27]

IV. Party Positions

Table 8 on the next page is a brief summary of parties who filed comments on GRE's IRP, alongside their position on the issues. A more thorough discussion will be provided later in the briefing papers.

[25] GRE reply comments, p .4.

[26] GRE reply comments, p. 5.

[27] GRE reply comments, p. 5.

Table 8. Summary of Party Positions

Party	**Positions**

Department	• Supports GRE's Preferred Plan.
	• Recommends GRE:
	  • provide updated compliance information and discussion of work toward compliance with CIP letters.
	  • separately calculate emissions sold to market with factor reflective of carbon emissions due to electricity production.
	  • incorporate several modeling suggestions in IRP.
	• Recommends GRE's forecasts in this proceeding not be used in future CN

CURE	• Does not support GRE's Preferred Plan.
	• Require new modeling that includes:
	  • updated EV adoption data from the EIA's 2023 AEO.
	  • a self-build solar option.
	• Supports a filing date of April 1, 2025 for its next IRP.

IUOE Local 49 and Carpenters	• Supports GRE's Preferred Plan, especially the following:
	  • New wind will provide good job opportunities for union construction workers.
	  • Supports exploration of carbon capture technology at Coal Creek.
	  • Supports feasibility study for pumped hydro storage in northeastern Minnesota.

LIUNA	• Supports GRE's Preferred Plan. • Recommends GRE provide initial estimates of potential job impacts.

Sierra Club	• Does not support GRE's Preferred Plan.
	• Require new modeling evaluating an alternative plan that:
	  • retires Spiritwood and ends reliance on the Rainbow PPA, and
	  • invests in 989 MW solar, 1,577 MW wind, and 1,051 MW battery storage by 2032.
	• Require GRE to conduct EnCompass modeling without constraints, which allows for solar, wind, and battery storage self-builds, and accounts for both New ERA grant potential and tax credits.
	• Require that GRE assign its IRP carbon intensity of the Rainbow PPA in this and all future dockets.

Geoffrey Tolley	• Require GRE to re-run its analysis to: (1) use updated projections from the EIA's 2023 AEO; (2) maximize IRA benefits pursuant to Commission's directive in Docket No. 22-624; (3) address early-evening load control with high EV growth; (4) address flattened winter bimodal demand curve in MISO Zone 1; and (5) include 10% self-generation from distribution coops

FORECASTING, SEASONAL PLANNING, AND ENCOMPASS RESULTS

I. GRE's Forecasting Process and Projected Resource Needs

For this planning period, GRE forecasts a 15-year compound annual growth rate (CAGR) of 0.5% for energy and 0.4% for demand. GRE's forecasting methodology is a three-phase process that aggregates AR sales, other customer adjustments including Fixed member sales, and external adjustments (e.g., EV, solar). The three steps can be summarized as follows:

- First, the AR cooperative hourly forecast is developed based on class monthly sales and the AR system load data.

- Next, once the AR hourly forecast is complete, it is adjusted to include the hourly impacts of Fixed Members, Harvestone,[28] Alliant,[29] and transmission losses.

- Finally, external forecasts for EVs and behind-the-meter PV are created. Hourly shapes for EVs and PVs are calibrated to monthly forecasts to create the final hourly system forecast.

Table 10 below shows GRE's system peak summary with the adjustments described above. Staff emphasized GRE's EV forecast with a red box, which shows a 16.24% CAGR for EVs during the planning period. One issue the Commission will need to address is CURE's position that GRE's EV adoption assumptions are unrealistically low, so CURE requests new EnCompass modeling to address with refreshed analysis on EV growth rates.

[28] Harvestone (formerly Dakota Spirit AgEnergy) is a biorefinery which began commercial operation in 2015 and produces ethanol, modified distillers' grains, corn oil, and E85. Harvestone is not forecast within the AR or FM cooperative forecasts and is included as a separate forecast item.

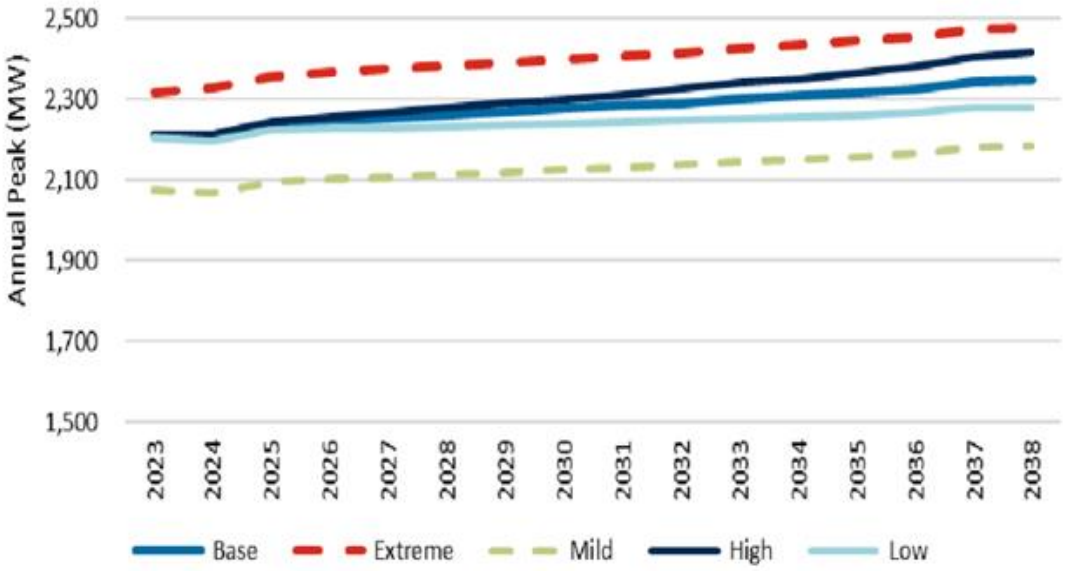
[29] The Alliant Load Southern Cooperative (Alliant) forecast consists of additional load that will be served by five AR cooperative members beginning in 2025. The additional load requirement results from the formation of the Southern Minnesota Electrical Cooperative (SMEC). SMEC is formed by 12 electric distribution cooperatives as the single point of contact for the purchase of electric service in southern Minnesota from Alliant Energy. Five of the 12 distribution cooperatives are AR members of GRE. At the end of 2024, a supply agreement with Alliant Energy will be terminated and five All Requirement Members in SMEC will be required to serve this load.

Table 10. GRE System Peak Summary

Year	Total Peak (MW)	AR	FM	Harvestone	Alliant	Losses	EV	PV
2023	2,210	1,877	220	6	-	104	4	(1)
2024	2,210	1,875	220	6	-	105	6	(2)
2025	2,239	1,881	220	6	21	106	8	(3)
2026	2,248	1,886	220	6	21	107	10	(1)
2027	2,255	1,892	220	6	21	107	11	(2)
2028	2,261	1,899	220	6	21	108	13	(5)
2029	2,269	1,905	220	6	21	108	14	(5)
2030	2,276	1,911	220	6	21	109	16	(6)
2031	2,284	1,917	220	6	21	109	18	(6)
2032	2,291	1,924	220	6	21	110	19	(7)
2033	2,302	1,930	220	6	21	110	21	(5)
2034	2,307	1,937	220	6	21	111	22	(9)
2035	2,317	1,945	220	6	21	111	24	(10)
2036	2,326	1,954	220	6	21	112	25	(11)
2037	2,344	1,962	220	6	21	112	27	(3)
2038	2,346	1,954	219	6	20	112	38	(3)
15 Yr CAGR	**0.40%**	**0.27%**	**-0.03%**	**-0.01%**	**0.00%**	**0.47%**	**16.24%**	**7.16%**

Staff notes that GRE ran four alternative forecasting scenarios in EnCompass, which assumed higher and lower growth rates for annual peak demand and energy requirements, to capture various uncertainties that may impact the load forecast. GRE's annual peak demand scenarios shown in Figure 5. As illustrated in this figure, the annual peak forecast bounds are roughly +/- 100 MW relative to the base case. The Commission can decide whether this forecast range appropriately captures uncertainties such as EV adoption rates.

Figure 5. Scenario Comparison – Annual Peak



II. Seasonal Planning

MISO's transition to a seasonal resource adequacy construct required GRE to make assumptions for its planning reserve margin (PRM) and resource accreditation assumptions across four seasons. To minimize uncertainty, GRE used Planning Year 2023/24 values across all years for both the seasonal PRM and resource accreditation percentages.

The table below shows the seasonal PRMs applied in each year of capacity expansion scenarios (however, note that GRE ran a "Higher Summer, Lower Other Seasons" sensitivity):

Table 11. MISO Seasonal Planning Reserve Margin, PY 2023/24

Season	PRM Percentage
Summer	7.4%
Fall	14.9%
Winter	25.5%
Spring	24.5%

The next table shows seasonal resource accreditation, as well as the price assumption used in year 2030 (GRE used these capacity accreditation values for all runs except the "Low Seasonal RRA" sensitivity).

Table 12. GRE's Base Case Assumptions for Supply-side Resources

Resource	2030 Cost	Capacity accreditation			
		Winter	Spring	Summer	Fall
Combustion turbine	$933/kW	100%	84%	80%	84%
Four-hour lithium-ion battery	$895/kW	95%	95%	95%	95%
Wind PPA	$45/MWh	40%	23%	18%	23%
Solar PPA	$50/MWh	6%	15%	45%	25%

Figure 6 below shows that with no new resource additions, GRE expects to incur a capacity shortfall in Summer 2031. Staff included dashed red lines to show that GRE has only about a 100 MW surplus in the winters of 2028-2030, but the surplus is higher in other seasons. However, in 2031 and beyond – once the Rainbow PPA ends – GRE has a capacity deficit of about 200 MW or greater in both the summer and winter.[30]

[30] Figure 9 of GRE's Initial Filing.

Figure 6. Planning model length – No New Resources

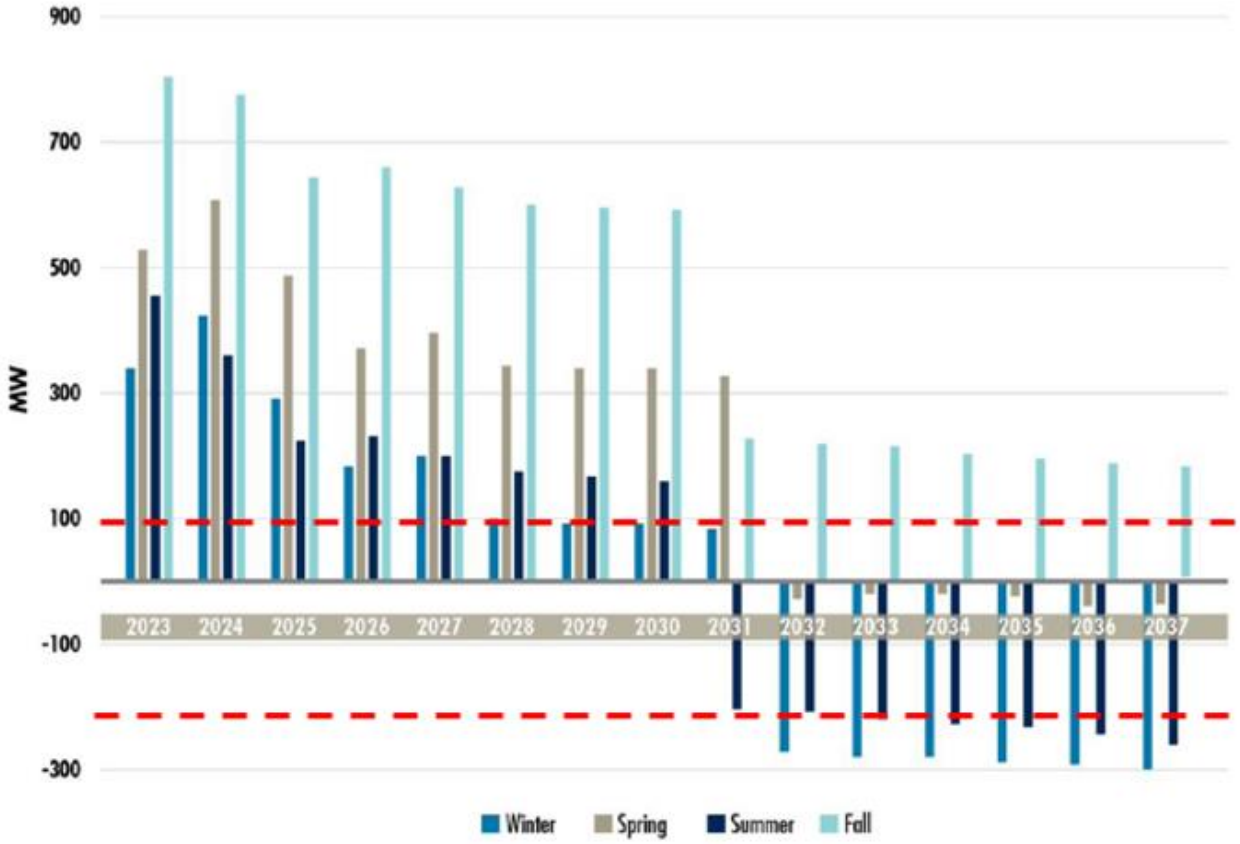
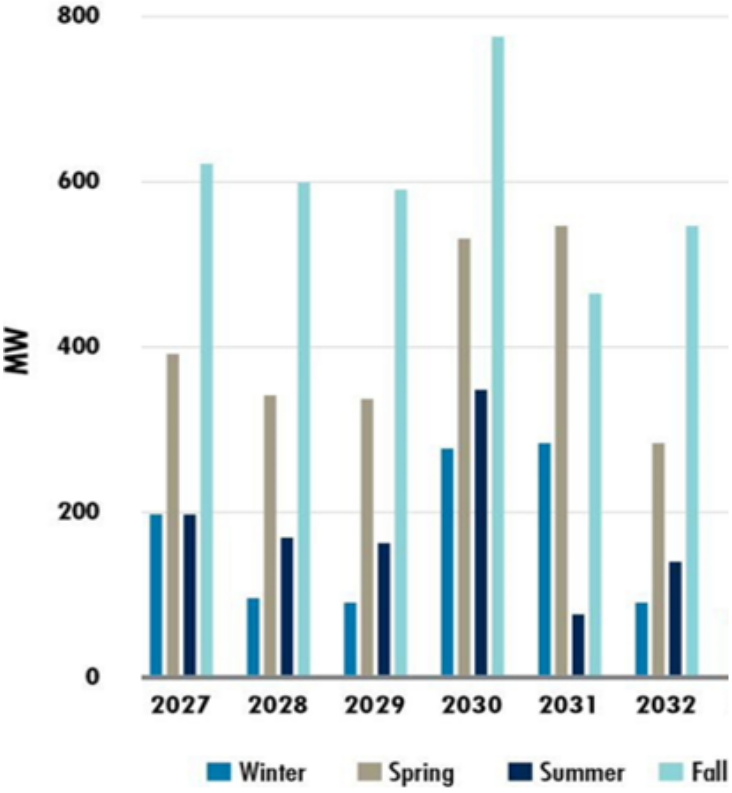


Figure 7 shows that the Preferred Plan satisfies GRE's resource adequacy requirements in all seasons during the planning period. In the figure below, Staff included only the 2027-2032 planning years in order to highlight the time in which generic resources are added and the Rainbow PPA is phased out.

Figure 7. Capacity Position – Preferred Plan



Preferred Plan

- 2030 – 200 MW Battery
- 2031 – 200 MW Solar, Rainbow PPA expires
- 2032 – 400 MW Wind

Accreditation Assumptions

- Batteries: 95% of nameplate capacity in all seasons
- Wind:
  - 40% of nameplate in the winter,
  - 18% in the summer.
- Solar:
  - 6% of nameplate in the winter,
  - 45% in the summer.

GRE argued that its Preferred Plan works well under MISO's transition to a seasonal construct because it results in a well-diversified portfolio of carbon-free resources that meets a broad range of needs:

> GRE sees each resource type contributing its different characteristics to GRE's resource mix to meet portfolio needs. Battery storage has high capacity accreditation across seasons and is able to charge at times of lower prices and discharge to help meet peak energy needs. This flexibility makes it an attractive resource in the model to create a least-cost portfolio. Solar has its highest capacity accreditation in the summer and also adds energy, primarily on peak. Wind has its highest capacity accreditation in the winter and produces the highest total amount of energy of these resources. Together, these resources meet GRE's seasonal capacity needs and energy needs that arise in the early 2030s.[31]

III. Modeling Results

A. Sensitivity Analysis

The table below shows most (but for space, not all) of GRE's sensitivities considered in

[31] GRE Initial Filing, p. 33.

EnCompass. As noted previously, GRE ran four load forecast sensitivities. Additionally, GRE considered a range of MISO market and natural gas prices, two wind and two solar PPA prices – as well as a self-build wind option (but not a self-build solar option) – and a range of storage options. GRE also considered factors such as whether existing wind PPAs, Elm Creek and Prairie Star Wind, would be extended rather than allowed to expire.

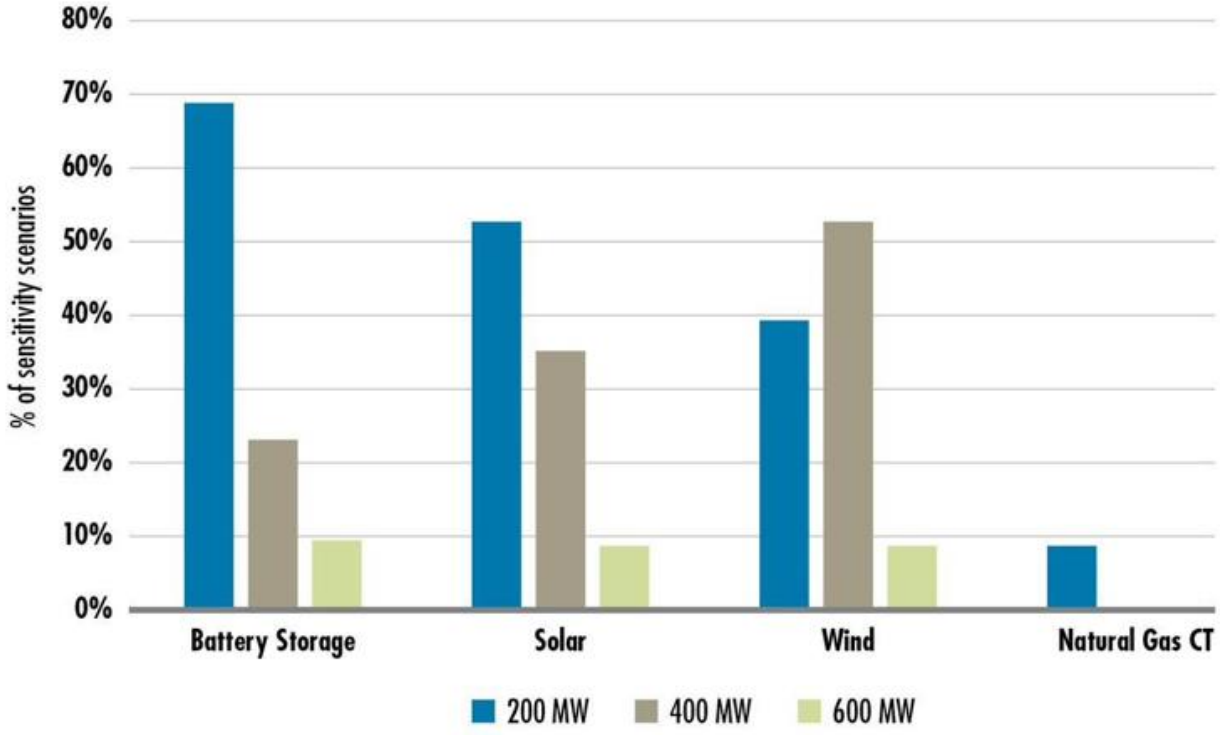
Table 13. Summary of EnCompass Sensitivities

Variable	Sensitivities
Load Forecast	• Low • Base • High • Extreme (extreme weather for two summers and winters)
MISO Market Prices	• Low (-30%), • Base (MN Hub) • High (100%)
Natural Gas (NG) Prices	• Low (-30%) • Base • High (+100%)
MISO Market Purchases	• None, • Base (up to 25%) • High (up to 75%)
MISO Reserve Margin	• Existing Seasonal; • Higher Summer, lower other seasons
Spiritwood Retirement	• No Retirement May Be Selected, • Forced Retirement in 2030
Wind	• Low – $35/MWh PPA • Base – $45/MWh PPA • Self-Build
Solar	• Low – $40/MWh PPA • Base – $50/MWh PPA
Storage	• Base – 4 -hour Lithium-ion Battery – NREL “Moderate” price with declining cost curve • High – 4-hr Lithium-ion Battery – NREL ATB “Moderate” flat price (i.e., without declining cost curve) • None – No battery storage offered
Extend Wind PPA	• Elm Creek & Prairie Star Wind PPAs extended

EnCompass was allowed to choose a CT, wind, solar, or storage as resource options. Figure 8 below shows the frequency with which each resource was selected across sensitivities. The takeaway is that 200 MW of battery storage was selected in roughly 70% of modeling runs, 200 MW of solar was selected in slightly more than half of the runs (although 400 MW of solar was selected in a third of the runs), and 400 MW of wind was also selected in slightly more than half of the runs (although 200 MW of wind was selected frequently as well). Therefore, GRE argued

that the Preferred Plan reflects a robust modeling outcome.

Figure 8. Proportion of sensitivity scenarios with each resource size and type



B. Spiritwood Station Retirement Analysis

Ordering paragraph 4.a. of the Commission's 2018 IRP Order required GRE to consider retirement scenarios for CCS and Spiritwood Station. For this IRP, GRE's Spiritwood retirement scenario permitted EnCompass to select retiring Spiritwood in 2030, but this option was not economic. According to GRE, this was because retiring Spiritwood resulted in more capacity additions and incurred high retirement costs. Specifically, GRE explained that:

> any retirement analysis of Spiritwood evaluation includes the fact Spiritwood has long-term steam supply contracts and road and water bond liabilities with Stutsman County and the city of Jamestown. Decommissioning of the plant would result in liquidated damages and early termination penalties to cover these liabilities — significantly adding to the cost of any proposed retirement scenario.[32]

C. Observations

According to GRE, the development of the Preferred Plan was directly informed by EnCompass modeling of the GRE portfolio. Staff highlights some of the modeling observations GRE included in the Initial Filing:

[32] GRE Initial Filing, p. 18.

- Across all scenarios modeled, the most frequently selected resource types were battery storage, wind, and solar resources.

- Specifically, the majority of scenarios added 200 MW of battery storage, 200 MW of solar, and 400 MW of wind, which are the sizes represented in the Preferred Plan.

- Although a natural gas CT was not included in the Preferred Plan, a natural gas CT addition was selected if market energy purchases were restricted.

- Drivers of lower-cost portfolios than the base case include lower wind, solar, market purchases, and natural gas prices.

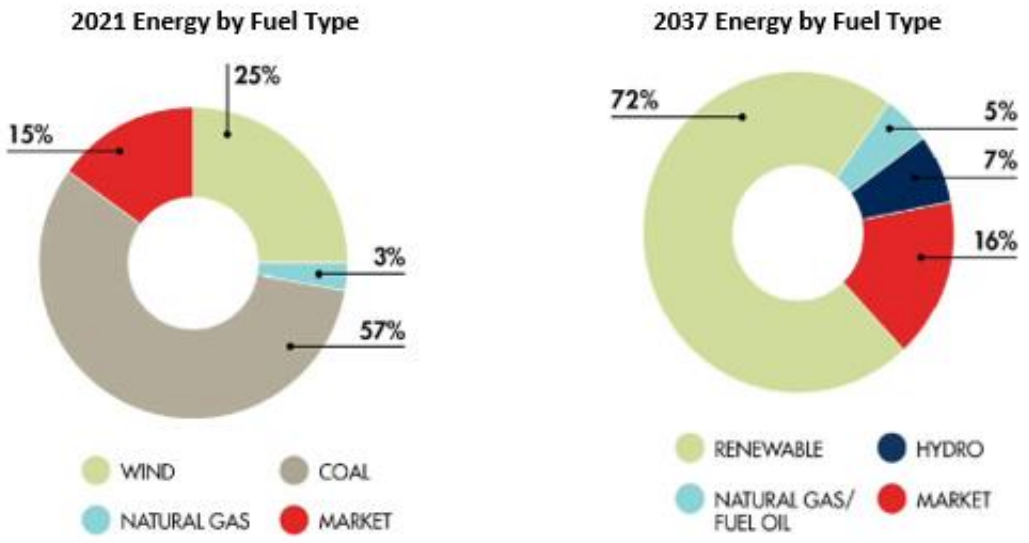
- Drivers of higher cost portfolios than the base case include higher market energy and natural gas prices, restriction of market purchases, Spiritwood Station retirement costs, and high load growth.

POLICY GOALS AND REQUIREMENTS

IV. State Energy Policy

The two charts below depict GRE's energy fuel mix in 2021 (on the left) and in 2037 after the implementation of its Preferred Plan (on the right). Note that CCS, at a size of 1,151 MW, provided over half of GRE's energy supply in 2021. By 2037, however, renewable energy will provide over 70% of GRE's energy mix, and the PPAs with Rainbow will have expired. Market purchases are roughly the same in 2037 as they were in 2021.

Figure 9. GRE 2021 and 2037 energy mix



According to GRE, this path positions the Cooperative well for compliance with the Minnesota

Renewable Energy Standard (RES), Carbon-Free Standard (CFS), and the state's Greenhouse Gas Reductions Goal.

A. RES Compliance

The charts above show that GRE's energy mix was about 25% renewables in 2021, which increases to 72% by 2037. According to the Initial Filing, GRE is currently complying with the RES by "retiring RECs equal to 25% of retail electric sales."[33] Regarding future compliance:

> [GRE's] biennial filing estimated GRE could comply with the Minnesota RES through 2040 at then currently approved levels. No obstacles are anticipated in meeting the current objective or standards. Even with the increased RES goal of 55% beginning in 2035, GRE anticipates an energy mix capable of satisfying that requirement as early as 2025, but will continue retiring RECs at current levels until the RES increases in 2035.[34]

Staff notes that, in its most recent biennial RES compliance filing, GRE projected a substantial REC surplus through 2025.[35] Staff outlined GRE's surplus RECs with a red box.

Table 14. Projected RES compliance for the current plus 3 upcoming years, including banked RECs

Year	Actual/Projected MN retail sales (MWh)	RES Req. (%)	RES Req. (MWh)	Projected Resources (MWh)	Projected Surplus (MWh)
2022	10,784,119	20%	2,156,824	10,314,948	8,158,124
2023	10,821,863	20%	2,164,373	12,870,004	10,705,632
2024	10,859,740	20%	2,171,948	16,080,412	13,908,464
2025	10,879,749	20%	2,724,437	20,286,474	17,562,037

Under Minn. Stat. § 216B.1691 subd. 2(e), electric utilities must file reports in the IRP estimating the rate impacts to comply with the renewable energy objectives of the state. GRE stated that it "has continued to meet the Minnesota RES with wind added for compliance and for economic reasons." In other words, the incremental rate impact from the RES is zero:

> GRE has been in compliance with the RES every year and has economically added new wind generation from 2017 to 2022. These new resources were unnecessary for meeting the 25% RES level and were pursued for the value that they represent to the portfolio. Therefore, there is no rate impact to the RES, as this wind would have been added to the portfolio absent an RES. Additional wind generation above and beyond the RES requirement has been added based on least-cost economics

[33] GRE Initial Filing, p. 36.

[34] GRE Initial Filing, p. 36.

[35] Docket Nos. E-999/PR-22-12, M-22-85 and PR-02-1240.

> as a hedge against GRE's member load. These resource selections were approved by GRE's members and the incremental cost of these resources are currently reflected in GRE's wholesale rates to its members. Therefore, the current rate impact of the RES is unchanged from GRE's last reported 2017 IRP values.[36]

B. GHG Reductions Goal

Minn. Stat. § 216H.02 Subdivision 1 (GHG Reduction Goal) states:

> It is the goal of the state to reduce statewide greenhouse gas emissions across all sectors producing those emissions to a level at least 15% below 2005 levels by 2015, to a level at least 30% below 2005 levels by 2025, and to a level at least 80% below 2005 levels by 2050.

According to GRE, its total portfolio met the 15% reduction in 2016, and GRE is on track to meet the 30% goal in 2025. The Cooperative estimates that by 2035, "GRE's retail electric sales will be 90% carbon free and carbon emissions will be more than 90% reduced from 2005 base levels."[37]

On page 44 of the Initial Filing, GRE discussed the "Minnesota ratepayer method" developed by the Department, which GRE used to estimate future GHG emissions. Table 10 on page 44 of the Initial Filing provided a summary of actual and projected emissions under the Preferred Plan. However, in response to Department Information Request 7 (DOC IR 7), GRE updated its emissions results. Using values from GRE's response to DOC IR 7 and the format from the Initial Filing, Staff created the table below to show GRE's updated glide path of percent reduction in GHGs (in CO2e[38]) relative to 2005 levels.

Table 15. Adjusted CO2e Emissions Glide Path, 2005-2037

MN Ratepayer Method	**2005**	**2021**	**2029**	**2037**
Direct emissions associated with electric power deliveries (tons)	14,317,625	10,234,890	143,843	386,455
Total CO2e after adjustments using Ratepayer method (Tons)	13,288,118	9,614,642	5,742,795	133,489
% Reduction from 2005	**-**	**28%**	**57%**	**99%**

The Department's comments provided a thorough, lengthy analysis of GRE's use of the Minnesota ratepayer method, and Staff will not repeat that analysis here. To be brief, Staff

[36] GRE Initial Filing, pp. 36-37.

[37] GRE Initial Filing, p. 58.

[38] "CO2e," or "Carbon dioxide equivalent," describes different GHGs in a common unit. For any quantity and type of GHG, CO2e is the amount of CO_2 which would have the equivalent global warming impact.

notes that this method includes the following analytical steps:

1. Start with total annual Minnesota member retail sales in MWh.
2. Calculate direct emissions (tons) by multiplying MWh generated times the corresponding CO_2 intensities from GRE owned generation, assuming no net annual market sales.
3. If there are net annual sales from GRE-owned resources, subtract these emissions by multiplying average GRE owned CO_2 intensity times the number of MWh sold.
4. Calculate emissions associated with PPAs and net annual market purchases by multiplying annual MWh times the corresponding carbon intensity.
5. For PPA MWhs without a corresponding REC retirement in M-RETs, the Midwest Reliability Organization West (MROW) regional grid carbon intensity will be applied.

C. Carbon-Free Standard

The Carbon Free Standard (CFS) under Minn. Stat. § 216B.1691 requires electric utilities to serve 100% of retail electric sales with technology that does not emit carbon dioxide by 2040. Cooperatives such as GRE have an interim requirement of 60% by 2030, which is a lower percentage than the 80% by 2030 interim requirement for investor-owned utilities. However, all utilities have an interim requirement of 90% by 2035.

Regarding CFS compliance, GRE noted:

> The CFS includes several flexible methods of compliance. For example, an individual Renewable Energy Certificate (REC) is allowed to satisfy both the CFS and the RES. In addition, a utility can partially satisfy the CFS with (i) the carbon-free portion of facilities that are only partially carbon-free and (ii) the utility's net market purchases to the extent the generation mix in the market is carbon-free as determined by the PUC.[39]

GRE stated that its REC balance from existing and planned wind PPAs positions the Cooperative well for CFS compliance. GRE expects to be at least 35% carbon-free in 2023 using the carbon-free calculation outlined in the CFS. However, "more guidance is still needed regarding the carbon intensity from net energy purchases from the MISO market."[40]

PARTY COMMENTS

Parties in support of GRE's Preferred Plan include:

- Department
- IUOE Local 49
- LIUNA

[39] GRE Initial Filing, p. 13.

[40] GRE Initial Filing, p. 13.

Parties who do not support GRE's Preferred Plan include:

- CURE
- Sierra Club
- Geoffrey Tolley

I. Department of Commerce

A. Summary

The Department recommends the Commission accept GRE's Preferred Plan, stating:

> The Department considers GRE's Preferred Plan to be generally reasonable in terms of cost, reliability, and risk. Relative environmental impact at this time is unknown. Therefore, the Department is generally supportive of GRE's Preferred and Five-Year Action Plans.[41]

The Department also made several recommendations for GRE's next IRP, many of which involve modeling recommendations that GRE agreed to in reply comments. These will be discussed later in this section.

The Department's analysis included a review of GRE's:

- 15-year energy and demand forecast process;
- EnCompass modeling;
- compliance with various Minnesota Statutory goals such as the CFS, RES, and solar energy standards;
- compliance with existing and potential environmental regulations; and
- energy efficiency and DR programs.

In brief, the Department's conclusions in these areas are as follows:

- ***Forecasting:*** The Commission should not use GRE's forecasts for any future certificate of need (CN) proceeding.

- ***Modeling:*** GRE's Preferred Plan is generally reasonable. Pages 53-54 of the Department's comments list 13 modeling suggestions for GRE to include in its next IRP.

- ***Compliance with Minnesota Laws and Regulations:*** Table 10 on page 43 of the Department's comments lists 13 applicable acts and regulations, which includes both federal and state regulations. With respect to Minnesota requirements, the Department did not raise any concerns regarding GRE's ability to comply with the RES. However, on CFS compliance, the Department stated that <u>without market purchases and RECs</u>, GRE falls short of the 60% requirement of the CFS by 1.2% in 2030. That said, the Department also noted that the Commission's investigation into CFS compliance (Docket

[41] Department comments, p. 41.

No. 23-151) will address this issue.

- ***Compliance with Federal Laws and Regulations:*** The Department highlighted potential noncompliance with the Coal Combustion Residuals Rule and the Good Neighbor Rule as regulations with significant uncertainty. According to the Department, GRE or associated parties are currently noncompliant with disposal of ash from the Coal-Creek plant and the transport rule.

- ***Energy Efficiency and DR Programs:*** The Department stated that GRE or associated parties are currently noncompliant with the CIP low-income spending standard.

B. Forecasting

The Department raised concerns over GRE's new approach to forecasting, which the Department described as a switch from using a relatively-straightforward econometric model to a complex and time- and resource-intensive, statistically-adjusted end-use (SAE) model. This left the Department unable to review the technical details of GRE's forecast, and the Department did not have time to create an alternative forecast. However, given that GRE does not appear to have an imminent need for new resources, the Department did not oppose using GRE's forecast for this IRP, but GRE's IRP forecasts not be used in a CN.[42]

According to the Department, SAE models, such as the one GRE developed for this IRP, have far greater complexity than the standard econometric forecast. In a resource planning context, the Department believes uncertainty can be better addressed by examining ranges of assumptions. The Department stated that "the costs of doing such intensive work involving SAE models appear to outweigh any benefits compared to the company's former methodology of only using econometric models."[43]

C. Modeling

Because the Commission's role in this proceeding is advisory, the Department "did not create a new base case or alternative preferred plan in EnCompass."[44] Rather, the Department reviewed GRE's modeling inputs and outputs and made suggestions.

In total, GRE considered 27 sensitivities in EnCompass—GRE's Preferred Plan and 26 other sensitivities. An important difference between the Preferred Plan and all other sensitivities was that the Preferred Plan "locked in" all planned projects, meaning that the battery, solar, and wind additions were hard-coded into the model. Conversely, the 26 sensitivities were run by changing one base case variable per run. Why this is important, the Department explained, is that "the sensitivities test the robustness of the base case, not the robustness of the preferred

[42] Department comments, p. 8.

[43] Department comments, p. 8.

[44] Department comments, p. 7.

plan."[45] This is crucial to understand because while the base case and Preferred Plan share the same size and type of expansion plan units, they do not share the same timing.

The table below summarizes how the Preferred Plan is set up differently than the Base Case:

Table 16. GRE's Preferred Plan vs. Base Case

Preferred Plan	Base Case

• Locks in 200 MW Battery in 2030
  • No batteries permitted to be added before 2030
• Locks in 200 MW Solar PPA in 2031
  • No solar permitted to be added before 2031
• Locks in 400 MW Wind PPA in 2032
  • No wind permitted to be added before 2032 or after 2032
• No DR, energy efficiency, or gas CTs permitted to be added at any time
	• Does not lock in any potential resources
	• No battery, gas CT, solar, or wind permitted to be added prior to 2027
	• Up to four units of each permitted to be added beginning in 2027

The next two charts illustrate how locking-in resources (Preferred Plan) versus not having these constraints in place (Base Case) affects the timing of resource additions. Batteries are shown by the yellow bar, solar is blue, and wind is red. The plans are plotted against GRE's total system reserve margin. Staff inserted the arrow to highlight that the Base Case (Chart 1) added a battery in 2027, whereas in the Preferred Plan (Chart 2), the battery in 2030 was locked-in.

[Intentionally blank]

[45] Department comments, p. 18.

Chart 1: Resource Additions by Year – Optimized Base Case

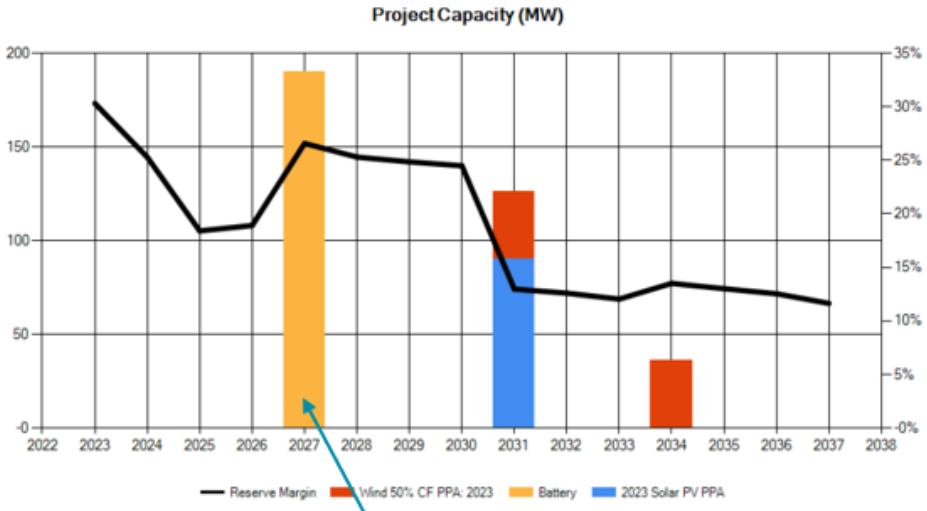
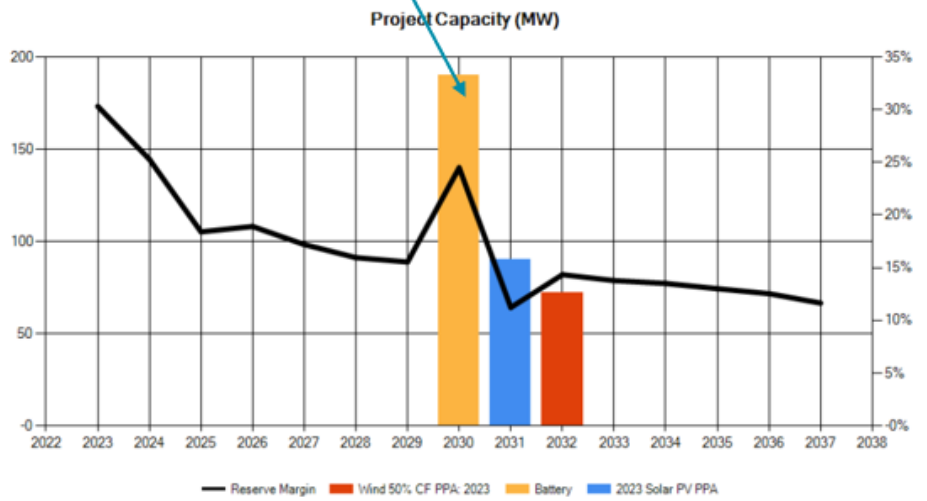


Chart 2: Resource Additions by Year – Locked-In Preferred Plan



Given these differences in timing, the Department expressed some concern over the exposure to market prices under the Preferred Plan:

> The 2031 and 2034 adds appear to be needed, in part, to meet minimum reserves. It does not look like the 2027 add is needed to meet minimum reserves . . . The Department notes that all sensitives except the "No Battery Storage Offered" add a battery in 2027. It appears that the reason this is such a heavily favored selection has to do with the 200 MW reduction in capacity from Rainbow Energy occurring in 2025. Since the Cooperative's Preferred Plan holds off on the battery addition until 2030, the Department is slightly concerned about the period of time between 2027 and 2030 in which GRE could be more heavily exposed to market prices.[46]

[46] Department comments, p. 23.

GRE responded that "GRE's IRP does not project a capacity shortfall until 2031. With respect to energy, GRE's members set an allowable market exposure tolerance and GRE implements a number of hedging strategies to ensure this tolerance is not exceeded."[47]

As Staff interprets this exchange, the Department and GRE agree that the timing of the capacity deficit does not occur until 2031, but they differ in their approach to risk prior to 2031.

Moreover, the Department and GRE also seem to agree on the size and type of resources. The table below shows the total number and size (but not timing) of units added for each sensitivity.[48] As shown, the most frequent result across sensitivities was one 200 MW battery, one 200 MW solar unit, and two 200 MW wind units. The selection of a CT unit occurred in only two runs—when market purchases were not permitted and when a battery was not available for selection.

Staff's takeaway from the table below is that whether units were locked-in or selected without these constraints, the size and type of units in the Preferred Plan was the same as most other sensitivities.

[Intentionally blank]

[47] GRE response to PUC Information Request 4.a. (February 1, 2024).

[48] Department comments, p. 21.

Table 17: Total Number of Resources Chosen by Sensitivity

Sensitivity Scenario Name	Battery (200 MW)	DR (3-33 MW)	EE (2-20 MW)	Gas CT (200 MW)	Solar (200 MW)	Wind (200 MW)
Base	1				1	2
Preferred Plan	1				1	2
Low Externality/Low Regulatory	1				1	2
Low Externality/Low Environmental	1				1	2
Reference (All High Externality Costs)	1				1	2
High Externality/High Regulatory	1				1	2
High Externality/High Environmental	1				1	2
High Load Forecast	1				1	2
Low Load Forecast	1				1	1
Extreme Summer and Winter	2				2	2
High Market and Marginal Fuel (NG) Prices	3				2	3
Low Market and Marginal Fuel (NG) Prices	2				2	1
No Market Purchases	2			1	2	2
High Market Purchases	1	1			1	1
Seasonal PRM Change	1				2	1
SWS Retirement 2030	2				1	2
Low Solar PPA Price	1				3	1
Low Wind PPA Prices	1				1	2
Low Renewable PPA Prices	1				1	2
Storage Costs Flat	1				1	2
No Battery Storage Offered				1	2	1
Self-Build Wind with PTC	2					3
Forced DSM Program Additions	1	1	1		1	2
Registered LMRs Increase	1				2	1
Lower RRA Accreditation	1				1	2
CT Partial Commit	1				3	1
Extend Wind Contracts	1				1	1
MH Contract Ends	2				1	2
Rounded Averages	1	0	0	0	1	2

Overall, the Department summarized its observations about GRE's outputs as follows:

- Natural gas CTs were selected in only two sensitivities: (1) No Market Purchases and (2) No Battery Offered;
- Unless forced into the model, DR and energy efficiency were never selected;
- Batteries were selected in every contingency in which a battery was permitted to be selected, and one battery selection was the most common result; and
- Solar and wind PPAs were both chosen in each contingency except for Self-Build Wind, which had more wind and less solar.[49]

Finally, the Department briefly discussed how the IRA and the Infrastructure Investment and Jobs Act (IIJA) were incorporated in GRE's modeling:[50]

> In this case GRE has incorporated at some aspects of the IIJA and the IRA into its modeling inputs. In fact, GRE has incorporated in the Petition a sensitivity that accounts for a very specific IRA/IIJA functions. The sensitivity assumes that rather than pursuing a PPA for wind (which has been GRE's standard practice) GRE would self-build wind and still be able to take advantage of the Production Tax Credit.[51]

The Department noted that while the IRA and IIJA were designed to reduce the cost of renewable resources, recent data shows that there has been upward pressure on solar and wind prices, leading to prices higher than previously forecast. According to the Department, this "highlights the importance of considering all of the factors influencing model inputs and not just some of the factors."[52]

D. Analysis of State Laws and Regulations

Section F. of the Department's comments discuss "standards that could feasibly constrain GRE's choices of what types of energy resources to draw upon and what types of technology will be used to produce electricity."[53] The Department noted that:

> Because there are so many newly established and forthcoming regulations, there is added uncertainty regarding the reliability of any current plans at this moment, which elevates the importance of monitoring future plans for compliance.[54]

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[49] Department comments, p. 22.

[50] The Department first noted that many market, governmental, and organizational changes can occur between the time that a utility "locks in the final structure of its modeling files and the time comments are due," so the Department generally addresses this issue by making changes to inputs or making recommendation for the utility to consider in the future.

[51] Department comments, p. 7.

[52] Department comments, p. 7.

[53] Department comments, p. 41.

[54] Department comments, p. 42.

Importantly, the Department found that GRE or associated parties are currently noncompliant with:

- the low-income spending standard within CIP;
- disposal of ash from Coal Creek Station; and
- the Good Neighbor Rule.

The remainder of this section will address GRE's compliance with Minnesota-specific requirements before moving onto EPA regulations in the section that follows.

1. Conservation Improvement Program

The Department reviews GRE's CIP compliance plans in a separate docket. However, CIP goals are relevant because compliance can impact GRE's resource mix and its plans for ensuring sufficient capacity. Additionally, low-income spending is important in part because there may be vulnerable communities within members' territories that requires monitoring compliance.[55]

According to the Department, GRE has historically not met CIP standards in energy savings and low-income spending, and if trends continue, GRE may continue to remain noncompliant, at least for the low-income standard. Therefore, the Department recommends that, in the next IRP, "GRE provide updated summary information on compliance and a discussion of GRE's work toward achieving compliance with the CIP letters, especially with the energy savings and low-income standards."[56]

2. Renewable Energy Standard and Carbon-Free Standard

On February 7, 2023, Governor Walz signed House File 7 (H.F. 7) into law. This legislation increased the RES to 55% renewables by 2035 and created a CFS, in addition to other statutory changes. The Commission has opened a generic docket, which is exploring how utilities will comply with the new standards.[57]

Addressing the increase to the RES, the Department noted that in 2023, GRE exceeded the 20% RES requirement by 15 percentage points. By 2037, GRE plans to exceed the RES by 23 percentage points. Thus, the Department did not raise any concerns with GRE meeting the RES for this IRP and will revisit compliance in the Commission's annual REC retirement and biennial RES dockets.

According to the Department's analysis of GRE's compliance with the CFS:

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[55] The Department noted that the average shortfall from the goal is small ($17,516), in part because the member cooperatives are small. Moreover, the percentage shortfall varies, some member cooperatives are as high as 100 percent short of the low-income spending standard.

[56] Department comments, p. 44.

[57] Docket No. E999/CI-23-151.

- Data provided by GRE in response to Information Request No. 3 shows that without market purchases and RECs, GRE falls short of the 60% standard by 1.2% in 2030.
- Also, GRE falls short by over 11% between 2035 and 2037, when the standard increases to 90%.
- However, the Commission's generic docket will provide additional clarity on compliance, and GRE's current IR responses should not be taken as evidence of its ability to comply or not comply with the new statute.[58]

3. Greenhouse Gas Reduction Goal

Based upon GRE's reported GHG emissions data, the Department concluded that GRE is compliant with the Minnesota GHG Reduction Goal for all years of the plan.

4. Jobs and Economic Development

In 2023, the legislature amended the IRP Statute to include a preference for local job creation. Minn. Stat. § 216B.2422, subd. 4a. states:

> As part of a resource plan filing, a utility must report on associated local job impacts and the steps the utility and the utility's energy suppliers and contractors are taking to maximize the availability of construction employment opportunities for local workers. The commission must consider local job impacts and give preference to proposals that maximize the creation of construction employment opportunities for local workers, consistent with the public interest, when evaluating any utility proposal that involves the selection or construction of facilities used to generate or deliver energy to serve the utility's customers, including but not limited to an integrated resource plan, a certificate of need, a power purchase agreement, or commission approval of a new or refurbished electric generation facility. The commission must, to the maximum extent possible, prioritize the hiring of workers from communities hosting retiring electric generation facilities, including workers previously employed at the retiring facilities.

In discovery, the Department asked GRE about local job impacts and maximizing local construction opportunities as it relates to the Preferred Plan. GRE responded that:

- The Dodge County Wind, Three Waters Wind, Discovery Wind, and Buffalo Ridge Wind are expected to create more than 1,250 local construction jobs (Three Waters and Buffalo Ridge are located in Minnesota);
- The Cambridge 2 dual fuel conversion will create 50 local construction jobs; and
- GRE will continue to employ 550 workers in its Elk River and Maple Grove power plants and field locations.

[58] Department comments, p. 46.

According to the Department, "GRE is currently compliant with this statute, but more specifics regarding details of the standards may evolve over time."[59] The Department noted that in the future the Commission may want to consider factors such as:

- Whether clarification of reporting is required to be able to determine economy-wide impacts; for example, impacts could be assessed by number of jobs hired by the utility, jobs in the local economy, or dollars to the local economy.
- Whether job impacts should be compared across dockets; for example, to be able to gauge whether job impacts are "high" or "low," the Commission could compare reports across dockets or in a single docket across utilities.
- Whether consistency on what is reported would be helpful; for example, the Commission may consider full-time versus part-time work, occupations hired, and salaries paid.
- Whether jobs outside of Minnesota are relevant; for example, GRE's IRP includes job impacts that would occur in Iowa and North Dakota.

E. Federal Laws and Regulations

As noted above, the Department believes GRE could face noncompliance with (1) the Coal Combustion Residuals (CCR) Rule and (2) the "Good Neighbor" provision of the Clean Air Act. Pages 50-51 of the Department's comments describe this issue.

In short, EPA proposed that the liner used to store the ash from Coal Creek was noncompliant. (To protect groundwater, among other things, the CCR Rule has liner materials and design requirements for CCR surface impoundments.) While the status of Coal Creek's compliance with the CCR is pending, the EPA has completed taking comments on a proposed denial on January 25, 2023, but has not made any final determination.

The second noncompliance issue pertains to a failure to meet the "Good Neighbor" (or Interstate Transport) provision of the Clean Air Act. The Department noted that on January 31, 2023, the EPA disapproved Minnesota's State Implementation Plan (SIP) for meeting Ambient Air Quality Standards in NO_X (ozone).

In response to a Department Information Request, GRE stated that EPA proposed an alternate federal implementation plan that allocated 84 NO_X allowances to GRE per Ozone season through 2025, where the Ozone season runs from May 1 through September 30 of each year.

Based on GRE's response, while GRE appears to have sufficient tradeable permit to cover summer emissions through 2025, GRE's allowance balance is less certain after 2025.

Aside from these two regulations, the Department stated that "GRE is currently compliant with the remaining federal rules investigated for this IRP."[60] The table below summarizes the

[59] Department comments, p. 48.

[60] Department comments, p. 51.

remaining EPA regulations that the Department assessed for compliance.

Table 18. Rule Name, Description, and Brief Analysis of Compliance

Rule	Compliance
Cross State Air Pollution Rule (CSAPR)	CSAPR sets standards meant to reduce smog and soot that travel across state boundaries. GRE does not foresee any compliance issues for CSAPR.
Acid Rain	GRE has a surplus of tradeable SO_2 and NO_X permits such that GRE does not foresee any issues with compliance.
Greenhouse Gas Rules for Fossil Fuel Fired Power Plants	Spiritwood Station may be impacted if the final rule is passed without any changes to the current EPA proposal. By 2030, GRE would have to install carbon capture and sequestration to the Spiritwood station if it wants to operate after 2039. Otherwise, Spiritwood can remain in operation until the end of 2039, but will need to co-fire natural gas at least 40% from 2035-2039.
Mercury and Air Toxic Standards (MATS)	MATS establishes national standards for mercury and Hazardous Air Pollutants. In April 2023, EPA proposed more stringent standards on particulate matter and tightened restrictions on steam generating and lignite-fired coal power plants. Although GRE states they are currently in compliance with the rule, because Spiritwood Station is capable of burning lignite coal, and both Spiritwood and Coal Creek are steam generating plants, the Department is uncertain whether these plants will maintain compliance.
Regional Haze Program	Regional Haze monitors visibility in National Parks and Wilderness Areas, including the Boundary Waters Canoe Area and Voyagers National Park. Currently, GRE is exempted from any emissions reductions in Minnesota's and North Dakota's State Plan, but periodic revisions to Minnesota's plan are due in 2028, which may impact operations at CCS.

F. Emissions Accounting

The Department raised the following regarding GRE's treatment of emissions:

- GRE claims that the purchases from Rainbow Energy Center are strictly financial transactions and should not result in any GHG emissions that are attributed to the Cooperative, although GRE included GHG emissions from Coal Creek Station in the IRP. The Department does not disagree that the Rainbow PPA is strictly financial, but GRE should still calculate Rainbow-specific emissions by multiplying total Rainbow energy purchases by a MISO carbon intensity factor.

- GRE should continue to use REC accounting to demonstrate compliance with state emissions reduction goals, but GRE should remove these figures when comparing emissions across sensitivities to clarify which sensitivities will produce the most and

least emissions.

- GRE calculated carbon emissions from net market purchases by subtracting all out-of-state market purchases from market sales to out-of-state buyers of electricity. The Department suggests that GRE should separately calculated emissions sold to the market with a factor reflective of carbon emissions due to electricity production from GRE.

In footnote 27 on page 47 of the Department's comments, the Department raised several issues the Commission may address in a future decision; for example, whether PPAs and financial transactions are independent of the resources used to supply the electricity, and whether any GHGs associated with the Rainbow PPA can be generalized to other bilateral PPAs.

G. EnCompass Recommendations

The Department recommends that GRE incorporate the following modeling suggestions in its next IRP, which Staff has grouped by category:

Model Design

1. Incorporate all known or planned resources into its model or explain why known or planned resources have been omitted.
2. Include a slightly broader range of potential resources, potentially determined through a more exhaustive pre-input study.
3. Develop a mixed integer programming (MIP) stop basis[61] and convergence tolerance cost analysis and consider these factors when developing the size of potential resources.

Market Assumptions

4. Try to pinpoint a moderate level of market sales to include in its base case, or at least in some scenarios, while being vigilant about avoiding capacity that is built solely to chase market prices.

Battery Assumptions

5. Continue to monitor battery arbitrage uncertainties in the modeling software and provide an update about further knowledge learned in its next IRP.

[61] The Department explained MIP as follows: "At a high level, EnCompass's MIP process involves two basic steps. In the first step EnCompass determines the potential ideal (or lowest possible cost) expansion plan by adding fractions of units. For example, the potential ideal plan may involve adding 30 percent of a wind unit in 2025, 70 percent of a solar unit in 2027, and 20 percent of a combustion turbine unit in 2030. The assumption is that fractions of units are not possible in the real world, and thus a second step is necessary. In the second step EnCompass experiments by adding whole units and not fractions of units in order to create feasible plans. For example, a feasible plan may involve adding one wind unit in 2025 and one combustion turbine unit in 2030. EnCompass continues to experiment until it finds a feasible plan (using whole units) that falls within an acceptable cost range. EnCompass then ceases experimenting and reports of the results of the feasible plan. The range of acceptable costs is defined by the modeler and is referred to as the 'MIP Stop Basis.'"

Environmental Costs

6. Incorporate some level of externality and carbon costs into base case assumptions;
7. Appropriately incorporate the Commission's regulatory costs into the model.
8. Confer with other utilities and potentially other interested parties to determine a best practice to address externality and environmental costs.

Emissions Reporting

9. Provide a comparative analysis of emissions across sensitivities, using MISO carbon intensity rates for energy purchases from Rainbow if the Rainbow contract does not involve actual energy purchases and removing REC accounting for purposes of comparing sensitivities.
10. Provide the relevant portions of the Rainbow contract(s) to demonstrate why a market carbon intensity rate is the more appropriate value;

EnCompass Files

11. Ensure that the appropriate input files correspond to reported exports.
12. Consider the use of a "setup" file for storing and transferring databases via spreadsheets.
13. Develop a database around variables the utility has control over (scenarios), variables the utility does not have control over (contingencies), and the Commission's carbon cost and externality futures (futures).

Staff will not elaborate on each of the Department's modeling recommendations but instead provide a high-level discussion of those that may be of particular interest to the Commission.

1. Model Design – Existing Resources

The Department noted that there were three specific resources that are known or planned but not incorporated into the model:

- The availability of Arrowhead Emergency Station, a fuel oil reciprocating engine;
- The plan to add a 1.5 MW Form Energy battery storage pilot project in 2024; and
- The planned conversion of Cambridge 2 into a dual fuel plant as part of the five-year action plan.

While none of these unmodeled resources are likely to impact the modeling results, the Department did not understand why these resources were not included. Therefore, in future IRPs, the Department suggests that GRE either incorporate all known resources into its model or explain why the resource has been omitted.

2. Model Design – Potential Resources

The Department noted that of the four utilities using EnCompass – the three investor-owned utilities and GRE – GRE's database considered the fewest number of resources, with just six resources available to the model:

> Other utilities have made available to their model natural gas combined cycle units, which GRE did not examine, as well as transmission additions and different sizes of batteries, CTs, DSM, solar, and wind . . . It may also be worthwhile for GRE to incorporate certain transmission components into future resource plans.[62,63]

The Department also suggested that GRE consider different sizes of each type of potential resource; the Department noted Minnesota Power's differently-sized DR projects and Xcel's levels of DSM consistent with the Department's statewide potential DSM study. Moreover, all three investor-owned utilities looked at different sizes and types of gas peaking units.

The Department acknowledged that there are benefits to offering fewer resources in the model – such as smaller problem sizes and faster run times – but those benefits should be balanced against a broad range of potential resources.

3. Interaction with MISO Markets

GRE did not model any scenarios that permitted market sales. In the past, the Department has argued that utilities should not be using ratepayer dollars purely to speculate on market prices, but assuming zero market sales is becoming increasingly problematic. To use wind resource modeling as an example, if EnCompass does not allow GRE to sell excess energy into the MISO spot market, then wind will simply be reported as curtailed, which undervalues the wind unit.

4. CO_2 Regulatory Costs

As the Commission knows, IRPs consider both CO_2 regulatory costs, which estimates the likely rate impacts of carbon regulations, and environmental externalities, which consider the social cost of pollution onto society (but it not a ratepayer impact). According to the Department, "GRE did not properly incorporate the regulatory carbon cost component of the Commission's futures into EnCompass," which could have been due to issues with modeling software.[64]

Also, as discussed in the recent CO_2 regulatory costs docket,[65] CO_2 regulatory costs are internalized into rates and therefore influence the dispatch and selection of resources, whereas externalities do not. The Department explained that GRE "labeled [CO_2 regulatory costs] as externality costs in EnCompass. This error means that although GRE's 'CO2 Reg' costs are

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62 Department comments, p. 38.

63 For example, Minnesota Power's model forced "transmission project" to be built anytime a new wind or solar project was built as a generic resource. Xcel's model used both "transmission cost free units", which reuse the existing interconnection rights of retiring baseload plants and generic units that had a transmission cost component included in the overall cost.

64 Department comments, p. 36.

65 Docket No. 07-1199

supposed to impact the model's expansion plan and dispatch decision-making, they do not."[66]

Because the CO_2 regulatory costs are not incorporated into the model's capacity expansion decision-making process, the Department concluded:

> At this time, this CO_2 regulatory cost misapplication has the most potential to meaningfully impact the Department's recommendations. The Department typically recommends plans based on least cost PVSC with a mid-range regulatory future, but no plans examined include regulatory costs. It's possible, therefore, that the Department would instead recommend that GRE pursue the base case timing for its capacity additions, or other course of action within the utility's control. The Cooperative also did not provide clarity on this front by comparing emissions across potential plans. This means that it is unclear to the Department which plan has the lowest environmental impact with correct consideration of externalities.[67]

H. Next IRP Filing Date

The Department offered a Spring 2027 filing date for GRE's next IRP. GRE's Preferred Plan does not add substantial resources until the 2030-2032 timeframe, so a 2027 filing date should enable the Commission to provide meaningful advice to GRE on these additions.

II. CURE

CURE recommends that the Commission reject GRE's Preferred Plan because it fails to include a reasonable EV adjustment into the load forecast, and GRE did not consider self-build solar as a resource option (GRE considered a solar PPA option only). CURE also questioned whether GRE's Cambridge 2 dual fuel conversion will impede the Cooperative's ability to comply with updated GHG emissions standards. CURE does not support the Department's recommendations for a Spring 2027 deadline for GRE's next IRP, since this would mean four years in-between IRP filings, and GRE's next plan can look very different given current uncertainties (e.g., New ERA program funding).

A. EVs

CURE argued that GRE did not account or plan for "the widespread electrification of transportation," which is evident from GRE's unrealistically low assumptions for EVs. First, CURE pointed to GRE's past EV forecasts, which have significantly underestimated EV adoption by its member-owners:

> In 2017, GRE reported that it anticipated 737 EV units across its service territory by 2018, and 2,080 units by 2023. The actual rate of adoption, according to GRE's

[66] Department comments, p. 36.

[67] Department comments, p. 37.

> IRP is 9,972 EVs, nearly five times larger than anticipated.[68]

Next, CURE noted that GRE's understated forecast can be partially explained by the Cooperatives reliance on the "outdated, 2021 U.S. Energy Information Administration's (EIA) Annual Energy Outlook (AEO) forecast for EV stocks."[69] CURE argued that if GRE had merely used the same source but with more recent data, GRE's EV assumption would have been much higher. CURE compared the difference in forecasted nationwide EVs between EIA's 2021 AEO and its 2023 AEO.

Table 19. EIA 2038 Sales Forecast of EV and Hybrid Vehicles

Vehicle Type	2021 AEO (2038 sales)	2023 AEO (2038 sales)
100-mile EV	4,000	5,400
200-mile EV	131,600	431,000
300-mile EV	385,000	859,700
Plug-in Hybrid	104,300	131,700
Electric-Gasoline Hybrid	402,700	380,000

CURE also referenced several other sources supporting the conclusion that EV adoption will happen much faster and at a much higher rate than GRE's IRP assumes. CURE recommended that GRE should at least update its IRP by refreshing its EV forecast:

> the least GRE can and should do is reassess its load forecast using the Energy Information Administration's (EIA) 2023 Annual Energy Outlook. Doing so will allow GRE and the Commission to determine whether GRE's Preferred Plan will be able to meet the increased load—especially from nighttime EV charging—that is likely to occur with an increase in EV adoption.[70]

B. Self-Build Solar

CURE believes GRE's EnCompass analysis is incomplete because the Cooperative chose not to consider self-build solar as a resource option in EnCompass; rather, GRE assumed that 200 MW solar PPAs would be the only solar resource available, which CURE argued is not the case. CURE explained that the Commission should:

> direct GRE to re-run its model with at least three self-build solar options—fixed-tilt, single-axis tracking, and solar-plus-storage. Each option should have an assumed nameplate capacity of at least 5 MW. Cost estimates for these options should come from the EIA or a comparable source.[71]

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[68] CURE initial comments, p. 2.

[69] CURE initial comments, p. 2.

[70] CURE reply comments, p. 1.

[71] CURE initial comments, pp. 3-4.

According to CURE, GRE's choice to exclude self-build solar is troubling considering the "millions of dollars available through IRA loans or tax credits—including a direct-pay option—to defray the costs."[72] CURE referenced Connexus Energy's solar-plus-battery project in Ramsey, Minnesota as evidence that solar-plus-storage is also commercially feasible in its service area.

GRE responded to CURE by stating that its solar addition does not occur until 2031, so the "decisions regarding location, duration, and ownership structure of those resources will be determined" at a later time.[73] CURE countered that "the costs for self-build solar and solar PPAs are distinct," and excluding self-builds "restricts the model's ability to choose the best timing for *all* solar resource options."[74] Therefore, the timing of GRE's proposed additions are not credible with insufficient consideration to all resource options available to the Cooperative.

C. Next IRP

CURE opposed the Department's suggestion of a Spring 2027 filing date for GRE's next IRP. CURE first argued that Minn. R. 7843.0300, subp. 2 would have GRE to file its next IRP on April 1, 2025. Additionally, as the largest generation and transmission cooperative in the state, serving nearly 30% of the state's population, CURE believes that "consistent, up-to-date energy planning information is essential."[75] Third, due to "GRE's insistence that self-build solar need not be included in this IRP,"[76] CURE has serious concerns if the Commission both delays the next IRP until 2027 and does not require GRE to supplement this record with modeling a self-build solar option. Finally, CURE noted that April 2027 is getting close to GRE's projected 2031 capacity deficit, and there is a reliability risk by delaying the next IRP this far into the future.

GRE's and the Department's justification for a four-year gap in-between IRP filings is that the Preferred Plan does not add new resources until the early 2030s. CURE responded that this is misleading. GRE's reply comments, for example, discuss the near-term addition of over 1,200 MW of utility-scale wind projects, and the timing can be impacted due to the outcome of GRE's New ERA funding request. GRE's member-owners are also under the New ERA program scoping "129 MW of distributed solar energy, 11.5 MW of wind and solar-wind-storage hybrid projects, and 115 MW of member-directed, transmission-connected renewable energy." Thus, referring only to the EnCompass units beginning in 2030 paints an incomplete picture of GRE's list of resource acquisitions discussed in the IRP.

Regarding topics to consider in GRE's next IRP, CURE requests that, first, the Commission "consider the anticipated impact of federal funding—primarily from IRA sources and any

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[72] CURE initial comments, p. 3.

[73] GRE reply comments, p. 9.

[74] CURE reply comments, p. 2.

[75] CURE reply comments, p. 3.

[76] CURE reply comments, p. 2.

consistent legislation extending such funding—obtained by GRE." According to CURE:

> If GRE is a recipient of IRA funding, that funding will have a significant impact on the cooperative's future planning as well as the rates member-owners pay. It is essential for the Commission to understand what funding, if any, GRE receives and how it impacts consumers and the cooperative's long-range energy planning.[77]

The second topic is modeling the retirement of Spiritwood Station in 2040. CURE reasoned that continuing to model Spiritwood retirement dates aligns with the CFS and GHG reduction goals, and it makes sense to consider the impacts that retiring Spiritwood would have on GRE's overall energy mix and costs to member-owners.

III. IUOE Local 49 and LIUNA

The International Union of Operating Engineers Local 49 (Local 49)[78] supports GRE's Preferred Plan. Specifically, Local 49 supported three main components:

- The addition of new wind resources in the near-term will provide good job opportunities for union construction workers and low-cost electricity generation for GRE members.

- While PPAs with Rainbow will step down over time, the continued operation of CCS will provide good ongoing job opportunities for its members while allowing for the exploration of carbon capture technology.

- Local 49 is excited about the feasibility study for pumped hydro storage in northeastern Minnesota. Local 49 has many members in the Iron Range area, and the construction of a large pumped hydro facility would provide significant work opportunities for them.

Similarly, LIUNA supported GRE's Preferred Plan, stating it "is well-designed to meet members' energy needs over the next 15 years," while positioning the Cooperative to meet its obligations under the CFS.[79] According to LIUNA, GRE reasonably phases out of the Rainbow PPA over time, retains infrequently-used CTs for reliability, and diversifies its portfolio with storage, solar, and wind in 2030-2032.

LIUNA also applauded GRE's stakeholder engagement in advance of the IRP filing and the Cooperative's prioritization of local job impacts in the handoff of CCS. LIUNA emphasized that

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[77] CURE initial comments, p. 4.

[78] IOUE Local 49 represents more than 12,000 Operating Engineers and their families in Minnesota, along with members in North and South Dakota. The North Central States Regional Council of Carpenters (Carpenters) represents approximately 12,000 workers and their families across Minnesota, along with members in Wisconsin, Iowa, Nebraska, North Dakota and South Dakota. Both unions work on a wide array of energy infrastructure construction and maintenance projects–including coal plants, natural gas plants, nuclear plants, wind and solar.

[79] LIUNA comments, p. 1.

CCS remains a critically-important source of local jobs and economic activity in North Dakota, and "while the future of the plant is uncertain, enhanced IRA support for carbon capture provides a potential path for delivering low-carbon energy without a devastating shutdown."[80]

LIUNA noted that following the sale of CCS, Spiritwood Station will be GRE's only significant coal-fired generation asset. Future planning efforts should recognize the value of Spiritwood and the co-benefits it provides to local businesses, workers, and local communities.

While supportive of the plan, LIUNA requested additional information be provided in GRE's next IRP. The CFS requires utilities to consider local job impacts, with a particular focus on construction jobs, as part of resource planning and acquisition. The next IRP should provide potential job impacts for each aspect of the Preferred Plan, including the Rainbow PPA and wind additions.

IV. Sierra Club

A. New ERA Program

The Sierra Club discussed GRE's Preferred Plan largely in the context of maximizing IRA-related funding. According to Sierra Club, "the New ERA program is geared to provide up to $970 million in direct cash grants and other financing to each cooperative that can deploy portfolios of clean energy at scale to replace expensive and inefficient fossil generation."[81] More, the New ERA program and direct-pay tax credits "can pay for more than 75 percent of the cost of renewable energy, energy storage, and other clean energy projects . . .".[82]

Based on an assessment of New ERA benefits conducted for this IRP by the U.C. Berkeley Center for Environmental Public Policy (CEPP), GRE could reduce costs and reliably serve customer requirements by replacing Spiritwood and ending the Rainbow PPAs by investing in:

- 989 MW of solar PV;
- 1,577 MW of wind; and
- 1,051 MW of battery storage.
    - Of this 1,051 MW of battery storage, Sierra Club recommends 172 MW be 4-hour, 468 MW be 6-hour, and 398 MW be 8-hour batteries.

According to Sierra Club, this portfolio would reduce wholesale electricity costs by more than 20% and deliver annual 2032 savings of $129 million.[83] Because GRE's modeling did not account for the $970 million it could secure from the New ERA program, Sierra Club recommends that GRE update its EnCompass modeling consider the action plan outlined above. The updated analysis should include all of the incentives and financing mechanisms offered by

[80] LIUNA comments, p. 2.

[81] Sierra Club comments, p. 2.

[82] Sierra Club comments, p. 1.

[83] A spreadsheet summary of CEPP's analysis for GRE is attached to these comments as Attachment A.

the IRA.

In the alternative, Sierra Club recommends that GRE should conduct an optimized EnCompass modeling run; as used here, "optimized" refers to removing constraints GRE placed in its model, such as locking-in potential resources and considering only a limited type of potential resources (e.g., solar PPAs but not solar self-builds).

B. Modeling Assumptions

As noted above, CEPP's analysis, which used NREL's ReEDS (Regional Energy Deployment System) model for its analysis,[84] found that GRE could cost-effectively and reliably replace Spiritwood and end the Coal Creek contract through a combination of solar, wind, and battery storage.

The clean energy portfolio was estimated to have a capital expenditure of around $4.5 billion. Of that amount, more than $1.8 billion could be recovered through the direct payment of production tax credits on both solar and wind, another $690 million could be recovered through direct payments of the investment tax credit for storage systems, and $970 million can be paid in cash through the New ERA program.

To test the reliability of this portfolio, the ReEDS model assessed how the U.S. electric system can integrate renewables, storage, and other technologies on an hour-to-hour basis. The model assumed that balancing areas had to serve at least the same amount of generation in 2032 as 2021, forcing new renewable energy to be largely local, and that utilities had to serve at least as much energy as they had in 2021. Additionally, utilities had to substantially improve their capacity position and not rely on the market for capacity purchases.

C. Environmental Regulations Risk

According to Sierra Club, GRE faces a significant risk of additional pollution control requirements at Spiritwood. GRE explained that under the EPA's proposed 111(d) rule, Spiritwood may need to install carbon capture or co-fire at least 40% on natural gas to comply:

> GRE's Spiritwood Station may be impacted if the 111(d) rule is finalized and implemented as proposed. Specifically, Spiritwood will either need to install carbon capture and sequestration (CCS) by 2030, if it plans to operate after 2039. Otherwise, Spiritwood can operate through 2039, but will need to co-fire natural gas at least 40% from 2035-2039. Spiritwood is able to co-fire natural gas now. Per the IRP Section 4, GRE is conducting a carbon capture feasibility study to better

[84] According to Sierra Club, "ReEDS is a capacity expansion model with in-depth characterizations of renewable energy resources, including clean energy and storage performance and cost at a high spatial resolution. The model is also designed to assess what elements of a clean portfolio are required to meet reliability on an hour-to-hour basis. While ReEDS is not a utility-specific model, it breaks down the US electric system into accurate representations of 134 balancing areas, with transmission constraints. All of the inputs used in the model are sourced from public information."

understand potential costs and implications for Spiritwood Station.

D. Carbon Emissions

An important consideration for this IRP is how GRE accounts for the carbon emissions associated with the Rainbow PPA. GRE stated that it accounted for carbon emissions for the PPA by assigning the carbon intensity of Rainbow to the energy associated with the PPA. Sierra Club believes "this is the correct approach and recommends that the PUC clarify that GRE must use this methodology going forward in all dockets."[85] Sierra Club explained:

> It is Sierra Club's position that GRE's approach in this docket of assigning the carbon intensity of Rainbow to the energy associated with the Rainbow PPA is the correct one. It is well-established that the Rainbow PPA was entered into as a "deal" to keep the Coal Creek power plant operating; GRE had previously planned to retire it in 2022 because it was uneconomic. GRE played a vital role in the continued carbon emissions from Coal Creek; but for its decision to enter this contract with Rainbow, those carbon emissions would have been entirely abated. GRE must take responsibility for the portion of emissions associated with the energy and capacity it receives under its PPA with Rainbow until that PPA ends.[86]

V. Geoffrey Tolley

Geoffrey Tolley (G. Tolley) is a member-owner of the Cooperative Light and Power Association of Lake County. G. Tolley argued that GRE's IRP is outdated, and the Commission's new directives from the Commission's investigation into the impacts of the IRA (Docket No. 22-624) suggest that GRE should update its IRP analysis. As an example, GRE did not account for the IRA's direct pay option for tax credits or financing assistance, which can assist GRE's newly-increased 10% Renewable Member Resource Option.

G. Tolley also echoed CURE's concern that the IRP depends on outdated assumptions from EIA's 2021 AEO, which understates growth in solar and EVs. For instance, G. Tolley pointed to how the 2023 AEO assumes substantially more growth in solar PV capacity, and G. Tolley referenced the significantly higher EV forecast in the 2023 AEO relative to the 2021 AEO.

Further, G. Tolley stated that GRE's phase-out of the Rainbow PPA is less than previously indicate to member-owners. Specifically, G. Tolley stated that the step-down in capacity is "at odds with the PPA described to the distribution coops in January 2022," which reduced the "initial 1,050 MW to 368 MW in 2023."[87]

G. Tolley recommends the Commission require the following changes prior to accepting GRE's

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[85] Sierra Club comments, p. 6.

[86] Sierra Club comments, pp. 6-7.

[87] G. Tolley initial comments, p. 4.

IRP:

1. Update projections to use those from the EIA's 2023 AEO and decrease reliance on pre-IRA data where possible.
2. Figure out how the EV fleet size forecast became so inconsistent.
3. Address the IRA in accordance with the PUC-adopted decision option 13a of Docket No. 22-624.
4. Address the potential to load control the early evening charging of 100,000 EVs, particularly in winter.
5. Address the potential of the winter bimodal demand curve in MISO Zone 1 to be flattened due to the effects of the IRA and thus the value of utility-scale solar PV investment.
6. Include estimates of distribution coop take-up of 10% self-generation given the significant incentives now available.

VI. GRE Responses to Intervenor Comments

GRE's October 2, 2023 reply comments provided both updates to the Preferred Plan that occurred since the Initial Filing – including, importantly, a discussion of GRE's "New ERA Project's Portfolio of Actions" –and responses to party comments. Also, to provide additional information on issues raised by the parties, GRE attached two appendices pertaining to GRE's EV initiatives and its carbon accounting methodology.

A. New ERA and Updates to the Preferred Plan

As mentioned previously, GRE's portfolio strategy for New ERA program investments has three main components:

1. Deliver wind energy over regionally-coordinated transmission;
2. Coordinate member-owner renewable energy resource deployment; and
3. Advance smart grid technologies that enable a VPP, or virtual power plant.

Notably, Discovery Wind, Dodge County Wind, and Three Waters Wind are all part of GRE's Preferred Plan and the New ERA LOI, and GRE may be able to accelerate the wind projects, which use existing interconnections, with New ERA funding.

Other updates to the Preferred Plan discussed in GRE's reply comments include (1) a one-year delay to the Form Energy long-duration storage pilot, pushing the in-service date to December 2025, and (2) a third short-term PPA with Rainbow Energy for the sale of financially settled energy in Minnesota.

B. Response to the Department

The Department recommended GRE incorporate 13 modeling suggestions in its next IRP. As stated below, GRE did not oppose these recommendations, but GRE believes that comments related to carbon accounting should be considered in the CFS docket:

> GRE does not oppose the recommendations made by the Department in its review

> of the modeling decisions and methodology. Understanding that there are complexities involved with the determination of carbon attribution for financial transactions that will be explored by this Commission and stakeholders in future proceedings, GRE largely agrees with the process changes suggested by the Department.[88]

GRE also supports the Department's recommendation that GRE file its next IRP in Spring 2027.

On pages 14-15 of GRE's reply comments, GRE responded as follows to the Department's assertions about noncompliance with the CCR, Good Neighbor provision, and CIP requirements:

- Because GRE is no longer the owner of Coal Creek Station, GRE "cannot comment on the current compliance of the unit with EPA CCR regulations," but should EPA deny the alternative liner application, GRE can comment on "limitations to station operations."[89]

- "GRE anticipates no issues complying with the Minnesota State Implementation Plan (SIP), if reinstated by the courts. The decision by the EPA to disapprove of Minnesota's SIP has been stayed for numerous states by the eight-circuit court and several other circuits. Given these court actions, it remains to be seen if EPA's Federal Implementation Plan (FIP) will remain law. Further, GRE itself would have been compliant with the EPA's FIP given allowance allocations in the first few years."[90]

- "GRE and its member owners participated in the changes to the energy conservation goals that allowed for a greater emphasis on efficient fuel switching. The promotion of heat pump technologies and electric vehicles is well in line with both state and federal energy policy goals focused on the promotion and adoption of these technologies, which seek to further decarbonize other sectors of the economy by leveraging the decarbonization successes of electric generation. Given the expected financial rebates and tax incentives that the Department will be central to promoting, GRE is confident that the savings will be met."

C. Response to CURE

1. Electric Vehicles

In response to CURE's comments on EV forecasting, GRE noted that EV growth "has minimum impact on GRE's near-term capacity expansion modeling and short-term capacity expansion plan in this IRP."[91] Forecasting the future of EV growth is, according to GRE, "extraordinarily difficult," but GRE is actively working on future EV scenarios:

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[88] GRE reply comments, p. 13.

[89] GRE reply comments, p. 14.

[90] GRE reply comments, p. 14.

[91] GRE reply comments, p. 7.

> The utility industry as a whole is working to better understand the emerging technologies surrounding electric vehicles and the pace of adoption. Accurately forecasting EV market penetration by 2037 is extraordinarily difficult and highly dependent on many factors that are geographic, economic, political, and commodity based. Therefore, GRE is currently at work evaluating improvements to forecasting future electric vehicle load scenarios. Local research on charging, input from GRE's member owners, manufacturing trends/capabilities and national/local policy will continue to be studied for future electric vehicle forecasts.[92]

GRE then discussed its participation in the Electric Power Research Institute's (EPRI) EVs2Scale2030™ initiative, which is a three-year collaboration that seeks to:

- enable the utility industry and its regulators to be in lockstep with vehicle manufacturers, fleet operators, and consumers to build confidence in achieving 2030 goals;
- enact systems and processes that support the pace of activity and investment required; and
- develop and optimize the tools and technologies required to enable EVs at scale and capture the grid benefits of this large and flexible load.

2. Self-Build Solar

GRE opposes CURE's request that the Commission order GRE to re-run its models with three self-build solar options, as GRE does not think this additional work will change the short-term action plan. EnCompass generally selects its first solar resource in 2031. GRE stated that "as GRE gets closer to the implementation date of need for these assets, the decisions regarding location, duration, and ownership structure of those resources will be determined. The omission of GRE owned solar assets does not compromise the validity of the planning work in any way."[93]

D. Response to Sierra Club

Sierra Club recommends the Commission apply in all future dockets GRE's method of assigning the carbon intensity of Rainbow to the energy associated with this PPA. GRE stated that it "does not believe this is a priority decision in this IRP," and the docket on CFS compliance is the appropriate forum for this discussion.[94]

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[92] GRE reply comments, p. 7.

[93] GRE reply comments, p. 9.

[94] GRE reply comments, p. 11.

STAFF DISCUSSION

I. Noncompliance Issues

A. EPA Rules and CIP

The Department stated that "GRE or associated parties are currently noncompliant with" (1) the EPA CCR Rule, (2) the EPA Good Neighbor Rule, and (3) the CIP low-income spending standard. GRE strongly disagreed with the Department's analysis, which is explained on pages 14-16 of GRE's reply comments and page 53 of these briefing papers.

Staff recognizes that the Commission plays an advisory role in GRE's resource planning process, but at the same time, Staff is reluctant to recommend the Commission accept an IRP in which the applicant is noncompliant with state or federal laws and regulations. Therefore, Staff requests that GRE and the Department propose a solution other than addressing noncompliance in the next IRP at or prior to the Commission hearing. It might be helpful for parties to clarify if (1) the CIP dispute is currently being resolved in a CIP docket such that it does not need to be an IRP issue, and (2) if "noncompliance" means that GRE is actively operating and/or purchasing power from sources that are in violation of EPA regulations, or if decisions still need to be made in order to address compliance at those sources.

B. CO_2 Regulatory Costs

The second potential noncompliance issue is GRE's consideration (or lack thereof) of the Commission's CO_2 regulatory costs. The last two Commission orders established specific modeling requirements that utilities must follow in their resource planning analysis. However, in this case, the Department stated that "GRE did not properly incorporate the regulatory carbon cost component of the Commission's futures into EnCompass."[95] In fact, the Department stated that GRE's misapplication of CO_2 regulatory costs left the Department unable to provide recommendations as they typically do in resource plans:

> At this time, this CO_2 regulatory cost misapplication has the most potential to meaningfully impact the Department's recommendations. The Department typically recommends plans based on least cost PVSC with a mid-range regulatory future, but no plans examined include regulatory costs. It's possible, therefore, that the Department would instead recommend that GRE pursue the base case timing for its capacity additions, or other course of action within the utility's control. The Cooperative also did not provide clarity on this front by comparing emissions across potential plans. This means that it is unclear to the Department which plan has the lowest environmental impact with correct consideration of externalities.[96]

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[95] Department comments p. 36.

[96] Department comments, p. 37.

As discussed previously, the Department's EnCompass analysis described how GRE's Preferred Plan differed from the base case. For example, under the Preferred Plan, resources were locked-in, while in the base case they were not. The Department noted that GRE's 26 sensitivities changed one base case variable at a time, which means the sensitivity analysis tested the robustness of the base case, not the Preferred Plan. Why this is relevant here is because, as shown in Table 3 on page 14 of the Department's comments, the base case included "No externality or carbon costs." It therefore appears that the vast majority of GRE's modeling runs (including the base case) did not include externalities, which were seemingly limited to the Preferred Plan and five required externality sensitivities. Note that this is Staff's understanding of the Department's comments, and Staff did not review GRE's EnCompass files, so the Commission may want to ask GRE and the Department to clarify this issue.

To address this, the Department makes two CO_2 regulatory costs modeling suggestions for GRE's next IRP:

1. Incorporate some level of externality and carbon costs into Base Case assumptions; and

2. Appropriately incorporate the Commission's regulatory costs into the model.

The Commission may determine that these solutions are inadequate for this proceeding given that they are already required by past Commission orders, which Staff will address below.

First, ordering paragraph 2.E. of the Commission's September 30, 2020 Order in the CO_2 regulatory costs docket[97] required utilities to run "[a] reference case scenario incorporating the Commission's middle or high values of the established environmental and regulatory cost ranges." It seems here that GRE did not use a base case with these values.

Second, ordering paragraph 2 of the Commission's December 19, 2023 Regulatory Costs Order required that "utilities shall continue to analyze potential resources under . . . the five modeling scenarios outlined in the [September 30, 2020 Order]."

Moreover, ordering paragraph 3 of the December 19, 2023 Order defined regulatory costs as "internalized" costs, meaning they impact the unit dispatch order and resource decisions:

> In their modeling scenarios, utilities shall consider environmental (that is, externality) costs in every year of the scenario to the extent that those costs exceed the regulatory (that is, internalized) costs for the same year.

Based on the Department's analysis, it does not seem that GRE internalized any CO_2-related costs, even among sensitivities which considered externalities. For instance, the Department stated that "although GRE's 'CO2 Reg' costs are supposed to impact the model's expansion plan

[97] Docket No. E-999/CI-07-1199

and dispatch decision-making, they do not."[98]

The Department's suggestions apply to the next IRP, but since they arguably were required by Commission orders for this IRP, the Commission will have to decide whether supplemental modeling is required before GRE's IRP can be accepted. Before taking this action, Staff recommends additional briefing from GRE and the Department at the Commission meeting.

II. Five Factors to Consider

Minn. R. 7843.0500 outlines five factors for the Commission to consider in evaluating proposed resource plans:

> In issuing its findings of fact and conclusions, the Commission shall consider the characteristics of the available resource options and of the proposed plan as a whole. Resource options and resource plans must be evaluated on their ability to:
>
> A. Maintain or improve the adequacy and reliability of utility service;
> B. Keep the customers' bills and the utility's rates as low as practicable, given regulatory and other constraints;
> C. Minimize adverse socioeconomic effects and adverse effects upon the environment;
> D. Enhance the utility's ability to respond to changes in the financial, social, and technological factors affecting its operations; and
> E. Limit the risk of adverse effects on the utility and its customers from financial, social, and technological factors that the utility cannot control.

Table 20 on the next page lists the Commission's factors to consider when evaluating resource plans and how GRE believes its Preferred Plan meets each factor. If the Commission finds that GRE's Preferred Plan is reasonable, then the Commission can refer to this table when outlining its rationale for accepting the IRP.

From Staff's perspective, if the noncompliance issues discussed in the previous section can be resolved, then Staff would agree with GRE and the Department that the Preferred Plan meets the Commission's evaluation criteria.

[98] Department comments, p. 36.

Table 20. GRE's Compliance with the Commission's IRP Evaluation Criteria

A. Reliability of service	• The Preferred Plan provides adequate capacity and energy to meet its members' requirements and MISO's Resource Adequacy requirements. • Load growth is met with GRE's current generation and an incremental portfolio of battery, wind, and solar, which will position the Cooperative well under MISO's seasonal planning construct. Also, GRE does not rely on the MISO capacity auction to meet members' needs.
B. Bills and Rates	• GRE's resource decisions are subject to the approval of its board of directors and, in some instances, also require the approval of GRE's member-owners. This ensures that resource decisions are in the best interest of the membership. • GRE assists members in lowering bills through conservation and energy efficiency programs. • GRE's EnCompass modeling showed that the Preferred Plan resulted in lower revenue requirements than many other expansion plans considered under a wide range of sensitivities.
C. Socioeconomic, Environmental Impacts	• By 2035, GRE's retail electric sales will be 90% carbon-free, and carbon emissions will be reduced by more than 90% from 2005 base levels. • GRE divested itself of CCS and entered into a PPA with Rainbow which provides a hedge to members as GRE transitions away from a historically coal-dependent cooperative. • GRE is meeting the RES and on track to meet the CFS.
E. and F. Flexibility and Risk management	• Transitioning away from CCS minimizes risk while preparing for additional future environmental regulations and market conditions. • Converting Cambridge 2 to dual-fuel will hedge against market price volatility and allow for fuel oil operation when natural gas is uneconomic or unavailable. • GRE's EnCompass analysis indicates that the Preferred Plan is robust in the face of a changing energy industry. • Spiritwood Station is an efficient CHP facility that now has the ability to generate electricity with 100% natural gas or coal, based on market conditions. • GRE is engaging with its members in grid modernization initiatives.

III. Disputed Issues

A. Forecasting

A utility's forecast is the foundation of an IRP, and the Department is usually the only party in resource plan dockets who reviews the validity and technical details of a utility's forecast. This makes it critical for the Department to be able to review a utility's forecast and verify the size, type, and timing of resources proposed. Simply put, the fact that the Department could not verify the reasonableness of GRE's forecast is an important aspect of this proceeding. This does not mean that GRE did anything wrong by developing a new forecasting model, but Staff believes that GRE should work with the Department prior to the next IRP filing so that the forecast can be appropriately evaluated without consuming an overwhelming amount of the Department's limited time and resources.

B. EV Forecasting

Staff believes the best resolution for CURE and GRE's dispute on EV forecasting is not to deny GRE's IRP, but for the Commission to direct GRE to develop a range of EV forecasts, in consultation with stakeholders, for GRE's next IRP. GRE stated in reply comments that it "is currently at work evaluating improvements to forecasting future electric vehicle load scenarios,"[99] so it appears that GRE is already on this path.

CURE argued that GRE's EV forecast is unrealistically low in part because it used an outdated, 2021 EV forecast developed by EIA in its 2021 Annual Energy Outlook (AEO).[100] If GRE had merely used the same source but with more recent data, CURE argued, then GRE's EV assumption would have been much higher. CURE raises a valid concern, but Staff believes the iterative nature of IRPs, as well as the time it takes for the utility to develop an IRP and parties and the Commission to review an IRP, warrants consideration.

GRE filed its IRP in early-2023, which means they likely developed its model throughout 2022 using the most recent data available. CURE may be correct that a 2023 EV forecast could turn out to be more accurate, but this is the problem with point estimates; it is problematic to use a single data point to estimate a 15-year growth rate. While 2023 data could turn out to be more accurate in the long-run, it is still a point estimate that is vulnerable to the same problem, which is why GRE should develop a range.

Put another way, Staff does not disagree with CURE that, with the benefit of hindsight, 2021 data led to underestimated EV adoption, but Staff disagrees with CURE that the solution is to deny GRE's IRP and require supplemental modeling using a different point estimate. Rather, CURE has made a persuasive case that GRE has historically underestimated EV growth and should test higher adoption rates in future EV forecasts. Therefore, Staff recommends that GRE work with CURE and others in advance of filing its next IRP to ensure this range reasonably

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[99] GRE reply comments, p. 7.

[100] CURE initial comments, p. 2.

captures a growth rate that GRE characterizes as "extraordinarily difficult" to predict.

Of course, this recommendation does not address CURE's concern with this IRP. However, the Commission can consider GRE's four alternative load forecast scenarios – the 50/50 forecast (base), the 90/10 (high), the 10/90 (low), and extreme – to assess whether the range of forecasting scenarios captures uncertainty in EV growth. Staff believes GRE tested a reasonable forecast range and notes that GRE's "Base Case" and "High Load Forecast" expansion plans appear to be the same.[101]

C. Self-build Solar

EnCompass was allowed to choose a CT, wind, solar, or storage as resource options. Some parties argued that GRE considered too few potential options; for example:

- ***Department:*** "Other utilities have made available to their model natural gas combined cycle units, which GRE did not examine, as well as transmission additions and different sizes of batteries, CTs, DSM, solar, and wind."

- ***CURE:*** "GRE failed to include at least one key variable—the option for self-build solar—meaning the model returned planning options that are inherently limited."

- ***Sierra Club:*** "GRE should conduct an optimized EnCompass modeling run in which it allows for solar, wind, and battery storage self-builds without constraints and accounts for both the New ERA grant potential as well as tax credits."

Staff agrees that GRE should have at least included self-build solar as a potential resource. Staff notes that GRE's last IRP considered both self-build and PPA solar, and it is unclear why GRE decided to remove self-build solar as an option for this IRP, especially given the tax credits available under the IRA.

While it is speculative to say what outcomes may result *if* GRE had considered self-build solar, GRE's sensitivity analysis indicates this question may be worth exploring. The table below, which is from GRE's Initial Filing, summarized the change (additions/subtractions) in the number of battery, wind, solar, and CT units in each sensitivity as compared to the base case.[102] Staff emphasized the "Low Solar Price" and "Self-Build Wind with PTC" sensitivities with a red box. Note that when solar prices were low, EnCompass added 600 MW of solar (or +400 MW relative to the base case). When self-build wind with PTCs was considered, EnCompass added 600 MW of wind (or +200 MW relative to the base case). This indicates that GRE's model appears to be sensitive to both the price of solar and whether a resource is a self-build or PPA.

[101] See Table 9 on page 35 of the Initial Filing.

[102] Note that this is referring to the same table as in the EV discussion, Table 9 on page 35 of GRE's Initial Filing.

EnCompass capacity expansion plan comparison – supply-side resources				
Scenario	Battery Storage	Solar	Wind	CT
Base Case/Preferred Plan	**200 MW**	**200 MW**	**400 MW**	-
Low/High CO2 Environmental & Regulatory Externalities, Criteria Pollutant Externalities	-	-	-	-
High Load Forecast	-	-	-	-
Low Load Forecast	-	-	- 200 MW	-
Extreme Summer & Winter	+ 200 MW	+ 200 MW	-	-
High Market & High NG Prices	+ 400 MW	+ 200 MW	+ 200 MW	-
Low Market & Low NG Prices	+ 200 MW	+ 200 MW	-200 MW	-
No Market Purchases	+ 200 MW	+ 200 MW	-	+ 200 MW
High Market Purchases	-	-	-	-
Seasonal PRM Change	-	+ 200 MW	- 200 MW	-
SWS Retirement in 2030	+ 200 MW	-	-	-
Low Solar Price	-	+ 400 MW	- 200 MW	-
Low Wind Price	-	-	-	-
Low Solar & Wind Price	-	-	-	-
Storage Costs Flat	-	-	-	-
No Battery Storage Offered	(- 200 MW)	+ 200 MW	- 200 MW	+ 200 MW
Self-Build Wind with PTC	+ 400 MW	- 200 MW	+ 200 MW	-
Forced DSM Programs Addition	-	+ 200 MW	-200 MW	-
Registered LMRs Increase	-	+ 200 MW	-200 MW	-
Lower RRA Accreditation	-	-	--	-
Granular CT Modeling	-	+ 400 MW	- 200 MW	-
Elm Creek & Prairie Star Extended	-	-	- 200 MW	-
Manitoba Hydro Contract Ends	+ 200 MW	-	-	-

GRE's response to this issue was that the Preferred Plan did not add resources until the 2030s, so the specific characteristics of solar resources will be determined once that date approaches. It is worth noting that while GRE may not incur a capacity deficit until 2030, as the Department explained, the reason why the Preferred Plan did not add resources until the 2030s is because the battery, solar, and wind additions were locked-in, and EnCompass was not permitted to select other resources sooner than 2030. According to the Department, all sensitivities except the "No Battery Storage Offered" added a battery in 2027, and "the reason this is such a heavily favored selection has to do with the 200 MW reduction in capacity from Rainbow Energy occurring in 2025."[103] This suggests that there are factors occurring prior to 2030 that influence the optimal expansion plan other than GRE's minimum resource adequacy requirements.

Based on these results, at least three things appear to be true:

1. A battery was selected in 2027 under every scenario in which a battery was permitted;
2. The low price solar sensitivity tripled the amount of solar selected, and
3. Self-build wind with PTCs added more wind than the PPA-only base case.

At this time, it is impossible to answer the question of what would be the result if GRE had, in

[103] Department comments, p. 23.

some combination, (1) modeled CO_2 regulatory costs correctly, (2) considered self-build solar with PTC benefits, and (3) paired self-build solar with a battery resource.

Having said that, the IRP rules require that resources only need to be defined generically,[104] and the resource acquisition process following an IRP considers factors such as ownership versus PPAs, location, and socioeconomic considerations. In other words, whether GRE's modeling could be improved is a separate question than whether GRE met the requirements of the IRP rules. Even though it may have been more instructive to include a self-build option, GRE considered solar on a generic basis in $/MWh terms, as though it were a PPA. The counterargument would be that the costs of a generic PPA and a generic self-build are distinct enough to change the Commission's size, type, and timing finding.

D. Carbon Emissions Accounting

Collectively, GRE, the Department, and parties provided an excellent, thoughtful discussion about carbon emissions accounting and the complexities involved. Perhaps the greatest emphasis among those comments was on how to account for carbon emissions associated with the Rainbow PPA. While GRE and the Department recommend that carbon accounting methodologies should be refined in the CFS docket, Sierra Club recommends that GRE's Rainbow PPA accounting method apply to all future dockets:

> The Commission should clarify that GRE should assign the carbon intensity of Rainbow to the energy associated with the Rainbow PPA in this and all future dockets.

The Department raised several interesting questions that may support a decision to avoid prescribing a particular methodology at Rainbow in "all future dockets." For instance, the Department questioned whether this accounting method could or should be generalized to other bilateral PPAs, and both the Department and GRE argued that the contract is purely financial in nature. The Commission may need additional briefing on this decision option at the agenda meeting before deciding whether to adopt Sierra Club's recommendation.

E. Supplemental Modeling

Previous sections describe CURE, Sierra Club, and G. Tolley's recommendations for GRE to conduct new EnCompass modeling. As Staff understands these recommendations, this would entail denying GRE's IRP and requiring GRE to file an updated IRP with recalculations on EVs and self-build solar, at a minimum. If that is the case, the Commission would need to require an updated IRP by a particular deadline and delegate authority to the Executive Secretary to set comment periods. Parties may need to clarify the procedural path they envision, since a decision to require supplemental modeling could be interpreted as a restart of GRE's IRP, which Staff would prefer to avoid. To the extent the Commission wishes to pursue new modeling at all, rather than denying the IRP, GRE could make a compliance filing showing the PVRR/PVSC of

[104] Minn. R. 7843.0400, subp. 2 states in part: "The utility is only required to identify a resource option generically, unless a commitment to a specific resource exists at the time of the filing."

a small number of modeling runs, and this could be filed after the IRP is accepted. Since the Commission is advising GRE, a compliance filing would serve to demonstrate the difference between the Preferred Plan and parties' requested modeling runs, so the member-owners have this information.

F. Issues for the Next IRP

Staff does not have any concerns with the parties' recommended topics for GRE to analyze in its next IRP. In summary, these topics include:

- ***Job impacts:*** LIUNA requested that GRE provide job impact estimates and plans for the Preferred Plan, including Coal Creek PPA and acquisition of wind PPAs. The Department raised an open-ended question about how "utilities will experiment with the new statutes over time to determine what is reasonable to fulfill the requirement."

- ***Spiritwood:*** CURE requested that GRE be required to model the retirement of Spiritwood Station by 2040. LIUNA raised the co-benefits Spiritwood provides to local businesses, workers, communities, and other economic activity tied to the plant.

- ***New ERA funding:*** CURE recommends the next IRP consider the anticipated impact of federal funding obtained by GRE.

G. Filing Date for GRE's Next IRP

The Department and GRE support a Spring 2027 filing date for the next IRP, while CURE proposes an April 1, 2025 filing date (consistent with the two-year schedule in the IRP rules). In this section, Staff offers an alternative of April 1, 2026.

Generally speaking, when advising the Commission on filing dates for a utility's next IRP, Staff looks to three issues:

1. What is the upcoming IRP schedule for all electric IRP filings?

2. Is there an urgent need for resources?

3. Are there issues for the next IRP that warrant consideration sooner rather than later?

First, the table below provides a list of open IRP dockets and their status as well as upcoming IRPs.

Table 21. Next IRP Filing Dates

Utility (Docket No.)	Status/Next IRP date
Otter Tail (21-339)	Commission hearing, May 2024
Xcel (24-67)	Filed on February 1, 2024
SMMPA	December 2, 2024
Minnesota Power	March 1, 2025
MMPA	August 1, 2025
Minnkota/NMPA	December 1, 2025
MRES	July 1, 2026

Based on the schedule for 2025 IRPs, Staff is reluctant to support CURE's recommendation for an April 1, 2025 filing date. However, Spring 2027 may conflict with utilities filing their next IRP; for example, assuming a three-year gap in-between IRP filings, Otter Tail or Xcel may be filing their next IRP at some point in 2027.

On the second and third issues, while it is true that GRE predicts a capacity surplus through 2030, as Staff noted previously, most scenarios added resources (specifically, a battery) prior to 2030, which coincided with the step-down of the Rainbow PPA. In addition, this is the first GRE IRP that considered a MISO seasonal construct, and Staff is not convinced that the assumptions GRE used for the planning years will remain the same over the next 3-4 years, so this could be a topic that could be revisited in 2026. Third, Staff agrees with CURE and Sierra Club that there were several limitations in GRE's modeling, such as EV forecasting, the lack of a self-build solar option, etc. If new modeling will not be required as part of this IRP, then Staff has concerns about not revisiting these issues until 2027.

DECISION OPTIONS

Accept or Deny

1. Accept GRE's Preferred Plan. *(GRE, Department, IOUE Local 49, LIUNA,)*

OR

2. Deny GRE's Preferred Plan. *(CURE, Sierra Club, Geoffrey Tolley)*

Forecasting

3. Find that GRE's forecasts in this proceeding shall not be used in any future Certificate-of-Need proceeding. *(Department)*

AND/OR

4. Direct GRE to work with the Department prior to filing its next IRP to address forecasting issues. *(Staff option)*

Electric Vehicles

5. Require GRE to reevaluate its load forecast assumptions for EV adoption, using data from the EIA's 2023 Annual Energy Outlook (AEO). *(CURE, G. Tolley)*

AND/OR

6. Direct GRE to include a range of future electric vehicle load forecasts in modeling scenarios in its next IRP. *(Staff option)*

Self-Build Solar and Other Potential Resource Options

7. Require GRE to re-run its model with at least three self-build solar options—fixed-tilt, single-axis tracking, and solar-plus-storage. Each option should have an assumed nameplate capacity of at least 5 MW. Cost estimates for these options should come from the EIA or a comparable source. *(CURE)*

8. Require GRE to update its EnCompass modeling to assess an alternative portfolio in which it retires Spiritwood and ends reliance on the Rainbow PPA and invests in 989 MW of solar, 1,577 MW of wind, and 1,051 MW of battery storage by 2032. This modeling must include all of the incentives and financing mechanisms offered by the IRA, including the $970 million GRE could secure through the New ERA program as well as all tax credits. *(Sierra Club)*

OR

9. Require GRE to conduct an optimized EnCompass modeling run in which it allows for solar, wind, and battery storage self-builds without constraints and accounts for both the New ERA grant potential as well as tax credits. *(Sierra Club)*

10. Require GRE to re-run its analysis using: (1) updated projections from the EIA's 2023 AEO and decrease reliance on pre-IRA data where possible; address changes in EV fleet size since the Initial Filing; (3) address the IRA in accordance with the PUC-adopted decision option 13a of docket 22-624; (4) address the potential to load control the early evening charging of 100,000 EVs, particularly in winter; (5) address the potential of the winter bimodal demand curve in MISO Zone 1 to be flattened due to the effects of the IRA; and (6) include estimates of distribution coop take-up of 10% self-generation. *(G. Tolley)*

Carbon Accounting

11. Require GRE to assign the carbon intensity of Rainbow to the energy associated with the Rainbow PPA in this and all future dockets. *(Sierra Club)*

Updated IRP

(If the Commission denies GRE's preferred plan and adopts any of decision options 5, 7, 8, 9, or 10, consider the following)

12. Require GRE to file an updated resource plan consistent with the Commission's decisions herein within 60 days of the order. *(Staff interpretation of CURE, Sierra Club, G. Tolley)*

OR

13. Require GRE to make a compliance filing within 60 days of the order with EnCompass modeling that includes the Commission's CO_2 regulatory costs, a self-build solar option, and an EV adoption rate in line with EIA's 2023 AEO. *(Staff alternative to #12. Note: Staff is not proposing this option as a recommendation, but as a possible compromise among the parties.)*

Next IRP

14. In the next IRP, direct GRE to:

    A. Provide potential job impacts for each aspect of the Preferred Plan, which includes the Rainbow and wind PPAs. *(LIUNA)*

    B. Provide updated summary information on compliance and a discussion of GRE's work toward achieving compliance with the CIP letters, especially with the energy

savings and low-income standards. *(Department)*

C. Separately calculate emissions sold to the market with a factor reflective of carbon emissions due to electricity production from GRE. Emissions purchased from the market should be calculated using an emissions factor representative of the MISO market. *(Department)*

D. Ensure that the appropriate input files correspond to reported exports.

E. Consider the use of a "setup" file for storing and transferring databases via spreadsheets.

F. Develop a database around variables the utility has control over (scenarios), variables the utility does not have control over (contingencies), and the Commission's carbon cost and externality futures (futures).

G. Incorporate some level of externality and carbon costs into Base Case assumptions.

H. Appropriately incorporate the Commission's regulatory costs into the model.

I. Confer with other utilities and potentially other interested parties to determine a best practice to address externality and environmental costs.

J. Include in its model a slightly broader range of potential resources, potentially determined through a more exhaustive pre-input study.

K. Incorporate all known or planned resources into its model or explain why known or planned resources have been omitted.

L. Try to pinpoint a moderate level of market sales to include in its base case, or at least in some scenarios, while being vigilant about avoiding capacity that is built solely to chase market prices.

M. Provide a comparative analysis of emissions across sensitivities, using MISO carbon intensity rates for energy purchases from Rainbow if the Rainbow contract does not involve actual energy purchases and removing REC accounting for purposes of comparing sensitivities.

N. Provide the relevant portions of the Rainbow contract(s) to demonstrate why a market carbon intensity rate is the more appropriate value.

O. Develop a MIP stop basis and convergence tolerance cost analysis and consider these factors when developing the size of potential resources.

P. Continue to monitor battery arbitrage uncertainties in the modeling software and

provide an update about further knowledge learned in its next IRP.

15. Require GRE to file its next IRP by:

A. Spring 2027 *(Department, GRE)*

B. April 1, 2025 *(CURE)*

C. April 1, 2026 *(Staff alternative)*