414 Nicollet Mall
Minneapolis, MN 55401

June 1, 2022

—VIA ELECTRONIC FILING—
PUBLIC DOCUMENT
NOT PUBLIC INFORMATION EXCISED

Mr. Will Seuffert
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, Minnesota 55101-2147

RE: RENEWABLE ENERGY OBLIGATION (REO)-RENEWABLE ENERGY STANDARD (RES) AND SOLAR ENERGY STANDARDS (SES) COMPLIANCE REPORT

COMMISSION CONSIDERATION AND DETERMINATION ON COMPLIANCE WITH RENEWABLE ENERGY STANDARDS
DOCKET NO. E999/M-22-85

RENEWABLE ENERGY CERTIFICATE RETIREMENT AND SOLAR ENERGY STANDARDS REPORTING FOR COMPLIANCE YEAR 2021
DOCKET NO. E999/PR-22-12

GREEN PRICING VERIFICATION FILING PROCESS
DOCKET NO. E999/PR-02-1240

Dear Mr. Seuffert:

Northern States Power Company, doing business as Xcel Energy, submits the attached compliance report to fulfill the verification and filing requirements for the Renewable Energy Standards (RES), Renewable Energy Credit (REC) retirement, and Green Pricing REC retirement required by Minn. Stat. § 216B.1691, Subd. 3. The Company also submits the 2021 Annual Report as required by the Minnesota Public Utilities Commission in an Order dated January 29, 2021 in Docket Nos. E-999/M-20-464 and E-999/M-13-542, Solar Energy Standards (SES).

We have provided the required information in the attached Excel spreadsheet templates. Attachment A contains RES, Green Pricing, and SES Retail Sales; RES, Green Pricing, and SES REC Retirements; Biennial Compliance Requirements; and REC Purchases and Sales.

REC Retirement

By May 1, 2022, the Company retired approximately 8.6 million RECs, representing 30 percent of annual retail sales for calendar year 2021, using the Midwest Renewable Energy Tracking System (M-RETS). The Company is therefore in compliance with the Minnesota RES requirements identified in Minn. Stat. § 216B.1691 subd. 2(a) and the Commission's March 19, 2010 Order in Docket No. E999/CI-03-869.

In addition, by May 1, 2022, the Company retired approximately 618,000 RECs for our Green Pricing Programs. Approximately 441,000 RECs were retired for the Windsource Program, approximately 167,000 RECs were retired for Renewable*Connect, and approximately 10,000 RECs were retired for the Renewable*Connect Government Program. Details of the Company's Green Pricing Program REC retirements are included in Attachment A.3.

The required information specified in the Commission's April 17, 2014 NOTICE and the May 28, 2013 ORDER FINDING UTILITIES IN COMPLIANCE WITH MINN. STAT. § 216B.1691 AND MODIFYING BIENNIAL REPORTING PROCEDURES in Docket No. E999/M-12-958, including the RES calculations, the RECs retired and the names of the M-RETS retirement sub-accounts, is provided in Attachment A.

As noted in Attachment A.7, the Company purchased 227,740 RECs for our Windsource program.

Biennial REO-RES Compliance

Attachment A.6 to this report provides the Company's forecasted retail sales data for 2022-2025, projected generation data for this reporting period, other state RES or Objectives to which the utility is subject, actions taken to address the RES requirements, and a discussion of potential obstacles to meeting our requirements and solutions to the same.

Certified Renewable Percentage

The Company began offering the Certified Renewable Percentage (CRP) to our customers in 2019 for calendar year 2018.

Each year, the Company calculates the CRP for the preceding year, after all program participation, REC sales, REC retirements for the RES, trade margin sales, and all other data points that affect the CRP are available. After the annual CRP is calculated, the Company then retires the additional RECs to match the amount of renewable energy delivered to customers.

The 2021 CRP is calculated at 34.3 percent. The increase over the previous year is due largely to additional wind resources brought online in 2021. We estimate that the CRP will continue to increase each year as new renewable resources continue to come online. The 2021 CRP is higher than the RES obligation and therefore the Company plans to retire additional RECs for the 2021 CRP beyond what is required for the RES.

Below is an overview of the MN CRP from 2018 to 2021. The 2019 and 2020 CRPs are currently in the process of third-party verification and the Company plans to verify the 2021 CRP in Summer 2022. The 2019, 2020, and 2021 CRPs are subject to change as an outcome of the verification process.

Year	**CRP Percent**
2018	26.6
2019	23.3
2020	31.8
2021	34.3

Renewable*Connect Government Program

The security and privacy of customer data, including energy usage data, is a key concern for the Company. As a matter of course, the Company generally does not publicly disclose energy usage data related to an individual customer.

In previous years of the REO/RES REC filing, the customer participating in the Renewable*Connect Government Program has requested certain information related to its energy usage be considered Non-Public, but the Department of Commerce has requested the information be submitted publicly. In advance of this year's Compliance filing, the Company reached out to this customer asking if the information that it normally considers Non-Public could be submitted publicly for this year's 2021 REO/RES REC filing. The customer consented to the Company submitting the information as Public information. Notwithstanding this one-time consent, the Company reserves the right to submit similar information as Non-Public in the future.

Summary of ongoing efforts to obtain solar energy, including a brief summary of the anticipated mix of project sizes for SES compliance.

For purposes of this Section, Solar Energy Standard (SES) compliance means the requirement set forth in Minn. Stat. § 216B.1691, Subd. 2f, whereby Xcel Energy, by the end of 2020, needs to generate or procure sufficient electricity generated by solar energy so that at least 1.5 percent of the Company's total retail electric sales in Minnesota is generated by solar energy. The additional requirement in Subd. 2f regarding the 10 percent solar carve-out requirement from systems of 40 kW (AC) or less is addressed below.

The Company has developed a large portfolio of resources and programs to provide renewable options to residential and commercial customers. Since the passage of the SES under the 2013 Energy Omnibus Bill, we have grown our utility portfolio of solar resources to expand access of solar benefits to all customers while achieving compliance in reporting year 2021. The Company expects to accumulate and exceed the amount of solar RECs (SRECs) required to satisfy the MN SES compliance requirements beginning in 2020 and continue well beyond 2034. SRECs accumulated in the REC bank beyond what is needed for compliance requirements, will be applied towards the MN state RPS obligations to avoid any REC expirations.

Progress towards the 10% carve-out for systems 40 kW_{ac} or less, including the method by which the utility will meet the carve-out.

A subset of programs from the section above can be used towards our 10 percent small solar carve out. Table 1 describes these impacts. These are further detailed in this section.

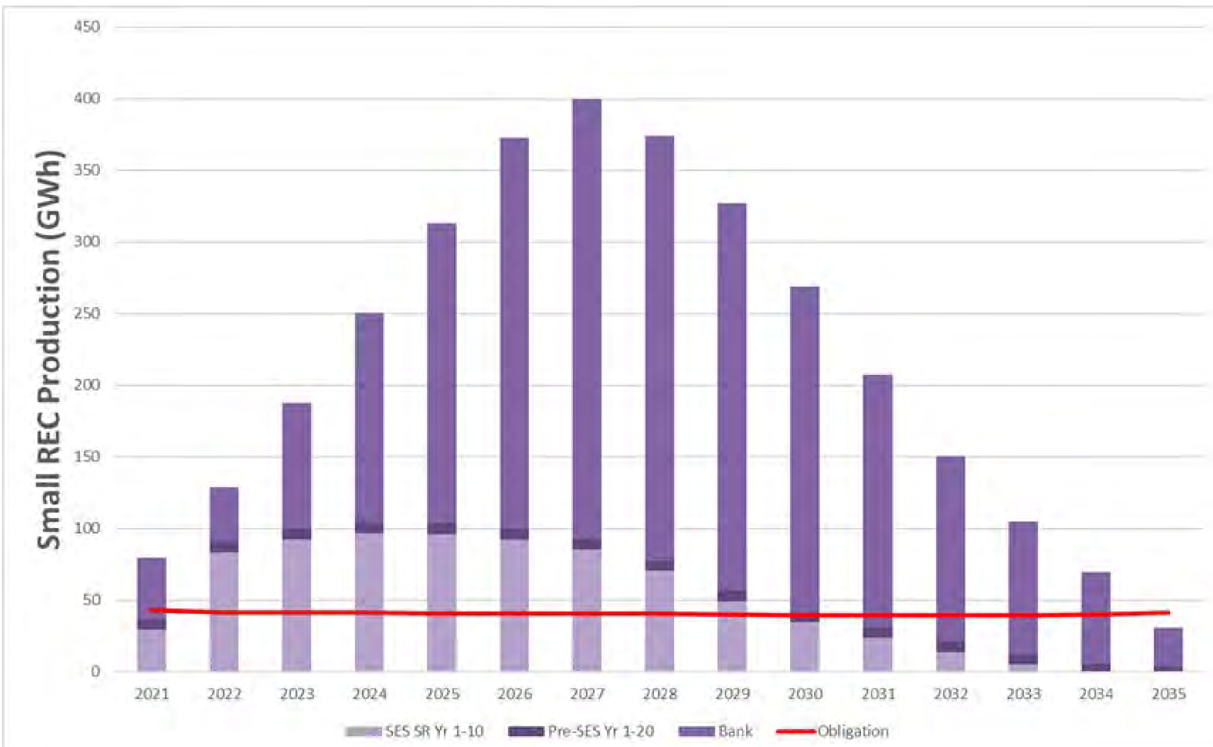
Table 1: Small Solar Carve Out – Programs

Program Name	Size	Years Available
Solar*Rewards (First Generation)	≤40 kW (DC)*	2010 – August 2014
Solar*Rewards (Second Generation)	≤ 20 kW (DC)* ≤ 40 kW (DC)*	August 2014 – May 2018 June 2018 – May 2019
Solar*Rewards (Third Generation)	≤ 40 kW (AC)	June 2019 - 2024
Solar*Rewards for Schools	≤ 40 kW (AC) >40 kW – 1 MW	May 2022 – June 2027
Made in Minnesota	≤40 kW	2014 – 2017

*Energy produced in DC goes through an inverter to get converted to AC. In this process there is energy loss, meaning that DC output results in a lower AC output.

Graph 1 below represents our current projection for REC compliance with the 10 percent small solar carve out. This chart shows the Company may be in compliance with the small solar carve out through 2034. However, this representation uses program assumptions, discussed below, and thus has embedded risk that the actual results could be significantly different than the forecast. The Company cannot predict what the installation rate will be for small rooftop solar.

Graph 1
Small SREC Production with Solar*Rewards Program Extension through 2024



The chart above assumes 100 percent of Solar*Rewards funds are allocated based on estimated solar system performance and that of these projects, 75 percent of them are completed each year for the Solar*Rewards program through 2024. If actual solar installations are lower than forecasted levels, the Company may not be able to meet the small solar carve-out requirements through 2034 as projected in the chart above.

With the prospect that the Solar*Rewards program may be extended in future years, the Company believes it will have sufficient small-solar RECs to meet our obligations without a buy-back option. If, at some time, it appears that the Company will not have sufficient RECs to meet its obligations, it may revisit the REC buy-back option.

Also, the above analysis is based on the understanding that the nameplate capacity for purposes of this statute is measured in alternating current (AC). This is consistent with the definition of capacity in Minn. Stat. § 216B.164, Subd. 2a.(c), as well as how capacity is used or interpreted under the following statutes: Minn. Stat. §§ 216B.1611, Subd.2(a), and Subd.3a(a)(1); 216B.1613; 216B.164, and Subd. 4c; 216B.1641 (b).

Discussion on the utilities' efforts to reach, by 2030, the energy goal that ten percent of the retail electric sales in Minnesota be generated by solar energy.

The 10 percent by 2030 goal is an energy goal of the state of Minnesota. We understand this question to be evaluating our current efforts to reach our proportional share of the state's energy goal.

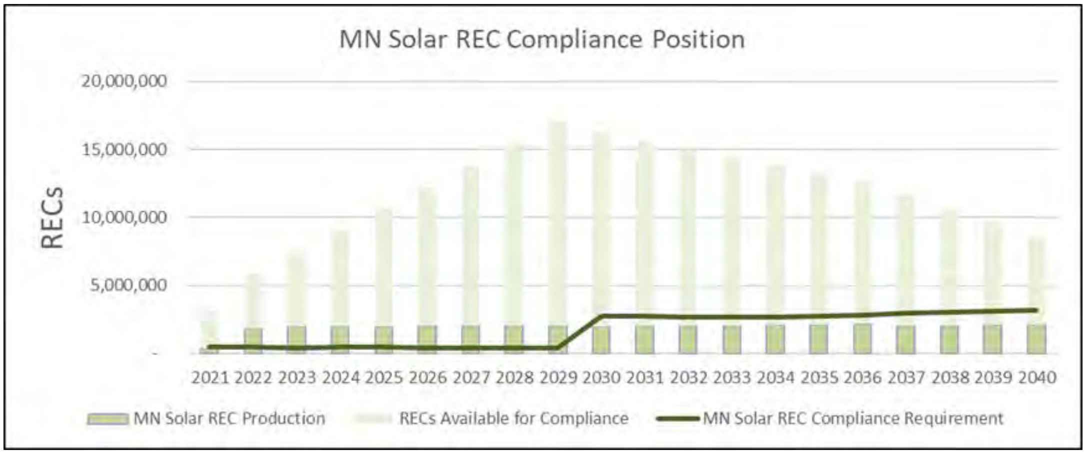
As shown in Graph 2 below, the Company forecasts that existing solar resources alone will not be sufficient to meet the 10 percent by 2030 goal. However, the Company has also proposed to add substantial amounts of solar generation to our portfolio in the coming years in our recently approved 2020-2034 Integrated Resource Plan.[1] In the Commission's Order approving the plan, it authorized the Company to procure approximately 900 MW of solar capacity coming online by the end of 2025, incremental to the proposed 460 MW solar generating facility near the Company's current Sherburne County coal generating facility's site.[2] Our plan also includes additional solar capacity build out, to replace and reuse interconnection made available when Sherco 1 and A.S. King coal units retire in the latter half of the 2020s. This capacity will provide substantial solar generation to our system and would contribute toward meeting the 10 percent SES goal into the future; in fact, by 2030, we expect over 10 percent of our generation to come from solar resources. As always, we will continually review the need for additional solar resources in our future resource plans, in order to achieve the goal long-term.

We note that there is currently significant supply chain uncertainty surrounding a recent decision by the U.S. Department of Commerce to accept an antidumping and countervailing duty trade complaint levied against solar components imported from four southeast Asian countries. In the near term, specific projects may be delayed beyond their originally envisioned timelines. However, at this time, we do not expect

[1] Docket No. E002/RP-19-368.
[2] Docket No. E002/M-20-891.

this investigation to negatively impact our long-term goals to add solar capacity to our system.

Graph 2



Attachment A contains certain portions that have been designated as Trade Secret information pursuant to Minnesota Statute § 13.37, subd. 1(b). In particular, the information designated as Trade Secret relates to specific Purchase Power Agreements (PPAs). The terms of the Commission approved PPAs require that this information be non-public. Other information marked as trade secret relates to specific production from specific customer facilities. Further, this is considered to be "non-public data" pursuant to Minn. Stat. §13.02, Subd.9, and is also "Trade Secret" information pursuant to Minn. Stat. §13.37, subd. 1(b) as it derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by other persons who can obtain economic value from its disclosure or use. In general, we publicly show the names of the Renewable*Connect resources because they are already publicly disclosed and therefore their identity is public, but their actual production is non-public. The names of the Windsource facilities have similarly already been publicly identified along with their capacities, but the actual production from each is not public. The smaller wind facilities generally are our retail customers and Minnesota regulations prohibit us from disclosing a customer name alone; therefore, we have treated as non-public the customer names along with their M-RETS ID that would otherwise identify them. Where we have biomass plants, because we have fewer than 15, we have treated as nonpublic the name and RECs of each. We note that the number of RECs retired from specific solar gardens is publicly provided because our solar garden tariff at tariff sheet 9-78 specifically authorizes us to make garden generation data public for each. Other REC retirement data for smaller facilities has been aggregated and de-identified.

Pursuant to Minn. Stat. § 216.17, subd. 3, we have electronically filed this document and served copies on all parties on the attached service list. If you have any questions about this information, please contact me at bria.e.shea@xcelenergy.com, or Pamela Gibbs at pamela.k.gibbs@xcelenergy.com or (612) 330-2889.

Sincerely,

/s/

BRIA E. SHEA
REGIONAL VICE PRESIDENT, REGULATORY POLICY

Attachments
c: Service Lists

PUBLIC DOCUMENT
NOT PUBLIC DATA HAS BEEN EXCISED

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

Minnesota Public Utilities Commission: Docket No. E999/PR-22-12 and Docket No. E999/M-22-85 **Attachment 1**
Minnesota Department of Commerce: Docket No. E999/PR-02-1240 Reporting Period: **January 1, 2021 - December 31, 2021**

Renewable Energy Certificate Retirement Report for Renewable Energy Standards and Green Pricing Programs

Report Year	2021	Date Submitted	June 1, 2022

FILING UTILITY INFORMATION		CONTACT INFORMATION	
Company ID #	85	Contact Name	Pamela Gibbs
Company Name	Xcel Energy	Contact Title	Regulatory Case Specialist
Street Address Line 1	414 Nicollet Mall	Contact Telephone	612-330-2889
Street Address Line 2		Contact E-Mail	pamela.k.gibbs@xcelenergy.com
City	Minneapolis	COMMENTS/NOTES	
State	MN		
Zip Code	55401		

Filing for **RENEWABLE ENERGY STANDARDS** on behalf of:

Utility Name	Utility Name	Utility Name	Utility Name
Northern States Power Company - Minnesota			

Filing for **GREEN PRICING PROGRAMS** on behalf of:

Utility Name	Utility Name	Utility Name	Utility Name
Northern States Power Company - Minnesota			

Filing for **SOLAR ENERGY STANDARD** on behalf of:

Utility Name	Utility Name	Utility Name	Utility Name
Northern States Power Company - Minnesota			

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

Minnesota Public Utilities Commission: Docket No. E999/PR-22-12 and Docket No. E999/M-22-85 **Attachment 2**
Minnesota Department of Commerce: Docket No. E999/PR-02-1240 Reporting Period: **January 1, 2021 - December 31, 2021**

Total Retail Sales to Minnesota Customers and Renewable Energy Certificates Required to be Retired for RENEWABLE ENERGY STANDARD Compliance

Retail Sales Total	28,810,844
RES Percentage Obligation	30%
RECs Required to be Retired	8,643,254
Actual RECs Retired	8,643,254

Enter current reporting year data.

Utility ID #	Utility	Retail Sales Amount (MWh)	Notes
85	Xcel Energy (NSP-MN)	28,810,844	

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

Minnesota Public Utilities Commission: Docket No. E999/PR-22-12 and Docket No. E999/M-22-85 **Attachment 3**
Minnesota Department of Commerce: Docket No. E999/PR-02-1240 Reporting Period: **January 1, 2021 - December 31, 2021**

GREEN PRICING Program Sales

TOTAL **GREEN PRICING** Sales (MWh)	618,333
RECS retired for **GREEN PRICING** programs	0

List the cumulative retail sales of green pricing electricity, including utility-managed community solar, and the number of customers as of December 31, 2021.

Utility ID # (on Worksheet 1)	Utility Name	Program Name	No. of Program Customers	Program Sales (MWh)	Retail Rate ($/kWh)	Notes - Per kWh
85	Xcel Energy (NSP-MN)	Windsource Minnesota	76,439	440,555	$0.0353	Windsource rate per kWh
85	Xcel Energy (NSP-MN)	Renewable * Connect	1,035	11,118	$0.03647	2021 Month-to-Month Rate
85	Xcel Energy (NSP-MN)	Renewable * Connect	1,111	60,508	$0.03345	2021 5-year rate
85	Xcel Energy (NSP-MN)	Renewable * Connect	656	95,847	$0.03295	2021 10-year rate
85	Xcel Energy (NSP-MN)	Renewable * Connect Government	1	10,305	$0.03295	2021 Rate
85	Xcel Energy (NSP-MN)	Community Solar Gardens				No sales because company receives all RECs and subscribers do not get CSG energy

Minnesota Public Utilities Commission: Docket No. E999/PR-22-12 and Docket No. E999/M-22-85 **Attachment 4**
Minnesota Department of Commerce: Docket No. E999/PR-02-1240 Reporting Period: **January 1, 2021 - December 31, 2021**

SES Retail Sales and
Solar Renewable Energy Certificates Required to be Retired for SOLAR ENERGY STANDARD Compliance

Retail Sales Total (MWh)	28,810,844
SES Excluded Retail Sales (MWh)	130,872
SES Retail Sales Obligation (MWh)	28,679,972
SES Total Percentage Obligation	1.50%
SES Small Scale obligation	0.15%
Non-Small Scale obligation	1.35%
Total SRECs Required to be Retired	430,200
Small SRECs to be retired	43,020
Non-Small Scale to be retired	387,180
Total Actual RECs Retired	430,200
Total actual small SRECs retired	43,020
Total actual non-Small Scale retired	387,180

Additional SES Reporting

Projected SES compliance for the current plus three (3) upcoming years. Include banked RECs.

Year	Actual/Projected MN retail sales (MWh) minus SES exempt sales	SES Total Req (MWh)	SES Small Scale Req (MWh)	SES Non-Small Scale Req (MWh)	Projected Total SRECs (MWh)	Projected SRECs 40 kW or less (MWh)	Projected SRECs greater than 40 kW (MWh)	Projected Total Surplus/ (Deficit) (MWh)	Projected SREC Surplus/(Deficit) 40 kW or less (MWh)	Projected SREC Surplus/(Deficit) greater than 40 kW (MWh)
2021	28,810,844	432,163	43,216	388,946	1,970,703	36,223	1,934,480	1,538,540	(6,993)	1,545,534
2022	28,310,524	424,658	42,466	382,192	2,037,774	98,000	1,939,774	1,613,116	55,534	1,557,582
2023	28,260,253	423,904	42,390	381,513	2,176,430	113,000	2,063,430	1,752,526	70,610	1,681,917
2024	28,296,449	424,447	42,445	382,002	2,199,617	116,000	2,083,617	1,775,171	73,555	1,701,615

Annual solar generation on the utilities' system for the previous calendar year

	Number of Facilities on Utility System	Capacity (MW)	Number registered in M-RETS	Capacity registered in M-RETS	SRECs Generated (2021)
40 kW or less	7,495	82	60	26.11	36,756
Generation from CSGs	881	826	881	826.29	1,419,215
Greater than 40 kW	69	4.05	37	271.31	514,732

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

Minnesota Public Utilities Commission: Docket No. E999/PR-22-12 and Docket No. E999/M-22-85 — **Attachment 5**
Minnesota Department of Commerce: Docket No. E999/PR-02-1240 — Reporting Period: **January 1, 2021 - December 31, 2021**

Renewable Energy Certificate Retirements for Renewable Energy Standards and Green Pricing Programs

Renewable Energy Standard REC Retirement Account Name:	NSP-MN RES Retirement-2021 / 4407E181-EFF7
Renewable Energy Standard REC Retirement Account Name:	NSP-MN SES Retirement-2021 / C256DDB6-872A
Green Pricing REC Retirement Account Name:	MN Renewable Connect 2021 / 3FA86168-25E4
Green Pricing REC Retirement Account Name:	NSP-MN Windsource Retirement-2021 / 3896023C-6BC8

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
	Total RECs or SRECs		8,643,254	0	43,020	387,180	1 REC = 1 MWh
[NOT PUBLIC DATA BEGINS				**[NOT PUBLIC DATA BEGINS**			
	North Star Solar PV - North Star Solar PV	Solar					MN Renewable*Connect 2021
	Odell Wind Farm - Odell Wind Farm	Wind					MN Renewable*Connect 2021
	North Star Solar PV - North Star Solar PV	Solar					MN Renewable*Connect Government 2021
	Odell Wind Farm - Odell Wind Farm	Wind					MN Renewable*Connect Government 2021
	Black Oak Wind, LLC - BOGWF	Wind					MN Windsource
	Boeve Windfarm - Boeve Windfarm	Wind					MN Windsource
	Border Winds Wind Farm - Border Wind	Wind					MN Windsource
	Buffalo Ridge I - Buffalo Ridge I	Wind					MN Windsource
	Buffalo Ridge II - Buffalo Ridge II	Wind					MN Windsource
	Cisco Wind Energy - Cisco Wind Energy	Wind					MN Windsource
	Courtenay Wind Farm - Courtenay Wind Farm	Wind					MN Windsource
	Elm Creek 2 - Elm Creek 2	Wind					MN Windsource
	JJN Windfarm - JJN Windfarm	Wind					MN Windsource
	K-Brink Wind Farm - K-Brink Wind Farm	Wind					MN Windsource
	McNeilus Group - McNeilus Group	Wind					MN Windsource
	Moraine II - Moraine II	Wind					MN Windsource
	Red Pine Wind Project, LLC	Wind					MN Windsource
	Rugby - Rugby	Wind					MN Windsource
	West Ridge - West Ridge	Wind					MN Windsource
	Windcurrent Farms - Windcurrent Farms	Wind					MN Windsource
NOT PUBLIC DATA ENDS]				**NOT PUBLIC DATA ENDS]**			
M627	SRMN2010-J-01 - SRMN2010-J-01	Solar			1,936		
M714	SRMN2011-01 - SRMN2011-01	Solar			1,136		
M737	SRMN2011-02 - SRMN2011-02	Solar			1,276		
M882	SRMN2011-03 - SRMN2011-03	Solar			94		
M766	SRMN2012-01 - SRMN2012-01	Solar			1,008		
M786	SRMN2012-02 - SRMN2012-02	Solar			1,461		
M797	SRMN2012-03 - SRMN2012-03	Solar			1,799		
M836	SRMN2012-04 - SRMN2012-04	Solar			175		
M881	SRMN2013-01 - SRMN2013-01	Solar			1,576		
M883	SRMN2013-02 - SRMN2013-02	Solar			1,680		
M931	SRMN2013-I-01 - SRMN2013-I-01	Solar			337		
M934	SRMN2013-J-01 - SRMN2013-J-01	Solar			46		
M936	SRMN2014-01 - SRMN2014-01	Solar			608		
M937	SRMN2014-I-01 - SRMN2014-I-01	Solar			1,589		
M938	SRMN2014-I-02 - SRMN2014-I-02	Solar			1,304		
M988	SRMN2014-I-03 - SRMN2014-I-03	Solar			623		
M939	SRMN2014-J-01 - SRMN2014-J-01	Solar			1,030		
M940	SRMN2014-J-02 - SRMN2014-J-02	Solar			1,147		
M949	SRMN2014-J-03 - SRMN2014-J-03	Solar			1,054		
M1061	SRMN2014-J-04 - SRMN2014-J-04	Solar			47		
M968	SRMN2015-I-01 - SRMN2015-I-01	Solar			1,533		
M1060	SRMN2015-I-02 - SRMN2015-I-02	Solar			1,311		
M1405	SRMN2015-I-03	Solar			444		
M969	SRMN2015-J-01 - SRMN2015-J-01	Solar			1,120		
M989	SRMN2015-J-02 - SRMN2015-J-02	Solar			993		
M1000	SRMN2015-J-03 - SRMN2015-J-03	Solar			1,071		
M1058	SRMN2015-J-04 - SRMN2015-J-04	Solar			998		
M1059	SRMN2016-I-01 - SRMN2016-I-01	Solar			1,271		
M1224	SRMN2016-I-02 - SRMN2016-I-02	Solar			1,080		
M1536	SRMN2016-I-03	Solar			166		
M1062	SRMN2016-J-01 - SRMN2016-J-01	Solar			1,075		
M1067	SRMN2016-J-02 - SRMN2016-J-02	Solar			1,078		
M1068	SRMN2016-J-03 - SRMN2016-J-03	Solar			1,062		
M1194	SRMN2016-J-04 - SRMN2016-J-04	Solar			1,043		
M1406	SRMN2016-J-05	Solar			588		
M1488	SRMN2017-I-01	Solar			1,488		
M1537	SRMN2017-I-02	Solar			441		
M1223	SRMN2017-J-01 - SRMN2017-J-01	Solar			1,115		
M1408	SRMN2017-J-02	Solar			1,096		
M1409	SRMN2017-J-03	Solar			1,137		
M1410	SRMN2017-J-04	Solar			1,072		
M1539	SRMN2017-J-05	Solar			1,032		
M1540	SRMN2017-J-06	Solar			173		
M2025	SRMN2018-I-02	Solar			38		
M1541	SRMN2018-J-01	Solar			660		
M1955	SRMN2018-J-03	Solar			4		
M2026	SRMN2018-J-05	Solar			5		
[NOT PUBLIC DATA BEGINS							
		Solar				14,740	
		Solar				10,282	
		Solar				7,095	
		Solar				10,036	
		Solar				10,787	
		Solar				8,794	
		Solar				6,475	
		Solar				6,593	

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
		Solar				11,448	
		Solar				5,555	
		Solar				5,858	
		Solar				17,136	
		Solar				7,116	
		Solar				15,051	
		Solar				9,677	
		Solar				12,563	
	NOT PUBLIC DATA ENDS]						
M1157	Blue Lake Wastewater Treatment (WWTP)Solar Project - Blue Lake Wastewater Treatm	Solar				641	
M1170	CHS Field - CHS Field Solar Arrays	Solar				35	
M1202	Court International LLC - Court International LLC	Solar				182	
M630	FreEner-g-2010-01 - FreEner-g-2010-01	Solar				68	
M1005	Hutchinson Wastewater Treatment Facility - Hutchinson WWTF Solar	Solar				180	
M1065	Marshall Solar Energy - Marshall Solar Energy	Solar				89,172	
M655	MCC - Solar	Solar				285	
M730	Merrick Solar - Merrick Solar	Solar				43	
M1036	Minneapolis /St. Paul International Airport - T1 Blue Ramp Solar	Solar				8	
M738	MNRDF_DNR - MNRDF_DNR	Solar				49	
M1064	North Star Solar PV - North Star Solar PV	Solar				135,240	
M1072	Parade Ice Garden - Parade Ice Garden	Solar				46	
M962	School Sisters of Notre Dame Solar Park - School Sisters of Notre Dame Solar Park	Solar				486	
M796	Slayton Solar - Slayton Solar LLC	Solar				849	
M559	St. John's Solar Farm - St. John's Solar Farm	Solar				259	
M1071	Target Midway Store - Target Midway Solar	Solar				198	
M1195	UEL Real Estate Holdings - UEL Real Estate Holdings LLC	Solar				92	
M1347	UNIVERSITY CENTRE AT 1919 LLP - UNIVERSITY CENTRE	Solar				141	
[NOT PUBLIC DATA BEGINS							
		Biogas	4,362				
		Hydroelectric Water	13,483				
		Hydroelectric Water	37,092				
		Hydroelectric Water	35,100				
		Hydroelectric Water	5,104				
		Hydroelectric Water	4,679				
		Hydroelectric Water	16,221				
		Hydroelectric Water	14,484				
		Hydroelectric Water	11,173				
		Hydroelectric Water	10,470				
		Hydroelectric Water	80,883				
		Hydroelectric Water	40,366				
		Hydroelectric Water	984				
		Hydroelectric Water	31,338				
		Hydroelectric Water	30,716				
		Hydroelectric Water	31,144				
		Hydroelectric Water	58,746				
		Hydroelectric Water	2,747				
		Hydroelectric Water	61,963				
		Hydroelectric Water	11,048				
		Hydroelectric Water	24,541				
		Hydroelectric Water	2,280				
		Hydroelectric Water	6,593				
		Hydroelectric Water	48,752				
		Hydroelectric Water	93,154				
		Hydroelectric Water	7,543				
		Hydroelectric Water	3,542				
		Hydroelectric Water	7,807				
		Hydroelectric Water	769				
		Hydroelectric Water	4,362				
		Hydroelectric Water	61,591				
		Hydroelectric Water	66,960				
	NOT PUBLIC DATA ENDS]						
M1621	330th Street West Solar Project 1	Solar	1,930				
M1622	330th Street West Solar Project 2	Solar	2,004				
M1623	330th Street West Solar Project 3	Solar	2,001				
M1624	330th Street West Solar Project 4	Solar	2,034				
M1625	330th Street West Solar Project 5	Solar	1,880				
M1359	Andromeda CSG1, LLC	Solar	2,031				
M1360	Andromeda CSG2, LLC	Solar	2,118				
M1361	Andromeda CSG3, LLC	Solar	2,165				
M1362	Andromeda CSG4, LLC	Solar	2,618				
M1363	Andromeda CSG5, LLC	Solar	2,043				
M1831	Antares CSG1, LLC	Solar	1,275				
M1832	Antares CSG2, LLC	Solar	1,260				
M1833	Antares CSG3, LLC	Solar	1,425				
M1299	Antila CSG1, LLC - Antila CSG1, LLC	Solar	2,319				
M1300	Antila CSG2, LLC - Antila CSG2, LLC	Solar	2,148				
M1880	Argo Navis CSG 3	Solar	950				
M1636	Argo Navis CSG1, LLC	Solar	1,146				
M1663	Argo Navis CSG2, LLC	Solar	1,266				
M1301	Aries CSG1, LLC - Aries CSG1, LLC	Solar	2,058				
M1302	Aries CSG2, LLC - Aries CSG2, LLC	Solar	2,041				
M1303	Aries CSG3, LLC - Aries CSG3, LLC	Solar	1,791				
M1304	Aries CSG4, LLC - Aries CSG4, LLC	Solar	1,937				
M1637	Armstrong Unit 1	Solar	1,647				
M1638	Armstrong Unit 2	Solar	1,539				
M1639	Armstrong Unit 3	Solar	1,653				
M1412	Aspen01	Solar	2,261				
M1413	Aspen02	Solar	2,064				
M1414	Aspen03	Solar	2,290				
M1415	Aspen04	Solar	2,247				
M1416	Aspen05	Solar	2,228				
[NOT PUBLIC DATA BEGINS							
		Solar	12,272				
		Solar	6,128				

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
		Solar	4,112				
		Solar	5,788				
		Solar	6,592				
		Solar	5,406				
		Solar	5,453				
		Solar	4,510				
		Solar	7,331				
		Solar	3,018				
		Solar	3,402				
		Solar	10,272				
		Solar	4,310				
		Solar	10,464				
		Solar	4,641				
		Solar	8,214				
	NOT PUBLIC DATA ENDS]						
M1339	B.R. Corcoran - Hennepin Kaat 1 - MINNESOTA SOLAR CSG 19, LLC	Solar	2,063				
M1340	B.R. Corcoran - Hennepin Kaat 2 - MINNESOTA SOLAR CSG 19, LLC	Solar	1,956				
M1341	B.R. Corcoran - Hennepin Kaat 3 - MINNESOTA SOLAR CSG 19, LLC	Solar	1,879				
M1342	B.R. Corcoran - Hennepin Kaat 4 - MINNESOTA SOLAR CSG 19, LLC	Solar	1,970				
M1343	B.R. Corcoran - Hennepin Kaat 5 - MINNESOTA SOLAR CSG 19, LLC	Solar	1,992				
M1616	Bartlett Unit 1	Solar	1,812				
M1617	Bartlett Unit 2	Solar	1,882				
M1618	Bartlett Unit 3	Solar	1,849				
M1619	Bartlett Unit 4	Solar	1,885				
M1620	Bartlett Unit 5	Solar	1,838				
M1905	Betcher CSG LLC	Solar	908				
[NOT PUBLIC DATA BEGINS							
		Solar	22				
	NOT PUBLIC DATA ENDS]						
M1321	Big Lake Holdco LLC #1 - Big Lake Holdco LLC #1	Solar	2,193				
M1322	Big Lake Holdco LLC #2 - Big Lake Holdco LLC #2	Solar	2,199				
M1323	Big Lake Holdco LLC #3 - Big Lake Holdco LLC #3	Solar	2,142				
M1324	Big Lake Holdco LLC #4 - Big Lake Holdco LLC #4	Solar	2,208				
M1325	Big Lake Holdco LLC #5 - Big Lake Holdco LLC #5	Solar	2,195				
M1761	Big Lake Solar Project 1	Solar	1,474				
M1769	Big Lake Solar Project 2	Solar	1,472				
M1770	Big Lake Solar Project 3	Solar	1,484				
M1772	Big Lake Solar Project 4	Solar	1,484				
M1773	Big Lake Solar Project 5	Solar	1,423				
M1100	Blue Lake 1 - Blue Lake 1	Solar	1,697				
M1101	Blue Lake 2 - Blue Lake 2	Solar	1,858				
M1102	Blue Lake 3 - Blue Lake 3	Solar	1,849				
[NOT PUBLIC DATA BEGINS							
		Solar	948				
	NOT PUBLIC DATA ENDS]						
M1598	Brase Unit 1	Solar	1,827				
M1599	Brase Unit 2	Solar	1,875				
M1600	Brase Unit 3	Solar	1,625				
M1601	Brase Unit 4	Solar	754				
M1053	Buhl Family CSG - Buhl Family CSG	Solar	380				
M1896	Butterfield CSG LLC	Solar	268				
M1290	Caelum CSG1, LLC - Caelum CSG1, LLC	Solar	1,968				
M1291	Caelum CSG2, LLC - Caelum CSG2, LLC	Solar	2,150				
M1369	Capella CSG1, LLC	Solar	1,904				
M1370	Capella CSG2, LLC	Solar	1,546				
M1371	Capella CSG3, LLC	Solar	1,409				
M1372	Capella CSG4, LLC	Solar	1,340				
M1373	Capella CSG5, LLC	Solar	1,323				
M1555	Carina CSG1, LLC	Solar	2,059				
M1556	Carina CSG2, LLC	Solar	1,874				
M1557	Carina CSG3, LLC	Solar	1,504				
M1558	Carina CSG4, LLC	Solar	1,823				
M1602	Carver Gladden Unit 1	Solar	1,707				
M1603	Carver Gladden Unit 2	Solar	1,703				
M1604	Carver Gladden Unit 3	Solar	1,733				
M1881	CEF Edina Community Solar, LLC	Solar	247				
M1838	CEF Shiloh Community Solar, LLC	Solar	164				
M1292	Centaurus CSG1, LLC - Centaurus CSG1, LLC	Solar	2,084				
M1293	Centaurus CSG2, LLC - Centaurus CSG2, LLC	Solar	1,927				
M1549	CF GM NES of Porter Way CSG A	Solar	1,951				
M1550	CF GM NES of Porter Way CSG B	Solar	1,955				
M1551	CF GM NES of Porter Way CSG C	Solar	1,911				
M1103	Chisago Community Solar 1, LLC - Chisago Community Solar 1	Solar	1,759				
M1104	Chisago Community Solar 2, LLC - Chisago Community Solar 2	Solar	1,782				
M1105	Chisago Community Solar 3, LLC - Chisago Community Solar 3	Solar	1,807				
M1106	Chisago Community Solar 4, LLC - Chisago Community Solar 4	Solar	1,796				
[NOT PUBLIC DATA BEGINS							
		Solar	61				
	NOT PUBLIC DATA ENDS]						
M1890	Clara City CSG 1, LLC	Solar	739				
M1781	Corvus CSG1, LLC	Solar	472				
M1780	Corvus CSG2, LLC	Solar	459				
M1779	Corvus CSG3, LLC	Solar	506				
M1778	Corvus CSG4, LLC	Solar	468				
M1777	Corvus CSG5, LLC	Solar	409				
M1640	Cottage Grove PV1	Solar	1,357				
M1641	Cottage Grove PV2	Solar	1,390				
M1642	Cottage Grove PV3	Solar	1,381				
M1643	Cottage Grove PV4	Solar	1,352				
M1644	Cottage Grove PV5	Solar	1,352				
[NOT PUBLIC DATA BEGINS							
		Solar	260				
	NOT PUBLIC DATA ENDS]						
M1374	Crater CSG1, LLC	Solar	2,161				

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Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
M1375	Crater CSG2, LLC	Solar	2,097				
M1376	Crater CSG3, LLC	Solar	2,061				
M1628	Delphinus CSG1, LLC	Solar	1,701				
M1629	Delphinus CSG2, LLC	Solar	1,819				
M1875	DG Minnesota CSG 1, LLC	Solar	877				
M1876	DG Minnesota CSG 1, LLC	Solar	841				
M1877	DG Minnesota CSG 1, LLC	Solar	865				
M1878	DG Minnesota CSG 1, LLC	Solar	888				
M1879	DG Minnesota CSG 1, LLC	Solar	910				
M1822	DG Minnesota CSG, LLC	Solar	604				
M1823	DG Minnesota CSG, LLC	Solar	585				
M1824	DG Minnesota CSG, LLC	Solar	503				
M1825	DG Minnesota CSG, LLC	Solar	598				
M1826	DG Minnesota CSG, LLC	Solar	588				
M1817	DG Minnesota CSG, LLC	Solar	437				
M1818	DG Minnesota CSG, LLC	Solar	417				
M1819	DG Minnesota CSG, LLC	Solar	478				
M1820	DG Minnesota CSG, LLC	Solar	479				
M1821	DG Minnesota CSG, LLC	Solar	518				
M1873	DG Minnesota CSG, LLC	Solar	504				
M1874	DG Minnesota CSG, LLC	Solar	354				
M1230	Dodge Holdco LLC #1 - Dodge Holdco LLC #1	Solar	1,780				
M1231	Dodge Holdco LLC #2 - Dodge Holdco LLC #2	Solar	1,798				
M1232	Dodge Holdco LLC #3 - Dodge Holdco LLC #3	Solar	1,709				
M1233	Dodge Holdco LLC #4 - Dodge Holdco LLC #4	Solar	1,793				
M1234	Dodge Holdco LLC #5 - Dodge Holdco LLC #5	Solar	1,850				
M1417	DodgeSun CSG 1	Solar	2,413				
M1418	DodgeSun CSG 2	Solar	2,431				
M1419	DodgeSun CSG 3	Solar	2,448				
M1420	DodgeSun CSG 4	Solar	2,445				
M1421	DodgeSun CSG 5	Solar	2,440				
M1676	DragonFly Solar	Solar	195				
M1590	Dundas Solar Farm 1	Solar	1,875				
M1591	Dundas Solar Farm 2	Solar	1,893				
M1592	Dundas Solar Farm 3	Solar	1,975				
M1593	Dundas Solar Farm 4	Solar	1,882				
M1594	Dundas Solar Farm 5	Solar	1,963				
M1107	Eichtens - Eichtens 039467	Solar	1,736				
M1108	Eichtens - Eichtens 040717	Solar	1,741				
M1109	Eichtens - Eichtens 040718	Solar	1,734				
M1110	Eichtens - Eichtens 040841	Solar	1,758				
M1111	Empire 1 - Empire 1	Solar	1,901				
M1112	Empire 2 - Empire 2	Solar	2,010				
M1113	Empire 3 - Empire 3	Solar	2,130				
M1114	Empire 4 - Empire 4	Solar	2,016				
M1115	Empire 5 - Empire 5	Solar	1,983				
M1312	Equuleus Community Solar Gardens #1 - Equuleus Community Solar Gardens #1	Solar	2,385				
M1313	Equuleus Community Solar Gardens #2 - Equuleus Community Solar Gardens #2	Solar	2,409				
M1314	Equuleus Community Solar Gardens #3 - Equuleus Community Solar Gardens #3	Solar	2,081				
M1315	Equuleus Community Solar Gardens #4 - Equuleus Community Solar Gardens #4	Solar	2,409				
M1316	Equuleus Community Solar Gardens #5 - Equuleus Community Solar Gardens #5	Solar	2,188				
M1235	Farmington Holdco, LLC #1 - Farmington Holdco, LLC #1	Solar	1,814				
M1236	Farmington Holdco, LLC #2 - Farmington Holdco, LLC #2	Solar	1,855				
M1237	Farmington Holdco, LLC #3 - Farmington Holdco, LLC #3	Solar	1,890				
M1238	Farmington Holdco, LLC #4 - Farmington Holdco, LLC #4	Solar	1,850				
M1239	Farmington Holdco, LLC #5 - Farmington Holdco, LLC #5	Solar	1,862				
M1809	Foreman's Hill CSG LLC	Solar	1,074				
M1810	Foreman's Hill CSG LLC	Solar	1,086				
M1811	Foreman's Hill CSG LLC	Solar	1,112				
M1812	Foreman's Hill CSG LLC	Solar	1,113				
M1813	Foreman's Hill CSG LLC	Solar	1,099				
M1240	Forest Lake Holdco #1 - Forest Lake Holdco #1	Solar	2,031				
M1241	Forest Lake Holdco #2 - Forest Lake Holdco #2	Solar	2,064				
M1242	Forest Lake Holdco #3 - Forest Lake Holdco #3	Solar	1,676				
M1243	Forest Lake Holdco #4 - Forest Lake Holdco #4	Solar	1,750				
M1244	Forest Lake Holdco #5 - Forest Lake Holdco #5	Solar	1,708				
M1868	Fox CSG 1, LLC	Solar	816				
M1869	Fox CSG 1, LLC	Solar	816				
M1870	Fox CSG 1, LLC	Solar	813				
M1871	Fox CSG 1, LLC	Solar	811				
M1872	Fox CSG 1, LLC	Solar	800				
M630	FreEner-g-2010-01 - FreEner-g-2010-01	Solar	125				
M1294	Gemini CSG1, LLC - Gemini CSG1, LLC	Solar	2,072				
M1295	Gemini CSG2, LLC - Gemini CSG2, LLC	Solar	2,267				
M1296	Gemini CSG3, LLC - Gemini CSG3, LLC	Solar	2,307				
M1422	Gopher 1	Solar	2,002				
M1423	Gopher 2	Solar	2,056				
M1424	Gopher 3	Solar	1,979				
M1425	Gopher 4	Solar	1,791				
M1426	Gopher 5	Solar	2,050				
M1907	Greenway Solar, LLC	Solar	191				
M1658	Grimm 049571	Solar	1,654				
M1386	Hauer Unit 1	Solar	1,983				
M1387	Hauer Unit 2	Solar	2,153				
M1388	Hauer Unit 3	Solar	1,835				
M1389	Hauer Unit 4	Solar	2,126				
M1390	Hauer Unit 5	Solar	1,555				
M1904	Heyer CSG LLC	Solar	1,309				
M1427	Hickory01	Solar	2,252				
M1428	Hickory02	Solar	2,306				
M1429	Hickory03	Solar	2,291				
M1430	Hickory05	Solar	2,275				
M1431	Hickory06	Solar	2,317				
M1659	Huneke I 049242	Solar	1,576				

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
[NOT PUBLIC DATA BEGINS							
		Solar	212				
	NOT PUBLIC DATA ENDS]						
M1245	Hwy 14 Holdco LLC #1 - Hwy 14 Holdco LLC #1	Solar	2,084				
M1246	Hwy 14 Holdco LLC #2 - Hwy 14 Holdco LLC #2	Solar	2,156				
M1247	Hwy 14 Holdco LLC #3 - Hwy 14 Holdco LLC #3	Solar	2,257				
M1248	Hwy 14 Holdco LLC #4 - Hwy 14 Holdco LLC #4	Solar	2,143				
M1249	Hwy 14 Holdco LLC #5 - Hwy 14 Holdco LLC #5	Solar	2,266				
M1326	IMS #1 - IMS #1	Solar	1,959				
M1327	IMS #2 - IMS #2	Solar	2,009				
M1328	IMS #3 - IMS #3	Solar	2,045				
M1329	IMS #4 - IMS #4	Solar	1,963				
M1330	IMS #5 - IMS #5	Solar	2,083				
M1559	Johnson CSG 1	Solar	2,263				
M1560	Johnson CSG 2	Solar	2,316				
M1561	Johnson CSG 3	Solar	2,286				
M1562	Johnson CSG 4	Solar	2,305				
M1563	Johnson CSG 5	Solar	1,615				
M1886	Johnson I CSG LLC	Solar	956				
M1887	Johnson II CSG LLC	Solar	702				
M1432	Kramer CSG 1	Solar	2,470				
M1433	Kramer CSG 2	Solar	2,473				
M1434	Kramer CSG 3	Solar	2,435				
M1660	Krause 049570	Solar	1,735				
M1840	Kreye01 CSG A	Solar	237				
M1841	Kreye01 CSG B	Solar	244				
M1843	Kreye01 CSG D	Solar	245				
M1844	Kreye02 CSG A	Solar	243				
M1845	Kreye02 CSG B	Solar	241				
M1846	Kreye02 CSG C	Solar	232				
M1847	Kreye02 CSG D	Solar	221				
M1842	Kreyer01 CSG C	Solar	247				
M1435	Lahr 1	Solar	1,872				
M1436	Lahr 2	Solar	2,193				
M1437	Lahr 3	Solar	2,194				
M1438	Lahr 4	Solar	2,179				
M1439	Lahr 5	Solar	2,018				
M1116	Lake Calhoun 17 - Lake Calhoun 17	Solar	2,038				
M1117	Lake Calhoun 18 - Lake Calhoun 18	Solar	2,037				
M1118	Lake Calhoun 19 - Lake Calhoun 19	Solar	2,012				
M1119	Lake Calhoun 20 - Lake Calhoun 20	Solar	2,034				
M1120	Lake Calhoun 21 - Lake Calhoun 21	Solar	2,024				
M1121	Lake Calhoun 27 - Lake Calhoun 27	Solar	2,012				
M1122	Lake Calhoun 28 - Lake Calhoun 28	Solar	2,035				
M1123	Lake Calhoun 29 - Lake Calhoun 29	Solar	2,000				
M1766	Lake Calhoun 43 LLC	Solar	865				
M1765	Lake Calhoun 44 LLC	Solar	816				
M1764	Lake Calhoun 45 LLC	Solar	858				
M1763	Lake Calhoun 47 LLC	Solar	882				
M1762	Lake Calhoun 49 LLC	Solar	807				
M1582	Lake Waconia Solar Garden	Solar	1,866				
M1583	Lake Waconia Solar IV Garden	Solar	1,866				
M1440	Lenzen Unit 1	Solar	1,851				
M1441	Lenzen Unit 2	Solar	1,907				
M1442	Lenzen Unit 3	Solar	1,770				
M1443	Lenzen Unit 4	Solar	752				
M1444	Lenzen Unit 5	Solar	1,847				
M1782	LeSun, LLC	Solar	528				
M1783	LeSun, LLC	Solar	517				
M1784	LeSun, LLC	Solar	544				
M1785	LeSun, LLC	Solar	480				
M1786	LeSun, LLC	Solar	566				
M1900	Libra Community Solar Garden, LLC	Solar	672				
M1188	Lind 1 - Lind SRC 041230	Solar	1,814				
M1189	Lind 2 - Lind SRC 041231	Solar	2,039				
M1190	Lind 3 - Lind SRC 041232	Solar	2,034				
M1191	Lind 4 - Lind SRC 041233	Solar	1,884				
M1192	Lind 5 - Lind SRC 041234	Solar	1,892				
M1650	Lindstrom CSG 1, LLC	Solar	1,864				
M1651	Lindstrom CSG 2, LLC	Solar	1,853				
M1652	Lindstrom CSG 3, LLC	Solar	1,857				
M1552	Lyra CSG1, LLC	Solar	1,918				
M1553	Lyra CSG2, LLC	Solar	1,786				
M1554	Lyra CSG3, LLC	Solar	1,812				
M1198	Mapleton CSG1 - Mapleton CSG1, LLC	Solar	2,032				
M1199	Mapleton CSG2 - Mapleton CSG2, LLC	Solar	1,947				
M1200	Mapleton CSG3 - Mapleton CSG3, LLC	Solar	1,794				
M1827	Mapleton Solar LLC	Solar	938				
M1828	Mapleton Solar LLC	Solar	901				
M1829	Mapleton Solar LLC	Solar	949				
M1830	Mapleton Solar LLC	Solar	468				
M1646	Marmas CSG 1	Solar	1,513				
M1647	Marmas CSG 2	Solar	1,560				
M1648	Marmas CSG 3	Solar	1,582				
M1649	Marmas CSG 4	Solar	1,553				
[NOT PUBLIC DATA BEGINS							
		Solar	73,417				
	NOT PUBLIC DATA ENDS]						
M655	MCC - Solar	Solar	389				
M1584	McHattie Unit 1	Solar	1,947				
M1585	McHattie Unit 2	Solar	1,999				
M1586	McHattie Unit 3	Solar	2,027				
M1587	McHattie Unit 4	Solar	1,992				
M1445	Menke Unit 1	Solar	2,069				

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Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
M1446	Menke Unit 2	Solar	2,259				
M1447	Menke Unit 3	Solar	2,319				
M730	Merrick Solar - Merrick Solar	Solar	66				
M1396	Michael 1	Solar	2,329				
M1397	Michael 2	Solar	2,341				
M1398	Michael 3	Solar	2,342				
M1399	Michael 4	Solar	2,276				
[NOT PUBLIC DATA BEGINS							
		Solar	3				
	NOT PUBLIC DATA ENDS]						
M1834	Minnesota Solar CSG 1, LLC	Solar	203				
M1835	Minnesota Solar CSG 1, LLC	Solar	647				
M1836	Minnesota Solar CSG 1, LLC	Solar	660				
M1837	Minnesota Solar CSG 1, LLC	Solar	630				
M1383	MINNESOTA SOLAR CSG 21, LLC	Solar	1,493				
M1384	MINNESOTA SOLAR CSG 21, LLC	Solar	1,566				
M1385	MINNESOTA SOLAR CSG 21, LLC	Solar	1,618				
M1364	MINNESOTA SOLAR CSG 9, LLC	Solar	2,004				
M1365	MINNESOTA SOLAR CSG 9, LLC	Solar	1,959				
M1366	MINNESOTA SOLAR CSG 9, LLC	Solar	2,015				
M1367	MINNESOTA SOLAR CSG 9, LLC	Solar	2,012				
M1368	MINNESOTA SOLAR CSG 9, LLC	Solar	2,019				
M1588	MN Lake Unit 1	Solar	1,800				
M1589	MN Lake Unit 2	Solar	1,543				
M1790	MN Solar Community, LLC	Solar	711				
M1791	MN Solar Community, LLC	Solar	692				
M1792	MN Solar Community, LLC	Solar	967				
M1793	MN Solar Community, LLC	Solar	824				
M1794	MN Solar Community, LLC	Solar	797				
M738	MNRDF_DNR - MNRDF_DNR	Solar	76				
M1344	Montgomery W - Highlander 1 - MINNESOTA SOLAR CSG 4, LLC	Solar	1,959				
M1345	Montgomery W - Highlander 2 - MINNESOTA SOLAR CSG 4, LLC	Solar	2,004				
M1346	Montgomery W - Highlander 3 - MINNESOTA SOLAR CSG 4, LLC	Solar	2,010				
M1250	Morgan CSG1, LLC - Morgan CSG1, LLC	Solar	2,289				
M1251	Morgan CSG2, LLC - Morgan CSG2, LLC	Solar	2,288				
M1252	Morgan CSG3, LLC - Morgan CSG3, LLC	Solar	2,139				
M1797	MSC Carver01, LLC	Solar	228				
M1798	MSC Carver01, LLC	Solar	197				
M1799	MSC Carver01, LLC	Solar	241				
M1800	MSC Carver01, LLC	Solar	241				
M1801	MSC Carver02, LLC	Solar	240				
M1802	MSC Carver02, LLC	Solar	237				
M1803	MSC Carver02, LLC	Solar	241				
M1804	MSC Carver02, LLC	Solar	227				
M1849	MSC-Wash01, LLC	Solar	235				
M1848	MSC-Wash02, LLC	Solar	237				
M1850	MSC-Wash03, LLC	Solar	238				
M1851	MSC-Wash04, LLC	Solar	223				
M1852	MSC-Wash05, LLC	Solar	213				
M1853	MSC-Wash06, LLC	Solar	217				
M1854	MSC-Wash07, LLC	Solar	213				
M1855	MSC-Wash08, LLC	Solar	187				
M1856	MSC-Wash09, LLC	Solar	203				
M1857	MSC-Wash10, LLC	Solar	212				
M1858	MSC-Wash11, LLC	Solar	209				
M1859	MSC-Wash12, LLC	Solar	213				
M1860	MSC-Wash13, LLC	Solar	213				
M1861	MSC-Wash14, LLC	Solar	210				
M1862	MSC-Wash15, LLC	Solar	214				
M1863	MSC-Wash16, LLC	Solar	217				
M1864	MSC-Wash17, LLC	Solar	215				
M1865	MSC-Wash18, LLC	Solar	217				
M1866	MSC-Wash19, LLC	Solar	215				
M1867	MSC-Wash20, LLC	Solar	211				
M1317	NES - CF of Tyler CSG A - NES - CF of Tyler CSG A	Solar	424				
M1448	Nesvold 1 - 1	Solar	2,225				
M1449	Nesvold 1 - 2	Solar	2,076				
M1450	Nesvold 1 - 3	Solar	1,833				
M1451	Nesvold 1 - 4	Solar	2,033				
M1452	Nesvold 1 - 5	Solar	2,131				
M1610	New Germany Solar Garden	Solar	2,091				
[NOT PUBLIC DATA BEGINS							
		Solar	100,341				
	NOT PUBLIC DATA ENDS]						
M1124	Northfield CSG1 - Northfield CSG1	Solar	2,034				
M1125	Northfield CSG2 - Northfield CSG2	Solar	1,954				
M1126	Northfield CSG3 - Northfield CSG3	Solar	1,913				
M1127	Northfield CSG4 - Northfield CSG4	Solar	2,125				
M1128	Northfield CSG5 - Northfield CSG5	Solar	2,085				
M1453	Northfield Holdco LLC Unit 1	Solar	2,327				
M1454	Northfield Holdco LLC Unit 2	Solar	2,252				
M1455	Northfield Holdco LLC Unit 3	Solar	2,290				
M1456	Northfield Holdco LLC Unit 4	Solar	2,398				
M1457	Northfield Holdco LLC Unit 5	Solar	2,228				
M1052	Novel CSG of Faircon - Novel CSG of Faircon	Solar	144				
M1257	Novel CSG of Twin Pine Farm - Novel CSG of Twin Pine Farm	Solar	61				
M1548	Novel CSG of Vetter Farms B	Solar	50				
M1265	Novel CSG of Winona A - Novel CSG of Winona A	Solar	499				
M1891	Novel Solar Eight LLC	Solar	136				
M1897	Novel Solar Eight LLC	Solar	119				
M1898	Novel Solar Eight LLC	Solar	169				
M1635	Nystuen	Solar	1,385				
M1899	Oak Leaf Solar XI LLC	Solar	511				
M2031	OE WI Solar 2 (Ore Dock)	Solar	29				

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
M1129	Orion CSG1 - Orion CSG1	Solar	1,910				
M1130	Orion CSG2 - Orion CSG2	Solar	1,733				
M1131	Orion CSG3 - Orion CSG3	Solar	1,838				
M1759	Osakis Solar LLC	Solar	953				
M1805	Osakis Solar LLC	Solar	1,015				
M1814	Osakis Solar LLC	Solar	1,008				
M1815	Osakis Solar LLC	Solar	1,020				
M1816	Osakis Solar LLC	Solar	1,046				
[NOT PUBLIC DATA BEGINS							
		Solar	42				
	NOT PUBLIC DATA ENDS]						
M1133	Paynesville CSG 2 - Paynesville CSG 2	Solar	2,199				
M1134	Paynesville CSG 3 - Paynesville CSG 3	Solar	1,961				
M1135	Paynesville CSG 4 - Paynesville CSG 4	Solar	1,749				
M1136	Paynesville CSG 5 - Paynesville CSG 5	Solar	2,158				
M1132	Paynesville CSG1 - Paynesville CSG1	Solar	2,123				
M1297	Pegasus CSG1, LLC - Pegasus CSG1, LLC	Solar	2,276				
M1298	Pegasus CSG2, LLC - Pegasus CSG2, LLC	Solar	2,396				
M1253	Pine Island Holdco, LLC #1 - Pine Island Holdco, LLC #1	Solar	1,896				
M1254	Pine Island Holdco, LLC #2 - Pine Island Holdco, LLC #2	Solar	1,876				
M1255	Pine Island Holdco, LLC #3 - Pine Island Holdco, LLC #3	Solar	1,887				
M1256	Pine Island Holdco, LLC #4 - Pine Island Holdco, LLC #4	Solar	2,102				
M1377	Pollux CSG1, LLC	Solar	1,400				
M1888	Prinsburg CSG 1, LLC	Solar	696				
M1137	Red Wing SD - Red Wing SD 42423	Solar	1,769				
M1138	Red Wing SD - Red Wing SD 42425	Solar	1,803				
M1139	Red Wing SD - Red Wing SD 42426	Solar	1,829				
M1140	Red Wing SD - Red Wing SD 42427	Solar	1,816				
M1141	Red Wing SD - Red Wing SD 42428	Solar	1,843				
M1400	Richmond 1	Solar	2,179				
M1401	Richmond 2	Solar	2,227				
M1402	Richmond 3	Solar	2,209				
M1403	Richmond 4	Solar	2,182				
M1404	Richmond 5	Solar	2,181				
M1889	RJC I CSG LLC	Solar	1,220				
M1894	RJC II CSG LLC	Solar	1,473				
M1142	Rosemount CSG1 - Rosemount CSG1	Solar	2,056				
M1143	Rosemount CSG2 - Rosemount CSG2	Solar	2,008				
M1144	Rosemount CSG3 - Rosemount CSG3	Solar	2,053				
M1145	Rosemount CSG4 - Rosemount CSG4	Solar	2,059				
M1146	Rosemount CSG5 - Rosemount CSG5	Solar	2,018				
M1806	Scandia CSG LLC	Solar	476				
M1807	Scandia CSG LLC	Solar	1,035				
M1808	Scandia CSG LLC	Solar	1,038				
M1458	Scandia Trail Unit 1	Solar	2,401				
M1459	Scandia Trail Unit 2	Solar	2,417				
M1460	Scandia Trail Unit 3	Solar	2,345				
M1461	Scandia Trail Unit 4	Solar	2,336				
M1462	Scandia Trail Unit 5	Solar	2,358				
M1662	School Sisters 051877	Solar	1,403				
[NOT PUBLIC DATA BEGINS							
		Solar	594				
	NOT PUBLIC DATA ENDS]						
M1614	Sherburne Community Solar Garden 1	Solar	1,640				
M1615	Sherburne Community Solar Garden 2	Solar	1,668				
M1613	Sherburne Community Solar Garden 3	Solar	1,684				
M1612	Sherburne Community Solar Garden 4	Solar	1,676				
M1611	Sherburne Community Solar Garden 5	Solar	1,668				
M796	Slayton Solar - Slayton Solar LLC	Solar	1,778				
M1630	South Street West Solar Project 1	Solar	1,697				
M1631	South Street West Solar Project 2	Solar	1,717				
M1632	South Street West Solar Project 3	Solar	1,645				
M1633	South Street West Solar Project 4	Solar	1,696				
M1634	South Street West Solar Project 5	Solar	1,646				
M1305	Spica CSG1, LLC - Spica CSG1, LLC	Solar	2,013				
M1306	Spica CSG2, LLC - Spica CSG2, LLC	Solar	2,255				
M559	St. John's Solar Farm - St. John's Solar Farm	Solar	420				
M1768	SunE Feely 1, LLC	Solar	989				
M1771	SunE Feely 1, LLC	Solar	988				
M1774	SunE Feely 1, LLC	Solar	981				
M1775	SunE Feely 1, LLC	Solar	925				
M1776	SunE Feely 1, LLC	Solar	954				
M1391	SunE Koppelman 1, LLC	Solar	2,366				
M1392	SunE Koppelman 2, LLC	Solar	2,390				
M1393	SunE Koppelman 3, LLC	Solar	2,372				
M1394	SunE Koppelman 4, LLC	Solar	2,232				
M1395	SunE Koppelman 5, LLC	Solar	2,326				
M1378	SunE Rengstorf 1, LLC	Solar	2,204				
M1379	SunE Rengstorf 2, LLC	Solar	2,184				
M1380	SunE Rengstorf 3, LLC	Solar	2,238				
M1381	SunE Rengstorf 4, LLC	Solar	2,185				
M1382	SunE Rengstorf 5, LLC	Solar	2,225				
M1653	SunE St. Cloud 1, LLC Unit 1	Solar	1,548				
M1654	SunE St. Cloud 1, LLC Unit 2	Solar	1,523				
M1655	SunE St. Cloud 1, LLC Unit 3	Solar	1,564				
M1656	SunE St. Cloud 1, LLC Unit 4	Solar	1,561				
M1657	SunE St. Cloud 1, LLC Unit 5	Solar	1,545				
M1595	SunE Stolee PV1	Solar	1,827				
M1596	SunE Stolee PV2	Solar	1,855				
M1597	SunE Stolee PV3	Solar	1,901				
M1147	Sunrise CSG 1 - Sunrise CSG 1	Solar	2,230				
M1148	Sunrise CSG 2 - Sunrise CSG 2	Solar	2,067				
M1149	Sunrise CSG 3 - Sunrise CSG 3	Solar	2,000				
M1150	Sunrise CSG 4 - Sunrise CSG 4	Solar	2,022				

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
M1151	Sunrise CSG 5 - Sunrise CSG 5	Solar	2,020				
[NOT PUBLIC DATA BEGINS							
		Solar	296				
	NOT PUBLIC DATA ENDS]						
M1795	Taurus CSG 1, LLC	Solar	894				
M1796	Taurus CSG 2, LLC	Solar	652				
M1626	Taurus CSG3, LLC	Solar	1,240				
M1627	Taurus CSG4, LLC	Solar	1,205				
M1463	Taylors Falls 1	Solar	1,879				
M1464	Taylors Falls 2	Solar	1,714				
M1465	Taylors Falls 3	Solar	1,928				
M1466	Taylors Falls 4	Solar	1,903				
M1467	Taylors Falls 5	Solar	1,873				
M1569	TJ Farms Unit 1	Solar	1,409				
M1570	TJ Farms Unit 2	Solar	1,343				
M1571	TJ Farms Unit 3	Solar	1,422				
M1572	TJ Farms Unit 4	Solar	309				
[NOT PUBLIC DATA BEGINS							
		Solar	232				
	NOT PUBLIC DATA ENDS]						
M1347	UNIVERSITY CENTRE AT 1919 LLP - UNIVERSITY CENTRE	Solar	802				
M1152	Ursa CSG1 - Ursa CSG1	Solar	1,842				
M1153	Ursa CSG2 - Ursa CSG2	Solar	2,032				
M1154	Ursa CSG3 - Ursa CSG3	Solar	2,032				
M1155	Ursa CSG4 - Ursa CSG4	Solar	2,053				
M1156	Ursa CSG5 - Ursa CSG5	Solar	1,883				
M1903	USS Big Lake 1 LLC	Solar	742				
M1901	USS Dubhe Solar LLC	Solar	709				
M1906	USS Good Solar LLC	Solar	706				
M1902	USS Kasch Solar LLC	Solar	798				
M1910	USS Nillie Corn Solar LLC	Solar	456				
M1908	USS Rockpoint Solar LLC	Solar	478				
M1909	USS Solar Dawn LLC	Solar	473				
M1307	Vega CSG1, LLC - Vega CSG1, LLC	Solar	2,352				
M1308	Vega CSG2, LLC - Vega CSG2, LLC	Solar	2,172				
M1309	Vega CSG3, LLC - Vega CSG3, LLC	Solar	2,303				
M1310	Vega CSG4, LLC - Vega CSG4, LLC	Solar	2,372				
M1311	Vega CSG5, LLC - Vega CSG5, LLC	Solar	2,370				
M1573	Veseli Solar Garden	Solar	2,019				
M1574	Vetter Estate Unit 1	Solar	1,324				
M1575	Vetter Estate Unit 2	Solar	1,696				
M1576	Vetter Estate Unit 3	Solar	1,576				
M1258	Wabasha Holdco LLC #1 - Wabasha Holdco LLC #1	Solar	1,792				
M1259	Wabasha Holdco LLC #2 - Wabasha Holdco LLC #2	Solar	1,786				
M1260	Wabasha Holdco LLC #3 - Wabasha Holdco LLC #3	Solar	1,765				
M1318	Walz #1 - Walz #1	Solar	555				
M1319	Walz #2 - Walz #2	Solar	2,191				
M1320	Walz #3 - Walz #3	Solar	2,132				
M1577	WasecaSun, LLC Unit 1	Solar	2,137				
M1578	WasecaSun, LLC Unit 2	Solar	2,084				
M1579	WasecaSun, LLC Unit 3	Solar	2,135				
M1580	WasecaSun, LLC Unit 4	Solar	2,148				
M1581	WasecaSun, LLC Unit 5	Solar	2,139				
M1468	Waterford Holdco LLC Unit 3	Solar	1,564				
M1469	Waterford Holdco LLC Unit 4	Solar	2,313				
M1470	Waterford Holdco LLC Unit 5	Solar	2,247				
M1564	Waterville Community Solar Farm 1	Solar	1,785				
M1565	Waterville Community Solar Farm 2	Solar	1,762				
M1566	Waterville Community Solar Farm 3	Solar	1,779				
M1567	Waterville Community Solar Farm 4	Solar	1,730				
M1568	Waterville Community Solar Farm 5	Solar	1,791				
M1661	Webster 049585	Solar	1,078				
M1261	Webster Holdco LLC #1 - Webster Holdco LLC #1	Solar	1,853				
M1262	Webster Holdco LLC #2 - Webster Holdco LLC #2	Solar	2,067				
M1267	Webster Holdco LLC #3 - Webster Holdco LLC #3	Solar	2,030				
M1263	Webster Holdco LLC #4 - Webster Holdco LLC #4	Solar	1,832				
M1264	Webster Holdco LLC #5 - Webster Holdco LLC #5	Solar	1,856				
M1839	WGL Solar Anderson, LLC	Solar	981				
M1882	WGL Solar Barone, LLC	Solar	716				
M1883	WGL Solar Bolduan, LLC	Solar	628				
M1895	WGL Solar Cornille, LLC	Solar	886				
M1892	WGL Solar Eichtens II, LLC	Solar	787				
M1760	WGL Solar Goodhue 1, LLC	Solar	1,088				
M1767	WGL Solar Goodhue 1, LLC	Solar	1,108				
M1893	WGL Solar Guse, LLC	Solar	753				
M1885	WGL Solar Huneke II, LLC	Solar	847				
M1787	WGL Solar Red Maple 1, LLC	Solar	1,258				
M1788	WGL Solar Red Maple 1, LLC	Solar	1,312				
M1789	WGL Solar Red Maple 1, LLC	Solar	1,292				
M1884	WGL Solar Winegar, LLC	Solar	709				
M1605	Wyoming 2 PV1	Solar	1,651				
M1606	Wyoming 2 PV2	Solar	1,677				
M1607	Wyoming 2 PV3	Solar	1,742				
M1608	Wyoming 2 PV4	Solar	1,150				
M1609	Wyoming 2 PV5	Solar	1,743				
M1645	Zumbro Solar Garden	Solar	1,733				
[NOT PUBLIC DATA BEGINS							
		Wind	55,426				
		Wind	3,914				
		Wind	115,058				
		Wind	5,210				
		Wind	265,176				
		Wind	4,025				
		Wind	87,227				

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
		Wind	98,106				
		Wind	43,396				
		Wind	41,305				
		Wind	429,775				
		Wind	604				
		Wind	48,196				
		Wind	22,175				
		Wind	58,808				
		Wind	186,116				
		Wind	107,584				
		Wind	5,051				
		Wind	16,619				
		Wind	308,347				
		Wind	28,696				
		Wind	299,356				
		Wind	55,089				
		Wind	3,378				
		Wind	183,932				
		Wind	3,372				
		Wind	2,844				
		Wind	4,604				
		Wind	125,889				
		Wind	205,402				
		Wind	55,745				
		Wind	534				
		Wind	201,068				
		Wind	194,058				
		Wind	168,540				
		Wind	40,645				
		Wind	366,149				
		Wind	433,528				
		Wind	39,728				
		Wind	31,192				
		Wind	33,943				
		Wind	610,441				
		Wind	2,513				
		Wind	20,957				
		Wind	793,305				
		Wind	481,714				
		Wind	77,414				
		Wind	4,818				
		Wind	57,861				
		Wind	5,002				
		Wind	5,184				
		Wind	8				
		Wind	24,896				
		Wind	14,965				
		Wind	11,544				
		Wind	26,854				
		Wind	27,637				
		Wind	18,076				
		Wind	3,451				
		Wind	3,176				
		Wind	35,770				
		Wind	2,093				
		Wind	49,220				
		Wind	60,515				

NOT PUBLIC DATA ENDS]

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

Minnesota Public Utilities Commission: Docket No. E999/PR-22-12 and Docket No. E999/M-22-85 **Attachment 6**
Minnesota Department of Commerce: Docket No. E999/PR-02-1240 Reporting Period: **January 1, 2021 - December 31, 2021**

Biennial Compliance reporting

Please report the following items in compliance with the PUC May 28, 2013 Order in Docket No. E999/M-12-958

RES Ordering Point

4.A. & 5.H. The year through which the utility can maintain compliance with its current renewable portfolio* Beyond 2040
*Include banked Renewable Energy Credits (RECs)

4.B. & 5.I. Projected RES compliance for the current plus three (3) upcoming years.

Year	Actual/Projected MN retail sales (MWh)	RES Req.(%)	RES Req. (MWh)	Projected Resources (MWh)	Projected Surplus/ (Deficit) (MWh)
	[NOT PUBLIC DATA BEGINS		[NOT PUBLIC DATA BEGINS		
2022		30%			
2023		30%			
2024		30%			
2025		30%			
	NOT PUBLIC DATA ENDS]				NOT PUBLIC DATA ENDS]

5.E.2 & 5.F. Identify other State Renewable Standards or Objectives to which the utility is subject, and the percentage of renewable energy allocated to meet the renewable requirements.

State	RES Req. (MWh)	RES Req. (%)	Percent of utility's total system renewable generation apportioned to this state (%)*
WI	858,032	12.89%	16.36%
MI	20,614	15%	0.34%
SD	214,473	10% Voluntary	5.33%
ND	0	Voluntary	5.29%

*apportionment of renewable energy should reflect each state's percentage of the utility's total system sales.

5.E.3 (i) The status of the utility's renewable energy mix relative to the objective & standards.

The Company's overall renewable energy mix exceeds the renewable portfolio standard (RPS) obligations for the state of Minnesota, and other states it operates in, and is sufficiently able to comply with these increasing requirements. The Company continues to increase its renewable energy mix, primarily in wind and solar, to take advantage of cost-effective resource additions and to decrease carbon emissions.

5.E.3(ii) Efforts taken to meet the objective and standards

In 2021, we added 650 MW of renewable generation capacity to our system and the Company continues to exceed our RES mandate for Minnesota. As approved in our most recent Upper Midwest Integrated Resource Plan, we will continue to add of renewable energy in the coming years.

5.E.3(iii) Obstacles encountered or anticipated in meeting the objective or standards

The annual Renewable Portfolio Standard (RPS) percentage rate and overall renewable requirement for Xcel Energy has significantly increased over the past several years. At the same time, the Company has been able to take advantage of cost-effective renewable resource additions to meet and exceed its compliance obligations.

5.E.3(iv) Potential solutions to the obstacles

The Company is currently positioned to meet and exceed our compliance obligations.

5.G. List any renewable generation facilities expected to become operational during the upcoming year

Facility Name	Type	Capacity (MW)	MISO Capacity Accreditation	Expected Comm'l Operation Date
Heartland Divide Wind II, LLC	Wind	200 MW	32 MW	April 2022
Dakota Range 1&2	Wind	300 MW	49 MW	Jan 2022
Ewington (repower)	Wind	20 MW	3 MW	Sept 2022
Northern Wind (repower)	Wind	120 MW	19 MW	Dec 2022

Note: As stated in our March 7, 2022 Letter in Docket Nos. E002/M-19-33 and E002/M-21-222, we currently expect that construction of the Elk Creek solar facility and the associated commercial operation date will likely be delayed until 2024. Therefore, we have removed Elk Creek Solar LLC from this list. We will continue to update the Commission on this project.

5.K. Identify efforts taken to adequately protect against undesirable economic impacts on ratepayers, including, but not limited to keeping customer's bills and the utility's rates as low as practicable, given regulatory and other constraints.

The Company continues to take advantage of opportunities as these are identified and determined to be beneficial to our customers.

SES Utilities Only

Ongoing efforts to meet SES objective and a brief summary of project mix for SES compliance.

See the "Summary of ongoing efforts to obtain solar energy, including a brief summary of the anticipated mix of project sizes for SES compliance" section within the Compliance Report on page 4.

Discussion on efforts to reach the 2030 goal that 10% of MN retail sales be generated by solar energy (Attach A, 14)

As noted in our filing, the Company already exceeds the current 1.5% requirement and we have substantial SRECs banked. We expect our REC bank to carry us through several more years of demonstrated solar compliance and provide partial fulfillment of the 10% goal. In order to increase solar generation so that we may meet the goal on an ongoing basis, the Company plans to add substantial amounts of solar generation to our portfolio in the coming years, as approved in our recent 2020-2034 Integrated Resource Plan. We will continually review the need for additional solar resources in our future resource plans, in order to achieve the goal long-term.

SES - A summary of progress toward compliance with the ten percent carve out for systems under 40 kW.

See the "Progress towards the 10% carve-out for systems 40 kWac or less, including the method by which the utility will meet the carve-out" section within the Compliance Report on page 4.

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

Minnesota Public Utilities Commission: Docket No. E999/PR-22-12 and Docket No. E999/M-22-85 **Attachment 7**
Minnesota Department of Commerce: Docket No. E999/PR-02-1240 Reporting Period: **January 1, 2021 - December 31, 2021**

M-RETS RECs Bought and Sold

Ordering pt. 4C requires reporting REC sales & purchases for the 2 preceding calendar years

REC Purchases Total	227,740
REC Sales Total	0

Enter REC data for the 2 preceding calendar years.

Wholesale REC Purchases	Wholesale REC Sales	PRICE	Type of purchase	NOTES
227,740		$4.15	For Green Pricing	MN Windsource REC Purchase

CERTIFICATE OF SERVICE

I, Christine Schwartz, hereby certify that I have this day served copies or summaries of the foregoing document on the attached list of persons.

xx by depositing a true and correct copy thereof, properly enveloped with postage paid in the United States Mail at Minneapolis, Minnesota

xx electronic filing

DOCKET NOS. E999/PR-02-1240
E999/PR-22-12
E999/M-22-85

Dated this 1st day of June 2022

/s/

Christine Schwartz Regulatory Administrator

414 Nicollet Mall
Minneapolis, MN 55401

PUBLIC DOCUMENT
NOT PUBLIC DATA EXCISED

June 1, 2023

—Via Electronic Filing—

Mr. Will Seuffert
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101

RE: RENEWABLE ENERGY OBLIGATION (REO)-RENEWABLE ENERGY STANDARD (RES) AND SOLAR ENERGY STANDARDS (SES) COMPLIANCE REPORT

RENEWABLE ENERGY CERTIFICATE RETIREMENT AND SOLAR ENERGY STANDARDS REPORTING FOR COMPLIANCE YEAR 2022
DOCKET NO. E999/PR-23-12

GREEN PRICING VERIFICATION FILING PROCESS
DOCKET NO. E999/PR-02-1240

Dear Mr. Seuffert:

Northern States Power Company, doing business as Xcel Energy, submits this compliance report to fulfill the verification and filing requirements for the Renewable Energy Standard (RES), Renewable Energy Credit (REC) retirement, and Green Pricing REC retirement required by Minn. Stat. § 216B.1691, Subd. 3. The Company also submits this as the 2022 Annual Report as required by the Minnesota Public Utilities Commission in its January 29, 2021 Order in Docket Nos. E999/M-20-464 and E999/M-13-542, Solar Energy Standards (SES).

We have provided the required information in Attachment A. Attachment A contains RES, Green Pricing, and SES Retail Sales; RES, Green Pricing, and SES REC Retirements; and REC Purchases and Sales. We note that the Commission has opened Docket No. E999/CI-23-151 to examine future reporting needs resulting from the recent changes to the RES and the newly created carbon free standard under Minn. Stat. § 216B.1691, and this report does not address these changes.

A. REC Retirement

By May 1, 2023, the Company retired approximately 8.6 million RECs, representing 30 percent of annual retail sales for calendar year 2022, using the Midwest Renewable Energy Tracking System (M-RETS). The Company is therefore in compliance with the Minnesota RES requirements identified in Minn. Stat. § 216B.1691 subd. 2(a) and the Commission's March 19, 2010 Order in Docket No. E999/CI-03-869.

In addition, by May 1, 2023, the Company retired approximately 677,000 RECs for our Green Pricing Programs. Approximately 493,000 RECs were retired for Windsource, approximately 172,000 RECs were retired for Renewable*Connect, and approximately 11,000 RECs were retired for Renewable*Connect Government. Details of the Company's Green Pricing Program REC retirements are included in Attachment A.3.

The required information specified in the Commission's April 17, 2014 Notice and the May 28, 2013 ORDER FINDING UTILITIES IN COMPLIANCE WITH MINN. STAT. § 216B.1691 AND MODIFYING BIENNIAL REPORTING PROCEDURES in Docket No. E999/M-12-958, including the RES calculations, the RECs retired and the names of the M-RETS retirement sub-accounts, is provided in Attachment A.

As noted in Attachment A.7, the Company purchased 330,000 RECs for our Windsource program.

B. Certified Renewable Percentage

The Company began offering the Certified Renewable Percentage (CRP) to our customers in reporting year 2018.

Each year, the Company calculates the CRP for the preceding year, after all program participation, REC sales, REC retirements for the RES, trade margin sales, and all other data points that affect the CRP are available. After the annual CRP is calculated, the Company then retires the additional RECs to match the amount of renewable energy delivered to customers.

The 2022 CRP is calculated at 42.55 percent compared to 34.3 percent in 2021. The increase over the previous year is due largely to additional wind resources brought online in 2022. We estimate that the CRP will continue to increase each year as additional renewable resources continue to come online. The 2022 CRP is higher than the RES obligation, and therefore the Company plans to retire additional RECs for the 2022 CRP beyond what is required for the RES.

Below is an overview of the Minnesota CRP from 2018 to 2022. All prior CRP calculations have completed the thorough process of third-party verification. The Company anticipates that the 2022 CRP will be verified by Fall of 2023.

Table 1: Annual CRP Percentages

Year	CRP Percent
2018	26.6
2019	23.3
2020	31.8
2021	34.3
2022	42.55

C. Renewable*Connect Government Program

The security and privacy of customer data, including energy usage data, is a key concern for the Company. As a matter of course, the Company generally does not publicly disclose energy usage data related to an individual customer.

In previous years of the REO/RES REC filing, the customer participating in the Renewable*Connect Government Program has requested certain information related to its energy usage be considered non-public, but the Department of Commerce has requested the information be submitted publicly. In advance of this year's Compliance filing, the Company reached out to this customer asking if the information that it normally considers non-public could be submitted publicly for this year's 2022 REO/RES REC filing. The customer consented to the Company submitting the information as public information. Notwithstanding this one-time consent, the Company reserves the right to submit similar information as non-public in the future.

D. Summary of ongoing efforts to obtain solar energy, including a brief summary of the anticipated mix of project sizes for SES compliance

For purposes of this Section, SES compliance means the requirement set forth in Minn. Stat. § 216B.1691, Subd. 2f, whereby Xcel Energy, by the end of 2020, needs to generate or procure sufficient electricity generated by solar energy so that at least 1.5 percent of the Company's total retail electric sales in Minnesota is generated by solar energy. The additional requirement in Subd. 2f regarding the 10 percent solar carve-out requirement from systems of 40 kW (AC) or less is addressed in Section E below.

The Company has developed a large portfolio of resources and programs to provide renewable options to residential and commercial customers. Since the passage of the SES in 2013, we have grown our utility portfolio of solar resources to expand access of solar benefits to all customers while achieving compliance in reporting year 2022. The Company began to satisfy the Minnesota SES compliance requirements in 2020 and expects to accumulate and exceed the amount of solar RECs (SRECs) required well beyond 2034. SRECs accumulated in the REC bank beyond what is needed for compliance requirements will be applied towards the Minnesota state RPS obligations to avoid any REC expirations.

E. Progress towards the 10 percent carve-out for systems 40 kW_{ac} or less, including the method by which the utility will meet the carve-out

A subset of programs from Section D above can be used towards our 10 percent small solar carve out. Table 2 describes these impacts. These are further detailed in this section.

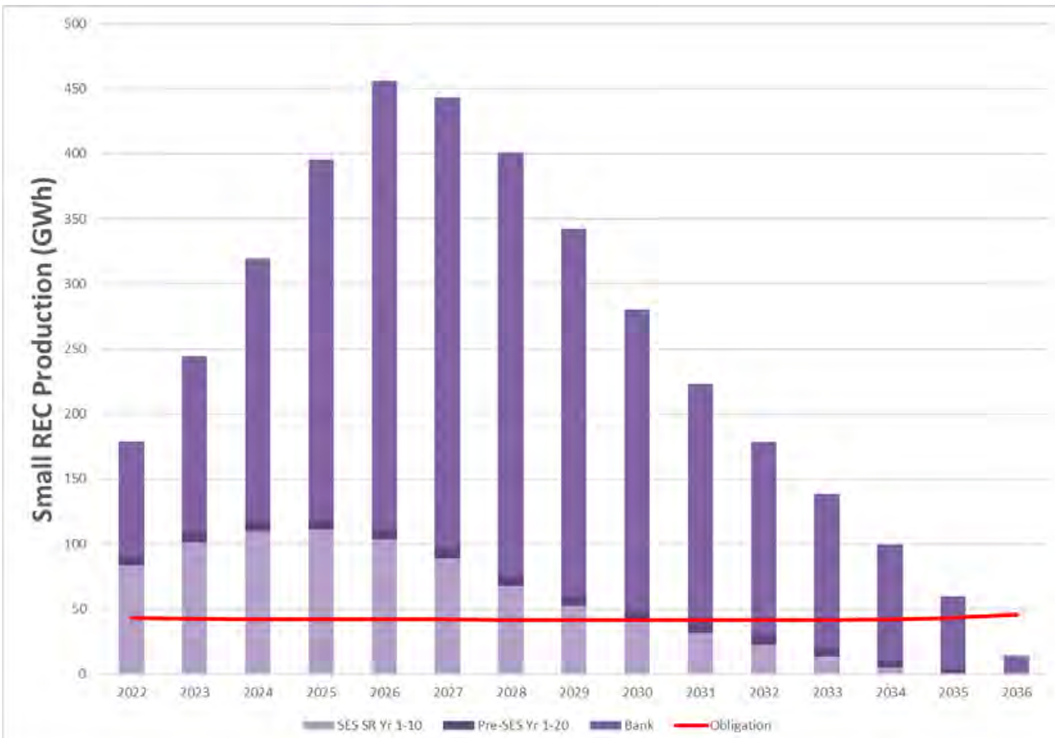
Table 2: Small Solar Carve Out – Programs

Program Name	Size	Years Available
Solar*Rewards (First Generation)	**≤40 kW (DC)***	**2010 – August 2014**
Solar*Rewards (Second Generation)	**≤ 20 kW (DC)* ≤ 40 kW (DC)***	**August 2014 – May 2018 June 2018 – May 2019**
Solar*Rewards (Third Generation)	**≤ 40 kW (AC)**	**June 2019 - 2024**
Solar*Rewards for Schools	**≤ 40 kW (AC) >40 kW – 1 MW**	**May 2022 – June 2027**
Made in Minnesota	**≤40 kW**	**2014 – 2017**

*Energy produced in DC goes through an inverter to get converted to AC. In this process there is energy loss, meaning that DC output results in a lower AC output.

Graph 1 below represents our current projection for SREC compliance with the 10 percent small solar carve out. This chart shows the Company may be in compliance with the small solar carve out through 2034. However, this representation uses program assumptions, discussed below, and thus has embedded risk that the actual results could be significantly different than the forecast. The Company cannot predict what the installation rate will be for small rooftop solar.

Graph 1
Small SREC Production with Solar*Rewards Program Extension through 2024[1]



The chart above assumes 100 percent of Solar*Rewards funds are allocated based on estimated solar system performance and that of these projects, 75 percent of them are completed each year for the Solar*Rewards program through 2024. If actual solar installations are lower than forecasted levels, the Company may not be able to meet the small solar carve-out requirements through 2034 as projected in the chart above.

With the new legislation extending the Solar*Rewards program to future years[2], the Company believes it will have sufficient small solar RECs to meet our obligations without a buy-back option. If, at some time, it appears that the Company will not have sufficient RECs to meet its obligations, we may revisit the REC buy-back option.

[1] Following a technology transition in mid-2019, the Company REC reports to M-RETS erroneously excluded generation from new small-solar resources. The Company has rectified the issue and filed the missing RECs with M-RETs. Previously omitted RECs are included in this report.
[2] On May 24, 2023, Governor Walz signed a bill that revised Minn. Stat. § 116C.7792 to change the 2024 incentive from $5 million to $11.25 million and created a 2025 incentive in the amount of $6.25 million.

Also, the above analysis is based on the understanding that the nameplate capacity for purposes of this statute is measured in alternating current (AC). This is consistent with the definition of capacity in Minn. Stat. § 216B.164, Subd. 2a.(c), as well as how capacity is used or interpreted under the following statutes: Minn. Stat. §§ 216B.1611, Subd.2(a), and Subd.3a(a)(1); 216B.1613; 216B.164, and Subd. 4c; 216B.1641 (b).

F. Discussion on the utilities' efforts to reach, by 2030, the energy goal that ten percent of the retail electric sales in Minnesota be generated by solar energy[3]

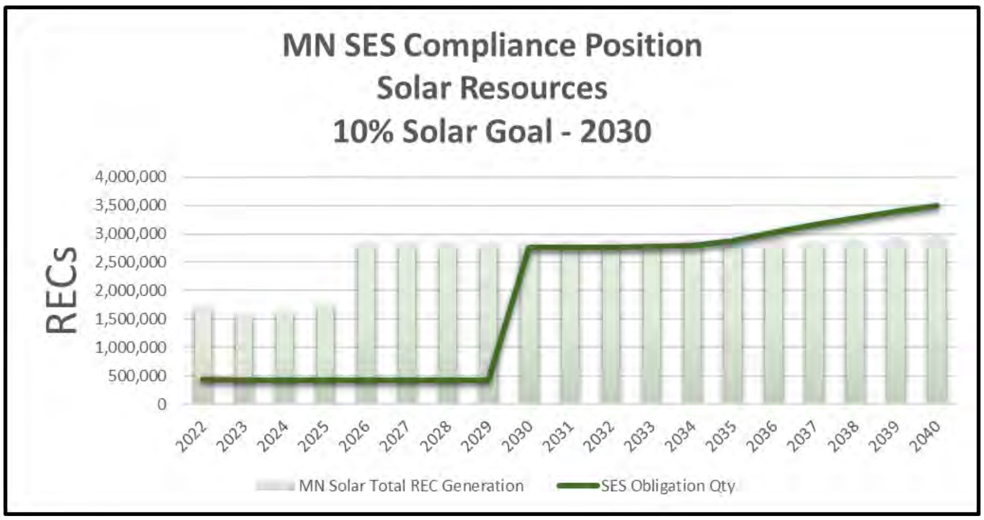
The 10 percent by 2030 goal is an energy goal of the state of Minnesota. We understand this question to be evaluating our current efforts to reach our proportional share of the state's energy goal.

As shown in Graph 2 below, the Company forecasts that the currently approved and proposed/planned solar resources will be sufficient to meet the 10 percent by 2030 goal and will furthermore be sufficient to satisfy the SES requirements through year 2035 without the use of banked RECs. However, the Company has also proposed to add substantial amounts of solar generation to our portfolio in the coming years in our recently approved 2020-2034 Integrated Resource Plan.[4] The Commission's Order approving the plan authorized the Company to procure approximately 900 MW of solar capacity coming online by the end of 2025, incremental to the recently approved Sherco Solar 1 and 2 460 MW solar generating facility near the Company's current Sherburne County coal generating facility site.[5] We recently completed an RFP that yielded 350 MW of that target, pending Commission approval, for an additional project at the Sherco site (Sherco Solar 3) and a PPA project (Apple River Solar).[6] Sherco Solar 3 – when combined with Sherco Solar 1 and 2 – will fulfill the Company's need to procure capacity to reutilize the interconnection rights made available when Sherco coal Unit 2 retires later this year. We will continue progress toward the Integrated Resource Plan's authorized solar procurement in the coming months. In total, this capacity will provide substantial solar generation to our system and would contribute toward meeting the 10 percent SES goal into the future; in fact, by 2030, we expect over 10 percent of our generation to come from solar resources. As always, we will continually review the need for additional solar resources in our future resource plans in order to achieve the goal long-term.

[3] Impacts of the changes to Minn. Stat. §§ 216B.1691, Subd. 2h. and 216B.2425, Subd. 9 will be discussed in the Company's November 1, 2023 IDP filing.
[4] Docket No. E002/RP-19-368.
[5] Docket No. E002/M-20-891.
[6] Docket No. E002/M-22-403.

We note that the solar market is currently facing significant challenges resulting from residual disruption around the U.S. Department of Commerce anti-dumping circumvention investigation of solar components imported from four southeast Asian countries, an increase in price exacerbated by inflation and increased underlying demand resulting from the passage of the Inflation Reduction Act. These issues are further discussed in our May 5, 2023 Solar Portfolio Petition filing.[7] However, at this time, we do not expect these challenges to negatively impact our long-term goals to add solar capacity to our system.

Graph 2[8]



Attachment A contains certain portions that have been designated as Trade Secret information pursuant to Minnesota Statute § 13.37, subd. 1(b). In particular, the information designated as Trade Secret relates to specific Purchase Power Agreements (PPAs). The terms of the Commission-approved PPAs require that this information be non-public. Other information marked as trade secret relates to specific production from specific customer facilities. Further, this is considered to be "non-public data" pursuant to Minn. Stat. §13.02, Subd.9, and is also "Trade Secret" information pursuant to Minn. Stat. §13.37, subd. 1(b) as it derives independent economic value, actual or potential, from not being generally known to, and not being readily

[7] *Id.*
[8] We note that Graph 2 does not show benefits from banked RECs; however, even with this conservative approach, it shows compliance through 2035. If we were to show benefits of banked RECs, we would show compliance through 2045.

ascertainable by proper means by other persons who can obtain economic value from its disclosure or use. In general, we publicly show the names of the Renewable*Connect resources because they are already publicly disclosed and therefore their identity is public, but their actual production is non-public. The names of the Windsource facilities have similarly already been publicly identified along with their capacities, but the actual production from each is not public. The smaller wind facilities generally are our retail customers and Minnesota regulations prohibit us from disclosing a customer name alone; therefore, we have treated as non-public the customer names along with their M-RETS ID that would otherwise identify them. Where we have biomass plants, because we have fewer than 15, we have treated as non-public the name and RECs of each. We note that the number of RECs retired from specific solar gardens is publicly provided because our solar garden tariff at Sheet No. 9-78 specifically authorizes us to make solar garden generation data public for each. Other REC retirement data for smaller facilities has been aggregated and de-identified.

We have electronically filed this document with the Minnesota Public Utilities Commission, and copies have been served on the parties on the attached service lists. Please contact me at rebecca.d.eilers@xcelenergy.com or 612-330-5570, or Pamela Gibbs at pamela.k.gibbs@xcelenergy.com or (612) 330-2889 if you have any questions regarding this filing.

Sincerely,

/s/

REBECCA EILERS
REGULATORY MANAGER

Attachment
cc: Service Lists

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

Minnesota Public Utilities Commission: Docket No. E999/PR-23-12 and Docket No. E999/M-23-85	**Attachment 1**
Minnesota Department of Commerce: Docket No. E999/PR-02-1240	Reporting Period: **January 1, 2022 - December 31, 2022**

Renewable Energy Certificate Retirement Report for Renewable Energy Standards and Green Pricing Programs

Report Year	2022	Date Submitted	June 1, 2023

FILING UTILITY INFORMATION		CONTACT INFORMATION	
Company ID #	85	Contact Name	Pamela Gibbs
Company Name	Xcel Energy	Contact Title	Regulatory Case Specialist
Street Address Line 1	414 Nicollet Mall	Contact Telephone	612-330-2889
Street Address Line 2		Contact E-Mail	pamela.k.gibbs@xcelenergy.com
City	Minneapolis	COMMENTS/NOTES	
State	MN		
Zip Code	55401		

Filing for **RENEWABLE ENERGY STANDARDS** on behalf of:

Utility Name	Utility Name	Utility Name	Utility Name
Northern States Power Company - Minnesota			

Filing for **GREEN PRICING PROGRAMS** on behalf of:

Utility Name	Utility Name	Utility Name	Utility Name
Northern States Power Company - Minnesota			

Filing for **SOLAR ENERGY STANDARD** on behalf of:

Utility Name	Utility Name	Utility Name	Utility Name
Northern States Power Company - Minnesota			

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

Minnesota Public Utilities Commission: Docket No. E999/PR-23-12 and Docket No. E999/M-23-85 **Attachment 2**
Minnesota Department of Commerce: Docket No. E999/PR-02-1240 Reporting Period: **January 1, 2022 - December 31, 2022**

Total Retail Sales to Minnesota Customers and Renewable Energy Certificates Required to be Retired for RENEWABLE ENERGY STANDARD Compliance

Retail Sales Total	28,990,173
RES Percentage Obligation	30%
RECs Required to be Retired	8,697,052
Actual RECs Retired	8,697,052

Enter current reporting year data.

Utility ID #	Utility	Retail Sales Amount (MWh)	Notes
85	Xcel Energy (NSP-MN)	28,990,173	

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

Minnesota Public Utilities Commission: Docket No. E999/PR-23-12 and Docket No. E999/M-23-85 **Attachment 3**
Minnesota Department of Commerce: Docket No. E999/PR-02-1240 Reporting Period: **January 1, 2022 - December 31, 2022**

GREEN PRICING Program Sales

TOTAL **GREEN PRICING** Sales (MWh)	676,508
RECS retired for **GREEN PRICING** programs	0

List the cumulative retail sales of green pricing electricity, including utility-managed community solar, and the number of customers as of December 31, 2022.

Utility ID # (on Worksheet 1)	Utility Name	Program Name	No. of Program Customers	Program Sales (MWh)	Retail Rate ($/kWh)	Notes
85	Xcel Energy (NSP-MN)	Windsource Minnesota	72,274	493,277	$0.03530	Windsource rate per kWh
85	Xcel Energy (NSP-MN)	Renewable * Connect	1,518	11,060	$0.03647	2022 Month-to-Month Rate
85	Xcel Energy (NSP-MN)	Renewable * Connect	1,116	58,573	$0.03345	2022 5-year rate
85	Xcel Energy (NSP-MN)	Renewable * Connect	642	102,101	$0.03295	2022 10-year rate
85	Xcel Energy (NSP-MN)	Renewable * Connect Government	1	11,497	$0.03295	2022 Rate
85	Xcel Energy (NSP-MN)	Community Solar Gardens				No sales because company receives all RECs and subscribers do not get CSG energy

Minnesota Public Utilities Commission: Docket No. E999/PR-23-12 and Docket No. E999/M-23-85 **Attachment 2**
Minnesota Department of Commerce: Docket No. E999/PR-02-1240 Reporting Period: **January 1, 2022 - December 31, 2022**

SES Retail Sales and
Solar Renewable Energy Certificates Required to be Retired for SOLAR ENERGY STANDARD Compliance

Retail Sales Total	28,990,173
SES Excluded Retail Sales	200,264
SES Retail Sales Obligation	28,789,909
SES Total Percentage Obligation	1.50%
SES Small Scale obligation	0.15%
Non-Small Scale obligation	1.35%
Total SRECs Required to be Retired	431,849
Small SRECs to be retired	43,185
Non-Small Scale to be retired	388,664
Total Actual RECs Retired	431,849
Total actual small SRECs retired	43,185
Total actual non-Small Scale retired	388,664

Additional SES Reporting

Projected SES compliance for the current plus three (3) upcoming years. Include banked RECs.

Year	Actual/Projected MN retail sales (MWh) minus SES exempt sales	SES Total Req (MWh)	SES Small Scale Req (MWh)	SES Non-Small Scale Req (MWh)	Projected Total SRECs (MWh)	Projected SRECs less than 40kW (MWh)	Projected SRECs greater than 40kW (MWh)	Projected Total Surplus/ (Deficit) (MWh)	Projected SREC Surplus/(Deficit) less than 40 kW (MWh)	Projected SREC Surplus/(Deficit) greater than 40 kW (MWh)
2022	28,990,173	434,853	43,485	391,367	1,814,471	83,119	1,731,352	1,379,618	39,634	1,339,985
2023	28,453,409	426,801	42,680	384,121	2,060,332	108,635	1,951,697	1,633,531	65,955	1,567,576
2024	28,189,103	422,837	42,284	380,553	2,084,604	117,427	1,967,177	1,661,767	75,143	1,586,624
2025	28,052,547	420,788	42,079	378,709	2,239,624	118,416	2,121,208	1,818,836	76,337	1,742,499

Annual solar generation on the utilities' system for the previous calendar year

	Number of Facilities on Utility System	Capacity	Number registered in M-RETS	Capacity registered in M-RETS	SRECs Generated
Less than 40kW	8698	84.9	111	54	83,608
Generation from eligible CSG subscriptions	917	860	917	860	1,401,119
Greater than 40kW	70	4.8	39	271	495,282

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

Minnesota Public Utilities Commission: Docket No. E999/PR-23-12 and Docket No. E999/M-23-85 **Attachment 4**
Minnesota Department of Commerce: Docket No. E999/PR-02-1240 Reporting Period: **January 1, 2022 - December 31, 2022**

Renewable Energy Certificate Retirements for Renewable Energy Standards and Green Pricing Programs

Renewable Energy Standard REC Retirement Account Name:	NSP-MN RES Retirement-2022 / 4741350A-A44A
Renewable Energy Standard REC Retirement Account Name:	NSP-MN SES Small Solar Retirement-2022 / 50084C28-50A9
Renewable Energy Standard REC Retirement Account Name:	NSP-MN SES Retirement-2022 / 91418AEB-E255
Green Pricing REC Retirement Account Name:	MN Renewable Connect 2022 / E2274CE8-D471
Green Pricing REC Retirement Account Name:	NSP-MN Windsource Retirement-2022 / C335B9CF-84A3

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
	Total RECs or SRECs		8,697,052	0	43,185	388,664	1 REC = 1 MWh
[NOT PUBLIC DATA BEGINS				**[NOT PUBLIC DATA BEGINS**			
	North Star Solar PV - North Star Solar PV	Solar					MN Renewable*Connect 2022
	Odell Wind Farm - Odell Wind Farm	Wind					MN Renewable*Connect 2022
	North Star Solar PV - North Star Solar PV	Solar					MN Renewable*Connect Government 2022
	Odell Wind Farm - Odell Wind Farm	Wind					MN Renewable*Connect Government 2022
	Boeve Windfarm - Boeve Windfarm	Wind					MN Windsource
	Cedar Hills Wind Farm - Cedar Hills Wind Farm	Wind					MN Windsource
	Cisco Wind Energy - Cisco Wind Energy	Wind					MN Windsource
	JJN Windfarm - JJN Windfarm	Wind					MN Windsource
	K-Brink Wind Farm - K-Brink Wind Farm	Wind					MN Windsource
	McNeilus Group - McNeilus Group	Wind					MN Windsource
	Moraine II - Moraine II	Wind					MN Windsource
	NextEra Energy Baldwin Wind Project - Baldwin Wind Project	Wind					MN Windsource
	Thunder Spirit Wind Farm - Thunder Spirit Wind	Wind					MN Windsource
	West Ridge - West Ridge	Wind					MN Windsource
	Windcurrent Farms - Windcurrent Farms	Wind					MN Windsource
PUBLIC DATA				**NOT PUBLIC DATA ENDS]**			
M627	SRMN2010-J-01 - SRMN2010-J-01	Solar			1,143	Public	
M714	SRMN2011-01 - SRMN2011-01	Solar			467		
M737	SRMN2011-02 - SRMN2011-02	Solar			1,451		
M882	SRMN2011-03 - SRMN2011-03	Solar			40		
M766	SRMN2012-01 - SRMN2012-01	Solar			567		
M786	SRMN2012-02 - SRMN2012-02	Solar			717		
M797	SRMN2012-03 - SRMN2012-03	Solar			941		
M836	SRMN2012-04 - SRMN2012-04	Solar			73		
M881	SRMN2013-01 - SRMN2013-01	Solar			946		
M883	SRMN2013-02 - SRMN2013-02	Solar			713		
M931	SRMN2013-I-01 - SRMN2013-I-01	Solar			198		
M934	SRMN2013-J-01 - SRMN2013-J-01	Solar			40		
M936	SRMN2014-01 - SRMN2014-01	Solar			322		
M937	SRMN2014-I-01 - SRMN2014-I-01	Solar			665		
M938	SRMN2014-I-02 - SRMN2014-I-02	Solar			669		
M988	SRMN2014-I-03 - SRMN2014-I-03	Solar			306		
M939	SRMN2014-J-01 - SRMN2014-J-01	Solar			788		
M940	SRMN2014-J-02 - SRMN2014-J-02	Solar			702		
M949	SRMN2014-J-03 - SRMN2014-J-03	Solar			797		
M1061	SRMN2014-J-04 - SRMN2014-J-04	Solar			29		
M968	SRMN2015-I-01 - SRMN2015-I-01	Solar			817		
M1060	SRMN2015-I-02 - SRMN2015-I-02	Solar			640		
M1405	SRMN2015-I-03	Solar			248		
M969	SRMN2015-J-01 - SRMN2015-J-01	Solar			835		
M989	SRMN2015-J-02 - SRMN2015-J-02	Solar			844		
M1000	SRMN2015-J-03 - SRMN2015-J-03	Solar			908		
M1058	SRMN2015-J-04 - SRMN2015-J-04	Solar			820		
M1059	SRMN2016-I-01 - SRMN2016-I-01	Solar			658		
M1224	SRMN2016-I-02 - SRMN2016-I-02	Solar			980		
M1536	SRMN2016-I-03	Solar			170		
M1062	SRMN2016-J-01 - SRMN2016-J-01	Solar			911		
M1067	SRMN2016-J-02 - SRMN2016-J-02	Solar			890		
M1068	SRMN2016-J-03 - SRMN2016-J-03	Solar			901		
M1194	SRMN2016-J-04 - SRMN2016-J-04	Solar			893		
M1406	SRMN2016-J-05	Solar			391		
M1488	SRMN2017-I-01	Solar			793		
M1537	SRMN2017-I-02	Solar			359		
M4342	SRMN2017-I-03	Solar			1,116		
M4343	SRMN2017-I-04	Solar			270		
M1223	SRMN2017-J-01 - SRMN2017-J-01	Solar			954		
M1408	SRMN2017-J-02	Solar			922		
M1409	SRMN2017-J-03	Solar			968		
M1410	SRMN2017-J-04	Solar			906		
M1539	SRMN2017-J-05	Solar			971		
M1540	SRMN2017-J-06	Solar			145		
M4344	SRMN2017-J-07	Solar			683		
M2025	SRMN2018-I-02	Solar			37		
M4345	SRMN2018-I-03	Solar			669		
M4346	SRMN2018-I-04	Solar			594		
M1541	SRMN2018-J-01	Solar			579		
M1955	SRMN2018-J-03	Solar			4		
M4347	SRMN2018-J-04	Solar			1,689		
M2026	SRMN2018-J-05	Solar			9		
M4348	SRMN2018-J-06	Solar			1,009		
M4349	SRMN2018-J-08	Solar			1,077		
M4350	SRMN2018-J-09	Solar			946		
M4351	SRMN2018-J-10	Solar			288		
M4352	SRMN2019-I-01	Solar			429		
M4353	SRMN2019-I-02	Solar			299		
M4354	SRMN2019-I-03	Solar			26		

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
M4356	SRMN2019-J-01	Solar			888		
M4357	SRMN2019-J-02	Solar			724		
M4358	SRMN2019-J-03	Solar			660		
M4359	SRMN2019-J-04	Solar			526		
M4360	SRMN2019-J-05	Solar			631		
M4361	SRMN2019-J-06	Solar			402		
M4362	SRMN2019-J-07	Solar			197		
M4363	SRMN2019-J-08	Solar			7		
M4366	SRMN2020-J-02	Solar			1		
[NOT PUBLIC DATA BEGINS							
		Solar			35		
		Solar			246		
		Solar			66		
		Solar			334		
		Solar			246		
		Solar				2,003	
		Solar				10,077	
		Solar				6,771	
		Solar				9,194	
		Solar				10,285	
		Solar				8,813	
		Solar				7,081	
		Solar				7,594	
		Solar				11,964	
		Solar				5,121	
		Solar				5,791	
		Solar				17,658	
		Solar				6,320	
		Solar				16,747	
		Solar				8,388	
		Solar				12,896	
		Solar				1,308	
		Solar				95	
		Solar				1,534	
		Solar				872	
		Solar				11	
		Solar				185	
		Solar				294	
		Solar				96,572	
		Solar				614	
		Solar				93	
		Solar				89	
		Solar				134,250	
		Solar				137	
		Solar				968	
		Solar				2,155	
		Solar				715	
		Solar				433	
		Solar				376	
		Solar				1,260	
	NOT PUBLIC DATA ENDS]						
M1919	58th Ave Solar Project 1	Solar	1,235				
M1920	58th Ave Solar Project 2	Solar	1,053				
M1921	58th Ave Solar Project 3	Solar	1,257				
M1922	58th Ave Solar Project 4	Solar	1,319				
M1923	58th Ave Solar Project 5	Solar	1,268				
M1932	Arcturus Community Solar Garden, LLC	Solar	1,645				
M1930	Auriga Community Solar Garden, LLC	Solar	1,745				
M1984	Edison Gym	Solar	188				
M1929	Leo Community Solar, LLC	Solar	1,802				
M1934	Montevideo Solar LLC (CSG B)	Solar	807				
M1935	Montevideo Solar LLC (CSG C)	Solar	905				
M1936	Montevideo Solar LLC (CSG D)	Solar	849				
M1937	Montevideo Solar LLC (CSG E)	Solar	967				
M1933	Montevideo Solar LLC (CSG)	Solar	638				
M1925	River Road Solar Project 2	Solar	1,236				
M1926	River Road Solar Project 3	Solar	1,277				
M1927	River Road Solar Project 4	Solar	1,276				
M1928	River Road Solar Project 5	Solar	896				
M1931	Sagitta Community Solar Garden, LLC	Solar	1,667				
M1914	USS Brockway Solar	Solar	1,594				
M1915	USS JJ Solar	Solar	1,826				
M1916	USS Norelius Solar	Solar	1,778				
M1917	USS Solar Rapids	Solar	1,712				
M1918	USS Walrus Solar	Solar	878				
M1985	Edison High School	Solar	104				
M2312	Kaus Community Solar Garden, LLC	Solar	1,618				
M2319	Meyer	Solar	381				
M1924	River Road Solar Project 1	Solar	1,185				
M2318	Sagittarius Community Solar Gardens, LLC	Solar	1,265				
M2313	SRC 2.01	Solar	1,384				
M2314	SRC 2.02	Solar	1,346				
M2315	SRC 2.03	Solar	1,331				
M2316	SRC 2.04	Solar	1,325				
M2317	SRC 2.05	Solar	1,351				
M2320	Altair Community Solar Garden, LLC	Solar	1,569				
M1080	Aurora - Albany Solar - Aurora Distributed Solar - Albany Solar	Solar	15,612				
M2311	Carpenter's Union	Solar	614				
M2322	Lindstrom Solar LLC	Solar	1,449				
M2321	Lindstrom Solar LLC	Solar	1,457				
M2333	Aquila Community Solar Gardens, LLC	Solar	1,453				
M2323	Canopus Community Solar Garden, LLC	Solar	1,457				
M2330	Capricornus Community Solar Garden, LLC	Solar	1,394				
M2331	Cassiopeia Community Solar Garden, LLC	Solar	1,456				

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
M2339	Crux Community Solar Gardens, LLC	Solar	1,364				
M2325	Fredrichs	Solar	291				
M2329	MSC-GreyCloud01, LLC	Solar	1,391				
M2324	Pisces Community Solar Garden, LLC	Solar	1,032				
M2338	Saint Cloud Solar LLC	Solar	1,104				
M2337	Saint Cloud Solar LLC	Solar	1,103				
M2336	Saint Cloud Solar LLC	Solar	1,085				
M2335	Saint Cloud Solar LLC	Solar	1,079				
M2334	Saint Cloud Solar LLC	Solar	1,098				
M2332	Vision01	Solar	1,123				
M2328	Winsted Solar LLC	Solar	1,286				
M2327	Winsted Solar LLC	Solar	1,275				
M2326	Winsted Solar LLC	Solar	1,268				
M1359	Andromeda CSG1, LLC	Solar	1,107				
M1360	Andromeda CSG2, LLC	Solar	1,124				
M1361	Andromeda CSG3, LLC	Solar	1,126				
M1363	Andromeda CSG5, LLC	Solar	1,050				
M1340	B.R. Corcoran - Hennepin Kaat 2 - MINNESOTA SOLAR CSG 19, LLC	Solar	1,115				
M1341	B.R. Corcoran - Hennepin Kaat 3 - MINNESOTA SOLAR CSG 19, LLC	Solar	1,101				
M1342	B.R. Corcoran - Hennepin Kaat 4 - MINNESOTA SOLAR CSG 19, LLC	Solar	1,114				
M1343	B.R. Corcoran - Hennepin Kaat 5 - MINNESOTA SOLAR CSG 19, LLC	Solar	1,113				
M1100	Blue Lake 1 - Blue Lake 1	Solar	1,114				
M1101	Blue Lake 2 - Blue Lake 2	Solar	1,030				
M1102	Blue Lake 3 - Blue Lake 3	Solar	1,078				
M1053	Buhl Family CSG - Buhl Family CSG	Solar	208				
M1370	Capella CSG2, LLC	Solar	1,129				
M1371	Capella CSG3, LLC	Solar	1,173				
M1372	Capella CSG4, LLC	Solar	1,004				
M1373	Capella CSG5, LLC	Solar	1,179				
M1103	Chisago Community Solar 1, LLC - Chisago Community Solar 1	Solar	888				
M1104	Chisago Community Solar 2, LLC - Chisago Community Solar 2	Solar	1,009				
M1105	Chisago Community Solar 3, LLC - Chisago Community Solar 3	Solar	969				
M1106	Chisago Community Solar 4, LLC - Chisago Community Solar 4	Solar	962				
M2347	Chisago Holdco LLC (Unit 1)	Solar	1,068				
M2348	Chisago Holdco LLC (Unit 2)	Solar	1,029				
M2349	Chisago Holdco LLC (Unit 3)	Solar	1,030				
M1374	Crater CSG1, LLC	Solar	1,123				
M1375	Crater CSG2, LLC	Solar	1,117				
M1376	Crater CSG3, LLC	Solar	996				
M1230	Dodge Holdco LLC #1 - Dodge Holdco LLC #1	Solar	943				
M1231	Dodge Holdco LLC #2 - Dodge Holdco LLC #2	Solar	953				
M1232	Dodge Holdco LLC #3 - Dodge Holdco LLC #3	Solar	925				
M1233	Dodge Holdco LLC #4 - Dodge Holdco LLC #4	Solar	949				
M1234	Dodge Holdco LLC #5 - Dodge Holdco LLC #5	Solar	970				
M1107	Eichtens - Eichtens 039467	Solar	993				
M1108	Eichtens - Eichtens 040717	Solar	989				
M1109	Eichtens - Eichtens 040718	Solar	990				
M1110	Eichtens - Eichtens 040841	Solar	995				
M1111	Empire 1 - Empire 1	Solar	1,092				
M1112	Empire 2 - Empire 2	Solar	1,139				
M1113	Empire 3 - Empire 3	Solar	1,183				
M1114	Empire 4 - Empire 4	Solar	1,177				
M1115	Empire 5 - Empire 5	Solar	1,165				
M1235	Farmington Holdco, LLC #1 - Farmington Holdco, LLC #1	Solar	805				
M1236	Farmington Holdco, LLC #2 - Farmington Holdco, LLC #2	Solar	1,044				
M1237	Farmington Holdco, LLC #3 - Farmington Holdco, LLC #3	Solar	1,043				
M1238	Farmington Holdco, LLC #4 - Farmington Holdco, LLC #4	Solar	1,012				
M1239	Farmington Holdco, LLC #5 - Farmington Holdco, LLC #5	Solar	1,042				
M2340	Frontenac Holdco LLC (Unit 1)	Solar	1,172				
M2341	Frontenac Holdco LLC (Unit 2)	Solar	1,199				
M2342	Frontenac Holdco LLC (Unit 3)	Solar	1,199				
M2343	Frontenac Holdco LLC (Unit 4)	Solar	1,189				
M2344	Frontenac Holdco LLC (Unit 5)	Solar	1,143				
M2351	Golf01	Solar	1,011				
M2352	Golf02	Solar	1,032				
M2353	Golf03	Solar	1,039				
M2345	Golf04	Solar	1,087				
M2354	Golf05	Solar	1,076				
M1386	Hauer Unit 1	Solar	1,067				
M1388	Hauer Unit 3	Solar	933				
M1116	Lake Calhoun 17 - Lake Calhoun 17	Solar	1,145				
M1117	Lake Calhoun 18 - Lake Calhoun 18	Solar	1,112				
M1118	Lake Calhoun 19 - Lake Calhoun 19	Solar	1,110				
M1119	Lake Calhoun 20 - Lake Calhoun 20	Solar	1,124				
M1120	Lake Calhoun 21 - Lake Calhoun 21	Solar	1,134				
M1121	Lake Calhoun 27 - Lake Calhoun 27	Solar	1,127				
M1122	Lake Calhoun 28 - Lake Calhoun 28	Solar	1,140				
M1123	Lake Calhoun 29 - Lake Calhoun 29	Solar	1,111				
M1188	Lind 1 - Lind SRC 041230	Solar	1,018				
M1191	Lind 4 - Lind SRC 041233	Solar	1,038				
M1192	Lind 5 - Lind SRC 041234	Solar	1,044				
M1198	Mapleton CSG1 - Mapleton CSG1, LLC	Solar	1,116				
M1199	Mapleton CSG2 - Mapleton CSG2, LLC	Solar	1,122				
M1200	Mapleton CSG3 - Mapleton CSG3, LLC	Solar	1,027				
M1385	MINNESOTA SOLAR CSG 21, LLC	Solar	994				
M1384	MINNESOTA SOLAR CSG 21, LLC	Solar	990				
M1383	MINNESOTA SOLAR CSG 21, LLC	Solar	953				
M1368	MINNESOTA SOLAR CSG 9, LLC	Solar	1,129				
M1367	MINNESOTA SOLAR CSG 9, LLC	Solar	1,121				
M1366	MINNESOTA SOLAR CSG 9, LLC	Solar	1,122				
M1365	MINNESOTA SOLAR CSG 9, LLC	Solar	1,115				
M1364	MINNESOTA SOLAR CSG 9, LLC	Solar	1,115				
M1344	Montgomery W - Highlander 1 - MINNESOTA SOLAR CSG 4, LLC	Solar	1,115				
M1345	Montgomery W - Highlander 2 - MINNESOTA SOLAR CSG 4, LLC	Solar	1,129				

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
M1346	Montgomery W - Highlander 3 - MINNESOTA SOLAR CSG 4, LLC	Solar	1,132				
M1252	Morgan CSG3, LLC - Morgan CSG3, LLC	Solar	1,147				
M1124	Northfield CSG1 - Northfield CSG1	Solar	834				
M1125	Northfield CSG2 - Northfield CSG2	Solar	966				
M1126	Northfield CSG3 - Northfield CSG3	Solar	795				
M1127	Northfield CSG4 - Northfield CSG4	Solar	1,024				
M1128	Northfield CSG5 - Northfield CSG5	Solar	1,005				
M2346	Novel CSG of Imholte	Solar	1,028				
M1129	Orion CSG1 - Orion CSG1	Solar	1,025				
M1130	Orion CSG2 - Orion CSG2	Solar	1,032				
M1131	Orion CSG3 - Orion CSG3	Solar	1,018				
M1135	Paynesville CSG 4 - Paynesville CSG 4	Solar	996				
M1136	Paynesville CSG 5 - Paynesville CSG 5	Solar	1,062				
M1132	Paynesville CSG1 - Paynesville CSG1	Solar	1,027				
M1253	Pine Island Holdco, LLC #1 - Pine Island Holdco, LLC #1	Solar	959				
M1255	Pine Island Holdco, LLC #3 - Pine Island Holdco, LLC #3	Solar	967				
M1377	Pollux CSG1, LLC	Solar	776				
M1137	Red Wing SD - Red Wing SD 42423	Solar	999				
M1138	Red Wing SD - Red Wing SD 42425	Solar	1,002				
M1139	Red Wing SD - Red Wing SD 42426	Solar	1,009				
M1140	Red Wing SD - Red Wing SD 42427	Solar	1,007				
M1141	Red Wing SD - Red Wing SD 42428	Solar	1,014				
M1142	Rosemount CSG1 - Rosemount CSG1	Solar	974				
M1143	Rosemount CSG2 - Rosemount CSG2	Solar	1,058				
M1144	Rosemount CSG3 - Rosemount CSG3	Solar	1,058				
M1145	Rosemount CSG4 - Rosemount CSG4	Solar	1,068				
M1146	Rosemount CSG5 - Rosemount CSG5	Solar	1,007				
M1305	Spica CSG1, LLC - Spica CSG1, LLC	Solar	1,139				
M1394	SunE Koppelman 4, LLC	Solar	1,138				
M1378	SunE Rengstorf 1, LLC	Solar	1,203				
M1379	SunE Rengstorf 2, LLC	Solar	1,214				
M1380	SunE Rengstorf 3, LLC	Solar	1,216				
M1381	SunE Rengstorf 4, LLC	Solar	1,205				
M1382	SunE Rengstorf 5, LLC	Solar	1,214				
M1148	Sunrise CSG 2 - Sunrise CSG 2	Solar	1,033				
M1149	Sunrise CSG 3 - Sunrise CSG 3	Solar	958				
M1150	Sunrise CSG 4 - Sunrise CSG 4	Solar	876				
M1151	Sunrise CSG 5 - Sunrise CSG 5	Solar	1,028				
M1152	Ursa CSG1 - Ursa CSG1	Solar	963				
M1153	Ursa CSG2 - Ursa CSG2	Solar	995				
M1154	Ursa CSG3 - Ursa CSG3	Solar	1,041				
M1155	Ursa CSG4 - Ursa CSG4	Solar	1,076				
M1156	Ursa CSG5 - Ursa CSG5	Solar	960				
M1910	USS Nillie Corn Solar LLC	Solar	1,315				
M1908	USS Rockpoint Solar LLC	Solar	1,267				
M1909	USS Solar Dawn LLC	Solar	1,296				
M2498	USS Webster Solar	Solar	1,376				
M1258	Wabasha Holdco LLC #1 - Wabasha Holdco LLC #1	Solar	1,018				
M1259	Wabasha Holdco LLC #2 - Wabasha Holdco LLC #2	Solar	1,013				
M1260	Wabasha Holdco LLC #3 - Wabasha Holdco LLC #3	Solar	1,011				
M1261	Webster Holdco LLC #1 - Webster Holdco LLC #1	Solar	1,085				
M1263	Webster Holdco LLC #4 - Webster Holdco LLC #4	Solar	1,067				
M1621	330th Street West Solar Project 1	Solar	861				
M1622	330th Street West Solar Project 2	Solar	868				
M1623	330th Street West Solar Project 3	Solar	908				
M1624	330th Street West Solar Project 4	Solar	864				
M1625	330th Street West Solar Project 5	Solar	860				
M1362	Andromeda CSG4, LLC	Solar	884				
M1831	Antares CSG1, LLC	Solar	1,049				
M1832	Antares CSG2, LLC	Solar	1,075				
M1833	Antares CSG3, LLC	Solar	1,065				
M1299	Antila CSG1, LLC - Antila CSG1, LLC	Solar	1,017				
M1300	Antila CSG2, LLC - Antila CSG2, LLC	Solar	882				
M2355	Aquarius Community Solar Gardens, LLC	Solar	1,106				
M1880	Argo Navis CSG 3	Solar	861				
M1636	Argo Navis CSG1, LLC	Solar	674				
M1663	Argo Navis CSG2, LLC	Solar	876				
M1301	Aries CSG1, LLC - Aries CSG1, LLC	Solar	887				
M1302	Aries CSG2, LLC - Aries CSG2, LLC	Solar	891				
M1303	Aries CSG3, LLC - Aries CSG3, LLC	Solar	864				
M1304	Aries CSG4, LLC - Aries CSG4, LLC	Solar	889				
M1637	Armstrong Unit 1	Solar	909				
M1638	Armstrong Unit 2	Solar	923				
M1639	Armstrong Unit 3	Solar	913				
M1412	Aspen01	Solar	998				
M1413	Aspen02	Solar	985				
M1414	Aspen03	Solar	982				
M1415	Aspen04	Solar	985				
M1416	Aspen05	Solar	983				
M1339	B.R. Corcoran - Hennepin Kaat 1 - MINNESOTA SOLAR CSG 19, LLC	Solar	923				
M1616	Bartlett Unit 1	Solar	1,007				
M1617	Bartlett Unit 2	Solar	1,023				
M1618	Bartlett Unit 3	Solar	990				
M1619	Bartlett Unit 4	Solar	1,003				
M1620	Bartlett Unit 5	Solar	976				
M1905	Betcher CSG LLC	Solar	1,007				
M1054	Bethel ELCA - Bethel ELCA	Solar	17				
M1321	Big Lake Holdco LLC #1 - Big Lake Holdco LLC #1	Solar	887				
M1322	Big Lake Holdco LLC #2 - Big Lake Holdco LLC #2	Solar	944				
M1323	Big Lake Holdco LLC #3 - Big Lake Holdco LLC #3	Solar	941				
M1324	Big Lake Holdco LLC #4 - Big Lake Holdco LLC #4	Solar	946				
M1325	Big Lake Holdco LLC #5 - Big Lake Holdco LLC #5	Solar	936				
M1761	Big Lake Solar Project 1	Solar	1,089				
M1769	Big Lake Solar Project 2	Solar	1,086				

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
M1770	Big Lake Solar Project 3	Solar	1,096				
M1772	Big Lake Solar Project 4	Solar	1,090				
M1773	Big Lake Solar Project 5	Solar	1,066				
M1598	Brase Unit 1	Solar	1,007				
M1599	Brase Unit 2	Solar	1,022				
M1600	Brase Unit 3	Solar	1,012				
M1601	Brase Unit 4	Solar	410				
M1896	Butterfield CSG LLC	Solar	241				
M1290	Caelum CSG1, LLC - Caelum CSG1, LLC	Solar	711				
M1291	Caelum CSG2, LLC - Caelum CSG2, LLC	Solar	869				
M1369	Capella CSG1, LLC	Solar	968				
M1555	Carina CSG1, LLC	Solar	885				
M1556	Carina CSG2, LLC	Solar	913				
M1557	Carina CSG3, LLC	Solar	892				
M1558	Carina CSG4, LLC	Solar	881				
M1602	Carver Gladden Unit 1	Solar	927				
M1603	Carver Gladden Unit 2	Solar	921				
M1604	Carver Gladden Unit 3	Solar	925				
M1881	CEF Edina Community Solar, LLC	Solar	419				
M1838	CEF Shiloh Community Solar, LLC	Solar	127				
M1292	Centaurus CSG1, LLC - Centaurus CSG1, LLC	Solar	894				
M1293	Centaurus CSG2, LLC - Centaurus CSG2, LLC	Solar	896				
M1549	CF GM NES of Porter Way CSG A	Solar	891				
M1550	CF GM NES of Porter Way CSG B	Solar	897				
M1551	CF GM NES of Porter Way CSG C	Solar	892				
M1890	Clara City CSG 1, LLC	Solar	810				
M1781	Corvus CSG1, LLC	Solar	934				
M1780	Corvus CSG2, LLC	Solar	943				
M1779	Corvus CSG3, LLC	Solar	918				
M1778	Corvus CSG4, LLC	Solar	933				
M1777	Corvus CSG5, LLC	Solar	908				
M1640	Cottage Grove PV1	Solar	767				
M1641	Cottage Grove PV2	Solar	764				
M1642	Cottage Grove PV3	Solar	771				
M1643	Cottage Grove PV4	Solar	776				
M1644	Cottage Grove PV5	Solar	764				
M1628	Delphinus CSG1, LLC	Solar	841				
M1629	Delphinus CSG2, LLC	Solar	915				
M2363	Deneb Community Solar Garden, LLC	Solar	1,055				
M1879	DG Minnesota CSG 1, LLC	Solar	917				
M1878	DG Minnesota CSG 1, LLC	Solar	927				
M1877	DG Minnesota CSG 1, LLC	Solar	911				
M1876	DG Minnesota CSG 1, LLC	Solar	926				
M1875	DG Minnesota CSG 1, LLC	Solar	915				
M1826	DG Minnesota CSG, LLC	Solar	859				
M1825	DG Minnesota CSG, LLC	Solar	878				
M1824	DG Minnesota CSG, LLC	Solar	739				
M1823	DG Minnesota CSG, LLC	Solar	751				
M1822	DG Minnesota CSG, LLC	Solar	835				
M1821	DG Minnesota CSG, LLC	Solar	761				
M1820	DG Minnesota CSG, LLC	Solar	879				
M1874	DG Minnesota CSG, LLC	Solar	537				
M1873	DG Minnesota CSG, LLC	Solar	829				
M1819	DG Minnesota CSG, LLC	Solar	884				
M1818	DG Minnesota CSG, LLC	Solar	700				
M1817	DG Minnesota CSG, LLC	Solar	675				
M2361	Dodge I	Solar	1,028				
M2362	Dodge II	Solar	412				
M1417	DodgeSun CSG 1	Solar	1,028				
M1418	DodgeSun CSG 2	Solar	1,058				
M1419	DodgeSun CSG 3	Solar	1,052				
M1420	DodgeSun CSG 4	Solar	1,056				
M1421	DodgeSun CSG 5	Solar	1,048				
M1590	Dundas Solar Farm 1	Solar	741				
M1591	Dundas Solar Farm 2	Solar	768				
M1592	Dundas Solar Farm 3	Solar	801				
M1593	Dundas Solar Farm 4	Solar	787				
M1594	Dundas Solar Farm 5	Solar	769				
M1312	Equuleus Community Solar Gardens #1 - Equuleus Community Solar Gardens #1	Solar	800				
M1313	Equuleus Community Solar Gardens #2 - Equuleus Community Solar Gardens #2	Solar	811				
M1315	Equuleus Community Solar Gardens #4 - Equuleus Community Solar Gardens #4	Solar	816				
M1316	Equuleus Community Solar Gardens #5 - Equuleus Community Solar Gardens #5	Solar	813				
M1813	Foreman's Hill CSG LLC	Solar	867				
M1812	Foreman's Hill CSG LLC	Solar	901				
M1811	Foreman's Hill CSG LLC	Solar	912				
M1810	Foreman's Hill CSG LLC	Solar	888				
M1809	Foreman's Hill CSG LLC	Solar	870				
M1240	Forest Lake Holdco #1 - Forest Lake Holdco #1	Solar	798				
M1241	Forest Lake Holdco #2 - Forest Lake Holdco #2	Solar	786				
M1242	Forest Lake Holdco #3 - Forest Lake Holdco #3	Solar	718				
M1243	Forest Lake Holdco #4 - Forest Lake Holdco #4	Solar	836				
M1872	Fox CSG 1, LLC	Solar	865				
M1871	Fox CSG 1, LLC	Solar	875				
M1870	Fox CSG 1, LLC	Solar	880				
M1869	Fox CSG 1, LLC	Solar	882				
M1868	Fox CSG 1, LLC	Solar	884				
M1294	Gemini CSG1, LLC - Gemini CSG1, LLC	Solar	884				
M1295	Gemini CSG2, LLC - Gemini CSG2, LLC	Solar	901				
M1296	Gemini CSG3, LLC - Gemini CSG3, LLC	Solar	885				
M1422	Gopher 1	Solar	880				
M1423	Gopher 2	Solar	887				
M1424	Gopher 3	Solar	876				
M1425	Gopher 4	Solar	935				
M1426	Gopher 5	Solar	912				

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for RENEWABLE ENERGY STANDARD compliance	RECs retired for GREEN PRICING programs	SRECs retired for Small Scale SOLAR ENERGY STANDARD compliance	SRECs retired for Non-small scale SOLAR ENERGY STANDARD compliance	NOTES
M1907	Greenway Solar, LLC	Solar	266				
M1658	Grimm 049571	Solar	1,022				
M1387	Hauer Unit 2	Solar	879				
M1389	Hauer Unit 4	Solar	728				
M1390	Hauer Unit 5	Solar	634				
M1904	Heyer CSG LLC	Solar	986				
M1427	Hickory01	Solar	962				
M1428	Hickory02	Solar	995				
M1429	Hickory03	Solar	914				
M1430	Hickory05	Solar	981				
M1431	Hickory06	Solar	994				
M1659	Huneke I 049242	Solar	1,012				
M1245	Hwy 14 Holdco LLC #1 - Hwy 14 Holdco LLC #1	Solar	914				
M1246	Hwy 14 Holdco LLC #2 - Hwy 14 Holdco LLC #2	Solar	917				
M1247	Hwy 14 Holdco LLC #3 - Hwy 14 Holdco LLC #3	Solar	951				
M1248	Hwy 14 Holdco LLC #4 - Hwy 14 Holdco LLC #4	Solar	944				
M1249	Hwy 14 Holdco LLC #5 - Hwy 14 Holdco LLC #5	Solar	952				
M1326	IMS #1 - IMS #1	Solar	754				
M1327	IMS #2 - IMS #2	Solar	771				
M1328	IMS #3 - IMS #3	Solar	789				
M1329	IMS #4 - IMS #4	Solar	775				
M1330	IMS #5 - IMS #5	Solar	764				
M1559	Johnson CSG 1	Solar	1,024				
M1560	Johnson CSG 2	Solar	1,037				
M1561	Johnson CSG 3	Solar	1,006				
M1562	Johnson CSG 4	Solar	838				
M1563	Johnson CSG 5	Solar	693				
M1886	Johnson I CSG LLC	Solar	873				
M1887	Johnson II CSG LLC	Solar	879				
M1432	Kramer CSG 1	Solar	1,056				
M1433	Kramer CSG 2	Solar	1,052				
M1434	Kramer CSG 3	Solar	1,055				
M1660	Krause 049570	Solar	1,050				
M1840	Kreye01 CSG A	Solar	276				
M1841	Kreye01 CSG B	Solar	278				
M1843	Kreye01 CSG D	Solar	276				
M1844	Kreye02 CSG A	Solar	273				
M1845	Kreye02 CSG B	Solar	266				
M1846	Kreye02 CSG C	Solar	264				
M1847	Kreye02 CSG D	Solar	263				
M1842	Kreyer01 CSG C	Solar	269				
M1435	Lahr 1	Solar	810				
M1436	Lahr 2	Solar	815				
M1437	Lahr 3	Solar	865				
M1438	Lahr 4	Solar	854				
M1439	Lahr 5	Solar	859				
M1766	Lake Calhoun 43 LLC	Solar	909				
M1765	Lake Calhoun 44 LLC	Solar	871				
M1764	Lake Calhoun 45 LLC	Solar	907				
M1763	Lake Calhoun 47 LLC	Solar	923				
M1762	Lake Calhoun 49 LLC	Solar	862				
M1582	Lake Waconia Solar Garden	Solar	933				
M1583	Lake Waconia Solar IV Garden	Solar	728				
M1440	Lenzen Unit 1	Solar	807				
M1441	Lenzen Unit 2	Solar	809				
M1442	Lenzen Unit 3	Solar	786				
M1443	Lenzen Unit 4	Solar	320				
M1444	Lenzen Unit 5	Solar	830				
M1786	LeSun, LLC	Solar	929				
M1785	LeSun, LLC	Solar	915				
M1784	LeSun, LLC	Solar	946				
M1783	LeSun, LLC	Solar	962				
M1782	LeSun, LLC	Solar	958				
M1900	Libra Community Solar Garden, LLC	Solar	1,037				
M1189	Lind 2 - Lind SRC 041231	Solar	877				
M1190	Lind 3 - Lind SRC 041232	Solar	876				
M1650	Lindstrom CSG 1, LLC	Solar	1,026				
M1651	Lindstrom CSG 2, LLC	Solar	1,008				
M1652	Lindstrom CSG 3, LLC	Solar	1,005				
M1552	Lyra CSG1, LLC	Solar	568				
M1553	Lyra CSG2, LLC	Solar	610				
M1554	Lyra CSG3, LLC	Solar	574				
M1830	Mapleton Solar LLC	Solar	532				
M1829	Mapleton Solar LLC	Solar	1,004				
M1828	Mapleton Solar LLC	Solar	997				
M1827	Mapleton Solar LLC	Solar	1,002				
M1646	Marmas CSG 1	Solar	934				
M1647	Marmas CSG 2	Solar	946				
M1648	Marmas CSG 3	Solar	956				
M1649	Marmas CSG 4	Solar	943				
M1584	McHattie Unit 1	Solar	926				
M1585	McHattie Unit 2	Solar	915				
M1586	McHattie Unit 3	Solar	909				
M1587	McHattie Unit 4	Solar	901				
M1445	Menke Unit 1	Solar	843				
M1446	Menke Unit 2	Solar	944				
M1447	Menke Unit 3	Solar	967				
M1396	Michael 1	Solar	1,024				
M1397	Michael 2	Solar	1,021				
M1398	Michael 3	Solar	1,015				
M1399	Michael 4	Solar	955				
M1837	Minnesota Solar CSG 1, LLC	Solar	943				
M1836	Minnesota Solar CSG 1, LLC	Solar	973				
M1835	Minnesota Solar CSG 1, LLC	Solar	952				

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
M1834	Minnesota Solar CSG 1, LLC	Solar	967				
M1588	MN Lake Unit 1	Solar	990				
M1589	MN Lake Unit 2	Solar	855				
M1792	MN Solar Community, LLC	Solar	904				
M1791	MN Solar Community, LLC	Solar	797				
M1790	MN Solar Community, LLC	Solar	766				
M1794	MN Solar Community, LLC	Solar	829				
M1793	MN Solar Community, LLC	Solar	853				
M1250	Morgan CSG1, LLC - Morgan CSG1, LLC	Solar	937				
M1251	Morgan CSG2, LLC - Morgan CSG2, LLC	Solar	949				
M1800	MSC Carver01, LLC	Solar	292				
M1799	MSC Carver01, LLC	Solar	289				
M1798	MSC Carver01, LLC	Solar	229				
M1797	MSC Carver01, LLC	Solar	274				
M1804	MSC Carver02, LLC	Solar	286				
M1803	MSC Carver02, LLC	Solar	291				
M1802	MSC Carver02, LLC	Solar	290				
M1801	MSC Carver02, LLC	Solar	289				
M1849	MSC-Wash01, LLC	Solar	286				
M1848	MSC-Wash02, LLC	Solar	292				
M1850	MSC-Wash03, LLC	Solar	292				
M1851	MSC-Wash04, LLC	Solar	283				
M1852	MSC-Wash05, LLC	Solar	283				
M1853	MSC-Wash06, LLC	Solar	292				
M1854	MSC-Wash07, LLC	Solar	289				
M1855	MSC-Wash08, LLC	Solar	243				
M1856	MSC-Wash09, LLC	Solar	279				
M1857	MSC-Wash10, LLC	Solar	288				
M1858	MSC-Wash11, LLC	Solar	287				
M1859	MSC-Wash12, LLC	Solar	286				
M1860	MSC-Wash13, LLC	Solar	285				
M1861	MSC-Wash14, LLC	Solar	288				
M1862	MSC-Wash15, LLC	Solar	288				
M1863	MSC-Wash16, LLC	Solar	284				
M1864	MSC-Wash17, LLC	Solar	290				
M1865	MSC-Wash18, LLC	Solar	291				
M1866	MSC-Wash19, LLC	Solar	289				
M1867	MSC-Wash20, LLC	Solar	292				
M1317	NES - CF of Tyler CSG A - NES - CF of Tyler CSG A	Solar	196				
M1448	Nesvold 1 - 1	Solar	937				
M1449	Nesvold 1 - 2	Solar	890				
M1450	Nesvold 1 - 3	Solar	968				
M1451	Nesvold 1 - 4	Solar	929				
M1452	Nesvold 1 - 5	Solar	970				
M1610	New Germany Solar Garden	Solar	1,087				
M1453	Northfield Holdco LLC Unit 1	Solar	972				
M1454	Northfield Holdco LLC Unit 2	Solar	889				
M1455	Northfield Holdco LLC Unit 3	Solar	968				
M1456	Northfield Holdco LLC Unit 4	Solar	1,000				
M1457	Northfield Holdco LLC Unit 5	Solar	990				
M1052	Novel CSG of Faircon - Novel CSG of Faircon	Solar	43				
M1257	Novel CSG of Twin Pine Farm - Novel CSG of Twin Pine Farm	Solar	26				
M1548	Novel CSG of Vetter Farms B	Solar	23				
M1265	Novel CSG of Winona A - Novel CSG of Winona A	Solar	194				
M1898	Novel Solar Eight LLC	Solar	182				
M1897	Novel Solar Eight LLC	Solar	147				
M1891	Novel Solar Eight LLC	Solar	192				
M1635	Nystuen	Solar	784				
M1899	Oak Leaf Solar XI LLC	Solar	687				
M1759	Osakis Solar LLC	Solar	940				
M1816	Osakis Solar LLC	Solar	966				
M1815	Osakis Solar LLC	Solar	965				
M1814	Osakis Solar LLC	Solar	981				
M1805	Osakis Solar LLC	Solar	969				
M1297	Pegasus CSG1, LLC - Pegasus CSG1, LLC	Solar	861				
M1298	Pegasus CSG2, LLC - Pegasus CSG2, LLC	Solar	848				
M1254	Pine Island Holdco, LLC #2 - Pine Island Holdco, LLC #2	Solar	736				
M1256	Pine Island Holdco, LLC #4 - Pine Island Holdco, LLC #4	Solar	820				
M1888	Prinsburg CSG 1, LLC	Solar	766				
M1400	Richmond 1	Solar	969				
M1401	Richmond 2	Solar	966				
M1402	Richmond 3	Solar	919				
M1403	Richmond 4	Solar	970				
M1404	Richmond 5	Solar	997				
M1889	RJC I CSG LLC	Solar	820				
M1894	RJC II CSG LLC	Solar	829				
M2356	Sartell Solar LLC (CSG A)	Solar	811				
M2357	Sartell Solar LLC (CSG B)	Solar	818				
M2358	Sartell Solar LLC (CSG C)	Solar	799				
M2359	Sartell Solar LLC (CSG D)	Solar	830				
M2360	Sartell Solar LLC (CSG E)	Solar	743				
M1808	Scandia CSG LLC	Solar	859				
M1807	Scandia CSG LLC	Solar	882				
M1806	Scandia CSG LLC	Solar	434				
M1458	Scandia Trail Unit 1	Solar	1,064				
M1459	Scandia Trail Unit 2	Solar	1,031				
M1460	Scandia Trail Unit 3	Solar	1,056				
M1461	Scandia Trail Unit 4	Solar	1,007				
M1462	Scandia Trail Unit 5	Solar	952				
M1662	School Sisters 051877	Solar	960				
M1614	Sherburne Community Solar Garden 1	Solar	842				
M1615	Sherburne Community Solar Garden 2	Solar	843				
M1613	Sherburne Community Solar Garden 3	Solar	840				
M1612	Sherburne Community Solar Garden 4	Solar	841				

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
M1611	Sherburne Community Solar Garden 5	Solar	839				
M1630	South Street West Solar Project 1	Solar	897				
M1631	South Street West Solar Project 2	Solar	858				
M1632	South Street West Solar Project 3	Solar	876				
M1633	South Street West Solar Project 4	Solar	880				
M1634	South Street West Solar Project 5	Solar	874				
M1306	Spica CSG2, LLC - Spica CSG2, LLC	Solar	937				
M1776	SunE Feely 1, LLC	Solar	931				
M1775	SunE Feely 1, LLC	Solar	928				
M1774	SunE Feely 1, LLC	Solar	927				
M1771	SunE Feely 1, LLC	Solar	937				
M1768	SunE Feely 1, LLC	Solar	946				
M1391	SunE Koppelman 1, LLC	Solar	1,038				
M1392	SunE Koppelman 2, LLC	Solar	1,044				
M1393	SunE Koppelman 3, LLC	Solar	1,038				
M1395	SunE Koppelman 5, LLC	Solar	1,038				
M1653	SunE St. Cloud 1, LLC Unit 1	Solar	838				
M1654	SunE St. Cloud 1, LLC Unit 2	Solar	846				
M1655	SunE St. Cloud 1, LLC Unit 3	Solar	829				
M1656	SunE St. Cloud 1, LLC Unit 4	Solar	829				
M1657	SunE St. Cloud 1, LLC Unit 5	Solar	840				
M1595	SunE Stolee PV1	Solar	950				
M1596	SunE Stolee PV2	Solar	954				
M1597	SunE Stolee PV3	Solar	961				
M1147	Sunrise CSG 1 - Sunrise CSG 1	Solar	840				
M1795	Taurus CSG 1, LLC	Solar	1,011				
M1796	Taurus CSG 2, LLC	Solar	911				
M1626	Taurus CSG3, LLC	Solar	1,025				
M1627	Taurus CSG4, LLC	Solar	994				
M1463	Taylors Falls 1	Solar	860				
M1464	Taylors Falls 2	Solar	857				
M1465	Taylors Falls 3	Solar	345				
M1466	Taylors Falls 4	Solar	880				
M1467	Taylors Falls 5	Solar	898				
M1569	TJ Farms Unit 1	Solar	772				
M1570	TJ Farms Unit 2	Solar	785				
M1571	TJ Farms Unit 3	Solar	801				
M1572	TJ Farms Unit 4	Solar	202				
M1903	USS Big Lake 1 LLC	Solar	1,143				
M1901	USS Dubhe Solar LLC	Solar	1,111				
M2499	USS Eggo Solar	Solar	1,044				
M1906	USS Good Solar LLC	Solar	1,090				
M1902	USS Kasch Solar LLC	Solar	1,159				
M2364	USS Kost Trail Solar	Solar	1,070				
M1307	Vega CSG1, LLC - Vega CSG1, LLC	Solar	963				
M1308	Vega CSG2, LLC - Vega CSG2, LLC	Solar	937				
M1309	Vega CSG3, LLC - Vega CSG3, LLC	Solar	955				
M1310	Vega CSG4, LLC - Vega CSG4, LLC	Solar	963				
M1311	Vega CSG5, LLC - Vega CSG5, LLC	Solar	974				
M1573	Veseli Solar Garden	Solar	1,040				
M1574	Vetter Estate Unit 1	Solar	952				
M1575	Vetter Estate Unit 2	Solar	984				
M1576	Vetter Estate Unit 3	Solar	916				
M1318	Walz #1 - Walz #1	Solar	206				
M1319	Walz #2 - Walz #2	Solar	816				
M1320	Walz #3 - Walz #3	Solar	801				
M1577	WasecaSun, LLC Unit 1	Solar	1,040				
M1578	WasecaSun, LLC Unit 2	Solar	1,033				
M1579	WasecaSun, LLC Unit 3	Solar	1,043				
M1580	WasecaSun, LLC Unit 4	Solar	1,054				
M1581	WasecaSun, LLC Unit 5	Solar	1,054				
M1468	Waterford Holdco LLC Unit 3	Solar	670				
M1469	Waterford Holdco LLC Unit 4	Solar	996				
M1470	Waterford Holdco LLC Unit 5	Solar	965				
M1564	Waterville Community Solar Farm 1	Solar	916				
M1565	Waterville Community Solar Farm 2	Solar	893				
M1566	Waterville Community Solar Farm 3	Solar	880				
M1567	Waterville Community Solar Farm 4	Solar	908				
M1568	Waterville Community Solar Farm 5	Solar	902				
M1661	Webster 049585	Solar	689				
M1262	Webster Holdco LLC #2 - Webster Holdco LLC #2	Solar	912				
M1267	Webster Holdco LLC #3 - Webster Holdco LLC #3	Solar	896				
M1264	Webster Holdco LLC #5 - Webster Holdco LLC #5	Solar	904				
M1839	WGL Solar Anderson, LLC	Solar	942				
M1882	WGL Solar Barone, LLC	Solar	1,017				
M1883	WGL Solar Bolduan, LLC	Solar	983				
M1895	WGL Solar Cornille, LLC	Solar	910				
M1892	WGL Solar Eichtens II, LLC	Solar	942				
M1767	WGL Solar Goodhue 1, LLC	Solar	968				
M1760	WGL Solar Goodhue 1, LLC	Solar	959				
M1893	WGL Solar Guse, LLC	Solar	991				
M1885	WGL Solar Huneke II, LLC	Solar	934				
M1789	WGL Solar Red Maple 1, LLC	Solar	963				
M1788	WGL Solar Red Maple 1, LLC	Solar	991				
M1787	WGL Solar Red Maple 1, LLC	Solar	953				
M1884	WGL Solar Winegar, LLC	Solar	842				
M2365	Wright Kirby 1	Solar	914				
M2366	Wright Kirby 2	Solar	946				
M2367	Wright Kirby 3	Solar	961				
M2368	Wright Kirby 4	Solar	967				
M2369	Wright Kirby 5	Solar	924				
M1605	Wyoming 2 PV1	Solar	902				
M1606	Wyoming 2 PV2	Solar	901				
M1607	Wyoming 2 PV3	Solar	900				

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
M1608	Wyoming 2 PV4	Solar	907				
M1609	Wyoming 2 PV5	Solar	870				
M1645	Zumbro Solar Garden	Solar	963				
M2389	CEF Clarks Grove Community Solar	Solar	193				
M2375	Felton PV1	Solar	586				
M2376	Felton PV2	Solar	589				
M2377	Felton PV3	Solar	590				
M2378	Felton PV4	Solar	587				
M2379	Felton PV5	Solar	592				
M2508	MNCS Solar Garden of Held, CSG A	Solar	673				
M2509	MNCS Solar Garden of Held, CSG B	Solar	681				
M2510	MNCS Solar Garden of Held, CSG C	Solar	688				
M2385	NES CSG of Gibbon CSG A	Solar	798				
M2386	NES CSG of Gibbon CSG B	Solar	795				
M2387	NES CSG of Gibbon CSG C	Solar	780				
M2388	NES CSG of Gibbon CSG D	Solar	205				
M2370	Novel - Oya CSG of Held Farms C	Solar	667				
M2371	Novel - Oya CSG of Held Farms D	Solar	704				
M2372	Novel - Oya CSG of Held Farms E	Solar	582				
M2373	Novel - Oya CSG of Held Farms F	Solar	356				
M2374	Novel - Oya CSG of Held Farms G	Solar	579				
M2380	Randolph PV1	Solar	317				
M2381	Randolph PV2	Solar	523				
M2382	Randolph PV3	Solar	522				
M2383	Randolph PV4	Solar	467				
M2384	Randolph PV5	Solar	519				
M2396	CEF Haven Community Solar	Solar	435				
M2512	CEF Pax Christi Community Solar	Solar	62				
M2393	Haven Solar Project 1	Solar	370				
M2394	Haven Solar Project 2	Solar	350				
M2395	Haven Solar Project 3	Solar	348				
M2390	MSC-Chisago01, LLC	Solar	602				
M2511	USS East Hauer Watt Solar	Solar	402				
M2391	USS King 2	Solar	683				
M2392	USS Lake Patterson Solar	Solar	696				
M2549	Clara City	Solar	354				
M1244	Forest Lake Holdco #5 - Forest Lake Holdco #5	Solar	179				
M2397	MSC-Empire01, LLC	Solar	384				
M2398	MSC-Rice01, LLC	Solar	430				
M2399	MSC-Scott01, LLC	Solar	247				
M2400	New Munich Solar LLC	Solar	399				
M2411	Novel Martin Solar One LLC	Solar	305				
M2401	Olinda Trail Solar	Solar	360				
M2404	Rollingstone Unit 1	Solar	40				
M2405	Rollingstone Unit 2	Solar	48				
M2406	Rollingstone Unit 3	Solar	34				
M2407	Rollingstone Unit 4	Solar	56				
M2408	Rollingstone Unit 5	Solar	53				
M2402	Stearns Solar I LLC	Solar	371				
M2410	USS DVL Solar	Solar	396				
M2513	Wabasha Solar II	Solar	357				
M2514	Wabasha Solar III	Solar	353				
M2403	Wabasha Solar LLC	Solar	373				
M2409	Winona Solar I LLC	Solar	363				
M2515	Winona Solar II	Solar	420				
M2500	CEF Minneapolis Ramp Community Solar, LLC	Solar	152				
M2517	Lady Slipper Unit 1	Solar	120				
M2518	Lady Slipper Unit 2	Solar	137				
M2519	Lady Slipper Unit 3	Solar	140				
M2520	Lady Slipper Unit 4	Solar	137				
M2521	Lady Slipper Unit 5	Solar	53				
M2550	Malmedal Garden LLC	Solar	158				
M2516	MSC-Chisago02, LLC	Solar	126				
M2502	USS Brude Solar	Solar	154				
M2501	USS Rapidan Solar	Solar	153				
M2551	Wollan Garden LLC	Solar	157				
M2506	Novel Brooten Solar LLC	Solar	138				
M2526	Novel Solar Two LLC	Solar	75				
M2525	Novel Solar Two LLC	Solar	75				
M2524	Novel Solar Two LLC	Solar	72				
M2523	Novel Solar Two LLC	Solar	68				
M2522	Novel Solar Two LLC	Solar	76				
M1133	Paynesville CSG 2 - Paynesville CSG 2	Solar	96				
M1134	Paynesville CSG 3 - Paynesville CSG 3	Solar	96				
M2503	USS Centerfield Solar	Solar	117				
M2505	USS Haven Solar	Solar	42				
M2504	USS Hockey Pad Solar	Solar	44				
M2548	CEF Waseca Community Solar	Solar	75				
M2507	USS White Cloud Solar	Solar	21				
{NOT PUBLIC DATA BEGINS							
		Wind	61,886				
		Wind	85,201				
		Wind	3,785				
		Wind	118,492				
		Wind	108,662				
		Wind	29,225				
		Wind	27,283				
		Wind	460,239				
		Wind	796,668				
		Wind	57,217				
		Wind	45,688				
		Wind	4,132				
		Wind	615,342				
		Wind	198,869				

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

MRETS ID	MRETS Generator Facility Name	Generator Fuel Type	RECs retired for **RENEWABLE ENERGY STANDARD** compliance	RECs retired for **GREEN PRICING** programs	SRECs retired for Small Scale **SOLAR ENERGY STANDARD** compliance	SRECs retired for Non-small scale **SOLAR ENERGY STANDARD** compliance	NOTES
		Wind	441,706				
		Wind	224,107				
		Wind	52,148				
		Wind	4,429				
		Wind	99,640				
		Wind	3,352				
		Wind	262,082				
		Wind	243,159				
		Wind	61,858				
		Wind	730				
		Wind	144,900				
		Wind	139,246				
		Wind	141,597				
		Wind	400,976				
		Wind	147,408				
		Wind	81,750				
		Wind	52,329				
		Wind	37,402				
		Wind	2,264				
		Wind	18,849				
		Wind	238,279				
		Wind	85,849				
		Wind	6,380				
		Wind	5,174				
		Wind	6,533				
		Wind	25,624				
		Wind	16,122				
		Wind	12,294				
		Wind	28,427				
		Wind	30,211				
		Wind	8,284				
		Wind	6,414				
		Wind	38,625				
		Wind	1,977				
		Wind	29,901				
		Wind	42,023				
		Wind	4,400				
		Wind	247,790				
		Wind	552,353				
		Wind	191,600				
		Wind	34,670				
		Wind	25				
		Wind	146,215				
		Wind	165,503				
		Wind	37,442				
		Hydroelectr	11,144				
		Hydroelectr	33,070				
		Hydroelectr	30,281				
		Hydroelectr	7,987				
		Hydroelectr	11,062				
		Hydroelectr	14,958				
		Hydroelectr	10,618				
		Hydroelectr	11,081				
		Hydroelectr	71,049				
		Hydroelectr	39,409				
		Biogas	4,353				
		Biogas	10,826				
		Hydroelectr	1,316				
		Municipal s	135,635				
		Hydroelectr	32,459				
		Hydroelectr	33,345				
		Hydroelectr	28,752				
		Hydroelectr	60,255				
		Hydroelectr	4,169				
		Hydroelectr	61,973				
		Hydroelectr	9,826				
		Hydroelectr	22,987				
		Hydroelectr	2,744				
		Hydroelectr	9,048				
		Hydroelectr	59,027				
		Hydroelectr	93,259				
		Hydroelectr	8,745				
		Hydroelectr	6,430				
		Hydroelectr	7,201				
		Hydroelectr	802				
		Hydroelectr	3,912				
		Hydroelectr	83,629				
		Hydroelectr	42,137				
		Hydroelectr	4,977				
	NOT PUBLIC DATA ENDS]						

Renewable Energy Certificate Retirement Report for
RENEWABLE ENERGY STANDARDS and GREEN PRICING PROGRAMS

Minnesota Public Utilities Commission: Docket No. E999/PR-23-12 and Docket No. E999/M-23-85 **Attachment 6**
Minnesota Department of Commerce: Docket No. E999/PR-02-1240 Reporting Period: **January 1, 2022 - December 31, 2022**

M-RETS RECs Bought and Sold

Ordering pt. 4C requires reporting REC sales & purchases for the 2 preceding calendar years

REC Purchases Total	330,000
REC Sales Total	0

Enter REC data for the 2 preceding calendar years.

Wholesale REC Purchases	Wholesale REC Sales	PRICE	Type of purchase	NOTES
		[NOT PUBLIC DATA BEGINS		
58,115			For Green Pricing	MN Windsource REC Purchase
271,885			For Green Pricing	MN Windsource REC Purchase
		NOT PUBLIC DATA ENDS]		

Certificate of Service

I, Christine Schwartz, hereby certify that I have this day served copies or summaries of the foregoing document on the attached list of persons.

xx by depositing a true and correct copy thereof, properly enveloped with postage paid in the United States Mail at Minneapolis, Minnesota

xx electronic filing

Docket Nos. E999/PR-02-1240
E999/PR-23-12

Dated this 1st day of June 2023

/s/
____
Christine Schwartz
Regulatory Administrator

APPENDIX O – 2023 WORKFORCE TRANSITION PLAN SUMMARY

Order Point 24 of the Commission's April 15, 2022, Order in Docket No. E002/RP-19-368 states:

The Commission authorizes the Executive Secretary to open a new docket regarding workers at retiring generating facilities in Minnesota, including Sherco and King.

A. *Xcel—working with the Minnesota Department of Employment and Economic Development and the Energy Transition Office; the International Brotherhood of Electrical Workers, Locals 23, 160, and 949; the Minnesota Building Trades; and the Center for Energy and Environment—shall develop a comprehensive plan for supporting transitioning workers. The plan shall consider the measures outlined in the IBEW comments dated March 17, 2020, and March 21, 2021, including skills inventories, training and education, worker placement and potential early retirement buy-out scenarios. Xcel shall file the plan with the Commission no later than December 31, 2022. The plan shall include an estimated budget for each measure, timeline for implementation, and a description of additional funding needed by DEED or the Energy Transition Office, if applicable, to implement the plan.*

B. *Beginning on December 31, 2023, and annually thereafter, Xcel shall file a detailed update on its efforts to implement the plan in coordination with CEE, DEED and the Energy Transition Office, and IBEW.*

The Company originally filed the Workforce Transition Plan as part of the Performance Based Rates Annual Report, pursuant to the Commission's February 9, 2022, Order Accepting Reporting and Setting Additional Requirements in Docket No. E002/CI-17-401. The Commission recently approved removing the Workforce Transition Plan reporting requirement from Performance Based Ratemaking at its November 2, 2023, hearing. The 2023 Workforce Transition Plan was filed with the Minnesota Public Utilities Commission in Docket Nos. E002/RP-19-368 and E002/M-22-265 on December 21, 2023, and has been included in this IRP as Attachment O1: 2023 Workforce Transition Plan.

Xcel Energy has a long and successful history of performing strategic workforce planning to support workers through a transition, creating and executing upon workforce plans, and enabling a smooth transition of our workforce. We have a highly skilled workforce, and it is our desire and intent to retain these skilled workers to the greatest extent feasible. While transition plans for impacted employees at the Sherburne County Generating Station (Sherco) and Allen S. King Generating Plant (King) facilities are still evolving, Xcel Energy continues to engage in significant and deliberate workforce transition planning efforts. The Company communicates regularly with plant employees, IBEW local unions, and building trades unions to ensure transparency and to maintain engagement. Outlined in the Plan are planning, headcount, and cost estimates with respect to workforce transitions that will occur because of the proposed retirement of electric generating facilities. The Plan also discusses what work is being done to facilitate the workforce transition in Minnesota – including the opportunity for workers to upskill and reskill – and the employment opportunities we anticipate being available to plant workers around the time of plant closures.

Xcel Energy®

414 Nicollet Mall
Minneapolis, MN 55401

December 21, 2023

—Via Electronic Filing—

Will Seuffert
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101

RE: WORKFORCE TRANSITION PLAN – ANNUAL REPORT
IN THE MATTER OF WORKFORCE TRANSITION RELATED TO RETIRING ELECTRICITY GENERATING FACILITIES
DOCKET NO. E002/M-22-265, E002/RP-19-368

Dear Mr. Seuffert:

Northern States Power Company, doing business as Xcel Energy, files this Annual Report on workforce transition related to our retiring electricity generating facilities.

Order Point 24 in the Commission's April 15, 2022, Order approving the Company's Integrated Resource Plan reads as follows:

A. *Xcel—working with the Minnesota Department of Employment and Economic Development and the Energy Transition Office; the International Brotherhood of Electrical Workers, Locals 23, 160, and 949; the Minnesota Building Trades; and the Center for Energy and Environment—shall develop a comprehensive plan for supporting transitioning workers. The plan shall consider the measures outlined in the IBEW comments dated March 17, 2020, and March 21, 2021, including skills inventories, training and education, worker placement and potential early retirement buy-out scenarios. Xcel shall file the plan with the Commission no later than December 31, 2022. The plan shall include an estimated budget for each measure, timeline for implementation, and a description of additional funding needed by DEED or the Energy Transition Office, if applicable, to implement the plan.*
B. *Beginning on December 31, 2023, and annually thereafter, Xcel shall file a detailed update on its efforts to implement the plan in coordination with CEE, DEED, and the Energy Transition Office, and IBEW*

The Company is committed to ensuring a just transition for our workforce. We have a long and successful history of performing strategic workforce planning to support workers through a transition, creating and implementing workforce plans, and enabling a smooth transition of our workforce. We have a highly skilled workforce, and it is our desire and intent to retain these skilled workers to the greatest extent feasible. Our Workforce Transition Plan (the Plan) reflects that intent.

The Company continues to engage in significant and deliberate workforce transition planning efforts. We have been communicating regularly with plant employees, IBEW local unions, and building trades unions to ensure transparency and to maintain engagement. This workforce transition plan highlights each step of the planning and transition process. The outcomes of each phase will be updated as workforce transition planning progresses, when plant retirement dates near, as future jobs and skills become more apparent, and as the Company evaluates existing opportunities for impacted workers across the organization.

The Plan includes cost estimates that we intend to update and refine over time, and which may inform future budgets. We will continue to work with DEED and the Energy Transition Office to explore additional funding. The Plan also includes an updated methodology for evaluating the future opportunities for impacted workers, which will more accurately reflect opportunities during the relevant transition timeframe. We look forward to continuing discussions with stakeholders and our employees in the coming years.

We have electronically filed this document with the Minnesota Public Utilities Commission, and copies have been served on the parties on the attached service list. Please contact Ashley Kehoe at ashley.r.kehoe@xcelenergy.com or me at bridget.dockter@xcelenergy.comif you have any questions regarding this filing.

Sincerely,

/s/

BRIDGET DOCKTER
MANAGER, POLICY, AND OUTREACH

Enclosures
cc: Service Lists

Xcel Energy®

WORKFORCE TRANSITION PLAN

MINNESOTA

DECEMBER 21, 2023

CONTENTS

INTRODUCTION

BACKGROUND

Leading the clean energy transition is one of Xcel Energy's corporate priorities. We were the first major US electricity provider with a vision to serve customers with 100% carbon-free electricity by 2050 and to reduce carbon emissions company-wide by 80% from 2005 levels by 2030.

Figure 1. Building our carbon-free future.

To achieve our carbon-free future goal in Minnesota, we plan to retire our existing coal plants by 2030, expand our use of wind, solar, and battery storage systems, build on our successful energy efficiency programs and demand response options, and add new transmission infrastructure to connect more clean energy to the grid. We have a highly skilled and experienced workforce that we plan to transition to new and existing jobs across Xcel Energy. Our workforce is an important part of our clean energy vision.

WORKFORCE TRANSITION

Outlined in this Workforce Transition Plan (Plan) are planning, headcount, and cost estimates with respect to workforce transitions that will occur because of the proposed retirement of electric generating facilities. This Plan, including its information and assumptions will continue to be updated as plant transitions evolve.

The Plan was originally filed as part of the Performance Based Rates Annual Report, pursuant to the Minnesota Public Utilities Commission's (the Commission) February 9, 2022, Order Accepting Report and Setting Additional Requirements in Docket No. E002/CI-17-401 and later added to this docket for reporting through our Integrated Resource Plan (IRP). The Commission recently approved removing the Workforce Transition reporting requirement from Performance Based Ratemaking at its November 2, 2023, hearing with the understanding we will continue to report our Plan in the instant docket. At the time of this filing, a formal Order in the Performance Based Ratemaking proceeding is pending.

Xcel Energy has a long and successful history of performing strategic workforce planning to support workers through a transition, creating and executing upon workforce plans, and enabling a smooth transition of our workforce. We have a highly skilled workforce, and it is our desire and intent to retain these skilled workers to the greatest extent feasible. While transition plans for impacted employees at the Sherburne County Generating Station (Sherco) and Allen S. King Generating Plant (King) facilities are still evolving, Xcel Energy continues to engage in significant and deliberate workforce transition planning efforts. The Company communicates regularly with plant employees, IBEW local unions, and building trades unions to ensure transparency and to maintain engagement. This Plan highlights each step of the planning and transition process. The outcomes of each phase will be updated as workforce transition planning progresses, when plant retirement dates near, as future jobs and skills become more apparent, and as the Company evaluates existing opportunities for impacted workers across the organization.

STRATEGIC WORKFORCE PLANNING DEPARTMENT

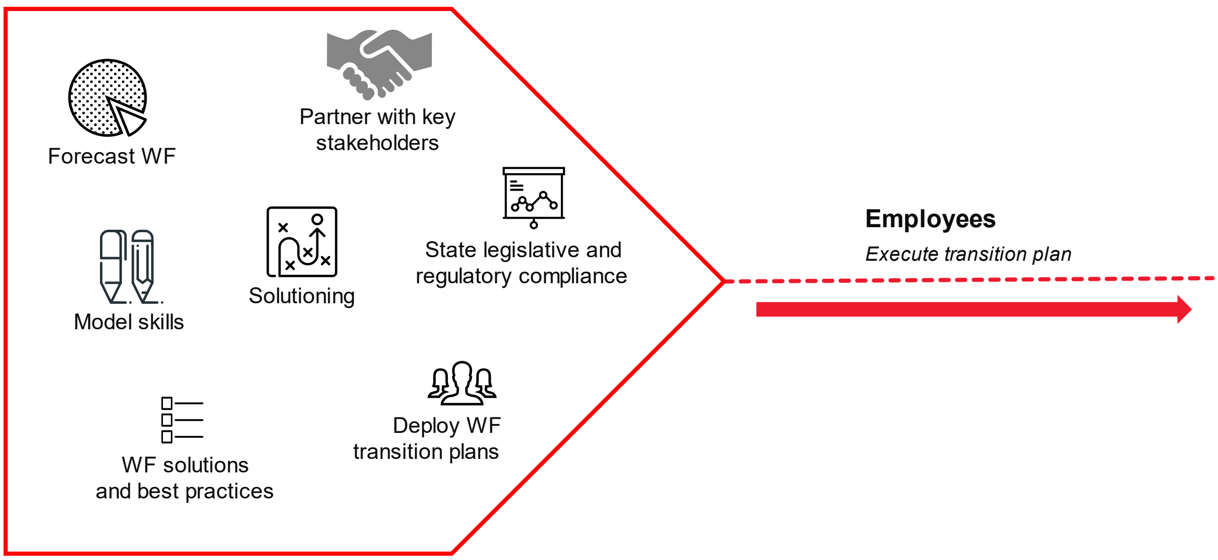
The Strategic Workforce Planning (SWP) department is housed within the Human Resource and Employee Services business area at Xcel Energy. The SWP department routinely performs workforce modeling to forecast headcount and costs, identify risks and opportunities, assess skill profiles across jobs and business areas, align the workforce to strategic priorities, and deploy workforce solutions based on data-driven insights. The SWP department holds the responsibility of creating and executing upon a workforce transition plan, in partnership and collaboration with multiple solution owners and key stakeholders.

The SWP department consists of workforce analytics consultants and analysts with a data science background and leadership consulting skills.

WORKFORCE TRANSITION PLANNING COLLABORATION

The SWP department at Xcel Energy works closely with both internal and external key stakeholders and partners to model, plan, design, and facilitate workforce transition.

Figure 2. Workforce transition planning collaboration.



Key internal partners and stakeholders include, but are not limited to:

- Human Resources and Employee Services Departments
    - Strategic Workforce Planning (SWP)
    - Workforce Relations (WFR)
    - Human Resources Business Partners (HRBPs)
    - Enterprise Learning Organization (ELO)
    - Workforce Analytics (WFA)
- Operations business areas
    - Energy Supply - Generation

    - Distribution
    - Transmission
    - Gas
- Northern States Power Minnesota (NSPM) operating company
    - Resource Planning
    - State Government Affairs
    - Community Relations

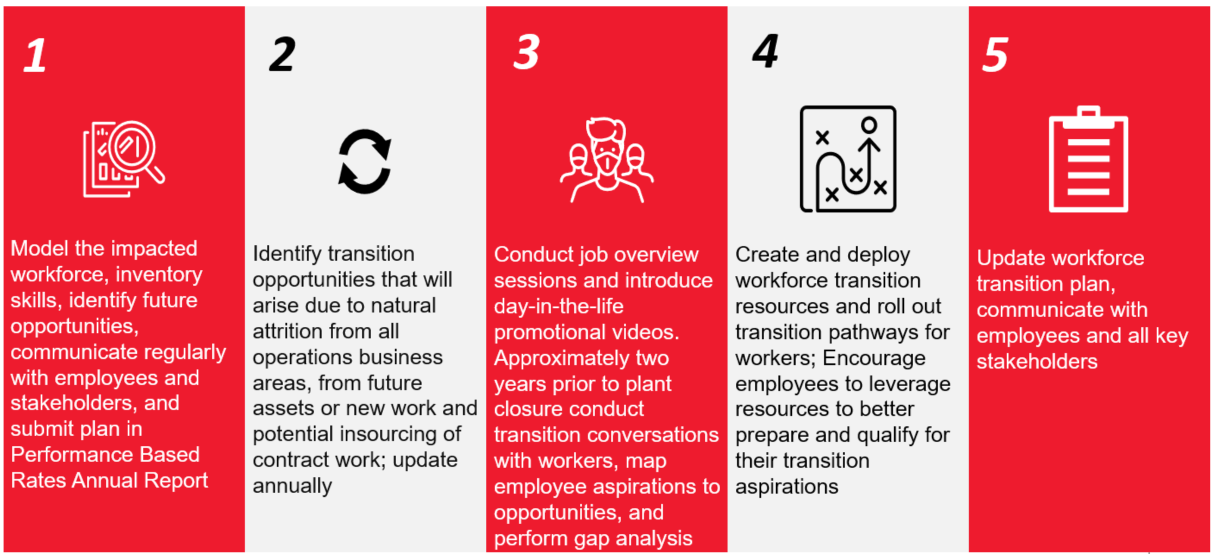
Key external partners and stakeholders include, but are not limited to:

- IBEW local unions representing Xcel Energy employees,
- Minnesota building trades labor unions whose members work for Xcel Energy and its contractors,
- Center for Energy Workforce Development (CEWD),
- Minnesota State Energy Center of Excellence,
- Energy Providers Coalition for Education (EPCE) and their education partners,
- Local education partners, community colleges and universities across the state, and
- All local workforce centers across the state of Minnesota.

WORKFORCE TRANSITION PLANNING PROCESS PHASES

To facilitate workforce transition in Minnesota, the SWP department continues to adopt the multifaceted approach described above to enable a smooth transition at coal plants. The process of planning for workforce transition is as follows:

Figure 3. Transition workforce planning process.



PHASE 1

WORKFORCE TRANSITION PLANNING MODELING

The following estimates were derived and updated as of **September 30, 2023,** and will continue to be updated as more refined input becomes available with respect to plant retirement, future opportunities that become available, and employees' aspirations and skills.

Furthermore, both the headcount and cost estimates will be refined once each employee participates in the transition conversations (which occur approximately two years prior to plant closure) and we are able to gain greater insight into the aspirations of our workers, their skills, available local opportunities, and programs we need to build or deploy to enable a smooth transition.

WORKFORCE HEADCOUNT MODELS

Detailed workforce analysis was conducted to estimate the number of potential impacted employees at each plant and identify the solutions required to transition these employees. This analysis is completed within the SWP department and in collaboration with other data analysts within Xcel Energy's Energy Supply and Resource Planning business areas.

Table 1. Projected headcount and number of employees to transition at Sherco

Plant	**Sherco**		
Event	*2023 EOY Unit 2 Closure*	*2026 EOY Unit 1 Closure*	*2030 EOY Unit 3 Closure*
Current Headcount as of September 30, 2023	187		
Target Headcount at closure	191	170	134
Projected Headcount Without Backfilling	172	115	35
Understaffed Level Without Backfilling	(19)	(55)	(99)
Projected Headcount With Backfilling	187	170	134
Employees to Transition	0	0	134

*Notes:

- There are 36 non-operations employees and an operations target headcount of 98, totaling 134 employees needed through 2030.

Table 2. Projected headcount and number of employees to transition at King

Plant	King
Event	*2028 EOY Closure*
Current Headcount as of September 30, 2023	84
Target Headcount at Closure	73
Projected Headcount Without Backfilling	1
Understaffed Level Without Backfilling	(69)
Projected Headcount With Backfilling	72
Employees to Transition	73
Number of Employees with Retention Agreements	(11)
Remaining Employees to Transition	62

*Notes:

- The Company and the union have already reached an agreement with 11 Operators to secure their employment at the King plant up until closure. The agreement includes transfer to Operator positions at other nearby plants.
- There are five non-operations employees and an operations target headcount of 68, totaling 73 employees needed through 2028.

Definition of workforce variables used in Tables 1 & 2:

- **Event**
  Proposed early retirement dates.

- **Current Headcount**
  Number of Xcel Energy benefitted employees working at the plant as of September 30, 2023. These numbers do not include supplemental building trade workers who are employed by either Xcel Energy or by contractors.

- **Target Headcount**
  The number of employees needed to run the remaining units. Through continued collaboration with the Company's Energy Supply team, we estimated the number of Xcel Energy employees that would, at a minimum, be needed to operate the plant up to and at the time of closure.

- **Projected Headcount (without back-filling)**
  Current Headcount less projected retirement and non-retirement attrition and transfers from September 30, 2023, up to the early retirement date. "Without back-filling" assumes employees who retire or leave the organization and who are not replaced.

- **Understaffed Level (without back-filling)**
  Target Headcount less Projected Headcount; to calculate the number of employees (understaffed)/overstaffed to the minimum Target Headcount of employees needed to operate a unit if employees who retire or leave the organization are not replaced.

- **Projected Headcount (with back-filling)**
  Current Headcount less projected retirements and non-retirement attrition and transfers from September 30, 2023, up to the Event date. In our projection with back-filling, employees who retire or leave the organization are replaced up to, but not exceeding, the Target Headcount.

- **Employees to Transition**
  This is the number of employees to be retained through transfer within the plant, within other generating units, or within other business areas across the organization. This number represents the number of employees who will be transitioned due to the retirement of a facility. To the extent feasible, we do not anticipate any layoffs. Our intent is to retain our employees and redeploy them across the organization. Opportunities for these workers are outlined below in the *Phase 2, Future Opportunities for Impacted Workers* section of this report.

  - *Sherco Unit 2 Closure*
    Employees to Transition is equal to Projected Headcount (with backfilling) less Target Headcount at closure. Previously backfilled workers will flow to positions at the remaining operating units (i.e., Unit 1 and Unit 3).

  - *Sherco Unit 1 Closure*
    Employees to Transition is equal to Projected Headcount (with backfilling) less Target Headcount at closure. Previously backfilled workers will flow to positions at the remaining operating unit (i.e., Unit 3).

  - *Sherco Unit 3 Closure*
    Employees to Transition is equal to Target Headcount at closure. There is no Projected Headcount beyond 2030, which is the final unit closure date; as more information becomes available, these estimates will be updated accordingly.

  - *King Closure*
    Employees to Transition is equal to Projected Headcount (with backfilling) minus the number of employees with retention agreements.

- **Number of Employees with Retention Agreements**
  This number represents the number of employees with agreements to remain at the King Plant through closure along with transfer to nearby plants.

- **Remaining Employees to Transition**
  This number represents the number of Employees to Transition minus the number of Employees with Retention Agreements. We will need to retain some employees for demolition after closure.

The SWP department uses target headcount and attrition forecasts in the workforce planning models to estimate the number of impacted employees at each plant. Energy Supply provides the target headcount in resource planning models and Workforce Analytics provides the retirement and non-retirement attrition projection data. These estimates are early projections and will continue to be updated annually and leading up to the retirement of each unit.

- Workforce Analytics at Xcel Energy uses an actuarial-based attrition simulator to forecast company turnover, both retirement and non-retirement.

  - Non-retirement attrition percentages are based on historical Xcel Energy experience.

  - Retirement attrition percentages are based on inputs such as the employee’s age, service, and selected retirement plan.

Target headcounts for the plants were derived by the plant directors at each plant location in Energy Supply. The plant directors created a workforce plan to identify the number of people they need in each job to continue safe operation of the remaining units. These projections are estimates and may be updated as we approach retirement of these units and when resource needs are more easily identifiable.

The above tables and calculations do not include supplemental workers that the Company uses on an as-needed basis or for major overhauls of the units. Supplemental workers are provided either directly by the building trade unions or by the contractors through which we source to execute on these activities.

WORKFORCE COST MODELS

Cost models of potential transition resources have been developed that include, but are not limited to, internal technical training, internal enterprise-wide learning courses, external educational assistance, relocation, and voluntary severance/early-exit.

Based on similar transitions of other coal plants across our service territory, primary transition resources needed to transition a workforce were identified and high-level cost projections associated with the anticipated closure of our remaining coal units in Minnesota were conducted.

Table 3. Estimated cost of potential transition resources

Plant	Sherco Unit 2	Sherco Unit 1	Sherco Unit 3	King
Event	Closure	Closure	Closure	Closure
Internal Tech Training	$0	$0	$6,150,000	$1,650,000
ELO Training			$150,000	$150,000
External Industry Training	$0	$0	$160,200	$44,500
On-the-Job Training				
Tuition Reimbursement	$0	$0	$189,000	$47,250

Relocation	$0	$0	$60,000	$20,000
Severance				
Subtotal	**$0**	**$0**	**$6,709,200**	**$1,911,750**
Grand Total	**$8,620,950**			

We estimate employee transition costs of approximately $8,620,950, as reflected in Table 3. This estimate is dependent upon final closure date and is based on the total cost of the combined transition resources applied to the total number of potentially affected workers for Sherco and King, which is reported as "Employees to Transition" in Tables 1 & 2. The costs are early estimates and will continue to evolve as we learn the aspirations of our workers, as attrition projections materialize, and as we learn of new opportunities within the communities these plants reside.

The assumptions used in each transition resource line item in Table 3 are listed below:

- **Event**
  Proposed early retirement date.

- **Internal Tech Training**
  An annual cost estimate of $25,000 per worker is provided by the Internal Technical Training team and is based on existing technical training infrastructure to provide ongoing training. The duration of technical training ranges from two to four years, with an average of three years used in the cost model. The percent of employees leveraging this resource is an estimate derived from the assessment of upskilling/reskilling needs and the historical transfers during prior plant retirements in which internal technical training was leveraged to move to positions at other Xcel Energy locations. The cost estimate does not include employee wages.

- **Enterprise Learning Organization (ELO) Training**
  The cost estimate for enterprise-wide transition resources by ELO is independent of the number of impacted employees who choose to leverage the resources. The ELO cost estimate of approximately $300,000 ($150,000 per plant) is derived based on the assessment of upskilling/reskilling needs. ELO may collaborate with local education partners to build and deploy training courses.

- **External Industry Training**
  The cost estimates for external industry training (e.g., certifications, micro credentials, individual courses) are calculated based on the certificate offerings at Bismarck State College (BSC), an EPCE education partner. There are five electric- and energy-related certificates that on average require 56.4 credit hours to complete each certificate. Since some employees will choose to complete all courses in the certificate while others will elect to take several individual classes to upskill and/or reskill, we halve the average number of credit hours used in our cost modelling, rounded to 28 credit hours. Additionally, we use $300 as the approximate per-credit-hour cost for the BSC certificates, consistent with the EPCE member tuition rate at BSC. The percent of employees leveraging this resource is an estimate derived from the assessment of upskilling/reskilling needs.

- **On-the-Job Training**
  Costs are expected to be incurred for on-the-job training in remaining units or at locations to which employees transfer. The cost estimate for on-the-job training has yet to be determined and will be estimated as we near the retirement of each unit and after gathering employee aspirations through transition conversations.

- **Tuition Reimbursement**
  We use $5,250 in our tuition reimbursement cost estimates, consistent with the United States Code, Title 26 Internal Revenue Code, §127 Educational Assistance Programs. An average of three years is used in the cost model. The percent of employees leveraging this resource is an estimate derived from the assessment of upskilling/reskilling needs.

- **Relocation**
  The relocation cost of $10,000 per worker is based on prior coal unit closures. The percent of employees leveraging this resource is an estimate derived from historical relocation during prior plant retirements.

- **Severance**
  Though we do not anticipate layoffs and we are committed to transitioning and retaining our workforce, some employees may not execute upon the transition pathways; severance costs will be estimated as we near retirement of each unit. Cost estimates for severance are derived based on the collective bargaining agreements.

Sherco Unit 2: There are no costs of transition because Projected Headcount (with backfilling) does not exceed Target Headcount, as outlined in Table 1, “Employees to Transition.” Employees may need additional training related to any uniqueness of units

1 and 3, which would result in on-the-job training costs that are to be determined but will be provided as part of future updates to the workforce transition plan.

Sherco Unit 1: There are no costs of transition because Projected Headcount (with backfilling) does not exceed Target Headcount, as outlined in Table 1, "Employees to Transition." Employees may need additional training related to any uniqueness of unit 3, which would result in on-the-job training costs that are to be determined but will be provided as part of future updates to the workforce transition plan.

Cost estimates will be refined in future updates to the workforce transition plan and after transition conversations with each employee take place and we are able to gather employee transition preferences, skill gaps, and the transition supports leveraged. Transition conversations with employees will take place approximately two years prior to closure.

PHASE 2

FUTURE OPPORTUNITIES FOR IMPACTED WORKERS

The Strategic Workforce Planning (SWP) Department anticipates that many of the transition opportunities for plant employees at Sherco and King will be in the form of transfers to nearby locations. Some of these transfers will require upskilling or reskilling, while others will be parallel job transfers and not require additional training. Prior versions of this plan utilized estimates of future opportunities that spanned from current year to year of closure. This has been updated to estimating future opportunities for the two years prior to closure through two years after closure in order to more accurately reflect opportunities during the relevant transition time frame. Unlike plant closures in more remote areas of our service territories, Sherco and King are located near large metropolitan areas, which include a high number of service centers and other Xcel Energy facilities which may offer opportunities to transitioning workers.

Using natural attrition forecasts as a proxy to determine the number of opportunities that will come available across all operations areas within 50 miles of the Sherco and King plants, the following estimates are provided:

Table 4. Projected future opportunities within Xcel Energy at locations near Sherco based on attrition and retirement forecast across all operations areas for 2028-2032.

Sherco Plant		
	Total Projected Jobs 2028-2032	Average Number of Jobs Per Year
Non-Bargaining	**1,122**	**224**
Bargaining	**137**	**27**
Nearby Locations: Riverside Gen Plant, 401 Nicollet Mall, 414 Nicollet Mall, Monticello Nuclear Plant, Monticello Service Center, Albany Service Center, Montrose Service Center, Maple Grove Service Center, St Cloud Service Center		

Table 5. Projected future opportunities within Xcel Energy at locations near King based on attrition and retirement forecast across all operations areas for 2026-2030.

King Plant		
	Total Projected Jobs 2026-2030	Average Number of Jobs Per Year
Non-Bargaining	**1,342**	**268**
Bargaining	**307**	**61**
Nearby Locations: 401 Nicollet Mall, 414 Nicollet Mall, Black Dog Gen Plant, High Bridge Combined Cycle, Inver Hills Gen Plant, Maple Grove Service Center, Monticello Nuclear Plant, Monticello Service Center, Prairie Is Training Center, Prairie Is Nuclear Plant, Rice Street Service Center, Riverside Gen Plant, Wescott Lng Plant, Hydro Maintenance Bldg Wissota, Wissota Hydro Plant, Wheaton Plant		

Similar analysis is conducted for all operations business areas across the state of Minnesota:

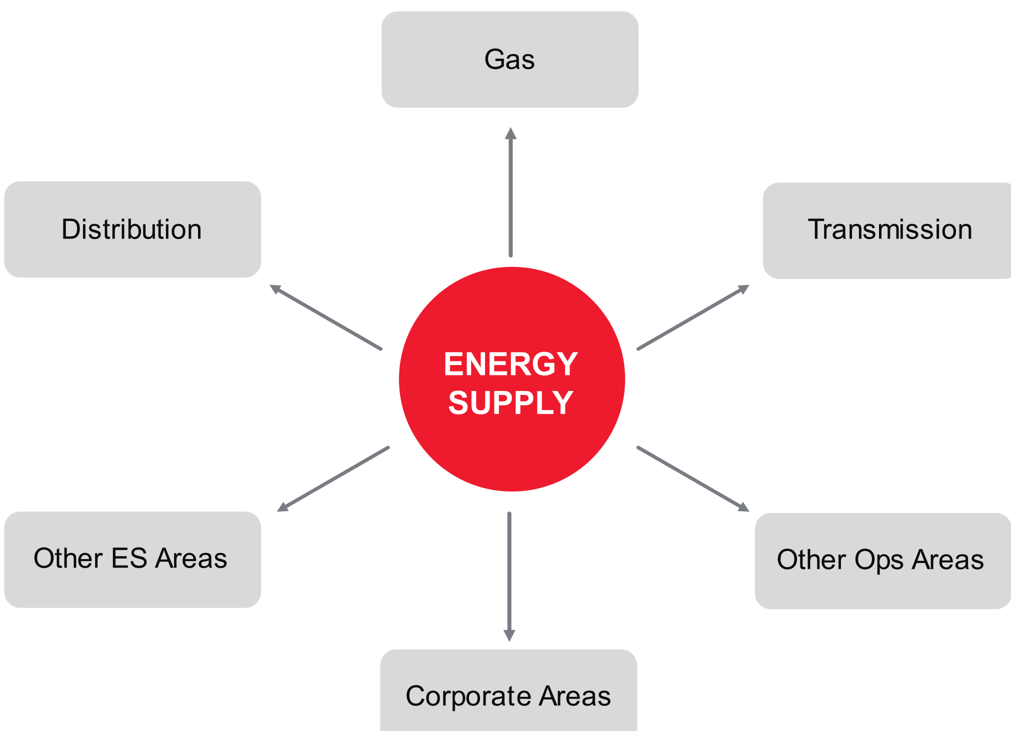
Table 6. Projected future opportunities within Xcel Energy across Minnesota based on attrition and retirement forecast for 2026-2032.

	Total Projected Jobs 2026-2032	Average Number of Jobs Per Year
Non-Bargaining	**2,415**	**345**
Bargaining	**756**	**108**

Many skills our employees at our coal generating facilities possess are transferrable to other positions across the Company. We will provide employees with information about available positions so they can identify the jobs in which they are most interested, and the skills those jobs require. Leaders across all operations business areas will welcome these skilled workers transitioning from the King and Sherco generating facilities into their organization.

Transition pathways will be created in partnership with each employee to retain, redeploy, or relocate workers based on their aspirations, availability, and in accordance with the collective bargaining agreements. Impacted workers will be able to leverage internal and external resources to upskill or reskill to transition into other positions within the Company.

Figure 4. Transition across operations.



The above tables are the greater portion of the opportunities that may be available to workers impacted by the early retirement of our coal plants. The Company continues to evaluate our resource mix and has proposed several solar projects near or on the plant sites that, if approved, may provide workers with future renewable energy jobs. The Company continues to work in partnership with our communities to draw new business and new jobs to the areas.

Providing insight to our employees about potential new jobs so they are aware of the different opportunities available is an important part of our transition efforts. To ensure employees are aware of and informed about different pathways, SWP plans in-person informational job overview sessions presented by employees who are in the positions that will become available. The goal of these sessions is to advertise potential job paths and show day-in-the-life promotional videos of jobs to explore.

To the extent practicable, Xcel Energy does not anticipate any layoffs. We have a strong track record in transitioning plant workers without layoffs. We are committed to a smooth transition as we continue the journey to achieve our clean energy goals.

We will continue to refine all opportunities and worker outcomes in future updates leading up to all retirement or conversion dates. In addition, we will build transparency and demonstrate the commitment to our workforce through updates to our employees, labor unions, and key external stakeholders impacted by these closures.

Our Employees with The Minnesota Building Trades

In recognition of the work performed at the Sherco and King Plants by workers from the Minnesota Building Trades Unions, we will continue to evaluate transition options and support the transition of long-tenured workers in partnership with key stakeholders, including trade union leadership, and leveraging resources available to impacted workers through local workforce centers and the MN Department of Employment and Economic Development (DEED). The Company will continue to identify options available to this workforce and will continue to adjust the workforce transition plan over time, gathering stakeholder feedback and providing updates to the Commission through the annual filing of this workforce transition plan.

To create a diverse pipeline of talent into energy jobs and continue supporting the building trades from whom we have long sourced temporary, contract, and construction work, Xcel Energy has partnered with the DEED to develop the Power-Up Workforce Development Program. This program will provide workforce training for clean energy-related construction work and help bring diverse candidates into the building trades. The program represents an investment in developing a diverse community of workers in the building trades, sustainable energy related construction jobs, and communities across our Minnesota service territory.

PHASE 3

TRANSITION CONVERSATIONS

Approximately two years prior to a unit retirement, transition conversations will be conducted with all employees at the impacted plant. The purpose of the transition conversation is to (1) provide greater insight into all the opportunities available to workers; (2) gather employee aspirations or transition preferences, including the jobs in which they are most interested; (3) evaluate the employee's current skills and their appetite for upskilling or reskilling; (4) determine whether they desire to relocate; and (5) address their questions or concerns about transition.

The SWP department will work collaboratively with teams across Human Resources and Employee Services to facilitate transition conversations with workers so that the Company can work in partnership with our employees and the unions on more detailed transition planning. The SWP department created a data template to capture transition preferences from transition conversations with workers and designed a real-time online form that will compile and aggregate data on the backend for further analysis.

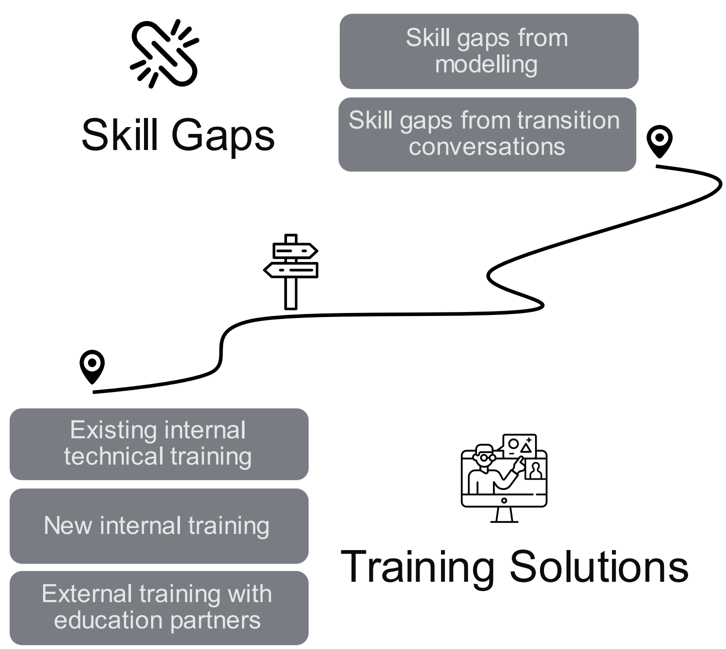
SKILL MODELLING AND SKILL GAP ANALYSIS

To assist in the transition of our coal plant employees by identifying skill gaps, the SWP department piloted skill inventorying and modeling for jobs at Sherco and King to help identify the skills within the positions at the plant and the skills needed to move into positions across Operations. The results of skill gap analysis will inform and guide SWP in recommending and deploying the appropriate reskilling/upskilling programs for the workers to leverage, which will enable their transition.

SWP developed bargaining job skill profiles using the Center for Energy Workforce Development (CEWD) Energy Industry Competency framework as the foundation and modified it to better fit and represent the skills and competencies of Xcel Energy jobs. The skill modelling is primarily focused on the core foundational skills that are transferable and applicable to a wide array of skilled technician jobs. With the CEWD framework used for soft skills and some technical skills, we then layered in the Xcel Energy Individual Contributor competencies to represent and capture the skills associated with each position, which aids in identifying where these skills are transferrable across Xcel Energy. Once the framework was complete, we consulted closely with job subject matter experts in Workforce Relations to go through each of the jobs to assess and rank the skills by position for both impacted positions at the coal plants and positions into which workers could potentially transition across the organization. The outcomes were then reviewed with plant leadership for feedback and/or adjustments.

SWP has developed additional quantitative models that map skill profiles from existing plant jobs to skill profiles of potential future jobs. These models assess the degree to which existing skills match skills needed in potential future jobs, shedding light on reskilling, upskilling, and other possible training pathways for Xcel Energy employees. Using text network analysis, SWP has also developed models for assessing how suitable existing plant jobs are with potential new jobs in renewable energy as well as with existing Xcel Energy jobs.

Figure 5. Skill mapping



After transition conversations take place, we aggregate and analyze the results to identify skill gaps based on a full skill profile of the worker, the skills they brought to the position, and the skills required for the position(s) to which they prefer to transfer to. Once skill gaps are identified, solutions that currently exist in upskilling/reskilling that we might be able to leverage internally or externally are gathered. This helps identify what we may want to modify, or what we may consider if new upskilling/reskilling solutions need to be created to bridge the skill gap. We will look for the most cost-effective solutions for the benefit of the greatest population of our workforce. We may leverage our internal training organization or external education partners in doing so.

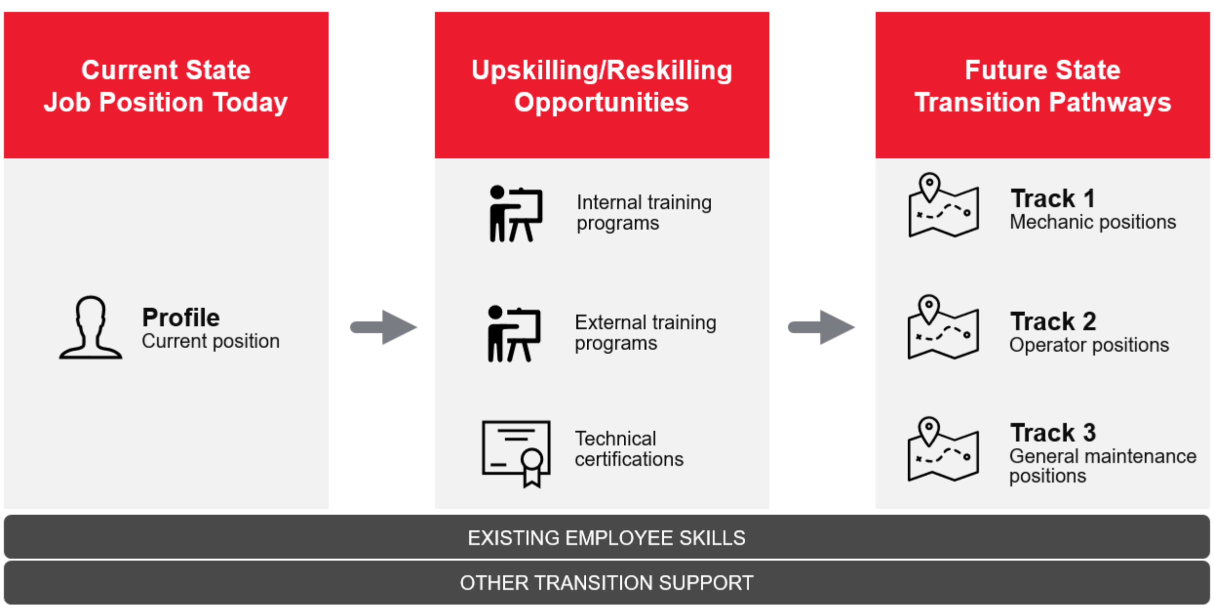
PHASE 4

TRANSITION PATHWAYS

Once skill gaps and solutions are identified, transition pathways are created for employees by leveraging existing upskilling/reskilling programs and building new upskilling/reskilling solutions with our internal and external training partners.

Transition pathways provide potential tracks for employees with the corresponding and recommended menu of options available for workers to transition, which would include upskilling/reskilling opportunities available plus other transition supports. The upskilling/reskilling opportunities include all internal training programs, external training programs, and technical certifications provided by external education institutions. The pathway will outline the resources available, and, in some cases, the timing/schedule of these trainings (if applicable). A transition track is a collection of similar future job opportunities that likely require similar skills and training. A supervisor will provide an overview of these transition tracks to each employee, offering support as their leader, answers to FAQs, and any other tools or information that may be helpful to the employee. Supervisors will receive training on how best to support their employees through the transition process itself and in providing effective coaching and feedback. It will then be up to the employee to take initiative and leverage the support offered.

Figure 6. Transition pathways.



Xcel Energy is an equal opportunity employer and will continue to operate in compliance with our collective bargaining agreements throughout this transition process. The Company endeavors to create and provide feasible workforce transition solutions to impacted workers.

For workers who may consider relocation to another position within the Company, we will work with them by looking at necessary training, the hiring process, relocation benefits, and other support, while maintaining compliance with our collective bargaining agreements. For workers who are eligible for retirement and decide to exercise that option, the HR retirement team will provide support and guidance through the retirement process.

Navigating uncertainty and change can be difficult. Xcel Energy provides numerous free resources to all employees and their family members at any time via our Employee Assistance Program (EAP), regardless of the employee's enrollment in a Company medical plan.

EAP offers information and guidance on topics including, but not limited to, managing change, handling personal crises, career counselling, educational support services, financial management and emotional well-being. Information on EAP is available to employees on the Company's intranet site, XpressNET.

PHASE 5

UPDATE WORKFORCE TRANSITION PLAN

In future annual Workforce Transition Plan filings, and leading up to the retirement of our plants, we will provide updates that use the latest information and assumptions in the headcount and cost models. Information gathered from the workforce transition conversations will be used to create the transition pathways based on the results of our skill gap analysis.

Additionally, we will continue to provide regular updates to key stakeholders, including our workforce, the IBEW Locals and other external stakeholders to continue to build upon the transparency of the phases and outcomes, commitment to our workforce, and our progress as we work to transition our Sherco and King coal plants.

CERTIFICATE OF SERVICE

I, Joshua DePauw, hereby certify that I have this day served copies of the foregoing document on the attached list of persons.

xx by depositing a true and correct copy thereof, properly enveloped with postage paid in the United States mail at Minneapolis, Minnesota

xx electronic filing

DOCKET NOS. E002/M-22-265
E002/RP-19-368

Dated this 21st day of December 2023

/s/
____
Joshua DePauw
Regulatory Administrator

APPENDIX P – 2023 SHERCO REMEDIATION REPORT SUMMARY

Order Point 20 of the most recent IRP Order[1] states:

> *Regarding remediation plans for the Sherco site:*
>
> A. *The Commission authorizes the Executive Secretary to open a new docket on this topic.*
>
> B. *Xcel shall conduct stakeholder meetings regarding the site with interested parties including the city of Becker; adjacent cities and townships including Becker Township and the city of Monticello; Sherburne and Wright counties; the Minnesota Department of Commerce, the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, the Center for Energy and Environment, the Clean Energy Organizations, the Minnesota Energy Transition Office [footnote omitted], and labor unions. By January 1, 2023, Xcel shall file in the new docket details describing updates on the site and the stakeholder outreach and meetings.*
>
> C. *Following these stakeholder meetings, by December 31, 2023, or in its next resource plan if earlier- and annually thereafter- Xcel shall submit to the Commission and to the city of Becker a detailed report describing the company's plans for the disposition of the Sherco site, equipment, and buffer property. The report shall include at least the following items:*
>
> 1) *A detailed description and timeline of any demolition, environmental clean-up, or similar work that will be required by the impending retirement of Sherco Unit 2.*
> 2) *To the extent possible, a description of the company's plans and a detailed timeline to decommission and demolish electric generating equipment related to Sherco Units 1 and 3.*
> 3) *A detailed description of the timeline, estimated costs, and steps necessary to remediate pollution at the Sherco site.*
> 4) *A section detailing how the company is working to ensure that plans for site remediation, economic development, or future development and maintenance of power generation, transmission, or distribution infrastructure are consistent with the community's long-range planning and vision.*
> 5) *A description of any ongoing efforts by the company to evaluate future uses for the plant site, any buffer property owned by the company, or any adjacent property, including a description of how the company is involving interested stakeholders in those efforts.*

[1] ORDER APPROVING PLAN WITH MODIFICATIONS AND ESTABLISHING REQUIREMENTS FOR FUTURE FILINGS, Docket No. E002/RP-19-368, April 15, 2022 (IRP Order).

> 6) *An update to the Commission on the status of efforts to support the city's and regions' economic development efforts, including – to the extent possible – specific projects and investments the company is assisting the city and region in attracting.*
> 7) *A description of the company's efforts to work with local governments and other stakeholders to assess and account for local land use and planning impacts. Before starting any additional regulatory process to determine the final length and route of the Sherco gen-tie line, Xcel shall consult with stakeholders to discuss the plans.*
> 8) *Any other items the Commission or the company sees fit to include.*
>
> *If Xcel cannot obtain the necessary information at the time of each filing, the company shall submit a detailed timeline on which it anticipates it will be able to provide the city and stakeholders with additional information.*

The IRP Order requires the Company to conduct stakeholder meetings and to submit to the Commission and the City of Becker an annual detailed report including a description and timeline of demolition, environmental cleanup or similar work required by the retirement of Sherburne County Generating Station (Sherco) Units 1, 2 and 3 and how those efforts are consistent with the community's long-range planning and visions; an update to the Commission on the status of efforts to support the city's and region's economic development efforts, including—to the extent possible— specific projects and investments the Company is assisting the city and region in attracting; and a description of the Company's efforts to work with local governments and other stakeholders to assess and account for local land use and planning impacts.

The report was filed with the Commission in Docket Nos. E002/RP-19-368 and E002/M-22-263 and provided to the City of Becker and interested stakeholders on December 28, 2023. A copy of the report is provided as Appendix P1: 2023 Sherco Remediation Report.

Xcel Energy®

414 Nicollet Mall
Minneapolis, MN 55401

December 28, 2023

—Via Electronic Filing—

Will Seuffert
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101

RE: COMPLIANCE FILING
IN THE MATTER OF XCEL ENERGY'S SITE REMEDIATION PLANS FOR DECOMMISSIONING THE SHERBURNE COUNTY GENERATING STATION
DOCKET NOS. E002/M-22-263, E002/RP-19-368

Dear Mr. Seuffert:

Northern States Power Company, doing business as Xcel Energy, files this detailed annual report on Sherburne County Generating Plant (Sherco) stakeholder outreach efforts and our plans for decommissioning, remediation and demolition for the site. We have appreciated the opportunity to work with interested stakeholders in these efforts and their participation in our quarterly stakeholder outreach meetings. This report was also shared with the City of Becker and interested stakeholders.

Order Point 20 in the Commission's April 15, 2022 Order approving the Company's Integrated Resource Plan reads as follows:

> B. *Xcel shall conduct stakeholder meetings regarding the site with interested parties including the city of Becker; adjacent cities and townships including Becker Township and the city of Monticello; Sherburne and Wright counties; the Minnesota Department of Commerce, the Minnesota Department of Natural Resources, the Minnesota Pollution Control Agency, the Center for Energy and Environment, the Clean Energy Organizations, the Minnesota Energy Transition Office, 41 and labor unions. By January 1, 2023, Xcel shall file in the new docket details describing updates on the site and the stakeholder outreach and meetings.*
>
> C. *Following these stakeholder meetings, by December 31, 2023, or in its next resource plan if earlier- and annually thereafter- Xcel shall submit to the Commission and to*

the city of Becker a detailed report describing the company's plans for the disposition of the Sherco site, equipment, and buffer property. The report shall include at least the following items:

1) *A detailed description and timeline of any demolition, environmental clean-up, or similar work that will be required by the impending retirement of Sherco Unit 2.*
2) *To the extent possible, a description of the company's plans and a detailed timeline to decommission and demolish electric generating equipment related to Sherco Units 1 and 3.*
3) *A detailed description of the timeline, estimated costs, and steps necessary to remediate pollution at the Sherco site.*
4) *A section detailing how the company is working to ensure that plans for site remediation, economic development, or future development and maintenance of power generation, transmission, or distribution infrastructure are consistent with the community's long-range planning and vision.*
5) *A description of any ongoing efforts by the company to evaluate future uses for the plant site, any buffer property owned by the company, or any adjacent property, including a description of how the company is involving interested stakeholders in those efforts.*
6) *An update to the Commission on the status of efforts to support the city's and regions' economic development efforts, including – to the extent possible – specific projects and investments the company is assisting the city and region in attracting.*
7) *A description of the company's efforts to work with local governments and other stakeholders to assess and account for local land use and planning impacts. Before starting any additional regulatory process to determine the final length and route of the Sherco gen-tie line, Xcel shall consult with stakeholders to discuss the plans.*
8) *Any other items the Commission or the company sees fit to include.*

If Xcel cannot obtain the necessary information at the time of each filing, the company shall submit a detailed timeline on which it anticipates it will be able to provide the city and stakeholders with additional information.

Pursuant to the Order, we have included details describing our stakeholder outreach efforts; remediation, decommissioning and demolitions plans and costs; and economic development efforts in the attached report.

We have electronically filed this document with the Minnesota Public Utilities Commission, and copies have been served on the parties on the attached service list. Please contact me at monsherra.s.blank@xcelenergy.com or Patti Leaf at patricia.b.leaf@xcelenergy.com if you have any questions regarding this filing.

Sincerely,

/s/

MONSHERRA BLANK
DIRECTOR, REGULATORY AND STRATEGIC ANALYSIS

Enclosures
cc: Service Lists

STATE OF MINNESOTA
BEFORE THE
MINNESOTA PUBLIC UTILITIES COMMISSION

Katie J. Sieben	Chair
Valerie Means	Commissioner
Matthew Schuerger	Commissioner
Joseph K. Sullivan	Commissioner
John A. Tuma	Commissioner

IN THE MATTER OF XCEL ENERGY'S SITE REMEDIATION PLANS FOR DECOMMISSIONING THE SHERBURNE COUNTY GENERATING STATION

IN THE MATTER OF XCEL ENERGY'S 2020-2034 UPPER MIDWEST INTEGRATED RESOURCE PLAN

DOCKET NOS. E002/M-22-263
E002/RP-19-368

COMPLIANCE REPORT

INTRODUCTION

Northern States Power Company, doing business as Xcel Energy, submits this Annual Report on Site Remediation Plans for Decommissioning the Sherburne County Generating Plant (Sherco) in compliance with the Minnesota Public Utility Commission's (Commission) April 15, 2022, Order approving the Company's Integrated Resource Plan. (IRP Orders)[1].

Order Point 20 of the most recent IRP Order states:

Regarding remediation plans for the Sherco site:

A. *The Commission authorizes the Executive Secretary to open a new docket on this topic.*
B. *Xcel shall conduct stakeholder meetings regarding the site with interested parties including the city of Becker; adjacent cities and townships including Becker Township and the city of Monticello; Sherburne and Wright counties; the Minnesota Department of Commerce, the Minnesota Department of Natural Resources, the Minnesota*

[1] ORDER APPROVING PLAN WITH MODIFICATIONS AND ESTABLISHING REQUIREMENTS FOR FUTURE FILINGS, Docket No. E002/RP-19-368, April 15, 2022 (IRP Order).

Pollution Control Agency, the Center for Energy and Environment, the Clean Energy Organizations, the Minnesota Energy Transition Office [footnote omitted], and labor unions. By January 1, 2023, Xcel shall file in the new docket details describing updates on the site and the stakeholder outreach and meetings.

C. *Following these stakeholder meetings, by December 31, 2023, or in its next resource plan if earlier- and annually thereafter- Xcel shall submit to the Commission and to the city of Becker a detailed report describing the company's plans for the disposition of the Sherco site, equipment, and buffer property. The report shall include at least the following items:*
    1) *A detailed description and timeline of any demolition, environmental clean-up, or similar work that will be required by the impending retirement of Sherco Unit 2.*
    2) *To the extent possible, a description of the company's plans and a detailed timeline to decommission and demolish electric generating equipment related to Sherco Units 1 and 3.*
    3) *A detailed description of the timeline estimated costs, and steps necessary to remediate pollution at the Sherco site.*
    4) *A section detailing how the company is working to ensure that plans for site remediation, economic development, or future development and maintenance of power generation, transmission, or distribution infrastructure are consistent with the community's long-range planning and vision.*
    5) *A description of any ongoing efforts by the company to evaluate future uses for the plant site, any buffer property owned by the company, or any adjacent property, including a description of how the company is involving interested stakeholders in those efforts.*
    6) *An update to the Commission on the status of efforts to support the city's and regions' economic development efforts, including – to the extent possible – specific projects and investments the company is assisting the city and region in attracting.*
    7) *A description of the company's efforts to work with local governments and other stakeholders to assess and account for local land use and planning impacts. Before starting any additional regulatory process to determine the final length and route of the Sherco gen-tie line, Xcel shall consult with stakeholders to discuss the plans.*
    8) *Any other items the Commission or the company sees fit to include.*

If Xcel cannot obtain the necessary information at the time of each filing, the company shall submit a detailed timeline on which it anticipates it will be able to provide the city and stakeholders with additional information.

The IRP Order requires the Company to conduct stakeholder meetings and submit to the Commission, City of Becker, and interested stakeholders a detailed report describing the Company's plans for the disposition of the Sherco site, equipment, and buffer property.

This report is filed with the Commission in Docket Nos. E002/RP-19-368 and E002/M-22-263 and provided to the City of Becker and interested stakeholders. The report follows.

I. QUARTERLY STAKEHOLDER OUTREACH EFFORTS

As required by the Commission's 2019 IRP Order, the Company has held quarterly meetings with Sherco community stakeholders. Though no cadence was dictated in the 2019 IRP Order for these meetings, they were held quarterly to be consistent with the Allen S. King Plant Stakeholder Outreach Efforts discussed in Appendix Q which required a quarterly cadence by the IRP Order. We have invited all stakeholders noted in the IRP Order. In addition, the Company has also extended invitations to the following agencies and community groups: the Becker, Big Lake, and Monticello Chambers; Minnesota Public Utilities Commission staff; business neighbors of the Sherco Plant; legislative representatives; the Southern Minnesota Municipal Power Agency; the University of Minnesota; and the Coalition of Utility Cities. The meetings have been held virtually or as hybrid meetings and have been well attended. The meetings have provided an overview of plans and known requirements associated with the retirement of the Sherco Plant and information about future efforts and have included significant opportunity for stakeholders to provide input and ask questions regarding information presented. Stakeholders have indicated their appreciation of the meetings and for the information shared. All presentation materials have been filed in the above-noted dockets. An overview of meetings conducted in 2023 follows.

A. First Quarter 2023

The first quarter 2023 Sherco Community Stakeholder Outreach meeting was held March 3, 2023, and focused on environmental remediation requirements associated with the retirement of the facility. Representatives from the Minnesota Pollution Control Agency (MPCA) participated in this meeting and provided an overview to stakeholders on environmental regulations pertaining to industrial wastewater, solid waste, and remediation requirements including remediation and reuse projects at other sites in the state.

The Company provided an overview on other historical remediation efforts undertaken at the Riverside Combined Cycle Generating Plant, the High Bridge Combined Cycle Plant, and the Black Dog Generating Plant when each of these facilities transitioned from coal fired facilities to natural gas fired units. The Company reviewed specific remediation requirements related to the existing coal yard and holding ponds.

B. Second Quarter 2023

The second quarter outreach meeting was held June 14, 2023. An update on the construction of the Sherco Solar 1 and 2 projects was provided including timelines and site progress. As well, a progress update on Sherco Solar 3 was given, outlining the approval process and timelines and interconnection with Sherco Solar 1 and 2.

C. Third Quarter 2023

The third quarter Sherco Community Stakeholder Outreach meeting was held September 28, 2023. The Minnesota Department of Employment and Economic Development (DEED) presented a recap of the Energy Transition Summit coordinated by DEED and held in Becker on June 26, 2023.

The Company provided an update on the Minnesota Energy Connection (MNEC) Transmission Project and the Alexandria to Big Oaks Transmission Line Project. These presentations included project descriptions and timelines and other vital information.

This was followed with an update on the Sherco Solar project detailing project location, permitting requirements, and construction progress.

A plant update was provided by plant management, which was followed by a stakeholder roundtable.

D. Fourth Quarter 2023

This stakeholder meeting was held December 8, 2023, and focused on providing information regarding recent federal Infrastructure Investment Jobs Act (IIJA) grants. Details pertaining to the Form Energy long-duration energy storage pilot project at Sherco, the Heartland Hydrogen Hub, and the Sherco Hydrogen Project were shared with stakeholders. In addition, we shared information pertaining to the upcoming formation of the Company's Environmental Justice Advisory Board (EJAB).

II. DEMOLITION AND ENVIRONMENTAL REMEDIATION PLANS

At this time, the main focus of the Sherco Plant is on the continued operation of Unit 2 until the end of 2023, Unit 1 until the end of 2026, and Unit 3 until the end of 2030, when each of the units will be respectively retired. Demolition and remediation planning efforts associated with the retirement of these units are underway but are still in a formative stage, with many decisions regarding future operations at the site needing to be determined due to the retirement of Unit 3 being more than six years out. The Company is in the process of developing a Site Decommissioning Plan for all three units, which is expected to be complete by the end of first quarter 2024. We will share those plan details in a future annual report filing when they are available. This Decommissioning Plan will address any potential demolition plans across all three units. While detailed plans and timelines are currently not available to share at this time, the following information is known.

A. Unit 2 Plans

In general, remediation and demolition activities will not begin at the site until all. three units have been retired in 2030. All three units share systems that will need to be maintained for the continued operation of Units 1 and 3 until their retirement in 2026 and 2030, respectively. The Unit 2 boiler may be removed after all three units have been retired at the end of 2030, however the turbine building will remain due to the conversion and operation of the Unit 2 generator as a synchronous condenser. The Unit 1 generator will also be converted to a synchronous condenser. Further investigation is needed to determine if the boilers can safely be removed while the synchronous condensers are in operation. It is expected that the synchronous condenser for Unit 2 could begin operation as early as fourth quarter 2025 with the Unit 1 synchronous condenser expected to begin operation fourth quarter 2027.

Current efforts for the future decommissioning of Sherco Unit 2 includes inventorying materials for removal of components from the unit that will not be needed for maintaining operation of the unit for the future conversion of the Unit 2 generator to a synchronous condenser, or that are not required for the continued operation of Units 1 and 3.

Once Unit 2 has been retired, unit specific systems may be decommissioned, isolated, drained, and left in a safe state which would allow for the demolition of equipment. Systems such as Scrubber Modules, Bottom Ash, and Fly Ash Systems, will be cleaned of ash. Coal will be burned down to empty the feed systems to the unit, and the silo-feeders and coal mills will be washed down to remove coal debris. The Unit 2 cooling towers are currently scheduled for demolition in 2024.

Systems to be left in service include, but are not limited to, the electrical systems for various components, the Thickener System, Building Heat, Auxiliary Steam, Fire Protection, Station Air Service/Potable Water, Closed loop cooling, Ash Water, and other common systems needed for the continued operation of Unit 1.

Other systems are being considered for isolation at this time. Isolation is the act of disconnecting power, or other means taken, which prohibit a system from operating.

Environmental remediation requirements of retired fossil fuel fired electrical generating facilities is prescriptively regulated by local, state, and federal authorities, however, we will not be required to begin remediation efforts on Sherco Unit 2 until Units 1 and 3 have also been retired, as they share common facilities.

As noted above, environmental remediation of the site will not occur until all three units are retired. Units 1 and 2 share common coal piles and ash disposal facilities that will remain in operation until after the retirement of Unit 1 in 2026. Environmental actions which will occur specific to Sherco Unit 2 will include, but are not limited to, notice to the Environmental Protection Agency (EPA) and MPCA of pending retirement and decommissioning.

B. Units 1 and 3 Plans

Steps towards the decommissioning of Units 1 and 3 will be conducted in a path similar to the Unit 2 decommissioning, with Unit 1 retiring December 31, 2026, and Unit 3 retiring December 31, 2030. As noted above, the conversion of the Unit 1 generator to a synchronous condenser is planned and the operation of the unit as a synchronous condenser is expected to begin by the end of 2027. Evaluation of the conversion of Sherco Unit 3 turbine generator to a synchronous condenser for additional grid stabilization is currently underway.

Once Units 1 and 3 have been retired, unit specific systems may be decommissioned, isolated, drained, and left in a safe state which would allow for the demolition of equipment. Systems such as Scrubber Modules, Bottom Ash, and Fly Ash Systems, will be cleaned of ash. Coal will be burned down to empty the feed systems to the units, and the silo-feeders and coal mills will be washed down to remove coal debris.

For safety reasons, the Unit 1 cooling towers are scheduled for demolition in 2027. Aside from the demolition of the Unit 1 and Unit 2 cooling towers, there will be no other large-scale demolition at the site until at least 2031. Detailed decommissioning information will be included in a future annual report filing when it is available.

As noted above, environmental remediation requirements of retired fossil fuel fired electrical generating facilities are prescriptively regulated by local, state, and federal authorities. We will not be required to begin environmental remediation efforts at the Sherco site until all three units have been retired. Environmental actions which will occur specific to Sherco Units 1 and 3 will include, but are not limited to, notice to the EPA and MPCA of pending retirement and decommissioning. The costs for these required remediation actions are not fully known at this time as the detailed plans have not been developed. Additionally, once plans are developed, they will require review and approval by the MPCA, which may result in changes to the final closure plans. Actual timelines will be dictated by internal Xcel Energy decisions as well as MPCA review and feedback prior to agency approval under MPCA's Solid Waste and Clean Water Act programs.

C. Units 1, 2, and 3 Plans

Plans for environmental remediation and demolition at the Sherco Plant are still in development. While the coal-fired generating capacity of the plant will be fully retired by December 31, 2030, plans that potentially reuse equipment within the powerhouse and plant support systems are under consideration. As previously noted, Unit 1 and Unit 2 generators will be reutilized as synchronous condensers and the potential conversion of the Unit 3 generator to a synchronous condenser is being evaluated. The synchronous condensers will require cooling water and other support systems to operate. Also as previously noted, some existing buildings will need to remain for the operation of the synchronous condensers. In addition, the Sherco substation will continue to be utilized. Demolition of the Unit 1 and 2 stack and the Unit 3 stack will not occur until after Unit 3 is retired.

There are six (6) impoundments and one basin at Sherco that contain either ash or ash contact water. The status of these impoundments is as follows:

- Scrubber Solids Pond 1 was closed and capped in 1995 following a plan approved by the MPCA.
- Scrubber Solids Pond 2 was closed and capped in 2014 following a plan approved by the MPCA.
- Scrubber Solids Pond 3 is currently active and will continue to be utilized by Sherco Units 1 and 2 until retirement. This pond is scheduled to be permanently closed in 2035 after the pond is dewatered either by evaporation and/or a permitted discharge of treated water. Costs associated with dewatering have not been estimated but could be significant.
- Pond 4 is currently under construction. It will be used to hold only ash contact

water, not scrubber solids. There is no scheduled closure date for this pond pending site redevelopment planning.
- Bottom Ash Pond 1 ceased receiving ash in October 2020. This pond is scheduled to be permanently closed and capped by October 2025.
- Bottom Ash Pond 2 is currently active but is scheduled to be permanently closed by 2035. It is utilized by all three units.
- Recycle Basin is currently active. There is no scheduled closure date pending site redevelopment planning. The recycle basin is utilized by all three units.

Post-closure monitoring of these impoundments will be controlled by the applicable federal and state requirements.

In addition to these six impoundments and the 3 basins, there is the Unit 3 dry ash landfill on plant property. The Unit 3 dry ash landfill will continue to operate through the retirement of Unit 3 in 2030. Terms of the existing state solid waste permit and current federal rules governing coal combustion residual landfills require that the landfill be closed and permanently capped within prescribed time limits after the Company ceases placing ash in the landfill.

We are required by environmental regulations to address specific portions of the plant process systems such as the Scrubber Solids Ponds and the Unit 3 Landfill. These requirements and their associated timelines do not come into effect until the Unit 3 retirement date of December 31, 2030. The plant's National Pollutant Discharge Elimination System and Solid Waste Permits require us to submit proposed closure plans to the MPCA for review and approval approximately 180 days before the Unit 3 retirement date. The demolition of all other structures onsite including the powerhouse, river intake structure, wastewater treatment system including the river discharge structure, cooling towers, etc., will depend on the Company's plans for future use of the site. The costs for these required actions are not fully known as the plans have not been developed.

The Company is currently evaluating future uses of the electric generating facility structure. Previously submitted information regarding those plans and the estimated costs have been filed under a Remaining Lives and Five-year Depreciation Study (the Study) filed in 2020 to Docket No. E, G-002/M-19-723[2]. The following information, including the information in Table 1, was included in the Study. Please see the full report for additional details.

[2] See *In the Matter of the Petition of Northern States Power Company for Approval of the 2020 Review of Remaining Lives and Five-Year Depreciation Study,* Docket No. E,G002/D-19-723, PETITION (August 18, 2020).

As noted in the Study, when the decision is made to begin physical dismantling of the Sherco Plant, Xcel Energy will begin field dismantling activities, beginning with engineering and planning, and the removal of asbestos and other hazardous materials from the site.

A preliminary planning phase of the program will begin once it has been determined that the plant will be dismantled, and the project has been authorized to proceed. During this phase, the Company will assemble its dismantling management organization, make appropriate decisions regarding the extent of dismantling and the approach to managing the activities, and will accomplish those site preparation activities necessary to transition from a plant shutdown configuration to site dismantling. For purposes of the development of a cost estimate, it is assumed that the intent is to dismantle the entire station as a single project. Costs incurred during this preliminary phase of the program are included in the dismantling costs presented in the Study.

Xcel Energy will prepare Sherco for dismantling by performing the following activities:

- Prepare specifications that identify and describe the objectives and major work activities to be accomplished (establishing the final site configuration)
- Assemble plant documentation that may be relevant to dismantling (drawings, hazardous material reports, environmental studies, etc.)
- Select an asbestos abatement contractor (if required) and Dismantling Contractor
- Assemble and mobilize the management and oversight team responsible for the project
- Document hazardous materials location and inventory

The inventory is an essential element of the cost estimate since dismantling costs are determined by applying unit cost factors against the corresponding inventory quantities. A site-specific inventory of materials to be removed was developed using a combination of methods and can be found in the Study.

In developing an estimate, the cost of labor, equipment and material, credit for scrap, and similar costs influence the results of the estimate. The basis for the significant cost drivers can be found in the Study.

Table 1: Sherburne County Station Summary of Activity Costs (2019 Dollars)

Activities	Unit 1	Unit2	Unit 3	Common	Station	Station Total
Sherburne County Unit Rating (MWe)	680	682	876			2,238
Characterization/Temporary Service	171,000	171,000	190,000	-	604,818	1,136,818
Worker Access	642,334	642,334	703,642	-		1,988,310
Pre-Demolition Cleaning (Boiler/Precipitator/Tanks)	1,081,050	1,081,050	1,081,050	-		3,243,150
Asbestos Remediation	2,508,884	2,508,884	-	500,000		5,517,768
Equipment Removal	5,699,637	5,547,162	6,568,928	4,670,730		22,486,487
Boiler(s)	4,182,168	4,182,168	4,619,900	-		12,984,236
Turbine Generator & Condenser	609,899	609,899	686,634			1,906,432
Exhaust Gas Treatment Equipment and Structures	4,245,955	4,398,430	4,741,985			13,386,370
Structures Demolition	7,038,228	7,038,228	7,657,026	6,378,958		28,112,441
Backfill/Grade/Landscaping/Well Closure	1,656,105	1,656,105	1,814,172	4,761,036	100,000	9,987,445
Coal Yard Closure					8,264,365	8,264,365
Ash Landfills/ Ash Ponds & Landfills Including Evaporation Ponds/Ash Pond Dewatering			3,169,905	20,754,000		23,923,905
Utility Management/Oversight	1,079,289	1,079,289	1,208,276	494,016		3,860,869
Demolition Contractor Management/Supervisory /Safety Staff	1,713,520	1,713,520	1,918,305	784,319		6,129,664
Security	317,316	317,316	355,239	145,243		1,135,113
Property Taxes	-	-	-	-	-	0
Project Expenses:						
Shared Heavy Equipment/Operating Engineers	1,544,579	1,544,579	1,729,174	706,991		5,525,323
Small Tool Allowance	535,084	535,084	539,646	326,216	n/a	1,936,030
Utilities Allowance (Office Equipment etc.)					76,789	76,789
Permits					1,832,569	1,832,569
Demolition Contractors Insurance					4,312,127	4,312,127

Demolition Contractors Fee					18,327,570	18,327,570
Sub-Total						176,073,780
Contingency						26,962,844
Project Total (before scrap credit)						203,036,624
Scrap Credit	(9,982,485)	(9,982,485)	(12,096,244)	(2,619,893)	-	(34,681,107)
Project Total						168,355,517

III. ECONOMIC DEVELOPMENT EFFORTS

Representatives from the Company's Economic Development and Community Relations departments have been working closely with the City of Becker, county representatives and other interested stakeholders on economic development opportunities. Those efforts are summarized here.

The Company spearheaded the Sherco Master Planning Process in conjunction with the City of Becker and community leaders with the Company funding 100 percent of the process. The Master Planning Process is a flexible tool, which presents a vision, framework, principles, and guidelines for the development of approximately 1,800 acres of the Sherco site and adjacent parcels in Becker, MN. These efforts resulted in the development of the adopted Becker Master Plan. The Master Plan Process included representatives from Xcel Energy, City of Becker staff, and community leaders.

In addition, the company participated in the alternative urban areawide review (AUAR) process. As defined by the Minnesota Environmental Quality Board: "The alternative urban areawide review (AUAR) process is a hybrid of the environmental assessment worksheet (EAW) and environmental impact statement (EIS) review processes. Responsible governmental units (RGU) can use an AUAR as a planning tool to understand how different development scenarios will affect the environment of their community before the development occurs."[3]. The Company contributed 100% of the cost for an environmental consultant to complete an AUAR with the City of Becker as the RGU. The AUAR was adopted in February 2023 by the City of Becker.

In addition to the stakeholder outreach identified above, bi-monthly calls are held with the City of Becker, Xcel Energy Community Relations, and Xcel Energy Economic Development to update each other on various economic development projects to ensure alignment and quarterly Xcel Energy advisory meetings are held

[3] https://www.eqb.state.mn.us/content/auar-process

with local city, county, and school district leaders to share updates. These meetings have been occurring for many years and are in addition to the quarterly stakeholder outreach meetings discussed above. Historically, the updates have included plant maintenance activities, city and county construction updates, economic development project updates, and other general updates. These are casual meetings meant to keep open and direct lines of communication amongst the parties.

Annually Xcel Energy leadership invites community leaders and elected officials from Wright and Sherburne Counties and communities to an Annual Community Breakfast to provide an opportunity for attendees to ask questions and provide input on the state of the Company and provide updates and information on the Sherco Plant and Monticello Nuclear Generating Plant, both of which are located within their respective communities.

The Company is working to ensure that plans for site remediation, economic development, future development and maintenance of generation, transmission or distribution infrastructure are consistent with the community's long-range plans and vision. As indicated, the Company is working in close contact with the community about, and understands the importance of, potential economic development opportunities associated with the retirement of the Sherco Plant. Going forward, site remediation efforts will consider Xcel Energy's long-range plan for the property and large remediation projects will be discussed with the city as they arise.

Following is an update on the status of efforts to support the city's and region's economic development efforts, including a listing of specific projects and investments the company is assisting the city and region in attracting.

- As part of the 2019 IRP, transmission system studies were performed to identify any reliability needs associated with coal unit retirements. The outcome of that work was project development to convert the Unit 2 and Unit 1 generators to Synchronous Condensers after the coal units cease operation.

- The 2019 IRP order issued April 2022 confirmed the need for solar generation within the region and the customer value of reusing interconnection rights associated with the retirement of the units. The Company ran Request for Proposals in 2021 and 2022 to acquire Sherco Solar 1, 2 & 3 to reutilize the 710MW of interconnection rights associated with Unit 2. The MISO Generator Replacement application was submitted at the end of 2022 and the solar projects are on schedule to meet commercial operation dates. We are constructing the Sherco Solar Project adjacent to the Sherco site. This will be the largest solar development in the state's history, producing enough clean energy to power approximately 150,000 homes in the Upper Midwest each year, creating nearly 1,000 union construction jobs and creating more than $350 million in local benefits (including landowner payments and state and local taxes) over the life of the project.

- Specific projects supporting the city's and regions' economic development efforts follow:

    - Joint initiatives by Sherburne County, the City of Becker and the Company have paved the way for the potential construction of a data center on approximately 350 acres of Xcel Energy-owned property. This sale, approved by the Commission in March 2023,[4] has the support of the City of Becker and Sherburne County, as it will bring jobs and much needed tax base to the community. The ultimate tax base impact can be determined once the data center's building permit has been submitted and reviewed by the County Assessor.
    - In addition to the data center project mentioned above, the Company continues to market large parcels of land to interested parties. Additional land in the City of Becker and Becker Township has been marketed for industrial development. The Company has designated approximately 1,300 acres of land surrounding the existing plant for future economic development. The City of Becker, in coordination with the Company, is currently constructing the expanded water and sewer services to much of this area, and the available acreage is being actively marketed by both the Company and the City of Becker. We are discussing these plans in the bi-monthly meetings noted above. At the March 9, 2023, MPUC agenda meeting discussing the Sherco Land Sale, we committed to including in this report the appraised value of remaining land currently being marketed. We note here that the only land currently being marketed is a 286-acre parcel located on the western portion of Sherco property which has a last appraised value of $8,770,000.
    - At the intersection of Liberty Lane and Energy Drive, Xcel Energy sold 78.73 acres to a metal recycling company, which began operations in 2019.[5] Sherburne County Tax Data shows the property had an estimated market value of $8,665,700 in 2023 resulting in annual taxes of more than $250,000.

[4] *Petition for Approval to Sell 348 Acres of Land at Sherco*, Docket No. E002/PA-22-489.
[5] *In the Matter of the Petition of Northern States Power Company for Approval to Sell 365 Acres of Sherco Land*, Docket No. E002/M-17-528.

- Stolt Land Holdings LLC purchased five acres from Xcel Energy in January 2020. According to Sherburne County Tax Data, the property had an estimated market value of $426,300 in 2023 resulting in annual taxes of more than $10,000.
- Xcel Energy is partnering with Form Energy on a long duration energy storage pilot project. This will involve the installation of an iron air 10 MW/1,000 MWh, 100-hour duration battery that is expected to be in operation by the end of 2025. This project will increase system reliability and play a role in meeting our Company-wide vision to provide our customers in all the states we operate in with 100 percent carbon-free electricity by 2050.
- Xcel Energy and the City of Becker have an agreement that the Company will pay assessments totaling $10.9 million for the benefit received from the City of Becker's sewer and infrastructure improvement projects to land owned by the company. The sewer and water projects increase the value of the land and Xcel Energy expects to recoup these costs as property is sold for economic development.

In addition, Order Point 21.C.4 requires us to discuss how we are working to ensure that our power generation, transmission, or distribution infrastructure plans are consistent with the community's long-range planning and vision. We note that there will be no impacts on the distribution infrastructure due to retirement of the units. While economic development efforts could require transmission and even distribution investments, we will incorporate anticipated load requirements into the forecast as appropriate.

IV. MN ENERGY CONNECTION

On March 9, 2023, Xcel Energy filed a Certificate of Need (CON) in Docket No. E002/CN-22-131 for an approximately 160- to 180-mile 345 kilovolt double-circuit transmission line to connect renewable energy in southwest Minnesota with the existing grid connection at the Sherco Plant. A Route Permit Application was filed in Docket No. E002/TL-22-132 on October 30, 2023. Review began on both applications fall 2023 with a decision expected in late 2024 or early 2025. If both applications are approved, we expect to begin construction in late 2025 with the project placed in service in late 2027.

In an effort to share information with the public and local officials about the MNEC Transmission Project, public meetings were held in February 2023 and June 2023.

Invitations were sent to all landowners that could potentially be affected by the route options. Initially, 150,000 landowners were notified of the CON filing, and the same list was used to inform landowners of the February 2023 open houses. In June, we reduced the list to all landowners that could be affected by the revised route options, to a total of nearly 50,000 landowners. The February meetings were held at five locations along the possible route corridor and approximately 550 members of the public attended. The June meetings were held at six different locations along the modified possible route corridor and approximately 750 members of the public attended.

At each open house, we provided to landowners, local governments, and key stakeholders information about the project, potential route options we had identified, and ways for those individuals to provide input on the land use impacts that each route option may have on their property. We also provided information about land use, easements, and right of way considerations near transmission lines as well as information about electric and magnetic fields, how route options are identified, construction practices, the upcoming regulatory proceedings, and other key issues. Xcel Energy staff was on hand at all meetings to answer questions and receive feedback from stakeholders.

Following the February 2023 open houses, the project team reviewed all comments and adjusted route options based on feedback received, as well as additional route review in order to identify route options that would lead to the least impactful route options.

In June 2023, we provided the updated route options to landowners and stakeholders and asked for additional feedback on those route options ahead of filing the Route Permit Application in October 2023. Overall, we received about 2,000 individual comments from landowners, local governments, and other officials.

In addition to public open houses, we have also met with local governments- counties, cities, and townships- throughout the project area to solicit feedback and provide information about the project. We have also met with state and federal agencies who may be involved in some aspect of the permitting process.

V. OTHER EFFORTS

The company was appointed and served on the Energy Transition Advisory Committee (ETAC) which was created in 2021 within the Department of

Employment and Economic Development (DEED). The directive of ETAC was to create a statewide energy transition plan and to advise the Governor, the Commissioner of DEED and the Legislature on energy transition issues, establish transition programs, economic initiatives, and transition policy (Minn. Stat. § 116J.5492). ETAC met through 2022, including site visits to communities impacted by the energy transition, meeting in the City of Becker on May 31, 2022. The Statewide Energy Transition Plan was filed by ETAC in December 2022. In 2023, the Legislature extended the life of ETAC until June 30, 2027, to file annual revisions to the Statewide Energy Transition Plan.

CONCLUSION

The Company takes seriously its responsibility to engage every community where we have major facilities and operations. Our commitment to our host communities and neighbors surrounding the Sherco Plant will outlive our coal operations. While the nature of our operations there will change in the years ahead, the site will continue to be important to the Company's ability to deliver reliable, safe, and affordable energy to our customers. We are glad to demonstrate that our longstanding participation in the social and economic life of the surrounding communities will continue.

We appreciate the opportunity to work with our stakeholders and neighbors and the time and talent given to us by them throughout this past year of community stakeholder meetings. We are committed to ongoing engagement with community stakeholders as the Sherco facility site transitions to cleaner energy generation and transmission.

CERTIFICATE OF SERVICE

I, Marie Horner, hereby certify that I have this day served copies of the foregoing document on the attached list of persons.

xx by depositing a true and correct copy thereof, properly enveloped with postage paid in the United States mail at Minneapolis, Minnesota

xx electronic filing

DOCKET NOS. E002/M-22-263
E002/RP-19-368

Dated this 28th day of December 2023

/s/
____
Marie Horner
Regulatory Administrator

APPENDIX Q – 2023 KING REMEDIATION REPORT SUMMARY

Order Point 21 of the most recent IRP Order[1] states:

Regarding remediation plans for the King site:

A. *The Commission authorizes its Executive Secretary to open a new docket on this topic.*
B. *Xcel shall conduct quarterly stakeholder meetings regarding the King site with interested parties including the city of Oak Park Heights, Washington County, the Department, DNR, the Energy Transition Office, PCA, the National Park Service, CEOs, CEE, the Wild Rivers Conservancy, and labor unions.*
C. *Following these stakeholder meetings, by December 31, 2023, or in its next resource plan if earlier- and annually thereafter- Xcel shall submit to the Commission, the city of Oak Park Heights, and interested stakeholders a detailed report describing the company's plans for the disposition of the King site, equipment, and buffer property. This report should include the following:*
    1) *The company's plans, estimated costs, and a detailed timeline to decommission and demolish the electric generation facility.*
    2) *A detailed description of the timeline and steps necessary to remediate pollution at the King site.*
    3) *A description of any ongoing efforts by the company to evaluate future uses for the plant site, any buffer property owned by the company, or any adjacent property, including a description of coordination with or involvement of the city and stakeholders in those efforts.*
    4) *The status of efforts to support the region's and city's economic development efforts, including- to the extent possible- specific projects and investments the company is helping the city to attract.*
    5) *An update on conservation efforts to reflect the uniqueness of the site and surrounding property located in and along the St. Croix National Scenic Riverway.*
    6) *Any other items the Commission or the company sees fit to include.*

If Xcel cannot obtain the necessary information at the time of each filing, the company shall submit a detailed timeline on which it anticipates it will be able to provide the city and stakeholders with additional information.

[1] ORDER APPROVING PLAN WITH MODIFICATIONS AND ESTABLISHING REQUIREMENTS FOR FUTURE FILINGS, Docket No. E002/RP-19-368, April 15, 2022 (IRP Order).

The IRP Order requires the Company to conduct quarterly stakeholder meetings and submit to the Commission, City of Oak Park Heights, and interested stakeholders a detailed report describing the Company's plans for the disposition of the King site, equipment, and buffer property. A similar requirement was passed by the Minnesota Legislature in 2023 and can be found in Minnesota Statute Chapter 60, Article 12, Section 70 (House File 2310).

The report was filed with the Minnesota Public Utilities Commission in Docket Nos. E002/RP-19-368 and E002/M-22-264 and provided to the City of Oak Park Heights and interested stakeholders on December 28, 2023. A copy of the report is provided as Appendix Q1: 2023 King Remediation Report.

Xcel Energy®

414 Nicollet Mall
Minneapolis, MN 55401

December 28, 2023

—Via Electronic Filing—

Will Seuffert
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101

RE: COMPLIANCE FILING
IN THE MATTER OF XCEL ENERGY'S SITE REMEDIATION PLANS FOR DECOMMISSIONING THE ALLEN S. KING GENERATING STATION
DOCKET NOS. E002/M-22-264, E002/RP-19-368

Dear Mr. Seuffert:

Northern States Power Company, doing business as Xcel Energy, files this detailed annual report on our Allen S. King Generating Plant (King) quarterly stakeholder outreach efforts and our plans for decommissioning, remediation, and demolition for the site. We have appreciated the opportunity to work with interested stakeholders in these efforts and their participation in our quarterly stakeholder outreach meetings. This report was also shared with the City of Oak Park Heights and interested stakeholders.

Order Point 21 in the Commission's April 15, 2022 Order approving the Company's Integrated Resource Plan reads as follows:

B. *Xcel shall conduct quarterly stakeholder meetings regarding the King site with interested parties including the city of Oak Park Heights, Washington County, the Department, DNR, the Energy Transition Office, PCA, the National Park Service, CEOs, CEE, the Wild Rivers Conservancy, and labor unions. Xcel shall file in the new docket by January 1, 2023, details describing the stakeholder outreach and updates for the efficient demolition of the King plant and remediation of the site and impacted land.*
C. *Following these stakeholder meetings, by December 31, 2023, or in its next resource plan if earlier- and annually thereafter- Xcel shall submit to the Commission, the city of Oak Park Heights, and interested stakeholders a detailed report describing the company's plans for the disposition of the King site, equipment, and buffer property. This report should include the following:*

> 1) *The company's plans, estimated costs, and a detailed timeline to decommission and demolish the electric generation facility.*
> 2) *A detailed description of the timeline and steps necessary to remediate pollution at the King site.*
> 3) *A description of any ongoing efforts by the company to evaluate future uses for the plant site, any buffer property owned by the company, or any adjacent property, including a description of coordination with or involvement of the city and stakeholders in those efforts.*
> 4) *The status of efforts to support the region's and city's economic development efforts, including- to the extent possible- specific projects and investments the company is helping the city to attract.*
> 5) *An update on conservation efforts to reflect the uniqueness of the site and surrounding property located in and along the St. Croix National Scenic Riverway.*
> 6) *Any other items the Commission or the company sees fit to include.*
>
> *If Xcel cannot obtain the necessary information at the time of each filing, the company shall submit a detailed timeline on which it anticipates it will be able to provide the city and stakeholders with additional information.*

Pursuant to the Order, we have included details describing our quarterly stakeholder outreach efforts; remediation, decommissioning and demolition plans and costs; and economic development efforts in the attached report.

We have electronically filed this document with the Minnesota Public Utilities Commission, and copies have been served on the parties on the attached service list. Please contact me at monsherra.s.blank@xcelenergy.com or Patti Leaf at patricia.b.leaf@xcelenergy.com if you have any questions regarding this filing.

Sincerely,

/s/

MONSHERRA BLANK
DIRECTOR, REGULATORY AND STRATEGIC ANALYSIS

Enclosures
cc: Service Lists

STATE OF MINNESOTA
BEFORE THE
MINNESOTA PUBLIC UTILITIES COMMISSION

Katie J. Sieben	Chair
Valerie Means	Commissioner
Matthew Schuerger	Commissioner
Joseph K. Sullivan	Commissioner
John A. Tuma	Commissioner

IN THE MATTER OF XCEL ENERGY'S SITE REMEDIATION PLANS FOR DECOMMISSIONING THE ALLEN S. KING GENERATING STATION

IN THE MATTER OF XCEL ENERGY'S 2020-2034 UPPER MIDWEST INTEGRATED RESOURCE PLAN

DOCKET NO. E002/M-22-264
E002/RP-19-368

COMPLIANCE REPORT

INTRODUCTION

Northern States Power Company, doing business as Xcel Energy, submits this Annual Report on Site Remediation Plans for Decommissioning the Allen S. King Generating Station (King) in compliance with the Minnesota Public Utilities Commission's (Commission) April 15, 2022 Order approving the Company's Integrated Resource Plan. (IRP Orders)[1].

Order Point 21 of the most recent IRP Order states:

Regarding remediation plans for the King site:

A. The Commission authorizes its Executive Secretary to open a new docket on this topic.

[1] ORDER APPROVING PLAN WITH MODIFICATIONS AND ESTABLISHING REQUIREMENTS FOR FUTURE FILINGS, Docket No. E002/RP-19-368, April 15, 2022 (IRP Order).

B. *Xcel shall conduct quarterly stakeholder meetings regarding the King site with interested parties including the city of Oak Park Heights, Washington County, the Department, DNR, the Energy Transition Office, PCA, the National Park Service, CEOs, CEE, the Wild Rivers Conservancy, and labor unions.*
C. *Following these stakeholder meetings, by December 31, 2023, or in its next resource plan if earlier- and annually thereafter- Xcel shall submit to the Commission, the city of Oak Park Heights, and interested stakeholders a detailed report describing the company's plans for the disposition of the King site, equipment, and buffer property. This report should include the following:*
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    4) *The status of efforts to support the region's and city's economic development efforts, including- to the extent possible- specific projects and investments the company is helping the city to attract.*
    5) *An update on conservation efforts to reflect the uniqueness of the site and surrounding property located in and along the St. Croix National Scenic Riverway.*
    6) *Any other items the Commission or the company sees fit to include.*

If Xcel cannot obtain the necessary information at the time of each filing, the company shall submit a detailed timeline on which it anticipates it will be able to provide the city and stakeholders with additional information.

The IRP Order requires the Company to conduct quarterly stakeholder meetings and submit to the Commission, City of Oak Park Heights, and interested stakeholders a detailed report describing the Company's plans for the disposition of the King site, equipment, and buffer property. A similar requirement was passed by the Minnesota Legislature in 2023 and can be found in Minnesota Statute Chapter 60, Article 12, Section 70 (House File 2310).

This report is filed with the Commission in Docket Nos. E002/RP-19-368 and E002/M-22-264 and provided to the City of Oak Park Heights and interested stakeholders. The report follows.

I. QUARTERLY STAKEHOLDER OUTREACH EFFORTS

As required by the IRP Order, the Company has held quarterly meetings with King community stakeholders. The Company included all stakeholders noted in the Commission's Order and also extended invitations to the following additional agencies and community groups: Minnesota Department of Transportation; Minnesota Public Utilities Commission staff; business neighbors of the Allen S. King Plant (the King plant); the US Army Corps of Engineers; area state legislators; the Greater Stillwater Chamber of Commerce; St. Croix County, Wisconsin; and the Cities of Stillwater and Bayport. The meetings have been held virtually or as hybrid meetings and have been well attended. The meetings have provided an overview of plans and known requirements associated with the retirement of the King Plant and information about future efforts, and have included significant opportunity for stakeholders to provide input and ask questions regarding information presented. Stakeholders have indicated their appreciation of the meetings and for the information shared. All presentation materials have been filed in the above-noted dockets. An overview of meetings conducted in 2023 follows:

A. First Quarter 2023

The first quarter 2023 King Community Stakeholder Outreach meeting was held February 23, 2023, and focused on environmental remediation requirements associated with the retirement of the facility. Representatives from the Minnesota Pollution Control Agency (MPCA) participated in this meeting and provided an overview to stakeholders on environmental regulations pertaining to industrial wastewater, solid waste, and remediation requirements including remediation and reuse projects at other sites in the state.

The Company provided an overview on other historical remediation efforts undertaken at the Riverside Combined Cycle Generating Plant, the High Bridge Combined Cycle Plant, and the Black Dog Generating Plant when each of these facilities transitioned from coal fired facilities to natural gas fired units. Details were provided regarding remediation efforts for each. In addition, information regarding remediation and present-day use of the King Ash Disposal Facility was provided. We also discussed future King remediation efforts required for the existing coal yard and holding pond.

B. Second Quarter 2023

The second quarter outreach meeting was held May 8, 2023. A tour of the King Plant was provided to interested stakeholders and included an overview of the plant's history, operations, pollution control equipment, and the falcon nesting platform.

C. Third Quarter 2023

The third quarter King Community Stakeholder Outreach meeting was held in-person on September 26, 2023. The meeting provided an overview of the recently released Xcel Energy Request for Proposals (RFP) to build 650 MW of solar generation in western Wisconsin. An overview of how solar projects are typically sited, built, and operated was also given.

This presentation included an update on the King Transmission Line, which will interconnect new solar generation to the grid at the King Substation. Information pertaining to preliminary routes and detailed pictures of the transmission line upgrades were provided.

The discussion also included an update on the King substation, which will remain in use following retirement of the King Plant. It was noted that an expansion of the substation will be necessary to accommodate the new transmission line. The presentation included a discussion regarding permitting requirements associated with these projects.

A plant update was provided by plant management, which was followed by a stakeholder roundtable.

D. Fourth Quarter 2023

This stakeholder meeting was held December 15, 2023, and focused on providing information regarding recent Infrastructure Investment Jobs Act (IIJA) grants. Details pertaining to the Sherco Form Energy Long Duration Energy Storage System, the Heartland Hydrogen Hub and the Sherco Hydrogen Project were shared with stakeholders. In addition, information pertaining to the future formation of the Company's Environmental Justice Advisory Board (EJAB) was shared.

II. DECOMMISSIONING AND DEMOLITION PLANS

At this time, the main focus of the plant is on the continued operation of the King Plant until the end of 2028 when it will be retired. Xcel Energy is currently evaluating future uses of the King electric generating facility structure and property. The preliminary Site Decommissioning Plan for the King Plant is in development and is expected to be completed by December 31, 2025. This plan will address any potential demolition plans for the site and the plan details will be shared in future annual reports once they are available. As reuse of the site continues to be evaluated, the Site Decommissioning Plan will continue to be updated and communicated. While detailed plans and timelines have not yet been developed, the following information can be shared.

Current preparatory efforts for decommissioning of the unit include inventorying materials for removal of components from the unit that will not be needed. The removal of the boiler is not expected until the unit is retired, currently planned for the end of 2028. Use of the existing generator as a synchronous condenser is currently under evaluation by the Company. If the Company proceeds to convert the existing generator to a synchronous condenser, further investigation will be needed to determine if the boiler can safely be removed while a synchronous condenser is in operation. The turbine generator and building would need to remain for the operation of a synchronous condenser. The potential demolition of all other structures onsite including the powerhouse, river intake structure, circulating water treatment system including the river discharge structure, cooling towers, pollution control buildings, etc., will depend on the Company's plans for future use of the site and, if deemed necessary, would only occur post-retirement of the unit. Stack and any building demolition deemed appropriate will also occur post-retirement. In general, components will not be removed from the site until the unit has been retired in 2028. The King substation will continue to be utilized.

Once the unit has been retired, unit specific systems may be decommissioned, isolated, drained, and left in a safe state, which would allow for the demolition of equipment. Systems such as pollution control equipment, Bottom Ash, and Fly Ash Systems, will be cleaned of ash. Coal will be burned down to empty the feed systems to the unit, and the silo-feeders will be washed down to remove coal debris. The Unit's cooling towers are being considered for demolition shortly after the unit ceases operation if there is no longer a need for cooling. Systems to be left in service could include, but are not limited to, the electrical systems for various components, Building Heat, Auxiliary Steam, Fire Protection, Station Air Service and Potable Water, Ash Water, and other systems.

Previously submitted information on the plans and estimated costs associated with demolition have been filed under a Remaining Lives and Five-year Depreciation Study (the Study) in 2020 in Docket No. E, G002/M-19-723.[2] The following information, including Table 1, was provided in the 2020 Study. Please see the full report for additional details.

A. Demolition Planning and Cost Estimates

As noted in the Study, when the decision is made to begin physical dismantling of the King Plant, Xcel Energy will begin field dismantling activities, beginning with engineering, and planning, and removal of asbestos and other hazardous materials from the station.

[2] See *In the Matter of the Petition of Northern States Power Company for Approval of the 2020 Review of Remaining Lives and Five-Year Depreciation Study,* Docket No. E,G002/D-19-723, PETITION (August 18, 2020).

A preliminary planning phase of the program will begin once it has been determined that the station will be dismantled, and the project has been authorized to proceed. During this phase, the Company will assemble its dismantling management organization, make appropriate decisions regarding the extent of dismantling and the approach to managing the activities, and will accomplish those site preparation activities necessary to transition from a plant shutdown configuration to site dismantling. For purposes of the development of a cost estimate it is assumed that the entire station will be dismantled as a single project. Expected costs to be incurred during this preliminary phase of the program are included in the dismantling costs presented in the Study.

Xcel Energy will prepare the King Plant for dismantling by performing the following activities:

- Prepare specifications that identify and describe the objectives and major work activities to be accomplished (establishing the final site configuration).
- Assemble plant documentation that may be relevant to dismantling (drawings, hazardous material reports, environmental studies, etc.).
- Select an asbestos abatement contractor (if required) and dismantling contractor.
- Assemble and mobilize the management and oversight team responsible for the project.
- Document hazardous materials location and inventory.

The inventory is an essential element of the cost estimate since dismantling costs are determined by applying unit cost factors against the corresponding inventory quantities. For the estimate, a site-specific inventory of materials to be removed was developed using a combination of methods and can be found in the Study.

In developing an estimate, the cost of labor, equipment and material, credit for scrap, and similar costs will influence the results of the estimate. The basis for the significant cost drivers can also be found in the Study.

Table 1: Allen S. King Station Summary of Activity Costs (2019 Dollars)

Activities	Unit 1	Common	Station	Station Total
Allen S. King Unit Rating (MWe)	511			511
Characterization/Temporary Service	150,000	-	201,606	351,606
Worker Access	630,789	-		630,789
Pre-Demolition Cleaning (Boiler/Precipitator/Tanks)	1,000,300	80,000		1,080,300
Asbestos/Lead Paint Remediation	4,284,988	-		4,284,988
Equipment Removal	7,865,365	1,682,890		9,548,255
Boiler(s)	3,460,641	-		3,460,641
Structures Demolition	10,016,294	2,476,372		12,492,666
Backfill/Grade/Landscaping/ Well Closure	2,605,976	977,821	113,991	3,697,788
Coal Yard Closure		10,718,358		10,718,358
Ash Landfills/ Ash Ponds & Landfills Including Evaporation Ponds		950,000		950,000
Utility Management/Oversight			3,027,199	3,027,199
Demolition Contractor Management/Supervisory/ Safety Staff			3,699,644	3,699,644
Security			776,195	776,195
Property Taxes	-	-	-	0
Project Expenses:				
Shared Heavy Equipment/Operating Engineers			3,194,695	3,194,695
Small Tool Allowance	580,281	102,742	n/a	683,023
Utilities Allowance (Office Equipment etc.)			52,508	52,508
Permits			685,566	685,566
Demolition Contractors Insurance			1,613,171	1,613,171

Demolition Contractors Fee			6,680,544	6,680,544
Sub-Total				67,627,939
Contingency				10,572,690
Project Total (before scrap credit)				78,200,628
Scrap Credit	(11,244,369)	(1,201,677)	-	(12,446,046)
Project Total				65,754,582

III. ENVIRONMENTAL REMEDIATION

Environmental remediation requirements of retired fossil fuel fired electrical generating facilities are prescriptively regulated by local, state, and federal authorities. Upon retirement of the facility, the Company will be required by environmental regulations to address specific portions of the plant process systems such as the Upper Holdup and Lower Holdup Ponds and the Coal Yard. These requirements are not triggered, and their associated timelines do not come into effect, until the King Unit retirement date of December 31, 2028. The costs for these required actions are not fully known at this time as the detailed plans have not been developed. Additionally, once plans are developed, they will require review and approval by the MPCA, which may result in changes to the final closure plans. A general timeline for the environmental remediation requirements and activities is noted in Table 2 below, however, the actual timelines will be dictated by internal Xcel Energy decisions and MPCA review and feedback prior to agency approval under MPCA's Solid Waste and Clean Water Act programs.

Table 2. King Plant Environmental Remediation Timeline*

June 30, 2025	Initiate assessment of planned coal inventory and supply/deliveries and pond operations and maintenance activities in relation to forecasted plant operations for the remaining years before unit retirement for planning purposes.
December 31, 2025	Finalize assessment including recommendations to optimize plant operations (including fuel supply and dispatch) for the remaining life of the unit.
June 30, 2026	Initiate development of coal yard burn down plan to facilitate closure work following unit retirement.

December 31, 2026	Finalize coal yard burn down plan.
January 31, 2027	Initiate coal yard burn down plan.
June 30, 2027	Initiate development of a National Pollutant Discharge Elimination System (NPDES) closure plan entailing ponds, coal yard, stormwater, and hold up and the coal yard.
June 30, 2028	File Facility Closure Notice pursuant to NPDES Permit and file recommended NPDES Closure Plan with MPCA for review and approval.
December 31, 2028	Shutdown and retire the electric generating unit to permanently cease the combustion of coal.
January 31, 2029.	Initiate closure activities in accordance with plan approved by MPCA.

* Subject to Change

A. OFFSITE SOLID WASTE LANDFILL

The King Plant Ash Disposal Facility was closed in 2011 and is currently in post-closure care. The site is maintained under a Solid Waste Permit issued by the MPCA with minimal required action including mowing, quarterly inspections, and leachate discharge monitoring. Xcel Energy maintains Financial Assurance to respond to environmental, maintenance, or emergency needs. A Water Quality Monitoring Report, describing both groundwater and leachate quality, is submitted to the MPCA quarterly. A Solid Waste Annual Report, which includes financial status (financial assurance) and a summary of the quarterly Water Quality Monitoring Reports, is provided to the MPCA annually. Continued monitoring will occur at the site, indefinitely.

Under a use agreement with the City of Oak Park Heights, the city uses the land as Oak Park Crossings Park. The Company and city work together to ensure that park uses are consistent with the permit.

IV. ECONOMIC DEVELOPMENT EFFORTS

Xcel Energy's Corporate Economic Development Team has many resources to assist communities and stakeholders with opportunities to increase economic development activity for their region. These resources include a real estate portfolio and marketing initiatives for site development; facilitation between community and prospective projects; as well as continuing work to grow an active pipeline of projects for the Xcel Energy territory. Specific support for the King Plant will be contingent upon further evaluation of future use for the facility and potential remediation efforts. Xcel Energy's Corporate Economic Development Team remains committed to assisting the City of Oak Park Heights on economic development opportunities.

Xcel Energy continues to consider future uses of the King Plant in ongoing coordination with the City of Oak Park Heights. Members of Xcel Energy's Corporate Economic Development Team have met with City of Oak Park Heights officials to discuss the Company's general economic development initiatives and future development opportunities at the plant site. These scenarios will be contingent upon continued evaluation for reuse of the Site and remediation efforts.

V. CONSERVATION EFFORTS - ST. CROIX NATIONAL SCENIC RIVERWAY

Xcel Energy has a long history of supporting conservation efforts in the St. Croix River Valley. In the early 1900s, Northern States Power owned more than 62,000 acres of undeveloped land that had been acquired for potential hydro development. Beginning in the 1960s, Company leaders expressed a desire to preserve those lands in a natural state and began discussions with the federal and state governments. These discussions resulted in the donation of approximately 52,000 acres of land along the St. Croix and Namekagon Rivers to the US Department of the Interior, and to the states of Minnesota and Wisconsin. These lands are now part of the St. Croix National Scenic Riverway. Xcel Energy is also an active supporter of the Wild Rivers Conservancy (WRC), with an Xcel Energy representative serving on the WRC's Board of Directors for the past several decades. The WRC is the nonprofit organization that supports the National Park Service (NPS) mission on the St. Croix and Namekagon Rivers.

The King Plant is located within the Lower St. Croix National Scenic Riverway (Lower St. Croix), designated by Congress due to its scenic, recreational, and geologic values. The Minnesota Department of Natural Resources (MNDNR), Wisconsin Department of Natural Resources (WDNR), and the NPS developed a Cooperative Management Plan (CMP) for the Lower St. Croix. This CMP emphasizes maintaining and enhancing the diverse character of the riverway while allowing limited planned development consistent with the historic character of the communities along the river.

As evaluation regarding decommissioning plans and future site uses for the site continues, we will continue to work with stakeholders from the NPS, the WRC, the US Army Corps of Engineers, MNDNR, WDNR and communities on both sides of the river to understand conservation goals and concerns at the King Plant site, and to ensure that those interests are considered as we determine plans for the future of the site. Xcel Energy will continue to evaluate opportunities to support or enhance the designated values of the riverway as plans develop.

VI. OTHER EFFORTS

A. Leadership in the Valley

As part of our Company's ongoing effort to engage our customers where we have plant locations, the Company regularly hosts local civic, business, and community groups for tours of our facilities. On October 12, 2023, we hosted a half-day presentation and tour of the King Plant as part of "Leadership in the Valley," an annual community leadership series sponsored by the Greater Stillwater Chamber of Commerce. A cohort of about 35 community leaders, drawn from area nonprofits, small businesses and local governments, learned about the Company's plans to decommission the King Plant as part of the Company's commitment to 100 percent carbon-free energy generation.

We discussed historic and current plant operations, reviewed our plans to build solar generation in Western Wisconsin to connect to the King Plant substation, and discussed future engineering and environmental issues that will factor into future reuse of the site. We anticipate further community outreach throughout 2024.

B. Energy Transition Advisory Committee

In addition, the company was appointed and served on the Energy Transition Advisory Committee (ETAC) which was created in 2021 within the Minnesota Department of Employment and Economic Development (DEED). The directive of ETAC was to create a statewide energy transition plan and to advise the Governor, the Commissioner of DEED and the Legislature on energy transition issues, establish transition programs, economic initiatives, and transition policy (Minn. Stat. § 116J.5492). ETAC met through 2022, including site visits to communities impacted by the energy transition. The Statewide Energy Transition Plan was filed by ETAC in December 2022. In 2023, the Legislature extended the life of ETAC until June 30, 2027, to file annual revisions to the Statewide Energy Transition Plan.

CONCLUSION

The Company takes seriously its responsibility to engage every community where we have major facilities and operations. Our commitment to our host communities and neighbors surrounding the King Plant will outlive our coal operations. While the nature of our operations there will change in the years ahead, the site will continue to be important to the Company's ability to deliver reliable, safe, affordable energy to our customers. We are glad to demonstrate that our longstanding participation in the social and economic life of St. Croix Valley communities will continue.

We appreciate the opportunity to work with our stakeholders and neighbors and the time and talent given to us by them throughout this past year of community stakeholder meetings. We are committed to ongoing engagement with community stakeholders as the King Plant site transitions to cleaner energy and transmission.

CERTIFICATE OF SERVICE

I, Marie Horner, hereby certify that I have this day served copies of the foregoing document on the attached list of persons.

xx by depositing a true and correct copy thereof, properly enveloped with postage paid in the United States mail at Minneapolis, Minnesota

xx electronic filing

DOCKET NOS. E002/M-22-264
E002/RP-19-368

Dated this 28th day of December 2023

/s/
____
Marie Horner
Regulatory Administrator

APPENDIX R – EQUITY

Order Point 25 of the most recent IRP Order[1] states:

Xcel shall engage in community outreach and establish a stakeholder group to do the following:

A. *Design for the equitable delivery of electricity services and programs for energy-burdened customers in the company's next Resource Plan.*
B. *Create new options to improve customer access to energy efficiency and renewable energy.*
C. *Draft a plan to be submitted in Xcel's next Resource Plan to bring the racial and gender diversity of the company's workforce in line with the utility's state goals.*
D. *Design incentives to ensure that communities of low-income, Black, Indigenous, and People of Color that have disproportionately borne costs of unjust and inequitable energy decision have equitable access to programs promoting distributed generation.*
E. *Adopt practices in furtherance of procedural justice- including deeper engagement with renters; affordable rental property owners; communities of Black, Indigenous, and People of Color; and under-resources individuals- providing resources for engagement and participation, and providing financial support for impacted individuals to participate in dockets and decision - making processes.*
F. *Form an environmental justice accountability board which shall develop environmental justice-focused initiatives to be incorporated throughout the utility.*

By January 1, 2023 and annually thereafter, Xcel shall file details describing stakeholder outreach and progress in its next resource planning docket, and in a separate docket to be established by the Executive Secretary.

I. INTRODUCTION

The Commission's April 15, 2022 Order in Docket No. E002/RP-19-368 requires the Company to address equity across a broad range of areas and program issues by engaging in community outreach, establishing a stakeholder group, and forming an environmental justice accountability board. An annual report on efforts and progress is required by January 1. This report was filed in Dockets E002/M-22-266 and E002/RP-19-368 on December 29, 2023. Some of the following information is drawn from that filing.

In response to the Order, the Company has taken a number of interrelated actions to enhance equitable outcomes and broaden participation in energy decision-making.

[1] ORDER APPROVING PLAN WITH MODIFICATIONS AND ESTABLISHING REQUIREMENTS FOR FUTURE FILINGS, Docket No. E002/RP-19-368, April 15, 2022 (IRP Order).

In response to the requirement to "establish a stakeholder group," we convened the Equity Stakeholder Advisory Group (ESAG), which has met approximately monthly since September 2022. We are also in the process of convening an Environmental Justice Advisory Board (EJAB) to continue the work of ESAG and to recommend energy and environmental justice (EJ) initiatives for implementation by the Company. In addition, we have incorporated consideration of equity, energy justice, EJ, and greater community participation into a wide range of programs and dockets, including the 2021 electric rate case, this Resource Plan, resource acquisitions and requests for proposals (RFPs), our 2023 Integrated Distribution Plan (IDP), our Energy Conservation and Optimization (ECO) Triennial Plan, Natural Gas Innovation Act plan (NGIA), electric vehicle (EV) programs,[2] workforce diversification programs, social investments and charitable contributions, among others. These efforts are summarized in the sections below.

In 2022*,* Xcel Energy adopted an EJ Position Statement[3] committing us to consider EJ in our energy, climate, and environmental initiatives, and to strive to provide meaningful opportunities for impacted communities to participate in the process. The position statement also outlines additional Company objectives including collaboratively engaging the communities we serve, maintaining affordability and reliability, and allocating the costs and benefits of the clean energy transition equitably. We have incorporated the consideration of EJ into our strategy, business, and operational plans following the directives of our EJ Position Statement.

Company efforts are guided by the 2023 legislated definition of EJ in Minn. Stat. § 116.065,[4] as well as the definition of "environmental justice area" in that statute and in the Minnesota carbon-free electricity standard,[5] which is also reflected in the Minnesota Pollution Control Agency's (MPCA's) mapping tool.[6]

II. EQUITY STAKEHOLDER ADVISORY GROUP

In September 2022, the Company convened ESAG to advise the Company on the programs identified in the Commission's Order – i.e., equitable delivery of electricity services and programs for energy burdened customers, improved customer access to

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[2] Transportation Electrification Plan as filed in the 2023 Intergraded Distribution Plan (November 1, 2023), Docket No. E002/M-23-452.
[3] See Environmental-Justice-Position-Statement.pdf (xcelenergy.com).
[4] See Minn. Stat. 116.065, Subd. 1(d) at Sec. 116.065 MN Statutes.
[5] See Minn. Stat. 216B.1691, Subd. 1(e) at Sec. 216B.1691 MN Statutes.
[6] Understanding environmental justice in Minnesota (arcgis.com).

energy efficiency and renewable energy, incentives to ensure that income-qualified and Black, Indigenous and People of Color (BIPOC) communities have equitable access to distributed generation programs, workforce diversification, and procedural justice in an attempt to broaden the ability of impacted individuals to participate in dockets and decision-making processes.[7] ESAG has met approximately monthly since it was convened. Summaries of each meeting have been filed in Docket Nos. E002/M-22-266 and E002/RP-19-368. The Company also filed in those dockets annual updates on December 22, 2022 and December 29, 2023, identifying progress in equity efforts as required by Integrated Resource Plan (IRP) Orders.[8]

A. Membership

ESAG is composed of representatives of approximately 35 community-based organizations, advocates for low-income households, EJ groups, clean energy advocates and state agencies. In developing the list of members invited to participate in ESAG, the Company worked to achieve representation from the wide diversity of racial, ethnic and cultural communities served by Xcel Energy, focusing particularly on elevating the voices of BIPOC communities. We also sought to include organizations working across the various program areas highlighted in the Commission's Order (energy burden, energy efficiency, renewable energy, and workforce), and to include both intervenor organizations who frequently participate in Commission dockets and many non-intervenors who have rarely or never participated, in order to serve the procedural justice objective of broadening participation in energy decisions.

B. Process

The first 10 ESAG meetings were facilitated by the Center for Economic Inclusion (CEI), an organization "committed to closing racial employment, income, and wealth gaps, and building racially inclusive and equitable regional economies." Founded in 2017, CEI is "dedicated exclusively to equipping public and private sector employers and policy makers to close racial employment, income, and wealth gaps and catalyze inclusive economic growth."[9] CEI led the ESAG through a systematic process that aimed to define the problem(s) to be solved; explore and identify root causes of the problem(s); and identify potential solutions and make recommendations on how Xcel Energy can address root causes of the problem(s).

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[7] IRP Order Point 25.
[8] Ibid.
[9] *See* Mission — Center for Economic Inclusion.

C. ESAG Work Streams

In terms of substance, ESAG's work has focused on three core areas:

1. Reducing Energy Burden for Low-income and BIPOC Customers

Work in this area builds on the recognition that, although energy burden (the share of income spent on household energy) may be relatively low for the average Minnesotan, it is unsustainably high for some – in particular, for those Minnesotans living in areas where higher than average energy burden overlaps with high poverty, a high proportion of People of Color, and other equity metrics. ESAG's work to brainstorm and then prioritize solutions, resulted in two leading potential strategies:

a) The first identified strategy would apply an automated discount to bills for low-income customers within identified qualifying areas. Qualifying areas would be chosen based on agreed thresholds for energy burden and/or poverty. The discount would take the form of a bill credit which would be applied automatically each month to electric bills of all households in the qualifying areas. There would be no household-level income checks, so there would be no administrative burden for participating households.

b) The second identified strategy would create a package of energy efficiency program ideas. This concept grew out of a desire to expand participation in energy efficiency programs that can reduce household energy bills in a more permanent way (complementing the short-term bill relief of the automated bill discount). Many community members who qualify for assistance to make their homes more energy efficient and save money face barriers to accessing this assistance – barriers including the complexity of navigating program offerings, not owning their home, the burden of completing applications and documenting income, and sometimes distrust of the utility and/or energy efficiency implementers when the offerings seem "too good to be true." This concept seeks to combine several innovations that could work together to lower these barriers, including block-by-block weatherization/efficiency initiatives, automatic qualification, community-based navigators, and requirements/incentives for efficiency implementers to partner with community-based organizations that may have greater trust in the community.

2. Equitable Access to Renewable Energy and Distributed Generation

Work in this area builds on the recognition that existing programs for solar and other types of renewable energy have tended to benefit wealthier residents, homeowners, and businesses while providing limited access for low-income customers, renters, and BIPOC residents and businesses. ESAG is fortunate to include among its members several organizations, both non-profit and for-profit, that are pioneering new ways for low-income and BIPOC customers to participate in and receive financial, employment and other benefits from the development of solar generation. ESAG met in January 2024 to discuss a consolidated list of potential strategies for more equitable access to renewable energy, and will be prioritizing this list for further discussions in first quarter 2024.

3. Workforce Diversification

Work in this area builds on the recognition that a company's most successful ideas and outcomes result from a collaboration between people with different experiences and perspectives. While progress has been made by the Company in workforce diversification, additional efforts are needed to promote racial and gender equity in the energy workforce – both Xcel Energy's own workforce, and the broader clean energy workforce that Xcel Energy's investments and procurement relies upon.
In particular, robust and coordinated efforts by a whole ecosystem of energy and workforce development organizations will be needed to ensure that the clean energy transition currently underway produces new career opportunities for a diverse workforce.

ESAG has worked on brainstorming and prioritizing workforce diversification strategies in the categories of recruitment, retention, training, and supplier diversity in contracting, procurement and RFPs. At the November 12, 2023 ESAG meeting, the Company provided an overview of our current diversity, equity and inclusion (DEI) strategies, including the Company's five pillars of Xcel Energy's strategy:

1. ***Build and maintain a diverse workforce, talent pipeline and leadership bench strength*** that reflects the communities and customers we serve.
2. ***Enhance community involvement and corporate giving programs*** to increase our support of organizations that advance DEI initiatives.
3. ***Increase data transparency, ensuring diverse workforce fair access to information*** and resources for all while striving to identify and eliminate unfair biases, stereotypes or barriers and leadership representation.

4. ***Establish targets to broaden our supplier diversity base***, encouraging businesses owned by women or veterans or whose owners are ethnically or racially diverse to participate in procurement process.
5. ***Create an environment where employees feel safe, respected and genuinely included and empowered*** to do their best work.

As required by IRP Order,[10] the Company has developed a Workforce Diversification Plan (Plan), included here as Appendix R1: Workforce Diversification Plan. The Plan provides an overview of the Company's stated workforce diversification goals which includes established objectives, timelines and metrics. The Plan was shared with ESAG members for their review and input prior to the January 17, 2024 ESAG meeting. During that meeting, ESAG members provided feedback and recommendations to be considered in the plan. ESAG members feedback from that meeting included, among other comments:

- Encouraging consideration of additional programs such as beneficial electrification training, complementing the training areas delivered via Energy Careers Academy (ECA);
- Establishment of a training facility in the St. Paul area and/or offering transportation accommodations to increase participants' access to the Minneapolis training location for the ECA;
- A request to provide detailed information regarding diversity in various occupation fields such as labor, engineering, Xcel Energy leadership, etc.;
- To consider additional outreach via community-based organizations and workforce development non-profit organizations for recruitment purposes, and additional grant/scholarship funding options for participants not eligible for federal Pell grants.

We appreciate ESAG members' willingness to connect with us to help spread the word about our program offerings to reach a broader audience for recruitment purposes and look forward to working with ESAG members on additional routes of advertisement for these programs. Transportation support is already available for students in the ECA program in the form of bus cards, gas cards and car repairs as needed. Pertaining to additional training for electrification, we do have some program offerings through a partnership with Center for Energy and the Environment providing energy auditor training. This is discussed further below. Regarding detailed diversity information, we will be providing additional information to help address this request in our March 15, 2024 filing required by Minn. Stat. § 216C.51.

[10] IRP Order Point 25.C

Based upon ESAG feedback, we have incorporated additional outreach efforts, evaluating additional means for easing access for student participation in St. Paul, and connecting with organizations that can facilitate access to specific community members. As well, we will evaluate additional training opportunities with local higher level educational institutions to assist the training potential of employees to assist with the clean energy transition. We view our Workforce Diversification Plan as a living document which will be modified over time. Suggestions not incorporated at this time will continue to be evaluated for later inclusion as appropriate. Throughout the process, ESAG has highlighted the need to increase access, awareness, and retention of diverse workforces. Strategies pertaining to these topics are discussed in Appendix R1.

D. Updates to the Commission

In addition to the meeting summaries filed after each meeting and the 2022 and 2023 annual reports, the Company and ESAG members reported on progress to date in a November 21, 2023 Commission planning meeting on equity. Presentations were given by Commission staff, the Department of Commerce, and Xcel Energy. The Company presented an overview and progress update on ESAG work to date, followed by remarks from 11 ESAG members. Presentation materials from this meeting have been filed in Docket Nos. E002/M-22-266 and E002/RP-19-368.

E. Compensation for ESAG participants

The topic of compensation of ESAG members has been raised on several occasions, both during the formation of ESAG and during ESAG meetings. The Company's position to date on compensation is based on our reading of the Commission's order directing the Company to form ESAG, as well as the Commission's statements in approving our IRP. The Order reads,[11] "Adopt practices in furtherance of procedural justice … providing resources for engagement and participation and providing financial support for impacted individuals to participate in dockets and decision-making processes." During the February 2022 IRP hearing, intervenors asked the Commission to order compensation for intervenors participating in the stakeholder group that the Commission directed us to establish – and the Commission explicitly declined to do so. Based upon these two Commission actions – declining to order intervenor compensation when asked, but including language in the Order on financial support for "impacted individuals" – our interpretation has been that we should not compensate active intervenors, but should consider compensating "impacted individuals" who have not previously intervened in Commission dockets,

[11] See footnote 1, Order Point 25 subpart E.

and who would bring a community perspective to the discussion that would be beneficial for the Company and Commission to hear.

Based on this interpretation, when initial invitations were extended to participate in ESAG, the Company requested those invited to let the Company know if they needed compensation in order to participate in ESAG and that a compensation model would be established. This request was repeated in a subsequent email communication as well as at in-person ESAG meetings. Only one ESAG member, who represents an organization that is a frequent intervenor in Commission dockets, requested compensation. We indicated that, based on our interpretation of the Commission's order, we would not provide compensation to intervenors. Since no other members requested compensation, we have not provided compensation to any ESAG member. We also note that all ESAG meetings have taken place during the workday, and to our knowledge all current ESAG members are salaried employees of organizations that they are representing.

We provide this explanation not to suggest that the compensation issue is definitively settled for future community engagement efforts – but rather to explain how it was addressed in ESAG. Notably, the issue of potential compensation for the EJAB is still under evaluation. EJAB members have not yet been chosen but may represent "impacted individuals" who are not intervenors and may bring a crucial under-resourced and/or BIPOC community perspective to our decision-making. We are currently evaluating whether and how to provide compensation to EJAB.

III. ESTABLISHMENT OF ENVIRONMENTAL JUSTICE ADVISORY BOARD

The Commission's Orders in Docket Nos. E002/M-22-266 and E002/RP-19-368 also require the Company to form an EJAB to develop EJ-focused initiatives to be incorporated throughout the utility.[12] Prior to forming the EJAB, the Company conducted research on other organizations – utilities as well as state and federal agencies -- that have established EJ advisory boards. We shared the results of this research with ESAG and asked for their input on several points related to the formation of the EJAB, including purpose, size and composition, the application and selection process, authority and decision-making, logistics, compensation, and Xcel Energy staff and executive participation. Having incorporated the majority of ESAG's recommendations on these decisions into the process, the Company plans to launch an application process to select EJAB members, which will include broad outreach via

[12] See footnote 1, subpart 25.F.

ESAG, EJ and community-based organizations, in the first half of 2024. We will then convene a review committee to evaluate and score applications.

While the Company was ordered to establish the EJAB to focus on EJ-focused initiatives, we do not think that the scope of the EJAB should be limited to just that. We expect that the EJAB will advise the Company on potential initiatives under the broader umbrella of equity and energy justice, including carrying on the work of ESAG to explore programs to reduce energy burden, improve access to energy efficiency and renewable energy, and diversify the energy workforce.

IV. COMMUNITY OUTREACH/LISTENING SESSIONS

The Company discussed – in both our July 1, 2022 letter in Docket Nos. E002/M-22-266 and E002/RP-19-368, and our 2022 Annual Report filed in those same dockets December 22, 2022 – that the Commission's Order requires us to "engage in community outreach" as well as "establish a stakeholder group." Community outreach and the stakeholder group (ESAG) appear to be two distinct efforts in the Order. We agree they are somewhat distinct. ESAG has been a "grass tops" rather than "grass roots" advisory group – engaging mid- to senior-level staff of various community-based organizations, energy implementers, and advocacy groups – to learn from them what they believe are their communities' top priorities and how Xcel Energy could better support those priorities. These leaders' perspectives have been very valuable. Our discussions with these leaders are, however, likely a different type of discussion than might happen in grass roots community meetings where people are representing themselves, their families and friends. We have therefore proposed that another means of community engagement could be to conduct community listening sessions in a variety of under-resourced and/or BIPOC neighborhoods, focusing on hearing from the communities themselves.

We have also heard the frustration community members sometimes voice when organizations ask them to convene with no very concrete "ask" or without a specific program for them to provide their feedback on. We believe that could be the case if we had begun our implementation of the Commission's Order with community listening sessions. The challenge is to strike the right balance – presenting something sufficiently detailed and specific for community members to respond to, but at the same time not "fully baked," so that their feedback can still meaningfully influence the program design. With this in mind, we proposed in our 2022 Annual Report to conduct community listening sessions, but only after investing time in ESAG to develop concrete energy program proposals for community members to react to. At the time of that filing, we thought we would be ready to have community listening sessions take place in 2023. While we still believe holding community listening sessions is the right approach, work in ESAG has extended beyond what we anticipated and therefore no community listening sessions were held in 2023. In addition, as ideas for the EJ Accountability Board have come into focus it seems the EJAB may itself be a mechanism for grass roots community input.

Considering this, the Company proposes to defer community listening sessions to late 2024, when ESAG's work has turned into concrete proposals for communities to react to, and once EJAB is up and running. We will evaluate at that time whether a third means of community outreach – the listening sessions – or some other means will bring us additional perspectives beyond what we have been able to gather from ESAG and EJAB.

V. OTHER COMPANY EQUITY EFFORTS

A. Distributed Energy Resources and Distribution Planning

Through our engagement with the ESAG we are identifying ways to improve our ability to provide equitable access to renewable energy. Through respective dockets, we will continue to work with stakeholders on ways to enhance our Service Quality Interactive Map, which includes electric reliability data, as well as our Hosting Capacity Map to make it easier for interested parties to access relevant metrics about our distribution system. However, one significant limitation to installing additional distributed solar generation in some areas can be a lack of available hosting capacity. For this reason, we are taking two important steps, as noted in our IDP, toward investing in proactive hosting capacity upgrades in Minnesota. First, we filed with the Department of Commerce (Docket No. E002/M-23-458) a proposed plan for hosting capacity upgrade projects using $10 million of funding, per state legislation.[13] Second, as discussed in our IDP, we have also included capital funds for proactive hosting capacity upgrades in our five-year budget. We recently filed a proposal on how the current distribution interconnection process could be modified to give queue priority to small (≤40 kW) customer-sited solar projects.[14]

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[13] See our November 1, 2023, filing to the Department of Commerce (Docket No. E002/M-23-458) regarding the Distribution System Upgrade Program created by Minn. Stat. § 216C.378 as added by Minnesota Session Laws 2023, Chapter 60, Article 12, Section 38.

[14] See our November 1, 2023, filing in Docket No. E999/CI-16-521, IN THE MATTER OF UPDATING THE GENERIC STANDARDS FOR INTERCONNECTION AND OPERATION OF DISTRIBUTED GENERATION FACILITIES ESTABLISHED UNDER MINN. STAT. § 216B.1611.

B. Supplier Diversity

The Company has established an internal goal of achieving 25 percent of sourceable spend diversity with small and diverse suppliers by 2025. The Company has implemented programmatic strategies to support the goal. In addition, the internal resources provide guidance, consultation, and training on supplier diversity matters to effectively maximize the corporate utilization of small, minority, and women-owned businesses.

Utilization of small, minority and women-owned business in supply purchasing is achieved through collaborative strategic relationships with suppliers, customers, stakeholders, and public and community organizations/groups. Our goal is to achieve this by:

- Creating a competitive and quality-focused process for all parties, including a plan of action to monitor, achieve and report program activities.
- Developing new, creative, and innovative opportunities to utilize minority-owned businesses, women-owned businesses and small businesses.
- Establishing qualified supplier relationships that ensure that Xcel Energy, its customers, and shareholders realize the benefits of competitive pricing and quality materials and services.
- Establishing annual targets to increase Xcel Energy's direct and subcontracting spend with small and diverse businesses.
- Maintaining memberships and ongoing engagement with National Minority Supplier Development Council (NMSDC) and its regional affiliates, Women Business Enterprise National Council (WBENC) and its regional affiliates, National Gay & Lesbian Chamber of Commerce (NGLCC), National Veteran Owned Business Association (NaVOBA) and Disability:IN.
- Demonstrating ongoing commitment and support through outreach activities.

It is our goal to continue to drive social and economic benefits to diverse suppliers and local communities through our supply purchasing. An annual Supplier Diversity Economic Impact Report is published and posted to the corporate website.

C. Enhanced Community Involvement and Corporate Giving

Xcel Energy and its Foundation has placed an emphasis on enhanced community involvement and corporate giving programs to increase our support of organizations that advance DEI initiatives. We note below the various internal programs that have been established towards those efforts.

1. *Xcel Energy Foundation*

In 2022, Xcel Energy Foundation launched a new approach to grantmaking called "Energizing the Future," focusing on aligning business priorities and reflecting our DEI commitments, laying the groundwork for a stronger community impact.

Through this new approach, the Foundation has provided nearly $4 million in funding – coming from Xcel Energy's shareholders and investors, not customers – to support a mix of urban and rural Minnesota 501(c)(3) nonprofits that focus on advancing Science, Technology, Engineering, and Mathematics (STEM) Career Pathways, Environmental Sustainability and Community Vitality.

In 2023, one hundred fifty-three 501(c)(3) nonprofits received $1.96 million through our Xcel Energy Foundation grant program. Of those grants, $1.04 million went to 84 nonprofits that indicate that their mission is explicitly dedicated to advancing DEI; $806,000 was invested in 55 nonprofits that have a BIPOC and/or Multiracial leader; 82 percent of the nonprofits receiving grants have a DEI policy; 74 percent reported that their staff reflect the diversity of the people they serve; and 63 percent of people served by the nonprofits are at or below 150 percent of the federal poverty definition.

Xcel Energy and its Foundation's grantmaking is one of the many ways that we give back to our communities.

2. *Xcel Energy Corporate Giving Efforts in the Community*

Xcel Energy Corporate community engagement programs enhance support of DEI initiatives. These programs focus on strategic philanthropy, scholarship programs, and pro bono programs.

a. Strategic Philanthropy

- **ReConnect Rondo** (Rondo Land Bridge): $120,000 ($50,000 in 2023 from Xcel Energy/ $70,000 in 2020 from Xcel Energy)
  - Reconnect Rondo's (RCR) mission is the realization of a Rondo Land Bridge (RLB) to reconnect communities proximate to Interstate Highway 94 in the Rondo neighborhood of Saint Paul. RCR is a community development organization established to maximize opportunities for business, economic, and social development. RCR's goal is to persuasively shape policy for the RLB to create opportunities

that uplift the public health, economic, housing, and social conditions of the Rondo communities.

- **Rondo Community Land Trust:** $60,000 ($50,000 in 2023 from Xcel Energy and $10,000 in 2023 from Xcel Energy Foundation)
  - The Rondo Community Land Trust is a local nonprofit with a mission to provide and advocate for permanently affordable, sustainable housing for families and individuals with low to moderate incomes. In 1989, a land trust model was established by the Summit-University Planning Council to keep housing affordable for future generations. It expanded to support affordable commercial space and to serve all of St. Paul, and now serves as an anti-gentrification measure for local businesses.

- **2022 Carbon Offset Investment** ($150,000)
  - **Indian Land Tenure Foundation (ILTF)** ($100,000): ILTF has partnered with the Bois Forte Band of Chippewa to restore to Tribal ownership over 28,000 acres within the reservation that were allotted to individual Indian landowners, then sold to non-Indians, in the late 1800s and early 1900s. The Company's purchase of high-quality carbon offsets will enable ILTF and Bois Forte to continue their work of Tribal land reacquisition and sustainable management.
  - **Green Minneapolis** ($50,000): Green Minneapolis is the lead organization on the Twin Cities Climate Resiliency Initiative (TCCRI), aiming to plant five million urban trees over the next 20 years. One of the project benefits includes planting in underserved communities that have little access to greenspace. Tree planting has been shown to reduce energy costs over time by providing shading (reducing cooling needs), improve local air quality by filtering pollutants, improve stormwater management by intercepting rainfall, and reduce the urban heat island effect in neighborhoods with high poverty and low tree canopy cover.
  - Note that both of these projects, originally funded by a 2022 Strategic Philanthropy investment, have now been incorporated into our proposed portfolio of innovative projects for the Company's first NGIA Plan, filed December 15, 2023. Further details on our NGIA Plan can be found below.

b. Energy Conservation and Optimization Scholarship Program

Xcel Energy provided nearly $1 million in scholarships to 2-year and 4-year colleges and universities within the Company's Minnesota service territory in 2022 and 2023. In 2022, six schools received scholarship funding from Xcel Energy. Funding support was expanded to include 11 schools in 2023.

This is a component of a larger Workforce Development Program, which operates with the objective of providing resources to income qualified persons to bring them into the clean energy workforce. In 2024-2026 this Program will continue to be funded through our Energy Conservation and Optimization (ECO) program as approved by the Department of Commerce on December 1, 2023 in Docket No. E002/CIP-23-92.

The Company's goal of these scholarships is to help develop a diverse workforce by investing in income-qualified students who are enrolled in programs that may lead to careers related to energy efficiency. It is anticipated that as they enter the workforce, their backgrounds will bring unique opportunities to support the expansion of energy efficiency within income qualified and underserved markets.

c. Pro Bono Skills-Based Volunteer Program

As they focus on fulfilling their missions, nonprofit organizations may not have the staff or resources to improve their business operations or advance new initiatives. Xcel Energy employees' personal knowledge and expertise can be a powerful force to help nonprofit organizations achieve their goals and make a deeper impact. That is the premise of Xcel Energy's Pro Bono Skills-Based Volunteer Program. In 2023, 19 employees contributed consulting services to nonprofit organizations in marketing, technology, legal, finance and human resources, volunteering more than 600 hours at three nonprofits and delivering a value of nearly $116,000 to nonprofit organizations through the program.

The volunteer effort began in 2020 and was developed as a way for employees to contribute their skills through pro bono consulting services to nonprofits advancing racial equity and social justice and serving underrepresented groups in the Twin Cities.

Since 2020, this program has supported the capacity building challenges of the following Minnesota-based 501(c)(3) nonprofits focused on advancing equity: The Sanneh Foundation, Project for Pride in Living, Project DIVA, Neighborhood Development Center, WomenVenture, 30,000 Feet, Immigrant Law Center of Minnesota, and Second Harvest Heartland.

d. Employee Board Service

Xcel Energy is intentional about engaging its employees in the communities it serves. One of the many ways we ensure meaningful connection between employees and our community is through board service. In 2023, Xcel Energy employees served on the board of directors for 39 nonprofit organizations in Minnesota who indicate that their organization is explicitly dedicated to advancing DEI.

e. United Way Contributions

Through Xcel Energy's annual giving campaign supporting local United Way chapters within our 8-state service territory, Xcel Energy employees and retirees, combined with a Company match from the Foundation, contributed $4.1 million in 2023. In Minnesota, $669,532 was raised in support of community organizations, with Company match supporting local United Way chapters. The United Way exists to fuel lasting change that will help achieve the vision of a community where all people thrive regardless of income, race, or place.

D. Request For Proposal Efforts

1. Resource Acquisition RFP Process

The Company is expected to procure a large amount of new generation in coming years through the resource acquisition RFP process as it executes the clean energy transition, and we will factor equity into that process. Many, but not all, of the acquisitions will take place through competitive resource acquisition processes, including RFPs. The Company receives proposals for future electric generation options through the RFP process, often including proposals for resources built, owned, and/or operated by third party developers as well as for resources to be built and/or owned directly by the Company. In many cases, the RFP process considers proposals for generation resources that are 3-6 years away from reaching commercial operation and may be located in any of the five states in which the Company's Upper Midwest service territory is located. These are typically somewhat early-stage procurements run by the Company for long term planning purposes to satisfy regulatory requirements.

Given the timing and breadth of the resource options that can be considered in these resource acquisition RFPs, the Company attempts to ensure that equity, energy justice, and EJ are considered for all project types – those proposed by both third parties and the Company – and all locations. Awareness is given to the details that are available for these projects at the time of RFP submittal, in other words, many of the details we have available at the time for these projects are preliminary. In the RFP process, bidders are required to respond to a set of questions pertaining to equity - such as use of diverse suppliers, use of union labor and/or prevailing wages, siting locations and community engagement, with the list continuing to grow over time.

Currently, the main equity touchpoints in the generation acquisition and resource development processes are as follows:

- Prior to RFP submittal, earlier stage development of resources may occur by developers at specific locations. Part of the development may incorporate energy justice, EJ, and equity in activities such as siting and community engagement.

- The RFP application requests information which must be submitted with the bid documents such as questions pertaining to the use of union labor and/or prevailing wages and requirements to submit information about planned use of diverse suppliers. The Company shares information regarding certified diverse suppliers to inquiring bidders and will send out additional information that developers can use to help understand and conform with equity, EJ, and energy justice requirements in RFPs as well as for their own future resource development efforts. The list of questions posed to bidders will change over time as we learn from these experiences.

- Equity is also taken into consideration during the bid evaluation process. We are currently updating and expanding how equity, energy justice, and EJ factor into the evaluation of proposals during the RFP evaluation period. One example includes the consideration of benefits from a proposed project on the local surrounding area. In recent RFPs, some data points related to local benefits have been collected from bidders in materials submitted with the proposal. However, as new information becomes available about how to define and consider this topic within the resource acquisition framework, the data collected and how it is used in the evaluation process will evolve. We intend to develop additional scoring metrics to include equity in the evaluation process.

  While equity is taken into consideration in the evaluation process, actual bid prices are not modified based upon equity. However, bids prices may be impacted, for example where tax credit adders from the Inflation Reduction Act (IRA) are applied to solar developments in income qualified communities.

- Once the RFP process has closed and projects have received approval, additional opportunities for the incorporation of equity, energy justice, and EJ are likely to arise during the project development stage pertaining to permitting, construction, and sourcing of actual materials used to construct the generation asset. As projects are approved through the required regulatory processes, subsequent sourcing efforts are undertaken by developers of the selected projects to procure specific resource components, additional labor, and other key elements necessary for the resource to achieve commercial operation. There are additional opportunities throughout the process for equity considerations.

We expect that changes to equity considerations in the RFP process will continue to occur over time as we learn through experience and also based upon the amount and timing of future RFPs. Since the RFP process can take 1.5 to 2 years for a given RFP, followed by years of development of the actual resources selected, we expect that changes to equity considerations in our processes will continue to be implemented gradually over time based upon our experiences.

2. RFP 101 Bidder Workshop

Based on conversations with members of ESAG, it was recognized that there was a need for the sharing of basic information regarding the RFP bidding process with those new to the process. In response, Xcel Energy hosted an RFP 101 Bidder Workshop, held October 12, 2023. The intent of the workshop was to share basic information with potential interested bidders regarding the NSP bidding process for new generation resources. The hybrid workshop generated great interest with over 75 external participants. Participants indicated their appreciation of the workshop and information shared. A copy of the workshop materials was filed to Docket no. E002/M-19-368.

E. Electric Vehicle Equity Efforts

The Company is committed to ensuring that all customers have an equitable opportunity to participate in programs and offerings designed to reap the benefits of transportation electrification. In pursuit of this commitment, the Company has offered and proposed various EV equity initiatives aimed at promoting inclusivity and fostering broader access to EV offerings in Minnesota.

1. Public Charging Pilot

The Company's Public Charging Pilot, approved by the Commission in July 2019,[15] aims to expand the deployment of Level 2 and Direct Current Fast Charging chargers across the Company's service territory. Our equity-driven objectives include deploying public charging and increasing access to charging and mobility services, including access for low-income communities. Key highlights of this initiative involve our

[15] Order Dated July 17, 2019, in Docket No. E002/M-18-643

partnership with HOURCAR to develop the EV Spot Network, which is utilized by the Evie Community Carshare service. The EV Spot Network was planned and implemented through the collaborative efforts of Xcel Energy, HOURCAR, the cities of Saint Paul and Minneapolis, East Metro Strong, and the American Lung Association. Evie Carshare, launched in February 2022, enables one-way trip services that begin within a 35-square mile area of Saint Paul and Minneapolis. Financial support and event contributions have lowered HOURCAR's operational costs, leading to more affordable Evie Carshare pricing for low-income customers. As of January 2024, the Company has 80 active sites, 55 of which are EV Spot Network sites. Between February 2022 and January 2023, Evie Carshare measured 2,637 unique users; 63,145 trips; 676,141 miles traveled; and approximately 2,092 metric tons of greenhouse gas (GHG) emissions reduced. HOURCAR estimates the service saved $5.8 million in transportation costs. Based on total utilization, 38 percent was derived from BIPOC/non-white users, as well as 36 percent from very low-income users and 11 percent from BIPOC/non-white users who are also very low-income.

The Company has also proposed a range of new offerings designed to further promote the equity and accessibility of transportation electrification throughout our service territory in our November 2023 Transportation Electrification Plan (TEP).[16] A detailed summary of those program offerings follows.

2. *The Home Wiring Rebate Program*

In the TEP, the Company proposed a Home Wiring Rebate Program (Rebate Program) which is aimed at encouraging EV adoption by alleviating the high infrastructure costs associated with residential charging and driving engagement in managed charging programs. For residents living in Disproportionately Impacted Communities (DIC), EJ areas of concern, or those participating in energy assistance programs, the Company proposed an enhanced rebate amount that covers a higher percentage of the average installation cost. Enhanced rebate recipients are eligible for the full $1,200 rebate to cover charging station costs included in the monthly service fee, compared to $500 for a "Market-Rate" rebate. For customers also participating in the Company's EV Accelerate at Home program, any unused portion of the $1,200 can be used to help offset the ongoing monthly residential charging costs. The customer must meet the following criteria to be eligible, as follows:

[16] Transportation Electrification Plan as filed in the 2023 Integrated Distribution Plan (November 1, 2023), Docket No. E002/M-23-452

- Premise is located within a DIC, as defined, and published by the White House Council on Environmental Quality's Justice40 Initiative;[17]
- Premise is located within an EJ Area of Concern (EJ Area), as defined and published by the Minnesota Pollution Control Agency (MPCA);[18]
- Must be a current or previous participant (within the last 5 years) within the State of Minnesota's Weatherization Assistance Program, Affordable Housing Rebate Program, or Minnesota's Low-Income Renter Classification. This program supports our commitment to equity, making EV adoption more accessible and affordable for all, with tangible benefits for underserved communities.

3. Bridge Funding for Fleets and Public Charging

The Company's Bridge Funding for Fleets and Public Charging proposal,[19] included in the TEP, outlines our commitment to responsible fund stewardship, aiming to maximize the impact of projects while ensuring equitable access to transportation electrification. Based on stakeholder feedback, the Company created the Commercial EV Pilot Application Review and Scoring Framework to standardize scoring across commercial EV projects and to align with equity and accessibility priorities. The Company will review and score project applications on a rolling basis across three scoring categories: Project Scope, Customer and Project Readiness, and Equity and Accessibility. Within these reviews, 300 total points are available for each project during the scoring review, with 45 percent of the points allotted to the Project Scope category, 20 percent to Customer and Project Readiness, and 35 percent to Equity and Accessibility. Applications that score 66 percent of the points or higher will qualify to participate and move on to the design and construction phase of the Pilot participation.

The Equity and Accessibility scoring category will include an evaluation of whether the project being considered increases access to electricity as a fuel for all, increases awareness and adoption of EVs, serves disproportionately impacted or underserved customers, including income qualified communities, BIPOC communities, Tribal nations, and rural communities, and is affiliated with or promotes small or underutilized businesses. Such projects that are aligned with stakeholder interests, demonstrate their ability to increase access to electricity as a fuel for all and serve disproportionately impacted or underserved communities will receive more points.

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[17] Methodology & data - Climate & Economic Justice Screening Tool (geoplatform.gov)
[18] Understanding environmental justice in Minnesota (arcgis.com)
[19] Transportation Electrification Plan as filed in the 2023 Intergraded Distribution Plan (November 1, 2023), Docket No. E002/M-23-452

This proposed scoring process plays a pivotal role in aligning proposed projects with the Company's commitment to providing equitable access to electrified transportation for customers and communities that stand to benefit the most.

4. *Electric School Bus Demonstration*

The TEP also included a proposal to support a demonstration to begin to study and address barriers to school bus electrification, school bus bi-directional connection to the grid, and to better understand the costs and benefits of electric school buses as grid resources. Through this demonstration, the Company proposed to partner with the Minnesota State Department of Commerce on its Electric School Bus Deployment Program, to support two V2G capable installations on sites of entities, school districts, or school bus owners and operators. The Company ensured that the proposal for the Electric School Bus Demonstration in its recent TEP was aligned with our equity efforts. One of the primary focuses of this proposed demonstration is on low-income, BIPOC students, who may be disproportionately impacted by vehicular emissions depending upon where they reside and/or due to higher rates of pre-existing health conditions, as well as rural students by ensuring that the demonstration project serves school districts in low-income, BIPOC, and/or rural communities.

To select participants, the Company will use its proposed Application Review and Scoring Process (including the Equity and Accessibility scoring category), mentioned in the above section on Bridge Funding for Fleets and Public Charging. In addition, the Company has proposed to utilize tools and resources such as the MPCA's EJ maps and the US EPA's Environmental Justice Screening Tool to evaluate equity efforts. These tools will help determine if the school district and buses operated by an operator serve a diverse set of school districts, communities, and students within our service territory, ensuring alignment with our objective to support disadvantaged communities, particularly low-income, BIPOC, and/or rural students. Additionally, we considered the proportion of students within a school district or school who receive free or reduced lunch plans to further enhance equity in the program.

5. *Residential Advisory Services*

The Company has proposed additional funding in the TEP for Residential Advisory Services to expand customer engagement and education opportunities. This proposal is rooted in proven effective efforts and in response to the Commission's recent

Order[20] to focus on "other non-infrastructure related pilots or programs that increase EV deployment, especially in disadvantaged communities." Education and outreach initiatives play a pivotal role in reaching and supporting disadvantaged communities by providing essential resources and information on how they can best participate in and benefit from EV offerings.

6. *Partnerships to Promote Access to Transportation Electrification for Tribal Communities*

Xcel Energy serves as the energy utility for two Tribes in Minnesota (Lower Sioux Indian Community and Prairie Island Indian Community) and three in Wisconsin (the Lac Courte Oreilles, Red Cliff, and Bad River Bands of Lake Superior Chippewa). We also serve one of the nation's largest urban Native populations, and partner with a broad range of Native-led non-profit organizations and businesses to serve this community's needs.

The Company is currently partnering with Native Sun Community Power Development on two U.S. Department of Energy-funded initiatives to develop EV infrastructure on Tribal Nations and travel corridors. The *Upper Midwest Inter-Tribal EV Charging Community Network* works to reduce EV barriers for Tribal members in the Upper Midwest and build EV-friendly travel corridors connecting Tribal Nations with urban centers. The *Expanding Regional EVSE Access with Tribal Nations based on Community Priorities* project is a Native-led, public-private partnership to promote EV adoption by Tribes and Tribal members in Wisconsin, Minnesota and Michigan by working with Tribes to engage their communities in EV planning and charging infrastructure development. Both projects aim to promote more equitable access to EVs and publicly accessible charging in underserved areas, helping Tribal members to benefit from reduced vehicle operating costs, reduced pollution, and other benefits of electrified transportation.

F. Energy Conservation and Optimization

The Company's 2024-2026 ECO Triennial Plan (Triennial) will provide unprecedented resources to support the underserved markets in Minnesota. It identifies a path forward to doubling the amount of financial resources committed to providing services to the income qualified market and aims to go above the minimum requirements established under Minn. Stat. §216B.241. Our three-year plan, approved in Docket No. E002/CIP-

[20] *See* ORDER ACCEPTING WITHDRAWAL OF CLEAN TRANSPORTATION PORTFOLIO SUBJECT TO CONDITIONS (August 23, 2023), Docket No. E002/M-22-432, Order Point 4C.

23-92 by the Department of Commerce on December 1, 2023, includes five program offerings in our Income-Qualified Market Segment with an energy savings target of 18.7 GWh of electricity and 97,500 dekatherms (Dth) of natural gas, impacting approximately 49,000 customers over the planning years of 2024 through 2026.

To achieve these targets, the Company is working to simplify our participation process and expand eligibility requirements to attributes that are easier for customers to verify. Further we will support our partner organizations through workforce development programming. We will also help customers pursue opportunities to replace electric resistance heating with new technologies, such as heat pumps, along with pre-weatherization support to reduce the number of homes that are deferred for weatherization services.

The design of our Triennial incorporates significant input from stakeholders engaged in serving the income qualified market who are familiar with the barriers faced by this market and provided unique insights into the opportunities to improve our program delivery. We describe the significant impacts of this portfolio below.

1. *Expansion of Weatherization*

The Triennial Plan expands both the number of rebates and services provided to support weatherization and efficient fuel switching, as well as the delivery channels that will be utilized to reach this market. Program awareness was identified as a barrier to participation. The Company will be incorporating additional outreach to Community Based Organizations (CBOs) to reach more customers with information through CBOs who customers trust and may have an established relationship with. Additional work is also underway to explore opportunities around geographic prequalification and weatherization measures for manufactured homes, a historically underserved market.

2. *Rental Properties*

Driving conservation in rental units has been a historic struggle caused primarily by the issue of the landlord/owner needing to pay for upgrades that do not necessarily provide them a direct benefit, as often renters are responsible for their own utility bills. Thus, the capital outlay required of the landlord benefits the renters and there is no direct incentive for the landlord to invest in energy efficiency improvements for the property. In properties where utilities are not paid directly by the renter, the cost is frequently incorporated into what the tenant pays for the unit, again removing the incentive to lower energy use. For rental properties with 1-4 units the Triennial reduces the landlord/owner co-pay to $0 for many efficiency improvement measures for the income qualified rental market, thus removing that barrier. The product that delivers energy optimization support to the multi-family market (5+ units) has been expanded and simplified to better engage property managers and owners for income qualified dwellings. The offering provides a holistic approach, starting with an audit to identify opportunities throughout the building and delivers direct installation of energy efficiency measures into the dwelling units while supporting upgrades to the common spaces with significant rebates.

3. *Workforce Training Efforts*

The Company has engaged in a multi-faceted program to provide career development training to underserved markets while providing a pipeline of workforce resources to deliver audits and weatherization services. Working not only with our program provider, the Center for Energy and Environment (CEE), but also a multitude of community organizations, we recruit participants into formal classroom training to provide a foundational knowledge on residential energy efficiency. Once the classroom learning is complete there is an opportunity to supplement this with "hands-on" experience with actual field experience through the Company's Home Energy Squad or working with participating insulation installers. In addition to formal training, this program provides resources, including stipends and travel vouchers, to remove barriers that frequently prevent participants from engaging in this type of training. The Company's Work Force Development supported through the Triennial will also deliver the previously described (see section V.C) portfolio of scholarships supporting higher education opportunities for members of underserved markets who are pursuing careers in green energy fields.

Based on data provided by CEE, as of late 2023, 77 participants have successfully completed the four-week training program, of which 89 percent identify as Black, Indigenous, Asia, Latino/Hispanic, or other People of Color. Prior to training, 98 percent of participants had incomes below 80 percent of Area Median Income.
On graduation, some participants have entered directly into employment in the sector as Energy Counselors with CEE, while others have gone on to further their training through programs like Xcel Energy's ECA Program. Sixteen participants have completed four-month internships in home energy auditing or home insulation. Several are working as Energy Auditors with CEE or Energy Conservation Specialists with Community Action Partnership of Ramsey and Washington Counties, while others have been hired as insulation installers, construction apprentices or community outreach specialists.

G. Natural Gas Innovation Act Programs

The NGIA, passed in 2021, creates a new framework for gas utilities to promote clean energy, greenhouse gas reductions, job creation and other benefits by bringing forward innovative resources that can decarbonize natural gas use in the building heating, commercial, industrial, and other sectors. The Company filed our first five-year NGIA innovation plan[21] in Minnesota on December 15, 2023. The portfolio of resources included in the plan includes renewable natural gas from a broad range of sources, power-to-hydrogen, carbon capture, a district energy project using networked geothermal ("community ground source heat pumps"), strategic electrification for commercial customers, and a weatherization/strategic electrification project for Tribal housing at Prairie Island Indian Community, as well as several research and development projects. We are working to incorporate equity and low-income considerations into our pilot programs. Five of the proposed projects in our portfolio are designed with equity in mind.

- The Prairie Island Indian Community project will work in a community defined in Minnesota statute as an EJ Area, providing larger incentives than are allowed under ECO in an effort to secure high participation by Tribal members, and helping residents weatherize and electrify housing (mostly manufactured homes) in pursuit of the Tribe's Net Zero vision.
- The Improved Forest Management carbon capture project will work with the Indian Land Tenure Foundation and Bois Forte Band of Chippewa to fund high-quality greenhouse gas reductions while supporting Tribal goals for reacquisition of lands lost to non-Indian owners in the late 1800s and early 1900s.
- The Green Minneapolis carbon capture project will work to plant trees in "urban heat island" areas with low canopy cover in Minneapolis, which tend to be areas with higher poverty and a higher proportion of People of Color. Increasing tree cover in these areas, besides sequestering carbon, will also provide shading and therefore energy savings over time.
- The Advanced Methane Leak Detection carbon capture project will deploy advanced leak detection within low-income or EJ Areas. This project will collect baseline data and enable enhanced repair approaches as applicable.
- The Community Ground Source Heat Pump project will include a site selection process after plan approval that incorporates siting within a low-income or EJ Area as a consideration within the site selection criteria.

[21] Filed in Docket Nos. G002/M-23-518 and G999/CI-21-566.

H. Federal Initiatives Supporting Equity

1. Inflation Reduction Act

The IRA, in addition to other benefits discussed in Appendix Y: Life Cycle Emissions Impacts, supports our: (1) net zero vision through expanded electrification incentives, (2) clean fuel vision through providing incentives for clean fuels, and (3) clean transportation vision by extending and modifying existing tax incentives for electric vehicle purchases. Together, these provisions present opportunities for greater cost-effective renewable deployment and increased electrification, which will ultimately drive incremental customer savings and increased emissions reductions.

The IRA ties the full value of potential tax credits to prevailing wage and apprenticeship requirements. The prevailing wage requirement requires that laborers and mechanics employed in the construction or repair of eligible facilities be paid wages at rates not less than the prevailing rates for the locality. Additional apprenticeship requirements require an increasing percentage of labor hours be performed by qualified apprentices who participate in a registered apprenticeship program. For projects beginning construction after 2023, qualified apprentices are required to perform 15 percent of labor hours. Contractors employing four or more employees must employ at least one qualified apprentice. The IRA also encourages the onshoring and manufacturing of components that go into clean energy generation. We will take steps to ensure our projects qualify for the full tax credits by ensuring those employed in construction meet prevailing wage and apprenticeship requirements.

The IRA also offers income-qualified and disadvantaged communities opportunities for Home Energy Rebates and various grants. These initiatives, made available by the Department of Energy (DOE) and the Environmental Protection Agency in 2023, enable the adoption of efficiency improvements in homes, and electrification technologies, especially for income qualified and disadvantaged communities which in turn, helps to reduce GHG emissions and help to support the clean energy transition. While utilities do not directly administer these programs, we have engaged with the agencies leading these efforts and other stakeholders to establish partnerships to maximize equitable benefits to communities within the state. For more information on the IRA, please refer to Appendix U: Inflation Reduction Act.

2. Investment and Infrastructure Jobs Act/Bipartisan Infrastructure Law Funding

The Federal government's Justice 40 Initiative requires Bipartisan Infrastructure Law (BIL) funding—also known as the Investment and Infrastructure Jobs Act (IIJA)--

applicants to include Community Benefit Plans (CBP). Xcel Energy submitted multiple grant applications to DOE for projects such as the hydrogen hub, energy storage, and grid resiliency programs which will provide significant funding to Minnesota. Each application includes a CBP outlining plans for community engagement, job creation and retention, and incorporation of Diversity, Equity, and Inclusion into these projects. The aim is to ensure that at least 40 percent of the benefits from federal funding go to disadvantaged communities.

Xcel Energy has been awarded funding for the Heartland Hydrogen Hub, Wildfire and Extreme Weather Mitigation under the Grid Resilience and Innovation Partnership (GRIP) program, Form Energy Long Duration Energy Storage under the Energy Storage Demonstrations program, and the Joint Transmission Interconnection Queue Projects and Portfolios (JTIQ) under the GRIP program. The scope of the Projects and CBPs are subject to negotiations with the DOE over the next 6-12 months. The company will commit to a formal CBP scope of work and milestones to report to the DOE over the project life cycle. This will include metrics such as community engagement, diverse supplier spend, workforce development, and other metrics we will work through with DOE.

I. Resilient Minneapolis Project

The Resilient Minneapolis Project (RMP) seeks to improve BIPOC communities' resilience to crises by installing solar/battery microgrids at three community center locations: the North Minneapolis Community Resiliency Hub, Sabathani Community Center, and the Minneapolis American Indian Center (collectively referred to as the RMP "hosts"). At each site, the Company is working with the hosts to install rooftop solar, battery energy storage systems (BESS), microgrid controls, and necessary distribution system modifications to integrate these technologies. The microgrids, when operating in "island" mode (i.e., during an electric system outage), will provide power for services critical to the communities the RMP hosts serve. Recognizing that outages are generally infrequent and brief, and the need to fully utilize RMP assets to benefit all customers, the RMP BESS systems will also be dispatched on a routine basis to provide a variety of grid services and learnings to benefit all the Company's customers.

Equity is the central driver of the RMP. The Company seeks authentic partnership and long-term investment in the three communities, who are disproportionately vulnerable to emergencies caused by climate change and other factors due to a history of discrimination and racial disparities in income, wealth, health, education, jobs and a wide range of other metrics. Providing islandable microgrids in these three locations will enable these trusted community organizations to continue delivering critical, and in some cases lifesaving, services in the event of an electric outage – shelter, cooling, food, communications, etc. The process has not been without challenges; in the wake of some miscommunications and delays in early 2023, the Company is learning how best to partner with BIPOC organizations, and seeking to tailor the kind of support we provide to each host's distinct goals and needs.

In pursuit of the Commission's September 21, 2023, Order in this docket,[22] the Company is currently working with the hosts to develop a revised RMP proposal to invest in resilience in the host communities identified in the original proposal. Our revised proposal, due March 19, 2024, will include an explanation of how the revised proposal is in the public interest, what objectives will be achieved, and how resilience for host communities will be improved. It will also discuss how the Company plans to deploy up to $9 million of our IIJA GRIP award allocated to microgrids in BIPOC communities, matched by up to $9 million in funding from our customers, to support greater resilience for BIPOC communities.

J. Tribal Engagement Efforts

Xcel Energy provides electric and/or natural gas service to two Tribal Nations in Minnesota (Prairie Island Indian Community and Lower Sioux Community) and three in Wisconsin (the Red Cliff, Lac Courte Oreilles, and Bad River Bands of Lake Superior Chippewa). We also serve one of the nation's largest urban Native American populations in the Minneapolis/St. Paul Metro area. Some of our recent efforts to conduct outreach, coordinate our work, and build new partnerships with Tribes and Native organizations include:

- The Company has adopted an enhanced Tribal notification process for recent renewable energy, transmission, and other projects. For projects such as the Minnesota Energy Connection, Long Range Transmission Planning 4 transmission line, and Sherco Solar, we went beyond merely notifying Tribes whose current land base is in the vicinity of these projects, also using the U.S. Department of Housing and Urban Development's Tribal Directory Assessment Tool to identify all Tribes with potential cultural or ancestral ties in the counties affected by these projects. We sent notifications to the appropriate contacts – generally the Council President and Tribal Historic Preservation Office – for each of these Tribes, providing basic information about the project

[22] Order Approving Withdrawal and Requiring Filing. *In the Matter of Xcel Energy's 2021 Integrated Distribution System Plan and Request for Certification of Distributed Intelligence and the Resilient Minneapolis Project*. September 21, 2023. Docket No. E-002/M-21-694.

and offering to discuss further if the Tribe had concerns or areas/cultural sites they would like to see the Company avoid in siting/routing and construction.

- The Company has supported the Prairie Island Indian Community's (PIIC's) Net Zero Project, specifically by coordinating on the planning of a PIIC-led initiative to conduct home energy audits, weatherization, and electrification of space and water heating for PIIC residents who are Xcel Energy natural gas customers. We subsequently included this pilot project in our NGIA plan, filed December 15, 2023. If approved by the Commission, the PIIC pilot will provide significant utility contributions for weatherization and electrification, using the flexible structure of NGIA to assist PIIC as an EJ Area under state statute.

- We have been collaborating closely with the PIIC on a requirement of this Resource Plan, "true comprehensive cost-benefit analysis, which includes potential environmental and economic impacts to the neighboring communities – in particular, the Prairie Island Indian Community and its Treasure Island Resort & Casino" relative to the continued operation of the Prairie Island Nuclear Generating Plant (PINGP).[23] The Company consulted with PIIC to develop the approach to this study; hired a consultant to conduct economic modeling both for PINGP retirement scenarios and to quantify the economic benefits to the region of Treasure Island Resort & Casino; and coordinated with PIIC to create a narrative on the non-quantifiable costs and benefits. Further information about the approach to this study can be found in Appendix M: Nuclear; the study itself will be filed as a subsequent supplement to this IRP.

- In response to comments filed by Mille Lacs Band of Ojibwe (MLBO) on the Monticello Subsequent License Renewal Application and Sherco Solar 3, we reached out to coordinate with the Tribe to understand their concerns and ensure they have an opportunity to engage in archeological surveys to identify any sensitive sites (e.g. burial mounds and other cultural/historic sites) or plant resources that should be avoided during construction activities. MLBO has since sent Tribal cultural resources staff and a forester to visit the sites to evaluate any sensitive sites and conduct a red cedar tree survey.

[23] Minnesota Public Utilities Commission. ORDER APPROVING PLAN WITH MODIFICATIONS AND ESTABLISHING REQUIREMENTS FOR FUTURE FILINGS. *In the Matter of the 2020–2034 Upper Midwest Integrated Resource Plan of Northern States Power Company d/b/a Xcel Energy*. April 15, 2022. Docket No. E-002/RP-19-368. Order Point 23.E.

- The Company is collaborating with Native Sun Community Power Development on two DOE grants designed to ensure equitable access to electrified transportation on Tribal Nations and for Tribal members. This is detailed in section V.E.6 above.

- We worked with Native-owned solar developer Solar Bear LLC and MIGIZI, a non-profit organization providing career pathways for Native youth, to support a 25-kW solar array on MIGIZI's new building through the Solar*Rewards program for Income-Qualified Nonprofit Entity Systems.[24]

- As noted in section V.C.2, the Company is collaborating with the Indian Land Tenure Foundation to support an improved forest management carbon offset project on the Bois Forte Band of Chippewa reservation in northern Minnesota. The project, part of the Company's strategy to achieve net zero greenhouse gas emissions from natural gas, supports the Tribe's efforts to repurchase and responsibly manage forest lands that were lost to non-Indian ownership in the Allotment Era of the late 1800s and early 1900s. In late 2022 the Company made an initial, voluntary purchase from the project.[25] We have also included this project in our NGIA portfolio; pending Commission approval, we would purchase additional high-quality carbon offsets from the project in the coming years.

- The Company serves on the board of American Indian Opportunities Industrialization Center (AIOIC), a workforce development organization serving Native and BIPOC populations in the Twin Cities. We have collaborated with OIC on securing commercial driver's licenses for graduates of Xcel Energy's ECA, and sent Xcel Energy volunteers to speak with the OIC's Youth Employment Services program on careers in energy. We hope to develop additional energy workforce diversification projects with the OIC.

- The Minneapolis American Indian Center is one of three hosts for solar/battery microgrids that the Company is supporting through our RMP efforts as discussed in the RMP section above.

- During development of the Foxtail and Dakota Range Wind facilities, Xcel Energy voluntarily worked with Standing Rock Sioux (for Foxtail) and Sisseton Wahpeton Oyate (for Dakota Range) to conduct Tribal cultural surveys prior to final design of the facilities. We altered each site's layout to protect identified Tribal cultural resources and had Tribal monitors onsite during construction to

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[24] See [Minneapolis nonprofit rebuilds 'greener' after civil unrest | Finance & Commerce (finance-commerce.com)](finance-commerce.com).
[25] See xcelenergy.com/staticfiles/xe-responsive/Carbon_Offset_Pilot_Brochure.pdf.

facilitate management of incidental finds during construction. We worked with both Tribes' Tribal Historic Preservation Officers to ensure their newly documented resources were protected for the future via the State Historic Preservation Offices for the respective states. Neither project had a federal nexus that required formal consultation. Xcel Energy believes that protecting the cultural and archeological history of the Americas benefits all of our communities.

VI. OTHER EQUITY EFFORTS IN THE STATE IMPACTING THE COMPANY

A. MPCA Air Quality Permitting in Minnesota

The MPCA Air Quality permitting rules requires the consideration of EJ impacts for facilities located in EJ Areas. This process is undertaken by the MPCA for issuance of new, or re-issuance of or modifications to existing, air quality permits meeting the requirements. If, during the permitting process, the MPCA determines the facility is located in, or near, an EJ community the agency may reach out to impacted communities for input, or request outreach by the permittee, in this case Xcel Energy. In the existing process there are no mandatory actions the permittee must perform, only voluntary actions based on agency suggestions.

In addition, the MPCA is currently initiating a rulemaking as required under 2023 legislation,[26] addressing cumulative impacts in EJ Areas in the air quality permitting process. The MPCA has indicated that this rulemaking is expected to be a three-year process with proposed rules expected to be put on public notice in May 2026. Once rules are finalized, cumulative impacts will be taken into consideration in the air quality permitting process.

VII. CONCLUSION

The Company recognizes and embraces the need for equity across all our plans, dockets, and program offerings. We put a priority both on enhancing equitable outcomes and on broadening participation in energy decision-making. We have made notable progress in the last two years, but much work remains to be done. As noted in this appendix, we have implemented measures throughout the Company to enhance equity through community outreach efforts, the establishment of ESAG, our charitable contributions, workforce training programs, our Workforce Diversification

[26] Sec. 116.065 MN Statutes.

Plan (Appendix R1), various program offerings, ECO and NGIA plans, supplier diversity goals, and federal initiatives among others. We will continue to participate in this space and continue to advance equity in all that we do, consistent with the Company's core values.

APPENDIX R1 – WORKFORCE DIVERSIFICATION PLAN

I. XCEL ENERGY'S COMMITMENT TO DIVERSITY, EQUITY, AND INCLUSION

Xcel Energy aims to create an inclusive and equitable work culture where diversity is valued and celebrated, while taking the same approach to conducting business and serving communities. Because social sustainability is central to our business strategy, we are building a workforce that reflects the diversity within our communities. Our most successful ideas and outcomes result from collaboration between people with different experiences and perspectives. By viewing opportunities and challenges through multiple lenses, we are better able to leverage our strengths and achieve our strategic priorities.

The Xcel Energy Enterprise Diversity, Equity and Inclusion (DEI) goals were established as guidelines meant to guide and govern our efforts to introduce and maintain an equitable, inclusive and diverse perspective across all areas of our organization and processes.

Our enterprise DEI Goals are as follows:

- Talent: **Build and maintain a diverse workforce, talent pipeline** and leadership bench strength that reflects the communities and customers we serve.

- Community: **Enhance our community involvement and giving programs** to increase our support of organizations that advance DEI.

- Data Management: **Increase data utilization and transparency to better inform our internal programs, advance our DEI strategies while** increasing internal process consistency and accuracy.

- Supplier Diversity: **Establish targets to broaden our supplier diversity base**, encouraging businesses owned by women, veterans and ethnically diverse individuals to engage in our procurement processes. Our Supplier Diversity goals and actions are further articulated in Appendix R: Equity.

- Workplace Culture: **Create an environment where all employees feel safe, respected, have a sense of belonging, while being empowered** to do their best work.

II. INTERNAL EFFORTS TO SUPPORT STATED DIVERSITY GOALS

Our internal efforts towards advancing and increasing the diversity within our workforce align with a range of focus areas targeted to deliver results across different points through the employee lifecycle including development and retention, attraction and recruitment, and community engagement.

A. Workforce Development and Retention Programs

In alignment with our Talent goal, our focus expands diverse initiatives seeking to enable talent availability for specific underrepresented segments of our workforce. This is accomplished by developing and advancing internal talent with engagement and development programs seeking to create paths for advancement and development for our employees.

1. Executive Sponsorship Program

The goal of this program is to create opportunities for employee networking with executive sponsors that will allow for a more tailored development opportunity for participants, as well as to explore potential career paths throughout the Company. We utilize engagement in this program as a component of our DEI corporate scorecard along with other internal talent focused metrics.

This program promotes increased diversity in our employee base in various career paths throughout the Company and leadership ranks – an important link we have long needed to successfully build out our internal talent development pipeline. The bottom line is that diverse perspectives make us a stronger organization, and building a robust talent pipeline that reflects our communities will be a key to successfully reaching our corporate goals. As a result, the Executive Sponsorship Program has enabled numerous members of our enterprise to obtain and develop meaningful relationship opportunities with senior leaders across the organization. In 2024, we are seeking to introduce improvements to the program infrastructure in order to support a greater number of participants, and to introduce a mentorship program, that, in parallel, will support and funnel internal talent to help them advance proactively in their career.

2. Internal Scholarship Program

We employ undergraduate and graduate college students and law clerks as interns to help build a robust, diverse talent pipeline. We place high school students in positions across our business areas through partnerships with school districts and community organizations such as Genesys Works, Cristo Rey Jesuit High School, and Girls Inc.

The students are offered the opportunity to apply for a scholarship they can utilize towards their higher education in colleges in the state of Minnesota.

In the last three years, we have awarded scholarships for BIPOC students in the state of Minnesota, selecting our recipients through our internship program (both college and high school) and the Energy Careers Academy. In 2020, we had a total of 7 recipients; increased to 16 recipients in 2021, 10 recipients in 2022 and a total of 19 recipients in 2023. The scholarship values range from $2,500 to $5,000 depending on financial needs and student-provided evidence through the application process. A board of volunteers from internal employees and other partner organizations review the applications and, led by the DEI representative, go through the exhaustive review to select the recipients.

3. *Career Launch Program*

Participants in Xcel Energy's Career Launch program join the Company as analysts to obtain hands-on experience towards a variety of career paths while also providing the tools to help navigate their futures at the Company. Analysts have the opportunity to select their rotations from more than 40 options that best align with their career goals. The program is designed to support the development of analysts to become strong, capable leaders with the skills and guidance necessary to jumpstart a promising career trajectory with Xcel Energy upon successful completion. Candidates are recruited from a diverse set of perspectives, backgrounds, education, and experiences to strengthen our Company's team working together to lead the clean energy transition.

4. *Business Resource Groups*

Change happens when people connect in new ways. In the early 2000's, we launched Business Resource Groups (BRG's) to create new avenues for development, recruitment, retention, and advancement and help to reach a broader candidate pool through BRG external offerings. Thirteen BRG's have been established to bring employees together to support common interests and to share perspectives.

Xcel Energy's BRG's are among the Company's strongest examples of how our team members support one another. Many employees dedicate time outside of work hours to create a safe environment, through BRGs, where they can exchange ideas, pursue common interests, seek equitable solutions to personal and professional challenges, and help communities succeed.

The Company's current Business Resource Groups are:

- **AAPI (Asian American and Pacific Islander Alliance)**: Encourages employees to bring their full identities to the workplace by educating the workforce regarding AAPI cultures and professional experiences, facilitating professional development and career growth, and creating a sense of unity between AAPI employees, allies and the community.
- **ABLE (Accessibility, Be an Ally, Lead, and Empower)**: Promotes accessibility and allyship, drives disability inclusion by leading at all organizational levels, and strives to empower self and others.
- **BLAX (Black Employees at Xcel Energy)**: Promotes career development, continued education, training and cultural awareness, and addresses the issues and concerns of people of color.
- **ECN (Employee Connection Network)**: Connects new and existing employees and broadens employee understanding of Xcel Energy through networking and community service opportunities.
- **GROW (Growth and Retention of Women)**: Identifies and implements innovative ideas and strategies for recruiting, developing, promoting and retaining women in non-traditional roles within the Energy Supply business area. Works with schools to increase girls' and women's awareness of such opportunities.
- **NAYGN (North American Young Generation in Nuclear)**: Provides opportunities to develop leadership and professional skills, create lifelong connections, engage and inform the public, and inspire today's nuclear technology professionals to meet the challenges of the 21st century.
- **Pride Alliance**: Advocates for the Company's leadership in diversity and inclusion by addressing issues related to sexual orientation and gender identity.
- **Tribal Wind**: Supports Native American employees through professional development resources, mentoring and networking. Strives to increase cultural understanding and awareness.
- **VETS (Veterans and Employees Together in Service)**: Sustains awareness on issues of interest to veterans and active military employees in our workforce and promotes programs and policies that support the welfare of veterans and their families.
- **WIN (Women's Interest Network)**: Strives to improve the lives of women and make Xcel Energy the workplace of choice for women. WIN programming focuses on professional development and work-life balance issues.

- **Xcelente**: Shares the Latino culture through awareness, inclusion and celebration; promotes the Company's image throughout the community; provides networking and mentoring opportunities.
- **XE WiN (Women in Nuclear)**: Explores and develops programs that help all employees working within our nuclear organization to expand their leadership skills, network and create positive visibility for the nuclear industry within the communities we serve.
- **YPN (Young Professionals Network)**: Provides a community where individuals at the start of their career can discuss career aspirations and challenges, share knowledge and ideas, and build meaningful relationships with co-workers with whom they may not normally interact.

5. Military and Veteran Outreach

We continue to build partnerships and support activities that maintain our visibility as a preferred employer for veterans and those currently serving in the National Guard or Reserves. Veterans made up 9 percent of our new hires in 2022. Xcel Energy attended more than 45 job fairs and events for veterans to seek out new hires and participated in the Department of Defense SkillBridge program and the Hiring our Heroes Corporate Fellowship Program. Approximately 10 percent of current employees are veterans. Many are actively involved in our VETS BRG, volunteer to help with recruitment, and mentor current veteran employees.

In 2023, Xcel Energy was again named a 5-Star Employer through the VETS Indexes Employer Awards that recognizes organizations that do the most to hire, retain, promote and support veterans. In 2022, we were recognized as a Military Times' Best for Vets employer for the eighth consecutive year, a Military Friendly Employer, a Disabled American Veterans (DAV) Patriot Employer, and we received the HIRE Vets Medallion Award for our exceptional commitment to hiring veterans.

6. Training and Employee Resources.

Leaders and employees are encouraged to increase their knowledge and awareness around DEI. The Company offers the following resources to support this:

- **Unconscious Bias and Microinequities Training**: All new hires receive training on how to avoid bias, and ongoing training is incorporated into all of our talent processes, including hiring, performance management, investment decisions and succession planning.

- **Leader Inclusion and Diversity Conversation Starter Guide**: We encourage employees to tackle tough issues and discuss timely events related to inclusion and diversity. The guide aids leaders in creating a safe environment and initiating those conversations.
- **Online Resources**: Our online DEI resource hub was created by employees to help increase awareness and provide help on different topics. Leaders are also provided with unique online resources designed to help them lead inclusively.

B. Attraction and Recruitment

We understand the need and critical role the development of a diverse talent pool plays when seeking to build a diverse workforce. We at Xcel Energy have a series of initiatives that are focused on supporting our progress towards enabling access to diverse talent to build a pathway reflective of the communities we serve:

1. Energy Careers Academy

To create a pipeline of trained candidates ready to fill job openings, Xcel Energy helped launch the Energy Careers Academy in fall 2022, along with the Minnesota State Community and Technical College and Minnesota State Energy Center of Excellence. The academy seeks to open doors to historically underserved populations and prepare them for a career field that offers stable, well-paying jobs. The program provides training in electrical linework and natural gas utility construction and service. Students receive hands-on instruction at Xcel Energy's training facilities and gain exposure to Company employees and leaders, including hiring managers. Energy-related educational programs are typically offered at technical schools in rural locations, but the Academy aims to enroll students in the Twin Cities area, helping remove a potential barrier for urban students. Minnesota State and Technical College is responsible for curriculum, accreditation, and instruction while the Minnesota State Energy Center of Excellence provides general program support and oversight. The three partners plan to increase program options including higher-credit diploma programs.

This program provides 9-month electrical line worker certification and 6-month gas utility construction/service worker accredited training to create a diverse pipeline for careers in these fields. The electrical line worker certificate program began in August 2022 and the gas worker training is expected to begin in 2024. The electrical line worker program is provided in Northeast Minneapolis. Gas worker training will be in Hugo, due to the specialized gas training facility there, but planning is underway to provide transportation if needed. Financial aid is available through Pell Grants and other scholarship opportunities. Students enrolled in the program also receive college and career readiness training and follow-up services throughout the length of the program. Throughout the program, students will have regular interactions with recruiters and hiring leaders from Xcel Energy and other utilities. Prior to graduation, students will be made aware of various job openings with Xcel Energy and other utilities and supported throughout the application process.

Support provided for Energy Careers Academy students includes:

- Informational sessions with Minnesota utility providers looking to hire students into Line worker apprenticeship programs,
- Mock interview sessions and resume workshops led by the Xcel Energy Talent Acquisition team and Minnesota State Community and Technical College,
- Personnel resources to complete additional education requirement such as commercial driver's license (CDL) permit test preparation, and
- Partnering with local nonprofits to provide funding for students to complete the CDL licensing test.

In 2023, the Energy Careers Academy graduated 11 students and Xcel Energy offered post-graduation placement to 8 of those students. These graduates, all from diverse backgrounds, were placed within our Line worker apprenticeship programs with close support of our internal talent teams. We initiated our second cohort of students in August of 2023, with 50 percent of the 12 individuals being ethnically diverse, and the first female student.

With the incorporation of the ESAG input, our team will continue to assess and evaluate potential improvements to the program to ensure accessibility by all community members. Specific ideas received highlight the need to support St. Paul community members and their access to the training site in Minneapolis, and the benefit of creating additional partnerships with organizations that represent a certain subgroup within our community where access to the program may need additional support (i.e. DACA etc.).

2. Power Up Initiative

Xcel Energy is proud to sponsor the Power Up initiative, a workforce development program which helps prepare underrepresented populations for careers in the utility construction trades. Xcel Energy and the Minnesota Department of Employment and Economic Development (DEED) have partnered with seven different organizations - Avivo, Emerge, Building Strong Communities, Career Solutions, Native Sun Community Power Development, Summit Academy, and Central Minnesota Jobs and Training, to bring two cohorts of 80 people through this workforce development program.

The program focuses on preparing enrollees for unique and challenging careers by teaching them skills such as interview techniques, resume writing, and professional presence as well as introductory tours of different jobsites. The program also allows enrollees to experience a "day in the life" of personnel in the energy construction trades.

The program is currently in its first phase of deployment. The first cohort is demographically diverse and includes women, people of color, indigenous people, and people with disabilities all from differing economic backgrounds. Once completed, these individuals will be well prepared to pursue careers in the energy construction trades. The main target of this program is consistent with our efforts of pipeline diversification and enabling access for our communities to career pathways within the utility industry.

All resources and details of the program are publicly available in the official website: Xcel Energy Power Up Program / Minnesota Department of Employment and Economic Development (mn.gov).

3. College and Highschool Internships

In partnership with the City of Minneapolis, Xcel Energy was one of the founding organizations offering high school students from the cities access to internship positions that allow them to experience valuable workplace exposure that ultimately enables potential access to a diverse range of career paths.

This High School internship program targets students in diverse communities that also meet income requirements to participate. Students are allowed to select internship opportunities and go through the interview process with their potential employer. Students must be 16 years of age and older to participate in the program. Current partners for funneling our internship pipeline are: Step Up (Minneapolis, MN), Right Track (St. Paul), Denver Public Schools (Denver, CO), Summer Earn and Learn (Amarillo, TX), Cristo Rey Jesuit High School (Minneapolis, MN), and Wisconsin Youth Apprenticeships (Eau Claire, WI).

For the last three years, our internship program has provided relevant opportunities for students from the cities of Minneapolis and St Paul. Table R1-1 below showcases the metrics of the breakdown of our students:

Table R1-1: Internship Metrics

Conversion from Intern to Full-time Employee	2020	2021	2022
	27	35	48

Intern Hires - Gender Diversity	2020	2021	2022
Female	25.9%	48.6%	33.3%
Male	74.1%	51.4%	66.7%

Intern Hires - Ethnic Diversity	2020	2021	2022
Minority	37.0%	40.0%	39.6%
Non-Minority	63.0%	60.0%	60.4%

4. *Career Fairs and Partnerships with Diverse Professional Organizations*

We understand the need for diverse talent across all areas and functions of our organization, and because of that we aim to strategically identify opportunities to partner with organizations leading the charge at enabling access to these talent pools. Some of these partners are:

- National and Regional Partners:
  - People of Color Career Fair,
  - National Black MBA National Conference,
  - National Society of Black Engineers National Conference
  - Society of Women Engineers National Conference
  - Sabathani Community Center Career Resource Fair
  - Genesys Works Career Fair
  - MN Center for Energy & Environment Quarterly Recruitment/info sessions
  - St. Paul Area Chamber Career Connect Day

- College Chapter Partnerships:
  - Society of Hispanic Professional Engineers
    - University of Minnesota Twin Cities
    - University of Denver
    - Colorado School of Mines
    - University of Wisconsin Madison
    - University of St. Thomas
    - West Texas A&M
  - National Society of Black Engineers Chapter Partnerships

- University of Minnesota Twin Cities
- University of Minnesota Duluth
- University of Denver

As we initiate the new year and identify the key priorities for 2024, our team will be exploring deepening these partnerships and leveraging synergies with our BRGs, community-based organizations and talent partners to enhance and diversify the talent pool across all levels of the organization.

C. Community Engagement and Advancement

We recognize the importance of accessing talent and building the talent pool as early as possible. To this end, we work consistently with Community Based Organizations (CBOs) to partner and find ways to work with students at different points of their journey in order to provide early exposure and access to career paths in energy.
We participate in the following outreach efforts.

1. Edina Career Tech Ed Community Advisory Board

Edina Public Schools developed a Design Team to look at how grades 6-12 Edina Public Schools courses could be aligned to create a pathway leading to a micro-credential, certification, internship, apprenticeship, or higher level of education study. This group of community partners and local businesses meets on a quarterly basis to discuss the work of subcommittees focused on enhancing Career and Technical Education programming in Edina Public Schools.

2. Metro State Class 310

Xcel Energy was the featured employer for Metro State Class 310 in 2021. This class is designed to give diverse students the opportunity to engage with a Twin Cities business over the course of the semester. Students are introduced to human resource leaders, connect with BRG members for a culture day, and participate in a mock interview event. Students will usually participate in a tour of the business but did not participate in 2021 because of Covid restrictions.

3. Careers in Energy Week

The Company invites students from Minneapolis Public Schools and surrounding districts to participate in Careers in Energy Week which includes plant tours, career panels and access to the Careers in Energy trailer.

For 2023, Careers in Energy Week was celebrated from October 16-20. The celebration was proclaimed by the Governor of Minnesota, Tim Walz. Throughout the week, utility companies within the state of Minnesota visited the communities they serve to highlight and promote energy careers. Xcel Energy had the opportunity to host the following events:

- Oct. 16: A staff engineer representative from Xcel Energy's Renewable Energy department went to Mahtomedi Middle School to speak about Renewable Energy, and how it pertained to their Electrically Powered City Project.
- Oct. 17: Xcel Energy attended the St. Paul Area Chamber's Career Connect Day. The Career Connect Day was an opportunity for St. Paul youth to explore various careers in several different sectors. Xcel Energy's main promotion was Energy Careers Academy (ECA). Xcel Energy brought several graduates from ECA, as well as members of the Talent Acquisition and Inclusion and Diversity teams to the event.
- Oct. 20: Xcel Energy hosted a teacher externship at the High Bridge facility in St. Paul. Teachers from various areas of the Minnesota metro area attended to learn about various offerings and opportunities Xcel Energy offers for youth, as well as creating pipelines with schools for further collaboration.

4. *Pro Bono Program*

As they focus on fulfilling their missions, nonprofit organizations may not have the staff or resources to improve their business operations or advance new initiatives. Xcel Energy employees' personal knowledge and expertise can be a powerful force for change to help nonprofit organizations achieve their goals and make a deeper impact. That's the premise of Xcel Energy's Pro Bono Skills-Based Volunteer Program. This growing program offers our employees the opportunity to help these organizations and share their talents, grow as leaders and build relationships with their colleagues.

In 2022, 18 employees contributed consulting services in marketing, technology, legal, finance and human resources, volunteering more than 590 hours at three nonprofits and delivering a value of nearly $116,000 through the program. The volunteer effort, which began in 2020, provides a way for employees to contribute their skills through pro bono consulting services to nonprofits serving underrepresented groups in the Twin Cities. Most of the work is virtual, involving three to six hours a week. Because of its success, the program was expanded in 2023 to our corporate offices located in Colorado, North Dakota, South Dakota, Texas and Wisconsin.

5. American Association of Blacks in Energy Minnesota

Xcel Energy was instrumental in creating the newest chapter of the American Association of Blacks in Energy (AABE) in 2022. Its mission supports African American community job training and placement, supplier diversity, legislative change and scholarships. AABE encourages industry and community leaders to collaborate and ensure that all stakeholders have a seat at the table in Minnesota. Xcel Energy employees have been instrumental in volunteering their time to assist with event planning, maintaining the chapter's social media pages and the coordination of chapter meetings as well as taking on various leadership roles.

In the Fall of 2023, Xcel Energy employees assisted in the planning and execution of AABE Minnesota's first inaugural golf tournament to raise college scholarship funds for BIPOC students participating in STEM programs and graduating in 2024. As we enter 2024, we will incorporate AABE into our strategic partners that will contribute to build a diverse pipeline for talent at all levels of the organization.

D. Strategic Partnership: Center of Energy Workforce Development

The Center for Energy Workforce Development (CEWD) is a non-profit consortium of energy companies, contractors, associations, unions, educators, and business partners working together to ensure a skilled, diverse workforce pipeline to meet future industry needs. CEWD's coordinated approach to workforce development has united electric, natural gas, and nuclear firms since 2006. In 2021, in response to the need for expanded collaboration, they expanded their umbrella to include the workforce development needs of those working in the fields of renewables, electric vehicle infrastructure, and energy storage.

CEWD represents more than 140 energy companies. Additionally, they have established partnerships with, and support from, the American Gas Association, American Public Gas Association, American Public Power Association, Distribution Contractors Association, Edison Electric Institute, Electric Power Research Institute, National Rural Electric Cooperative Association, and Nuclear Energy Institute.

Xcel Energy is one of several energy companies that are part of the Minnesota Energy Consortia. Through this partnership, we have helped enable programs focused on building diversity within the Energy Careers pipeline for the state. In partnership and collaboration with CEWD, we have also helped create the DEI Roadmap for Industry Change[1] as a resource and tool for the energy industry professionals and organizations,

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[1] CEWD_DEI-Report-View-Printable.pdf).

seeking to create an equitable, more diverse and inclusive workforce that can help address the needs of the future. This tool focuses on offering details on current industry trends but also actionable steps for organizations in different focus areas:

- To Ensure More Diverse, Equitable, and Inclusive Energy Workplaces
- To Increase Diversity in the Energy Workforce
- To Develop a Diverse Talent Pool
- To Retain Diverse Talent in the Energy Workforce
- To Expand Diversity in C-Suite Roles

In addition, several resources are available to provide guidance and additional information on the work with CEWD Minnesota Consortia:

- The Minnesota Consortia Website: Minnesota | CEWD
- The DEI Roadmap for Change: DE&I Roadmap for Change | CEWD
- Energy Careers pathway and resources: Home - Get Into Energy

In 2024, our team will continue to strengthen the relationship with CEWD and the Minnesota Consortia seeking to drive greater impact by leveraging internal efforts and the established DEI Roadmap for change, alongside other local industry partners.

III. CREATING SUSTAINABILITY FOR INTERNAL DIVERSIFICATION EFFORTS

A. One Xcel Energy Way: DEI Rally Room

Xcel Energy has incorporated a new internal process to drive operational excellence focused on identifying requirements to help achieve desired performance for a specific function. As part of the internal implementation aligned to our workforce development efforts, the organization officially kicked off a designated DEI Rally Room.

A Rally Room is a command center that brings leaders and teams together (cross-functional as required) to rally and manage around a key objective and theme (corporate priorities). Ultimately, the teams visualize what work is needed, establish responsibilities, support each other, and deliver to achieve the desired results. This effort is designed to be highly visual, focusing on clearly displaying information on how we are addressing a specific priority, including problem definitions, what "good" looks like, goals, key metrics, performance trends, specific problem areas, action items and current status. In summary, collaboration, planning, visual management, operating reviews, problem solving and defining standards for sustainability are paramount aspects of the Rally Room.

1. *Goals of the Diversity, Equity, and Inclusion Rally Room*

In 2023, the Company identified and established a set of opportunities which then translated into work packages to allow for the introduction of improvements, new processes and positive changes seeking to create a sustainable infrastructure for the existing and potential new talent programs at Xcel Energy.

The first six months of the project allowed us to deliver the following accomplishments:

- Problem definition and identification.
- Focus groups and internal data analysis with employees and BRGs.
- Engagement of leaders and business units to drive alignment.
- Prioritization of focus areas and initiatives for 2024 tactical implementation plan.
- Connection point with the Equity Stakeholder Advisory Group to receive and incorporate feedback as part of the analysis phase.

The overall focus areas of the Rally Room aligned with specific tactical implementation plans are:

- <u>Attraction and Recruitment</u>: Focus on improving the employee attraction and recruitment experience by improving the key elements that inform and shape the strategy of these activities within the talent organization.
- <u>Retention and Development</u>: Improve existing programs and introduce new strategies focused on increasing employee satisfaction scores, and overall education towards building a culture of inclusion.
- <u>Inclusion and Belonging</u>: Improve employee sentiment associated with these Inclusion index components that have been consistently in a downward trend for the last three years.
- <u>Operations and Field Employees</u>: Improve overall employee experience focusing on main detractors based on employee feedback and existing internal data trends.
- <u>Culture and wellbeing for employees</u>: Improvement of overall employee experience and connection to our collective culture.
- <u>Middle Management and Business Leaders:</u> Focus on education, development, and support of leaders impacting our employee experience and overall enterprise culture.

B. Current State and Measuring Progress

At Xcel Energy, our focus towards advancing talent and supporting the communities that we serve has become an internal imperative with accountability that we are seeking to advance and mature. We recognize our opportunities to continue effectively diversifying and building a diverse workforce inclusive of all members of our communities, and with the Rally Room project we are actively focusing on making progress.

In alignment with this effort, we are utilizing internal existing data points to evaluate potential solutions to advance and ensure progress is not only reported but measured. Through different channels, we publicly share our workforce demographics data to ensure alignment and foster conversations that can drive advancement with both internal and external partners. As shown in the table below, our reporting for internal demographics includes both gender and ethnicity, which allows for further assessment of opportunities and pathways for recruitment and retention:

Table R1-2: Xcel Energy Minnesota Internal Workforce Demographics[2]

	Female	Minority	Black	Hispanic	Asian	Native Hawaiian/ Pac Islander	American Indian/ Alaska Native	Two or More
Minnesota Workforce Demographics	21.39%	9.87%	2.80%	2.39%	2.87%	0.04%	0.35%	1.41%

- Workforce Representation Data: 2022 Sustainability Report – Diversity_Equity_Inclusion_SR.pdf (xcelenergy.com)
- Workforce Representation Data: EEO1 annual report - EEO-1-Employer-Information-Report.pdf (xcelenergy.com)
- Additional Data summary: Sustainability Report Data - Sustainability_Data_Summary_SR.pdf (xcelenergy.com)
- Additional Workforce data: Global Reporting Standards Content Index - GENERAL STANDARD DISCLOSURES (xcelenergy.com)

We constantly evaluate and assess the internal representation and diversity data, with the goal of measuring progress as well as utilizing additional leading indicators that can

[2] As of 12/31/2023.

help us evaluate potential trends and points of advancement. Based on the existing market availability from the most recent census, or the estimated amount of people available and aligned with our internal job codes, and current data points, we focus on finding strategic ways to partner and develop access points for talent that can contribute to a healthy and diverse expansion of our talent pool.

The Rally Room initiative and its focus on data driven processes with One Xcel Energy Way, as well as measurement of key performance indicators to track progress, have introduced a new way for our organization to define and track our goals with a focus on periodically measuring the indicators that can support our progress. Some of these indicators are:

- Recruitment metrics (talent pipeline metrics, recruitment event driven metrics, candidates' metrics).
- Retention metrics (internal talent mobility and advancement, BRG engagement and participation, volunteering metrics).
- Employee engagement and participation (twice a year employee survey focused on employee satisfaction and belonging).

With the intention of driving progress on these metrics, the upcoming year for the Rally Room will include the tactical implementation of initiatives aligned with the identified work packages, the internal reporting and assessment of metrics for these initiatives, as well as consistent points of evaluation throughout the year to assess progress.

APPENDIX S – STAKEHOLDER ENGAGEMENT SUMMARY

I. INTRODUCTION

In preparation for the development of this Integrated Resource Plan (IRP), numerous stakeholder outreach efforts were made as required from the Commission's last IRP Order.[1] We appreciated the opportunity to host multiple informational and technical workshops and to connect with our stakeholders. The workshops offered provided stakeholders with details about the Company's IRP process, allowed us to obtain stakeholder feedback and input, and respond to stakeholder questions. We appreciated our stakeholders' participation in the various workshop offerings, as well as their questions, feedback and input, which were taken into consideration in this IRP and will be taken into consideration in development of future IRPs. In addition to workshops specific to IRP planning, additional outreach efforts were made regarding remediation efforts at the Allen S. King Generating Plant (A.S. King) and the Sherburne County Generating Plant (Sherco); equity efforts through the formation of our Equity Stakeholder Advisory Group (ESAG); with the Prairie Island Nuclear Generating Plant (Prairie Island) community; with the Clean Energy Organizations (CEO's) regarding legislated community solar garden mandates and how the new 3 percent legislation dovetails with those mandates. The Company is committed to engaging all interested stakeholders and the general public in the development of our IRP.

Stakeholder workshops pertaining to the IRP itself were offered to address multiple IRP Order Points.[2] In addition, quarterly stakeholder outreach meetings were held with the A.S. King and the Sherco communities as required by Order Points 20 and 21. Details of these meetings are included in Appendices Q and R. Outreach to the Prairie Island stakeholders was conducted as required by Order Point 22 and is detailed in Appendix M: Nuclear. Order Point 25 required the Company to establish a stakeholder group to address equity efforts including the establishment of an environmental justice accountability board. The results of these efforts are detailed in Appendix R: Equity.

We discuss here our IRP stakeholder engagement efforts associated with the Order Points, input received from stakeholders during those efforts, and how the Company has incorporated or addressed the input received, as appropriate.

The Company agrees that stakeholder engagement can help generate new ideas and enhance collaboration around our integrated resource plans. The stakeholder discussions we have facilitated have been useful for the Company to gain a better,

[1] Docket No. E002/RP-19-368 (hereafter, 2019 IRP).
[2] 2019 IRP at Order Points 10, 12, 14, and 15.

more holistic understanding of different stakeholder priorities and policy drivers that we can consider in our system resource planning. We appreciate our stakeholders' participation in these workshops.

In the remainder of this section, we provide:

- Workshop series overview
- Workshop summaries and IRP/Integrated Distribution Plan (IDP) workshop Survey Results
- Additional Outreach Efforts.

II. WORKSHOP SERIES OVERVIEW

The Commission's IRP Orders required the Company to conduct outreach efforts on storage options, including solar generation and battery storage; the role of hydrogen and clean fuel alternatives including full supply-chain and life-cycle carbon impacts; development of a modeling construct for solar-powered generations connected to the company's distribution grid; and regarding forecasting of electric adoption rates.[3] Based on the amount of material we wanted to share with stakeholders, the Company held five workshops, which included presentations from the Company's staff, questions and input from attendees, and time for open discussion. The series of workshops was held beginning September 2022 and ran through August 2023, with workshops being held virtually, in-person, or as hybrid meetings. Additional meetings, outside of the workshop series, were held regarding the development of a modeling construct and solar bundles. A separate RFP 101 Workshop, not required by Orders, was held on our Request for Proposal (RFP) process. These meetings are summarized below.

The overall duration of all the IRP workshops combined was more than 16.5 hours. We recognize that this was a significant amount of time for stakeholders, and we appreciate their time participating and input. Table S-1 includes a matrix of the IRP Order Points requiring stakeholder outreach and the corresponding workshops held. Table S-2 includes a listing of additional outreach conducted.

[3] IRP Orders at Order Points 10, 12, and 15.

Table S-1
IRP Order Points and Workshops Held

Order Point	Addressed in Workshop
IRP Overview (directed by IDP Order Point 6.1)	IRP/IDP 101 Workshop: September 26 and 27, 2022
IRP Order Point 9.d: Improve non-wires alternatives analysis, including market solicitations for deferral opportunities to make sure Xcel can take advantage of distributed energy resources to address discrete distribution system costs.	Planning the Grid of the Future Part 2 Workshop: June 12, 2023
IRP Order Point 10: In its next resource plan Xcel shall, either through its Integrated Distribution System Plan proceedings or through another stakeholder process, develop and/or improve its forecasts of the adoption rate for the following technologies, to be used in Xcel's base case scenario and its overall demand forecast.	
(A) Adoption of light-, medium-, and heavy-duty electric vehicles	Forecasting: Electrification and DER Workshop: February 13, 2023
(B) Adoption of electric space heating.	Forecasting: Electrification and DER Workshop: February 13, 2023
(C) Adoption of electric water heating.	Forecasting: Electrification and DER Workshop: February 13, 2023
(D) Electrification of other end uses.	Forecasting: Electrification and DER Workshop: February 13, 2023
(E) Increased potential for demand response and load flexibility from an increase in electrification of the technologies in A-D.	Resource Modeling Workshop: August 8, 2023
(F) Adoption of solar-powered generators- including generators sited by customers, community solar gardens organized under Minn. Stat §216B.1641, and generators that are neither sited by customers nor related to community solar gardens.	Resource Modeling Workshop: August 8, 2023
IRP Order Point 12: Xcel shall include in its next resource plan a deeper analysis of:	
(1) storage options, including options combining solar generation and battery storage and	Resource Modeling Workshop: August 8, 2023
(2) the role of hydrogen and clean fuel alternatives in Xcel's resource mix. In preparation, Xcel shall work with stakeholders to develop a fair basis for comparing the full supply-chain and life-cycle carbon impacts of the generation and storage resource options under consideration to help the Commission evaluate the "adverse socioeconomic effects and adverse effects upon the environment" of each option, pursuant to Minn. R. 7843.0500, subp. 3.C.	Policy, Planning and Technology Workshop: November 15, 2022 Resource Modeling Workshop: August 8, 2023
IRP Order Point 15: Xcel shall work with stakeholders to develop a modeling construct that enables Xcel, as part of its next resource plan, to model solar-powered generators connected to the company's distribution grid as a resource. Xcel and stakeholders shall address the following factors in developing the modeling construct:	
A. Using a "bundled" approach as is used to model energy efficiency and demand response.	Resource Modeling Workshop: August 8, 2023
B. The costs borne by the utility and the costs borne by the customer.	Resource Modeling Workshop: August 8, 2023
C. Cost effectiveness tests.	Resource Modeling Workshop: August 8, 2023
IRP Order Point 16: In its next resource plan, Xcel shall account for local clean energy goals, in aggregate, in forecasting and modeling. In particular, the plan should include consideration of local community generation goals for distributed generation.	Policy, Planning and Technology Workshop: November 15, 2022 Resource Modeling Workshop: August 8, 2023

Table S-2
Additional IRP Stakeholder Outreach Efforts

IRP Order Point 15: Xcel shall work with stakeholders to develop a modeling construct that enables Xcel, as part of its next resource plan, to model solar-powered generators connected to the company's distribution grid as a resource.	Meetings held with Clean Energy Organizations: July 20, 2023 October 24, 2023
IRP RFP 101	October 12, 2023
Modeling Assumptions Discussion	Department of Commerce: October 2, 2023 Public Utility Commission Staff: October 9, 2023

To better accommodate stakeholders' schedules and increase participation rates, a survey was sent to stakeholders to solicit information pertaining to their preferred meeting format. Responses indicated that 66 percent of stakeholders preferred meetings held virtually, yet 66 percent also indicated that meetings held in-person were more effective. A variety of meeting workshop options were held over the series, with all in-person workshops later in the series being offered as hybrid workshops.

Invitations were filed in Docket No. E002/RP-19-368 and emailed to those who have requested to be on our "Interested Parties List." As discussed below, four workshops covered topics related to both the IRP and the IDP.[4] At every workshop, we referenced the "Interested Parties List" and provided direction on how stakeholders could be added to the list. Approximately 500 stakeholders on our Interested Parties List received email invitations for each workshop. Based on the number of direct e-mail invitations alone, which does not include attendees that may have been alerted to the workshop via docket submissions, participation rates ranged from five percent to 11 percent, or approximately 25-55 participants. Participants could submit questions during the registration process and were also provided ample opportunity to ask questions and provide feedback and input during each workshop. Consistent with the Commission's July 23, 2020 Order in Docket No. E002/M-19-666, workshops were open to any interested person.[5] We filed the Company's presentation in Docket No. E002/RP-19-368 after each workshop.

Conservatively speaking, we estimate that the Company's employees dedicated over 700 labor hours to the development and delivery of these workshops. We recognize the benefit and the importance of connecting with our stakeholders and receiving their input and feedback on our planning processes. The in-person and virtual workshops each held their own benefits. The in-person workshops allowed the Company to

[4] Docket No. E002/M-23-452 (hereafter, 2023 IDP). IDP workshop materials and summaries were filed in the 2021 IDP docket (Docket No. E002/M-21-694).
[5] Order Point 5 states, "Xcel must allow any interested person to participate in stakeholder engagement meetings regarding its IDP and HCA."

connect one-on-one with our stakeholders, while the virtual sessions provided participants easier access to the workshops and minimized travel requirements.

The workshop series began with a general overview on the IRP process, and each following workshop became more detailed and technical in nature. We found that once the information became more specific, the number of stakeholders attending each consecutive workshop decreased, but the feedback we received and questions that were asked also became more specific.

After the completion of the workshop series, we conducted a survey of the stakeholders that attended any of the IDP or IRP workshops to obtain their feedback on the workshop series structure, content, and the IDP/IRP stakeholder process. The results of that survey are included below.

III. WORKSHOP SUMMARIES

In this section, we provide a summary of each stakeholder workshop. For each workshop summary in this section, we provide:

- Workshop logistics.
- Approximate number of external stakeholders in attendance.
- IRP Order Points covered[6] as well as IDP Order Points covered where appropriate.
- An overview of the workshop content and presentations. We note that each workshop presentation was filed in the instant docket.
- A discussion of stakeholder questions/input received and how we are considering or have incorporated input.

A. Workshop 1: IDP/IRP 101

- **Logistics**: Virtual: September 26, 2022 and In-Person: September 27, 2022
- **Attendance**: 54 total participants – 49 virtual; 5 in-person
- **IDP Order Point**: *6.a – Integrated Distribution Planning 101*

1. Workshop 1 Overview

This workshop was held in response to IDP Orders. A summary is included here in that it provided a general overview of both the IRP and IDP planning processes. To be

[6] Order Points listed come from the April 15, 2022 Order unless otherwise noted.

inclusive and reach a broader audience, this workshop was held twice – once virtually during business hours and again, in-person during the evening at the Wilder Foundation located in St. Paul. Both workshops used the same presentation. Forty-nine stakeholders participated virtually, and five attended the in-person workshop.

The intent of this workshop was to share information about Xcel Energy's IRP and IDP processes and to receive input from the general public. The workshop included a high-level overview of both the IRP and IDP, a summary of the regulatory processes for each, the Company's internal planning processes for each, and where alignment and/or differences exist between the two plans.

The presentation began with an overview of the Company's service territory; customers; priorities; and our clean energy goals. This was followed by an overview of the IRP process, which included a discussion of statutory requirements and the internal and external processes involved. It was conveyed that the intent of the IRP process is to identify the best set of resources to meet customer needs, which requires a balancing of four core objectives: reliability, cost, environmental considerations, and risk. This was followed with a high-level overview of the IRP modeling process, including an overview of the EnCompass Power Planning Software utilized.

The IRP discussion was followed by an overview of the IDP process. This included a discussion on the objectives and filing process; an overview of the transmission and distribution systems; the internal planning process, inclusive of how the load forecast is developed; risk analysis that is conducted on the distribution system using the forecast; and mitigation plan development, non-wires alternatives (NWA) analysis, and project prioritization in the budgeting process.

The presentation also discussed how the IDP and IRP planning processes interact and their respective timelines.

2. Workshop 1 Stakeholder Questions and Input

- Several clarifying questions were asked by participants.
- We received input regarding integration of the IRP and IDP, encouraging the optimization of investments across the two plans rather than independently. This feedback aligns with stakeholder input in our most recent IRP and IDP dockets, and with the Commission's most recent IRP and IDP Orders, which require the Company to "take steps to better align distribution and resource planning."[7]

[7] *See* April 15, 2022 Order in Docket No. E002/RP-19-368 (IRP Order), at Order Point 9.

We agree that integrated planning is increasingly important. At the workshop, we explained that the different scales, timelines, and cadences of the planning processes present some challenges to full alignment. However, we are continually seeking to improve alignment and have addressed this topic further in Appendix L: System Planning Integration of this IRP and our 2023 IDP filing.[8] We were able to align several of the forecast vintages between this IRP and our 2023 IDP filing; however, as noted in Table L-1: Forecast Vintage Comparison in Appendix L, some updates were made to those vintages, as new information was available.

B. Workshop 2: Policy, Planning, and Technology

- **Logistics**: Hybrid (In-Person and Via Conference Call): November 15, 2022
- **Attendance**: Approximately 50 total participants – 30-40 virtual; 14 in-person
- **IRP Order Point**: 12.2 *Xcel shall include in its next resource plan a deeper analysis of the role of hydrogen and clean fuel alternative in Xcel's resource mix. In preparation, Xcel shall work with stakeholders to develop a fair basis for comparing the full supply-chain and life-cycle carbon impacts of the generation and storage resource adverse effects upon the environment.*
- **IRP Order Point: 16**-*In its next resource plan, Xcel shall account for local clean energy goals, in aggregate, in forecasting and modeling. In particular, the plan should include consideration of local community generation goals for distributed generation.*

This workshop addressed requirements from the Commission's IDP Order Point.[9]

1. *Workshop 2 Overview*

In order to encourage interaction and dialogue, this meeting was held in-person with a call-in number provided. Fourteen stakeholders attended in person, with approximately 30 to 40 stakeholders attending virtually. The presentation was subsequently filed in the instant docket.

The intention of the workshop was to share information about: federal, state, and local policies, goals and regulations; Xcel Energy's corporate goals and technological advancements; and to discuss how they will impact Xcel Energy's resource planning and distribution planning processes. In addition, we sought to obtain input from stakeholders on how they thought we should incorporate these policies, goals, and regulations.

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[8] Docket No. E002/M-23-452. *See* Appendix A1.
[9] IDP Order at Order Point 6.

The workshop presentation reviewed our key inputs to our planning process: Xcel Energy's goals; policies and regulations including an overview of the Good Neighbor Rule, the Inflation Reduction Act (IRA), the Infrastructure Investment and Jobs Act (IIJA), the Energy Conservation and Optimization Act (ECO), and the Natural Gas Innovation Act (NGIA); community clean energy goals; Xcel Energy's Equity Stakeholder Advisory Group (ESAG); lifecycle greenhouse gas emissions considerations; advanced grid technologies; and new generation and storage resource options.

2. Workshop 2 Stakeholder Questions and Input

- Several clarifying questions were asked by participants.
- We specifically requested participants to submit ideas for alternate lifecycle carbon emission assessments for us to consider in relation to Order Point 12 of the IRP Order. No suggestions have been received to date.
- We were asked how we plan to incorporate local clean energy goals into IDP forecasting. We indicated that a survey had been sent to communities asking for information pertaining to their clean energy goals. The information will be used in our planning.
- We were also asked if there is a back-up plan in case new technologies do not materialize. We responded that this is precisely why we look at a wide variety of resource options and that there is sufficient time in the planning horizon to pivot if a new technology does not materialize as originally intended.
- We were asked if we were considering new nuclear generation. We responded that we are investigating new nuclear technologies and their costs and benefits to the system, but that there is currently a moratorium on new nuclear in Minnesota.
- We were encouraged to evaluate a higher penetration rate of demand side management, and we indicated that we would look at it in the 2024 IRP along with the impacts of advanced rate making. These evaluations have been addressed in Appendix J: Distributed Energy Resources.

C. Workshop 3: Forecasting: Electrification and Distributed Energy Resources

- **Logistics**: Virtual: February 13, 2023
- **Attendance**: 46 total participants
- **IRP Order Point**: 10.(a)-(d)- *In its next resource plan Xcel shall, either through its Integrated Distribution System Plan proceedings or through another stakeholder process, develop and/or improve its forecasts of the adoption rate for the following technologies, to be used in Xcel's base case scenario and its overall demand forecast.*

A. Adoption of light-, medium-, and heavy-duty electric vehicles.
B. Adoption of electric space heating
C. Adoption of electric water heating.
D. Electrification of other end uses.

This workshop also addressed requirements of our Integrated Distribution Plan Order Point.[10]

1. Workshop 3 Overview

The intent of the workshop was to share information with our stakeholders regarding the forecast processes relied on in the IRP and IDP and to receive their feedback. We discussed:

- The forecasting process in general;
- Detailed information on our forecasting methodologies for electric vehicles (EV), solar photovoltaics (PV), demand response (DR) and load flexibility, beneficial electrification, and energy efficiency; and
- The timing of the various forecasts and how they impact both the IRP and IDP process and consistency between the plans.

The workshop presentation provided specific information on our load and demand forecasts; discussed forecast methodologies and assumptions for technologies including EVs, distributed solar, end-use/building electrification, and batteries; as well as DR and energy efficiency. We also discussed how these forecasts are utilized in both the resource planning and distribution planning processes. This workshop provided ample opportunity for participants to ask questions and to provide feedback on the forecast process utilized in the Company's IRP and IDP process.

2. Workshop 3 Stakeholder Questions and Input

- Several clarifying questions were received from stakeholders.
- We were asked if we are considering dynamic pricing to encourage DR. We indicated that we have on-going dynamic pricing pilots, but that dynamic pricing has not been incorporated into the current forecast. If dynamic pricing is approved, it will be incorporated into the forecast.
- A stakeholder inquired if we consider climate change impacts on weather in the forecasting process. We indicated that while we are not specifically doing this to date, we rely on historical weather normal averages. As the weather changes, it

[10] IDP Order, at Order Point 6.

will be reflected in the forecast going forward. We noted we are also concerned about trying to predict impacts of global climate change on weather and are evaluating ways to incorporate those impacts into the forecast.

- Regarding EV forecasting, we were asked if we conducted a very high EV adoption scenario that surpasses 20 percent by 2030. We explained that we have not conducted this scenario, as it would require every new vehicle purchase in Minnesota to be an EV, taking into consideration the retirement rate of non-EVs. We will continue to monitor the total new vehicles trends.
- We were asked if we would consider the High Electrification Scenario to reflect the impacts of our current and future EV programs or if we see our programs receiving adoption rates somewhere between the Mid and High scenarios. We explained that the high adoption EV scenarios that we evaluate are more aspirational. While our programs encourage higher EV adoption levels, there are numerous external factors that impact whether the higher adoption scenario is realized. The most critical aspect is price parity of EVs with internal combustion engine vehicles. Our forecasting model incorporates price parity and historical adoption trends. Once actuals start to show this growth, the model will incorporate that change.
- We were asked if we have done any work on price sensitivity of EV demand, DR for EVs, and if there are any areas of study for the overlap of Time of Use (TOU) rates and DR. We were also asked if DR participation rates increase or decrease when the customer is on a TOU rate. We responded as follows:
    - Regarding DR, a finding that came out of the measurement and verification study indicates that there was not a change in usage. It was also noted that in the second year, TOU rate impacts tend to be concentrated to a small number of customers but for those customers, the impacts had a large effect.
    - Regarding EVs, we have been operating residential managed charging programs and pilots involving EV-specific TOU rates, and bill credit incentives to encourage EV charging to occur during off-peak system hours. Off-peak hours are from midnight to 6 am, Monday-Friday. We have seen significant sensitivity to on/off peak times, with roughly 90 percent of all charging activity from program and pilot participants taking place during off-peak hours.
- We received a suggestion that we present any building electrification scenarios in terms of the percentage of sector-specific end use that is served by electricity (e.g., 20 percent of residential space heating is electric by 2030). We are considering this feedback but note that building end-use electrification forecasting is still emerging.

- Stakeholders shared feedback on our distributed generation (DG) forecasts and how distribution system constraints are reflected in our forecasts. In response to participant questions on this topic, we indicated that our community solar garden (CSG) forecast is limited by available substation capacity, but our rooftop solar forecast is unconstrained. Stakeholders indicated a desire to see a forecasting scenario that accounts for interconnection constraints, and a scenario that assumes no constraints. In our 2023 IDP, partly in response to this feedback, we reflected the unconstrained scenario in all of our solar LoadSEER modeling because it provides a better indication of where system upgrades and investments may be required.

D. Workshop 4: Planning the Grid of the Future Part 2

- **Logistics**: Virtual: June, 12 2023
- **Attendance**: 26 total participants
- **IRP Order Point**: 9.d- *Xcel shall takes steps to better align distribution and resource planning including: improve non-wires alternatives analysis, including market solicitations for deferral opportunities to make sure Xcel can take advantage of distributed energy resources to address discrete distribution system costs.*

This workshop also addressed requirements from the Commission's IDP Order.[11]

1. *Workshop 4 Overview*

This was the second part of a two-part workshop, with the first part held on May 22, 2023. Part 1 addressed only IDP Order Points and thus is not summarized here. At this workshop, the Company covered grid investment plans, including synergies with hosting capacity, NWA analysis, and the use of weighted average cost of capital (WACC) versus societal discount rates.

The presentation started with an overview of 2023 legislation that impacts the IDP planning process, followed by a brief overview of the IDP planning process. Next, the Company reviewed the mitigation planning process, budgeting process and how projects are prioritized, EV grid investments, and hosting capacity investments. Lastly, we talked through the NWA screening analysis process inclusive of avoided revenue requirements (ARR), stacked values and WACC versus societal discount rates applied.

[11] IDP Order, at Order Points 3 and 6.

This workshop provided ample opportunity for participants to ask questions and to provide feedback to be considered in our plans. In an attempt to obtain more input from stakeholders, this workshop employed the use of Microsoft Teams Polls (Polls). During the workshop, we posed eight questions to participants and received response rates of four percent to 27 percent. Questions posed and responses received were posted to the docket along with the slide deck.

2. Workshop 4 Stakeholder Questions and Input

Stakeholder questions and discussion focused primarily on NWA analysis and DER hosting capacity, with a few additional questions surrounding our budgeting process and forecasting.

- Several clarifying questions were asked by participants.
- Regarding NWA analysis, a stakeholder asked if mandated projects could be considered for NWAs. We responded that this may be possible if a mandated project, in which we are required by a local jurisdiction to move our facilities, includes a capacity component. In our 2023 IDP, we discussed the types of projects that would lend themselves to non-traditional solutions.
- We were also asked if we would consider conducting NWA analysis for projects below the $2 million threshold set in the Commission's IDP Filing Requirements.[12] We indicated that we think $2 million remains an appropriate threshold.
- A stakeholder expressed surprise at the results of the NWA analysis conducted using the weighted average cost of capital (WACC) versus the societal discount rate but opined that the societal discount rate was most appropriate to capture the societal value of an NWA as opposed to building a large generation plant. We clarified that an NWA would not be offsetting a generation plant but would be an alternative to traditional poles and wires upgrades. The NWA analysis considers a wide variety of technology, in front of the meter and behind the meter.
- A stakeholder asked if we have thought about supply set-up for a solar plus storage owner and if we have thought about how NWA contracts will be structured to meet special needs. We indicated that we are evaluating how specific contracts could be structured.
- Regarding hosting capacity and DER, we were asked how important hosting capacity is for meeting local goals for electrification and local solar and if we

[12] See December 8, 2022 Order in Docket Nos. E002/M-21-694 and E002/M-17-897, Xcel Energy IDP Filing Requirement 3.E.1.

would consider adding the hosting capacity layer to the Service Reliability and Service Quality Map so that applicants can view relative hosting capacity by geography and census tract. We indicated that right now, this information is contained in two separate maps and that a side-by-side comparison can be conducted to obtain the desired information. However, we are considering combining this information into one map in the future.

- A question was posed if there are any areas that can be considered a priority area for where DERs could be sited with lower interconnection costs, which would guide the development of DERs. We explained that the hosting capacity map is the best tool to guide DER development; the green areas of the hosting capacity map will have comparatively lower interconnection upgrade costs.
- A stakeholder asked if we had considered dynamic curtailment as a way to address a limitation identified in an interconnection study. We indicated that this is also known as flexible interconnection, and it is something we are trying to study more as the data becomes available. We are currently involved in a study about this with the Electric Power Research Institute (EPRI). We were also asked if we can incorporate state and local goals around electrification. We indicated that we are required to consider local goals as part of the IRP, and this year, we sent a survey to community members asking them about their clean energy goals to ascertain that we will be able to help communities meet their goals. The survey is discussed in Appendix V: Community Goals and was also addressed in the 2023 IDP.
- We were asked to provide more detail in our upcoming filing on how the "as funds allow" portion of the budget is calculated, including an explanation regarding where that funding comes from. In the 2023 IDP filing, we discussed how our budgets are developed each year using a "bottoms-up" approach.

Lastly, we were asked if we would be willing to share a draft copy of the IDP before it is officially filed, if we will be providing a preview before filings, and if we could provide the stakeholder workshop report to the Interested Parties List. We responded that we intended to hold an IDP preview workshop for stakeholders in September 2023, and that we would send a copy of the stakeholder workshop report to the Interested Parties List via email upon filing. We also indicated that stakeholders are also welcome to comment on our IDP after it is filed. A copy of the stakeholder workshop report was sent to all participants of any of the IDP workshops on August 1, 2023 and the IDP Preview was held September 19, 2023.

3. Poll Input

In an effort to obtain more input from stakeholders, this workshop employed the use of Microsoft Teams Polls (Polls.) This application allowed us to present questions to participants to generate more input on specific topics. We also posed open-ended questions to generate conversation. Participation in the Polls was not mandatory. During the workshop, we posed eight questions to participants and received response rates of 4 percent to 27 percent. See Table S-3 below for questions and a summary of responses:

Table S-3
Planning the Grid of the Future (Part 2) – Polls Questions and Responses

Question	Summary of Responses
1) What do you recommend that we do to proactively prepare for EV adoption?	Stakeholders suggested partnering with EV providers to gauges sales in the region, appliance disaggregation, load hosting capacity analysis, load control to disable charged when load is needed for grid support, proactively upgrade transformers, time of use rates for all customer classes, and upgrading the grid to prepare.
2) How should we identify and prioritize locations for the Hosting Capacity Program?	Stakeholders identified equity, looking at locations with known capacity constraints, planned locations for public EV charging stations, upgrading communities who are hosting many megawatts of CSG and larger DG installations, and having a common understanding of what grid access means. We will consider these ideas in our plan for the distributed energy resources system upgrade program, which we must file with the Minnesota Department of Commerce by November 1, 2023. (See Docket No. E002/M-23-458.)
3) Ideas on alternative methods to allocate costs of distribution system upgrades?	One stakeholder responded, noting an emerging approach in some states to charge the first DG applicant for a part of the upgrade with the expectation that the next DG applicants would pay their prorated share going forward. We will consider this in the forthcoming IDP. (We discussed this approach in Appendix I of the 2023 IDP.)
4) Is our ARR split methodology a fair approach to cost-sharing NWAs?	All five respondents indicated that they were not sure.
5) Should Xcel Energy continue to conduct NWA analysis using both the WACC and societal discount rates?	Five respondents thought it was appropriate to continue to utilize both methodologies and three were not sure.
6) What is your prioritization of the NWA roadmap items?	The weighted results indicated the LoadSEER enhancements were most important and 8760 NWA analysis, potential stacked value additions and automation of efficiency improvements all tied for second.
7) Do you agree with the direction of our planning process?	Three somewhat agreed, two were neutral and two somewhat disagreed.
8) Are there other ways participants you would like provide input on the IDP process?	One respondent indicated that they would like to see more discussion around the use of Flexible DER Interconnections using Dynamic System Ratings. Another participant indicated that they would like to have the opportunity to speak with Xcel Energy engineers one on one. In our view, the series of six workshops provided covering the IDP process has provided ample opportunity for stakeholders to ask detailed, specific questions of the Company's engineers who presented and were available throughout the duration of the workshops to receive feedback and answer questions.

E. Workshop 5: Resource Modeling

- **Logistics**: <u>Hybrid (In-Person and Via Conference Call):</u> August 8, 2023
- **Attendance**: 41 total participants 9 in-person and 32 virtual participants
- **IRP Order Point**: 3(c)- *Xcel shall analyze this likely need [for firm dispatchable resources] based on up-to-date system-wide modeling, including corrected modeling of wind fleet variability and of exchanges with MISO, in order to –*
  1) *establish the capacity, energy, resource adequacy, energy availability, ancillary service, and reliability needs, and*
  2) *quantify and compare the contribution of the electric system attributes from the different resource options considered to meet the identified grid needs.* And
- **IRP Order Point** 10(e) and (f)- *In its next resource plan Xcel shall, either through its Integrated Distribution System Plan proceedings or through another stakeholder process, develop and/or improve its forecasts of the adoption rate for the following technologies, to be used in Xcel's base case scenario and its overall demand forecast. (E) Increased potential for demand response and load flexibility from an increase in electrification of the technologies in A–D. (F) Adoption of distributed solar-powered generators—including generators sited by customers, community solar gardens organized under Minn. Stat. § 216B.1641, and generators that are neither sited by customers nor related to community solar gardens.* And
- **IRP Order Point:** *12- Xcel shall include in its next resource plan a deeper analysis of (1) storage options, including options combining solar generation and battery storage, and (2) the role of hydrogen and clean fuel alternatives in Xcel's resource mix. In preparation, Xcel shall work with stakeholders to develop a fair basis for comparing the full supply-chain and life-cycle carbon impacts of the generation and storage resource options under consideration to help the Commission evaluate the "adverse socioeconomic effects and adverse effects upon the environment" of each option, pursuant to Minn. R. 7843-0500, subp. 3.C.* And
- **IRP Order Point:** *15- Xcel shall work with stakeholders to develop a modeling construct that enables Xcel, as part of its next resource plan, to model solar-powered generators connected to the company's distribution grid as a resource. Xcel and stakeholders shall address the following factors in developing the modeling construct:*
  A. Using a "bundled" approach as is used to model energy efficiency and demand response.
  B. The costs borne by the utility and the costs borne by the customer.
  C. Cost effectiveness tests.
  D. Other topics as identified by stakeholders.

  Xcel shall include improved load flexibility and demand response modeling methodologies prospectively, including in its next resource plan.
- **IRP Order Point:** *16- In its next resource plan, Xcel shall account for local clean energy goals, in aggregate, in forecasting and modeling. In particular, the plan should include consideration of local community generation goals for distributed generation.*

1. *Workshop 5 Overview*

At this workshop, the Company shared information regarding several aspects of our modeling approaches for the next IRP. The workshop included an overview of our EnCompass modeling process and objectives as well as our planned approach for modeling inputs- including generation and demand-side resources- and new analysis approaches used in the IRP.

The presentation started with an overview of the Xcel Energy IRP process including a refresher on IRP goals and objectives and modeling tools employed; a discussion of statutes and rules governing the process; and how equity fits into the process. This was followed by a presentation of the economic modeling framework steps taken, and what we plan to include in the 2024-2040 IRP baseload scenarios which was followed by a discussion of examples of sensitivities that will be run to help address portfolio risk and to ultimately inform the preferred plan. A listing of generic resource technology and changes from the last IRP were discussed. Information pertaining to options inclusive of cost and performance data sources and how profiles of generic wind and solar will be developed; key renewable and battery input assumptions; impacts of new tax credits and interconnection costs; alignment of the IRP and IDP and sensitivities used; incorporation of demand response and energy efficiency bundles; and details of the Energy Conservation and Optimization Plan were shared. The presentation wrapped up with a discussion of new factors and approaches to be incorporated such as the recent 100 by 2040 legislation, Community Solar Garden and DG solar requirements, new environmental regulations; and changes to the MISO construct. This was followed by an overview of the Lifecycle Emissions Analysis that was undertaken and results noted.

This workshop provided ample opportunity for participants to ask questions and to provide feedback to be considered in our plans. As with prior workshops, we used Polls to draw out stakeholder input. During the workshop, we posed five questions to participants and received response rates of 29 percent to 68 percent. Questions posed and responses received were posted to the docket along with the slide deck.

2. *Workshop 5 Stakeholder Questions and Input*

Stakeholder questions and discussion focused primarily on NWA analysis and DER hosting capacity, with a few additional questions surrounding our budgeting process and forecasting.

- Several clarifying questions were asked by participants.
- Several stakeholders made comments pertaining to incorporation of equity into the process with emphasis on clean energy benefits and accessibility.

We indicated that we are still working through the incorporation of equity into the process and that we would appreciate feedback on this. It was also indicated that the IRP process focusses on need versus resources and that equity considerations are easier to incorporate into the actual selection process. We have established the Equity Stakeholder Advisory Group (ESAG) and have received input from members. As well, we will be forming an Environmental Justice Accountability Board (EJAB) and will be discussing equity matters with that group going forward.

- A request was made that the cost/benefit analysis for Prairie Island (required in Order Point 23.E of the Commission's order approving the Company's prior IRP) be clearly connected to the assumptions used in IRP modeling. The Company will ensure this is the case by providing the EnCompass model outputs to the contractor we have engaged to run cost/benefit analysis modeling scenarios using the REMI E3+ model; in essence, the EnCompass outputs will be the inputs to REMI, ensuring consistency in assumptions. For further details see Appendix M: Nuclear.
- One stakeholder indicated their concern about the inclusion of advanced nuclear technology and also wondered if we were considering virtual power plants in the plan. Virtual Power Plants have been incorporated into our planning evaluations detailed in Appendix X: Advanced Technologies.
- Questions regarding usage of green hydrogen were asked- if we would be producing our green hydrogen, purchasing it off the market or selling excess to the market. We indicated that we are still in the planning stages of producing green hydrogen- with the thought being that we would likely produce it for our own consumption but that if excess were available we could consider selling that.
- We were encouraged to not model sources on 100 percent natural gas when they may eventually operate on hydrogen and to not keep these two fuel sources separate.
- We were asked how we intended to incorporate proposed EPA greenhouse gas rules (NSPS 111(b) and (d)) into modeling. We indicated that we intend to include the proposed rules in our analysis. This rule has been incorporated into the environmental policy sensitivity, limiting operation of impacted existing combined cycle units to a capacity factor less than or equal to 50 percent and limiting new combustion turbines to a capacity factor of 20 percent.
- A stakeholder noted that the DG standard is not 1-10MW but simply 10 MW.
- A stakeholder inquired if we intended to have additional conversations with stakeholders regarding the DG modeling construct. We indicated that we have held meetings with stakeholders on this and that future meetings were expected. A summary of these conversations follows below.

- Regarding Order Point 15, a stakeholder wanted to note that the 3 percent solar carve out is a floor and not a ceiling. The comment was noted.
- It was asked if the model could go beyond the 3 percent. We indicated that we are still assessing this and that the impact on affordability would need to be considered.
- We were asked why DG was not included for the generic resources as base load. We indicated that the theory is for the base model to be the middle of the road scenario with sensitivities evaluated to determine what level of renewables can be achieved.
- It was noted that in the last IRP there wasn't addition of wind until 2026 and we were asked if that could also happen on the solar side. We indicated that we would consider that.

3. Poll Input

As with the prior workshop, we again used Polls in Microsoft Teams and also used OpinionX to obtain stakeholder input. We also asked open-ended questions to prompt discussion. During the workshop, we posed five questions to participants and received response rates of 12 percent to 63 percent. See Table S-4 below for questions and a summary of responses:

Table S-4
Resource Modeling – Polls Questions and Responses

Question	Summary of Responses
1) How would you weight the following core planning objectives? (Distribute 100 total points across the 5 categories) Environmental, Cost, Reliability, Risk, Other	1. Environmental 785 Points 2. Reliability 775 Points 3. Cost 680 Points 4. Risk 515 Points 5. Other: Unidentified 35 Points 6. Other: Equity distribution of Cost/Benefits 15 Points 7. Other: Socioeconomic 5 Points
2) Please rank the following in order of importance as they pertain to addressing equity: 1) Involvement in decision making opportunities 2) Access to renewable distributed generation 3) Affordability 4) Job/Workforce Opportunities 5) Decreased exposure to environmental impacts 6) Energy efficiency program accessibility	1. Affordability 130 Points 2. Decreased Exposure to Environmental Impacts 110 Points 3. Energy Efficiency Program Accessibility 101 Points 4. Job/Workforce opportunities 93 Points 5. Involvement in Decision Making Opportunities 84 Points 6. Access to Renewable Distributed Generation 65 Points
3) What additional metrics would help us evaluate these core planning principles?	Responses included: protecting life; level of DER adoption and distribution-level interconnection; equity; people; EV adoption; resiliency; updated capacity factoring; factoring in long term

Question	Summary of Responses
	perspective and looking at cutting emissions and future benefits; land use; baseload vs. dispatch generations; affordability; extreme weather events; and growing income disparity
4) What types of additional Demand Response, otherwise known as load flexibility, do you envision?	Responses included: EVs as energy source; time of use rates; EV flexibility; behind the meter; microgrids; batteries as an aggregate resource; EV's and other behind the meter storage; large scale batteries as technology permits; distribution resources and microgrids for further distribution build out; third party aggregators of DR and Virtual Power Plants; and electric heating using Bitcoin mining.
5) Rank the policy and planning changes in the order you think they will have the most impact on our plans: 1) 100 x 40 2) MN CSG and DG Solar Programs 3) Federal Incentive Programs 4) MISO Resource Adequacy Changes 5) EPA Power Plant Regulations	1. MN 100x40 92 Points 2. MISO Resource Adequacy Changes 69 Points 3. Federal Incentive Programs 67 Points 3. EPA Power Plant Regulations 67 Points 5. MN CSG & DG Solar Programs 50 Points

F. IRP Workshop Survey Results

After the conclusion of the IRP and IDP workshop series, we requested feedback on the series through an online survey. We sent the survey to everyone who participated in one or more of the IRP and IDP workshops. The intent of the survey was to obtain feedback on the workshops in order to inform future efforts. The survey included questions pertaining to duration, frequency, location, satisfaction and if the level of information shared was appropriate. Also, we requested feedback on how we could improve stakeholder efforts going forward and if there was support for similar workshops in the future. Of the nearly 160 emails sent requesting a response to the survey, we received six responses, or a response rate of approximately four percent. Those that did respond indicated that:

- They found the duration of the workshops was just right.
- The workshops were informative and helpful.
- They felt they had a better understanding of the process after participation.
- Regarding venue location, one participant suggested that the workshops be held in a location other than downtown Minneapolis, and one indicated that the venue location affected their decision to attend in person.
- Regarding the level of detail that was provided, the majority of respondents found the level of detail "just right." One respondent indicated that they found that the information was often very technical and that while they found they were offered ample opportunity to ask questions and provide feedback, it was difficult to be able to do so while absorbing the information and suggested a more basic conversation. On the other hand, one respondent felt the information shared was too simplified.

- All but one respondent found that the IRP process was about what they expected- with one finding it more complex than expected. Three indicated agreement with our planning process and the other three did not respond to this question. No additional information was offered.
- Four respondents indicated satisfaction with the stakeholder process and two did not. One that did not agree indicated they felt that it would be helpful to have an even more basic explanation of some of the topics covered so that they are accessible to those working on these matters for the first time. The other expressed appreciation for all the effort put into the workshops but suggested the sharing of the presentation prior to the workshop for review by registrants so that they could be better prepared to ask questions.
- Five respondents indicated that they felt they had sufficient opportunity to offer input during the workshops. The one that indicated they didn't have sufficient opportunity pointed to the poll questions being simplified on complex topics and felt that workshop leaders were guiding the answers.
- Two respondents provided feedback on how we could improve the stakeholder process going forward. One suggested sharing an even more basic explanation of the topics for those new to the work. The other suggested the pre-sharing of slides and holding smaller group discussions instead of broader discussions.
- All supported the Company hosting a series of workshops again in the future.

We appreciate the valuable feedback provided by the six survey respondents and will consider the feedback received in future workshops.

IV. ADDITIONAL OUTREACH EFFORTS

A. CSG and 3 Percent Solar Mandate Discussions with CEO's

1. July 20, 2023 meeting

On July 20, 2023, a roundtable discussion was organized by Xcel Energy with members of the Clean Energy Organizations[13] (CEO's) to gather feedback on potential impacts to the distributed solar modeling constructs, discussed in Order Point 15, by recent legislation requiring three percent of retail electric sales in Minnesota be generated from solar systems constructed or procured after August 1, 2023 by 2030.[14] The CEO's indicated that they do not expect any changes to the Order Point 15 distributed solar

[13] Representatives from Vote Solar, The Institute for Local Self-Reliance and Fresh Energy participated in the discussion.
[14] Minn. Stat. § 216B.1691, Subd. 2h, amendment effective January 1, 2024.

modeling constructs resulting from the new 3 percent mandate. Their interpretation is that the 3 percent requirement will likely occur in front of the meter while solar bundling will likely occur behind the meter. We agree with this interpretation and will proceed to develop a solar bundle modeling construct in addition to incorporating the 3 percent requirement into our Resource Plan.

2. *October 24, 2023 meeting*

On October 23, 2023, a second roundtable discussion was organized by Xcel Energy with members of the Clean Energy Organizations[15] (CEO's) to further discuss the distributed generation (DG) solar bundle modeling construct, as directed in Order Point 15. This discussion was geared solely towards new selectable DG solar bundles not already included in the base case, and bundles above and beyond the 2023 Community Solar Garden (CSG) and three percent legislation. The Company presented details regarding the DG solar modeling framework presented by the Institute for Local Self-Reliance (ISLR) in the last IRP and the parties had an extensive discussion about updated model assumptions. The parties agreed using assumptions in the 2023 National Renewable Energy Laboratory (NREL) ATB, where applicable, was reasonable. In addition, solar bundle sizing, bundle pricing impacted by lending rates, and representative operation and maintenance costs were discussed. The suggestion was made that the cost benefit tests be consistent with the National Standard Practice Manual for Benefit-Cost Analysis of Distributed Energy Resources.

B. Modeling Assumption Discussions

1. *Department of Commerce Modeling Assumption Discussion*

On October 2, 2023, the Company met virtually with representatives from the Department of Commerce (DOC) to share our IRP modelling assumptions and to receive feedback and input on the assumptions. We also addressed a set of questions sent prior to the meeting by the DOC. These questions addressed seasonal modeling, the MISO construct, resource acquisition, scenarios, modeling assumptions and pricing assumptions.

2. *Public Utilities Commission Staff Modeling Assumption Discussion*

As well, the Company met virtually with MN Public Utilities Commission Staff on October 9, 2023 to discuss our IRP modelling assumptions and to receive their

[15] Representatives from Vote Solar, Sierra Club, Fresh Energy and MN Center for Environmental Advocacy participated in the discussion.

feedback and input. We discussed the MISO construct, various scenarios, optimization of EnCompass modeling for seasonal impacts, major assumption changes such as MISO accreditation, IRA assumptions, policy changes, long term duration storage, distributed generation modeling, forecasts and local clean energy goals.

C. RFP 101 Workshop

On October 12, 2023, the Company hosted a Request for Proposal (RFP) 101 Workshop. The idea for this workshop arose from Xcel Energy's Equity Stakeholder Advisory Group (ESAG) engagement meetings. As part of a broader discussion in ESAG on diversifying the energy workforce, we heard from ESAG members that the Company should take steps to increase participation of Black, Indigenous and People of Color (BIPOC) organizations in the RFP bidding process. The intent of this workshop was to share general information about the NSP RFP bidding process for new generation resources to interested bidders. As well, we also hoped to learn information that could help our design of future RFPs and further ensure a fair and competitive process.

The Workshop focused on RFPs for generation resources that serve the bulk NSP system, such as utility scale generation sources or large distributed generation. The workshop did not cover rooftop distributed generation or Community Solar Gardens or any specific RFPs.

The workshop invitation was submitted to the IRP docket, to our MN DER distribution list comprised of 2,908 individuals, to our "RFP Renewables Release List" comprised of an additional 90 individuals, and to our ESAG distribution list. This workshop generated significant interest with 88 external participants attending the workshop.

V. CONCLUSION

We appreciate stakeholders' participation in these workshops, for input received and questions asked. We recognize that the scheduled time for the entire series of workshops was more than 16.5 hours, which is an extensive time commitment for stakeholders. The Company hopes that participants found the workshops informative, useful, and an effective way to provide us their input and feedback. We took great effort to ensure that stakeholders had every opportunity to ask questions and provide feedback. Based on feedback obtained at workshops and through survey results the stakeholder workshop series was successful in that stakeholders found it informative and were supportive of Xcel Energy hosting a series of workshops again in the future.

From the Company's perspective we found it successful in that we were able to receive valuable input from our stakeholders.

Where feasible, we have incorporated specific stakeholder input into the IRP process, as noted above in the workshop summaries. We are tracking all input that has not been incorporated directly and we will continue to consider and, where feasible, incorporate this feedback in the future.

We are committed to continuing to deliver reliable, affordable, and clean energy to our customers. This commitment requires a rigorous planning process that reflects the input and priorities of stakeholders, including the Commission, our customers, and the communities we serve.

We appreciate the interest and desire for our stakeholders to be involved and help shape the future of our system, their willingness to participate in these workshops and provide us their input.

APPENDIX T – MISO GRID CONGESTION

I. INTRODUCTION

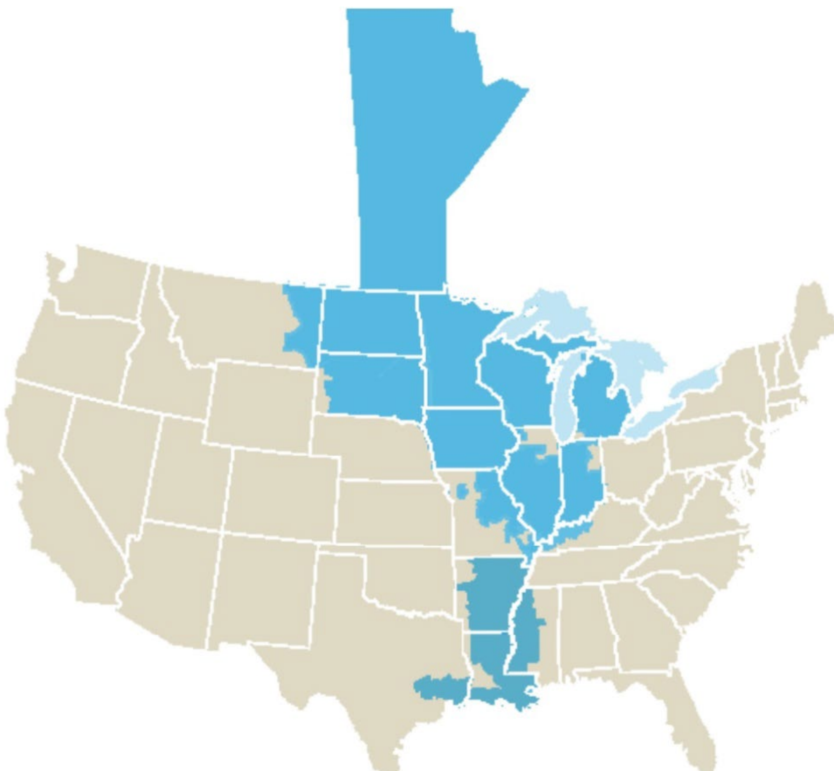
Congestion is a complex issue that requires careful planning, management and coordinated efforts from multiple stakeholders. Here we provide an overview of the problem of congestion as it relates to resource planning and outline the steps, we are taking to address it. Though we cannot address congestion alone, we are looking for solutions to address congestion for our customers' benefit and furthering policy objectives. We have engaged in multiple efforts to find and mitigate transmission constraints. While many of our investments target physical improvements to constraints impacting our system, we are also reviewing regional policies to ensure adequate measures are in place to avoid future congestion impacts.

II. DEFINING GRID CONGESTION

The grid is facing new challenges as traditional baseload units retire, large scale renewables deployment increases, and Distributed Energy Resources (DER) are increasingly adopted. Sustainable, clean energy depends upon the necessary infrastructure to support the delivery of electricity from remote renewable resources to more heavily populated load centers. The Xcel Energy operating companies NSP-Minnesota and NSP-Wisconsin, operate an integrated transmission system (the NSP System) that comprises more than 8,400 miles of transmission and sub transmission facilities operating at voltages between 23.7 kilovolts (kV) and 500 kV, and approximately 550 transmission and distribution substations. The NSP System is within the Midcontinent Independent System Operator (MISO) footprint and serves retail customer loads in Minnesota, North Dakota, South Dakota, Wisconsin and Michigan.

A fundamental responsibility of transmission system operators is to ensure reliable operation of the transmission system. The Mid-continent Independent System Operator (MISO) is the regional transmission organization (RTO) which operates the transmission system and an energy market in parts of 15 states and the Canadian province of Manitoba. As an RTO, MISO is responsible for planning and operating the transmission system within its footprint in a reliable manner. MISO also provides operational oversight and control, market operations, and oversees planning of the transmission systems of its member Transmission Owners (TOs). MISO has 48 TO members with more than 65,800 miles of transmission lines that are under MISO's functional control.[1] MISO's members also include 128 non-TOs such as independent power producers and exempt wholesale generators, municipals, cooperatives, transmission dependent electric utilities, and power marketers and brokers.[2] A map of MISO's geographic footprint is provided in Figure T-1 below.

Figure T-1: MISO Footprint



MISO is responsible for managing the flow of electricity on the transmission system. MISO does this by balancing the generation and consumption of electricity and ensuring the reliability of the electric grid. MISO accomplishes this as part of its duties as an Independent System Operator (ISO) by not only scheduling and dispatching

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[1] *See* MISO, *Fact Sheet* (updated Mar. 2023), *available at* https://www.misoenergy.org/about/media-center/corporate-fact-sheet/.

[2] A complete membership list of MISO members by stakeholder group is available at: https://www.misoenergy.org/Library/Repository/Communication%20Material/Corporate/Current%20Members%20by%20Sector.pdf.

generators, but also operating a day ahead and real-time energy market system for electricity which is designed to provide pricing signals that encourage the efficient use of generation resources and transmission capacity.

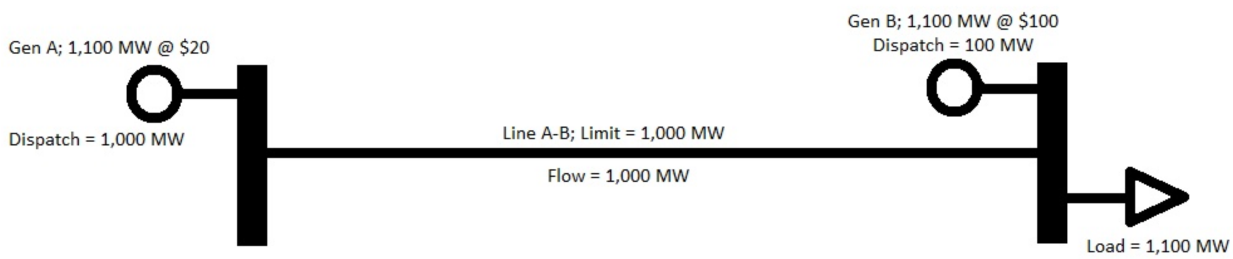
Limits on transmission facilities can prevent MISO from dispatching the most efficient generation resources during all hours of the year, thereby increasing wholesale energy costs. Transmission constraints are the physical limits on the amount of electricity flow the system is allowed to carry in order to ensure safe and reliable operation. Transmission constraints occur at different points on the transmission system, such as transmission lines, substations, or in specific regions. Regardless of the source, these constraints result in bottlenecks in the transmission system, and higher costs for electricity delivery.

These transmission constraints create inefficiencies in the wholesale energy market and increase costs through shadow prices. Locational marginal prices (LMPs) are economic indicators used to reflect the value of electricity at specific locations within the grid. MISO calculates LMPs for over 2,000 nodes. LMPs include marginal energy costs (i.e., cost of generating the last megawatt-hour MWh of energy in order to balance supply and demand in the market) as well as congestion costs and transmission losses. Collections of nodes are often represented by zones or hubs that provide a summary of regional prices and a benchmark for forward trading of power. When there is congestion in the transmission system, shadow prices signal the congestion cost savings for increasing a given transmission path by 1 Megawatt (MW). Shadow prices are used throughout the industry to determine which transmission paths or flowgates are the most congested and are used by the market model to set LMPs at different nodes throughout the system. The price of electricity is not uniform across the grid due to constraints and losses. Ignoring the effect of transmission losses, when no transmission constraints are restricting economic dispatch, all marginal prices at all points would be identical. If there is a constraint, the marginal prices on two sides of the constraint will differ. The difference in price is an economic measure of congestion.

Transmission congestion refers to the economic impacts on the users of electricity that result from operation of the system within these limits. Congestion occurs when demand for electricity in a particular region exceeds supply, and there is insufficient transmission capacity to move the least costs generation to customers. Once the system is overloaded, cheaper generation cannot be dispatched, and more expensive generation is used to serve load. Higher cost generators from areas without transmission constraints must be used to meet customer demand, thereby raising the price of electricity.

Figure T-2 is an illustration of how congestion affects the energy used and pricing in a single moment of time. The illustration assumes an energy need of 1,100 MW that could be supplied by two potential generators, one at a charge of $20 per MW and one at $100 per MW.

Figure T-2: Congestion Illustration



In this theoretical intact system, Generator A could serve the entire 1,100 MW needed, but cannot do so because of the 1,000 MW limit on Line A-B. Instead, Generator A's dispatch is limited to 1,000 MW and Generator B will be called on to deliver the 100 MW balance. If Generator A were able to deliver the entire 1,100 MW it can generate, the energy cost would be $22,000 assuming no energy is lost during transmission. Due to system constraints, the total cost to deliver the 1,100 MW rises to $30,000 because 100 MW cannot be delivered, and replacement energy is required (1,000 MW X $20 for Generator A plus 100 MW X $100 for Generator B). In short, the congestion causes the overall cost of energy to increase $8,000 or 36 percent based on this simplified example. When there is no congestion, the lowest cost generator, regardless of fuel source, is the one that serves load.

Managing congestion is critical to minimizing costs associated with electricity production and transmission and enabling further investments in renewable energy. LMPs play a crucial role in managing grid congestion and optimizing the operation of the electricity market by using economic indicators to manage the flow of electricity. However, congestion also represents increased prices for our customers. By addressing the causes of congestion directly we can work to mitigate its impact on electricity prices.

III. CAUSES AND IMPACTS OF GRID CONGESTION

Generally, we see congestion on the transmission system because of the increasing demands for electricity, both in terms of load, and the changing generation mix of its supply. Integrating new renewable generation can lead to congestion on the MISO system, causing transmission constraints as the system may lack the flexibility to accommodate further resources without physical improvements. The existing transmission infrastructure may be outdated, in need of significant upgrades, or unable to accommodate additional generation leading to congestion as energy must find alternative pathways to get to customers. Further, policy may also contribute to congestion through unintended impacts. While there are many causes of congestion, its impact on higher prices for our customers must be accounted for in our system planning.

Across our footprint we are experiencing significant growth in energy demand, prompting us to seek innovative solutions to meet the increasing electricity needs of our customers. One prominent approach has been an escalating reliance on wind and solar generation. With its abundant wind resources and the growing solar potential, the upper Midwest is emerging as a leader in renewable energy deployment. Wind farms are becoming a common sight across the region and solar installations, ranging from rooftop arrays to large-scale solar farms, are proliferating, harnessing the region's sunlight. By harnessing wind, solar and other forms of renewable energy, we are striving to meet the surging energy demand while achieving a greener and more sustainable energy future.

The growth in renewable generation may both increase and decrease the need for new transmission. As legacy units retire, they are often being replaced by wind and solar generation, but the fuel sources for these resources are often locationally dependent. Regions with favorable conditions, and abundant resources are not often located near load centers. Historically, transmission lines delivered power from large scale base load generators to population centers. The infrastructure needed to support the dispersed replacement generation for retiring baseload units is continuously growing.

While there are abundant levels of wind, solar, and even biomass in the Upper Midwest, often they are located in more remote locations. Siting renewables in these remote locations requires new or upgraded transmission to efficiently deliver energy to load centers. More remote areas lack the necessary transmission infrastructure for large scale renewable projects due to their lower population density, and lower historical electricity demand as they were not historically prioritized with for extensive transmission infrastructure development in the past. As a result, the existing transmission system does not always have the capacity to accommodate the additional power generated by large renewable energy projects.

Further, in addition to the physical constraints mentioned, fuel costs can increase congestion impacts. Congestion costs can be exacerbated by high natural gas prices due to natural gas fueled generation generally being dispatched to offset congested renewables due to the natural gas generation's flexibility and distance to the load.

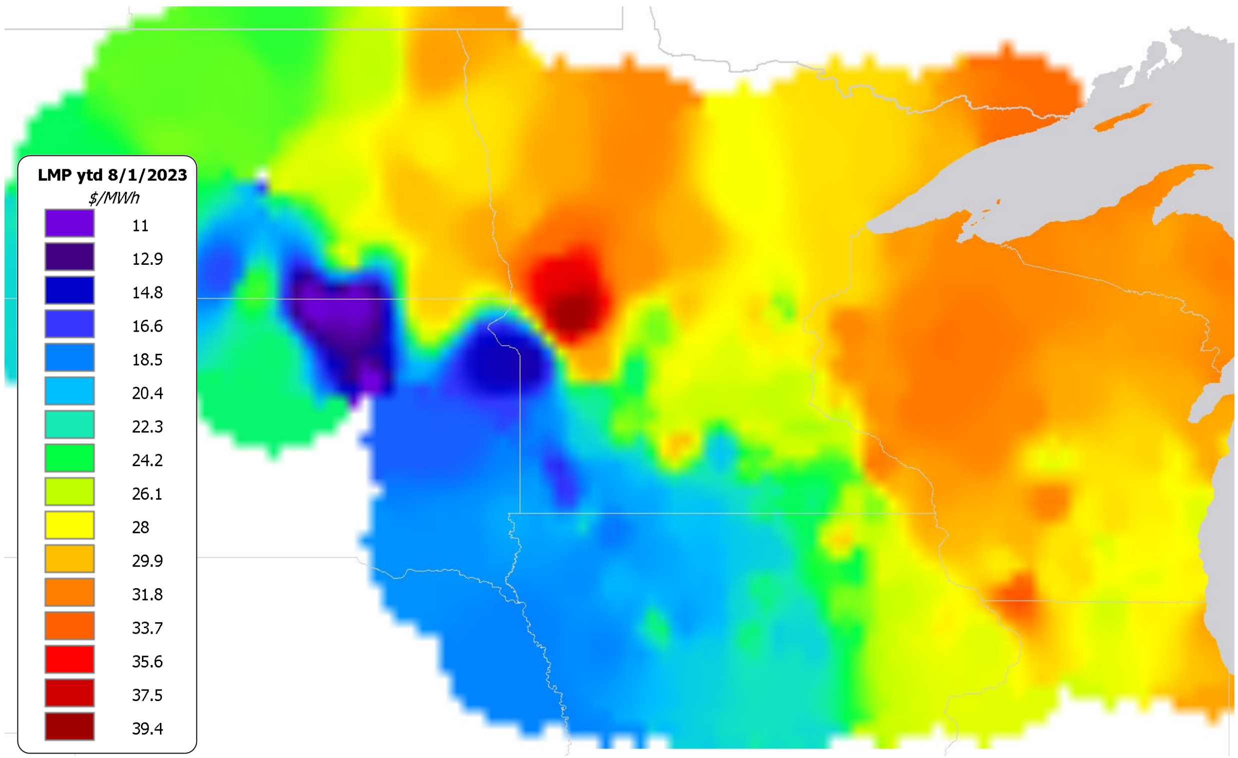
Finally, as mentioned, policy may also contribute to congestion through unintended impacts. We identified congestion impacts that resulted in increased costs to customers as part of the MISO Generator Interconnection Process. One of the ways in which MISO exercises its role of managing the flow of electricity is by analyzing transmission service requests by parties looking to use the transmission system. The MISO Generator Interconnection Process is used to analyze interconnection requests for new generators connecting to MISO facilities to ensure the reliability of the transmission system and ensure the deliverability of new and existing network resources.

In our work with MISO and stakeholders, we found that the MISO Generator Interconnection Process had resulted in increased costs to customers though the thresholds in which generators were made responsible for upgrade costs, and how the dispatch of resources in the Interconnection Process study were being implemented. The MISO thresholds at the time the issue was identified were that a 5 percent or greater contribution would require a generator seeking Network Resource Interconnection Service (NRIS) to pay for an identified upgrade. For a generator seeking Energy Resource Interconnection Service (ERIS), a contribution level of 20 percent or greater was required to be assigned the costs of an upgrade. This resulted in needed upgrades being identified during the System Impact Study efforts, but due to contribution levels being below the thresholds, these constraints were not being mitigated.

Over time we have seen increasing congestion on the MISO system. As a visual representation, we can examine historical congestion through examining the average LMPs on MISO system. Figure T-3 shows LMPs on the MISO system in our area year to date as of August 1, 2023.[3]

[3] Hitachi Energy Velocity Suite simple average, LMPs on the MISO system in our area year to date as of August 1, 2023.

Figure T-3: MISO Historical LMP Averages



Areas which are dark blue to purple show low average LMPs and represent the market signal an abundance of generation and a lack of load while orange to dark red signal an abundance of load, and lack of generation. Regions with a drastic price difference in a relatively short distance are highly congested areas signaling constraints on the system.

Currently, wind generation from the western part of MISO flows toward the load centers in the east, such as the Twin Cities Metro area and load centers beyond the transmission interconnection between Minnesota and Wisconsin. The existing west-to-east transmission capacity is at times operating at its limit. The transmission interface across the Minnesota-Wisconsin border is currently stability-limited and trying to force additional renewable energy through these lines could result in voltage collapses in Northern Wisconsin that would destabilize the grid. This forces us into curtailing wind energy at its source in the west as it is operationally and economically inefficient to utilize the inexpensive and clean energy to which we have access.

Table T-1 below shows congestion and curtailment information for 2022 and 2023. These are the official curtailment values and reflect the curtailment billed to the Company. The months where the curtailment data was not available, we used the MWh derived in our monthly curtailment estimate calculation. The costs for these months were the MWh from our estimate, multiplied by the average monthly cost of curtailment.

Table T-1: Congestion and Curtailment Costs for 2022 and 2023

[PROTECTED DATA BEGINS

PROTECTED DATA ENDS]

The monthly costs (listed as negative values) of recent congestion impacts are provided in Table T-1 in the column titled Total Impact. Monthly Total Impact is the sum of the Congestion and Curtailment costs, offset by Financial Transmission Right (FTR) revenue. Curtailment and Congestion are considered negative and Financial Transmission Right (FTR)s are considered revenue positive in the calculation.

While curtailment and congestion costs are dependent on transmission outages and wind levels, overall, these numbers show higher costs than we have experienced in the in recent history. This increasing curtailment is the result of several various aspects of system operations, but a common factor is that the Upper Midwest MISO transmission system has become oversubscribed and unable to support all the wind generation that has recently gone into service. For instance, in 2022 wind generation went into service before the completion of transmission upgrades required for the generation to interconnect were complete, causing several transmission outages. In other words, there was more wind generation installed in the western subregion of MISO than could be delivered to meet customer demand throughout the MISO footprint. Without additional transmission development, and steps to mitigate these impacts, we will more frequently encounter this problem as we add more renewable generation to our system.

Beginning in June 2020 the NSP system began to see a significant increase in congestion costs in MISO settlements, exhibiting another step increase in April 2021. For 2023 through June, congestion costs have fallen off to some degree as compared to 2022; however, there remains significant volatility as observed in April 2023 and may increase moving forward in 2023 and 2024. Therefore, to better align the 2024 forecast with costs expected for congestion, we have updated our MISO cost and revenue forecast to include data inclusive of results observed for April 2021 through June 2023 which are annualized to provide the forecast for 2024. Figure T-4 shows NSP congestion costs from January 2019 to June 2023.

Figure T-4: NSP Congestion Costs

[PROTECTED DATA BEGINS

PROTECTED DATA ENDS]

IV. EFFORTS TO ADDRESS CONGESTION

Managing congestion is crucial for minimizing production and transmission costs and facilitating investments in renewable energy. A strong transmission system ensures continued reliable and affordable service, and the ability to meet state and regional energy policy goals, and support for a diverse generation mix, including renewable energy.

Congestion costs are directly affected by transmission investment. If transmission investment removes a constraint to relieve congestion, then the investment will reduce congestion costs to customers. The congestion costs avoided are a direct measure of the economic benefit from, or value of, this investment. However, projects must be measured to ensure the value of the investment exceeds the costs.

Upgrading or replacing aging infrastructure helps ensure the safe and efficient transmission of electricity, however constructing transmission lines can be technically complex, expensive, and time consuming. Developing or upgrading transmission infrastructure requires significant planning and coordination, obtaining all necessary permits and regulatory approvals. As a project's scale increases, so do the permitting and environmental considerations. Anticipated benefits, by themselves, may or may not be sufficiently large and recurrent to warrant the investment and reducing congestion costs is not the only economic benefit that might justify a transmission investment. Robust analysis is needed to determine which projects to pursue.

The MISO Transmission Expansion Plan (MTEP) is a comprehensive process undertaken by MISO to assess, plan and propose transmission system improvements within its operational footprint. MTEP aims to ensure reliability, efficiency, and the cost effectiveness of the electrical transmission infrastructure within the MISO region through identifying needs, developing scenarios, studying alternatives, performing cost benefit analysis, and conducting stakeholder engagement. The MTEP process aims to address congestion and level the playing field for all generators to deliver their energy based on supply and demand. This in turn ensures that the energy market operates in the most efficient and cost-effective manner.

MISO adheres to the planning principles outlined in FERC Order No. 890 and 1000 in developing the MTEP. These FERC Orders require an open and transparent regional transmission planning process and include the requirement to plan for public policy and for coordinated inter-regional planning and cost allocation. Consistent with these FERC directives, the MTEP process seeks to ensure the reliable operation of the transmission system, support the achievement of state and federal energy policy requirements, and enable a competitive energy market to benefit all customers. Xcel Energy plays an active part in the entirety of the MTEP process including the futures development and model development, and validation.

The development of the MTEP typically starts in June every other year and is an 18-month overlapping cycle of model building, stakeholder input, reliability analysis, economic analysis, resource assessments, and drafting of the MTEP report. As part of the process MISO usually performs a Market Congestion Planning Study (MCPS). The 2016 MCPS was an example of how transmission can produce lower APC as this study resulted in the development of our Huntley-Wilmarth 345 kV line Market Efficiency Project (MEP). The Huntley to Wilmarth 345 kV project alleviated the observed congestion at the Minnesota/Iowa border. Though we acquired new right-of-way to construct the 345 kV circuit on the approved route, approximately 40 percent of the line was constructed as a double circuit with the existing Wilmarth-Lakefield Jct. 345 kV line.

The last MCPS was performed in 2019, with the 2020, 2021, 2022, and 2023 MCPS Studies being eliminated to open resources for Long-Range Transmission Planning (LRTP)—which is MISO's largest ever undertaking to update and modernize the transmission system. The LRTPs are a comprehensive planning effort outlining the transmission infrastructure needs and tests expansion plans for the MISO region to accommodate widespread changes in the electric landscape due to changing technology and customer needs. The scale and pace of these changes have required prompt attention to develop the most efficient, cost-effective investments to ensure grid reliability in the future. The LRTP initiative is MISO's response to the current and future resource evolution that has and continues to affect the bulk electric system.

The LRTP projects are sorted into various tranches depending on their priority. Tranche 1 resulted in a $10.3 billion transmission portfolio that was approved by the MISO Board of Directors in July 2022. The projects in the Upper Midwest represent about $3 billion in total investment; with Xcel Energy's assigned projects representing about $1.2 billion of the total Upper Midwest investment. The MISO LRTP Tranche 1 projects in Minnesota utilize the existing 345 kV second circuit capabilities where possible, which will increase the overall ability to transfer power across the system while limiting environmental and landowner impacts. We have also submitted additional projects as part of MISO LRTP Tranche 2 portfolio currently in development. As Tranche 2 projects are announced, we will continue to engage in transmission development, and look forward to developing approved projects to enhance the capacity of the grid.

While Xcel Energy regularly participates in MISO to address congestion and expand capacity, we additionally study congestion with our project partners, or on our own.

For instance, Xcel Energy, as part of Grid North Partners[4] conducted a study to identify the root causes of congestion from July 2020 to July 2022. The study identified 94 facilities in and around Minnesota causing congestion in Minnesota. The second circuit on the Brookings County - Lyon County and Helena-Hampton transmission lines, along with five other projects to upgrade facilities were submitted in MISO's MTEP to mitigate some of this congestion. A total of 17 facilities were able to be upgraded at low cost (under $1 million) and another five upgrades we found (under $10 million) to mitigate congestion. Much of the congestion observed is due to high-wind weather patterns with much longer duration than the typical 4-hour batteries available as a non-transmission alternative.

Also, as a result of the study, Xcel Energy initiated an out-of-cycle request to MISO for completing the second 345 kV circuit from Brookings County - Lyon County and Helena-Hampton for the existing CAPX Brookings-TC facility. In addition, though not a Market Efficiency Project per se, Xcel Energy recently initiated two projects, the MN Energy Connection and the King Connection, which are designed to utilize existing transmission access rights and will enable further renewable investment. The MISO interconnection queue has many new interconnection requests seeking to connect to a system that is already congested. Reusing existing transmission rights through the MN Energy Connection and King Connection Projects allows Xcel Energy to interconnect additional MWs through its existing transmission rights, avoiding lengthy delays often related to MISO queue interconnection studies.

In addition to these larger transmission projects, Xcel Energy has been developing multiple market participant-funded transmission projects to address congestion. These projects aim to enhance the reliability, efficiency, and capacity of the electric transmission grid by addressing constraints. For instance, we converted the bifurcated 115 kV line from High Bridge to Rogers Lake to a double circuit 115 kV line to alleviate congestion on the High Bridge Generating Plant. Additionally, we constructed new breaker positions at High Bridge and Rogers Lake to accommodate the second 115 kV circuit to remove the bifurcation ties at both ends of the High Bridge – Rogers Lake 115 kV line while adding breaker positions at both substations.

[4] Grid North Partners include DPC, OTP, MP, MRES, CMMPA, RPU, SMMPA, WPPI, Xcel Energy and GRE.

Xcel Energy performed its own internal analysis to determine small projects designed to address constraints and remove system limiters on congested lines. The projects listed in Table T-3 focus on substation equipment and sag limits in Southwest Minnesota.

Table T-2: Xcel Energy Congestion Projects

Substation	Chisago County (CHI)
Scope	Replace primary and secondary 115 kV bus 1 differential relays for TR05 and TR06
Property Units	(4) Control System
ISD	8/1/2022
Substation	Inver Hills (IVH)
Scope	Replace busbar
Property Units	(1) Conductor
ISD	3/1/2023
Substation	Kohlman Lake (KOL)
Scope	Replace meter on breaker 5P106
Property Units	(1) Control System
ISD	8/1/2022
Substation	Prairie (PRA)
Scope	Replace meter on breaker 5G8
Property Units	(1) Control System
ISD	8/1/2022
Substation	Scott County (SCO)
Scope	Replace busbar
Property Units	(1) Conductor
ISD	3/1/2023
Substation	Wilmarth (WLM)
Scope	Replace bushing current transformers on breaker 5S11, and switches 8S26B1, 8S25B, 8S25A, 8S26B1
Property Units	(1) Circuit Breaker (BCT) (4) Switches
ISD	3/1/2023
Substation	Riverside (RIV)
Scope	Replace switches 5M330B, 5M331B, 5M329A, 5M330A, 5M329B, 5M331A, aux current transformers on 5M304 and 5M305, and two sections of busbar

Property Units	(6) Switches (2) Device, Potential (2) Conductor
ISD	3/1/2023
Substation	Red Rock (RRK)
Scope	Replace bushing current transformers on breaker K2, switches K2B1, 946B, K2B2, 946A, and meters on 946 and K2
Property Units	(1) Circuit Breaker (BCT) (4) Switches (2) Control Systems
ISD	3/1/2023

We are working with the Grid North Partners' Tech Team to further identify simple system upgrades (≤ $1M cost) to improve transmission line ratings.

Xcel Energy has been monitoring congestion and curtailment on a weekly basis to find new issues as they arise and determine whether a permanent solution is warranted or if the congestion is related to temporary system conditions. For example, Xcel Energy Transmission Operations takes both system reliability and curtailment and congestion cost impact into consideration when scheduling transmission outages. Also, we started an internal study process to determine any transmission system reconfigurations on the underlying transmission system able to positively impact the bulk transmission system and congestion. We confirmed our first system reconfiguration project in Southwest Minnesota to help alleviate congestion in the area.[5] Finally, we implemented a process to study reconfiguration requests from outside entities. These requests are looked at to determine effectiveness, duration, and impact on the transmission system. Reliability is the primary determinant to whether a reconfiguration request is approved. MISO is working on setting up their process which Xcel Energy will participate in.

Lastly, policy can contribute to congestion. As mentioned, we found that the MISO Generator Interconnection Process had resulted in increased costs to customers through the thresholds in which generators were made responsible for upgrade costs, and how the dispatch of resources in the Interconnection Process study were being implemented. After working with MISO and stakeholders, a 10 percent rather than

[5] This request was reversed after several months due to a policy issue with MISO and SPP. In October MISO and SPP began coordinating their Day Ahead studies to recognize some of each other's flow gates which will help reduce SPP flows on the system. SPP previously did not recognize MISO flow gates and set a dispatch that could negatively impact MISO's dispatch. Xcel Energy Transmission Operations takes both system reliability and curtailment and congestion cost impact into consideration when scheduling transmission outages.

20 percent contribution threshold for generators requesting ERIS was implemented for facilities 230 kV and lower. This represents a step in the right direction and will alleviate some future congestion related impacts going forward, however we will continue monitoring the contribution of ERIS requests on 345 kV facilities to determine the impact. Due to this policy change, new wind coming online in the future will likely contribute less to congestion than previous projects due to triggering more transmission upgrades before the project goes online.

V. NON-TRANSMISSION SOLUTIONS

As stated, the growth in renewable generation may both increase and decrease the need for new transmission. While in cases it can cause new congestion issues, in others places new generation near load centers may help alleviate congestion impacts.

Using regional LMPs as part of generation planning offers a nuanced approach to mitigating congestion impacts. By closely examining the MISO Historical LMP Averages, such as depicted in Figure T-3, planners can identify areas where the cost of electricity delivery is significantly higher due to congestion. These high-cost areas often indicate a mismatch between local generation and demand. Incorporating this LMP data into generation planning allows for strategic placement of new generation assets, particularly near load centers marked by high LMPs. This targeted approach not only optimizes the use of existing transmission infrastructure but also minimizes the need for costly upgrades. Moreover, it provides a financial incentive for developers to invest in regions where their generation capacity can be most effectively utilized. By aligning generation planning with regional LMPs, utilities can make data-driven decisions that contribute to a more efficient, reliable, and cost-effective grid, thereby alleviating both current and future congestion-related impacts.

Finally utilizing DER or increasing energy storage technology on the load-side of a constraint, will also have a similar effect in reducing congestion costs. Investment in energy storage technology such as batteries can help alleviate grid congestion by allowing excess generation to be stored for later use. This can reduce the amount of electricity that needs to be transmitted over congested lines.

VI. CONCLUSION

Transmission congestion is a significant challenge. Addressing congestion is important for ensuring the reliable and affordable delivery of electricity to consumers. By expanding transmission capacity, improving coordination between transmission system operators, periodically reexamining policies, investing in generation and storage technology, we can do our part to help alleviate grid congestion and ensure reliable delivery of electricity to Xcel Energy customers.

APPENDIX U – INFLATION REDUCTION ACT

I. MAXIMIZING INFLATION REDUCTION ACT (IRA) BENEFITS

The Inflation Reduction Act (IRA) aligns with our vision to reduce carbon emissions from the electricity we generate and deliver to our customers by enabling economic investments in carbon-free resources. The availability of tax credits, the expanded types of clean energy technologies that qualify, and the quicker ability to monetize the tax credits through transferability accelerates our ability to achieve our clean energy and carbon-free goals—with greater certainty.

The IRA provides the opportunity to transfer Production Tax Credits (PTCs) and Investment Tax Credits (ITCs) to unrelated taxpayers for cash. Eligible credits include PTCs and ITCs earned after 2022, including PTCs from projects placed in service before 2022. However, tax credits carried forward from years prior to 2022 are not eligible for transferability. Consideration paid in exchange for transferred tax credits is not includible in gross income and is not deductible by the transferee.

The Company's 2024 IRP leverages significant incentives from the IRA. Below is a summary of the tax credits available for our supply side resources included in our resource plan.

Tax Credits Considered for Supply Side Resources

- **PTC extension (Sec. 13101)** The IRA extends the existing PTC to projects for production of electricity from renewable sources such as wind, biomass, hydropower, and other resources. The IRA also made solar eligible for the PTC. Eligible projects must begin construction before January 1, 2025. However, after 2024, the technology neutral provisions in the IRA (discussed below) take over and continue with essentially the same PTC provisions through at least 2032. The base credit is set to $0.03/kW, adjusted for inflation. The full credit is five times the base credit. In order to qualify for the full credit, the project must meet certain prevailing wage and apprenticeship requirements. The credit is increased by 10 percent if the project meets certain domestic content requirements and by another 10 percent if located in an energy community. Eligible energy communities include (1) brownfield sites, (2) census tracts or adjoining census tracts where coal units were retired after 2009, or (3) a statistical area with above average unemployment and significant coal, oil, or natural gas employment or where coal, oil, or natural gas contributes significantly to local tax revenues.

- **Technology neutral PTC – new §45Y (Sec. 13701)** The IRA adds a new technology-neutral tax credit for production of clean electricity. This credit replaces the existing PTC for electricity generated from renewable sources (extended in Section 13101 through 2024). Eligible facilities are those generating electricity for which the greenhouse gas emissions rate is not greater than zero. To qualify, the facilities must be placed in service after December 31, 2024. The base credit is $0.03/kW adjusted for inflation. The full credit is five times the base credit and is earned if certain prevailing wage and apprenticeship requirements are met. The credit is increased by 10 percent for projects meeting certain domestic content and increased by 10 percent if located in an energy community. Credits phase-out the later of (a) 2032 or (b) when U.S. greenhouse gas emissions from electricity are 25 percent of 2022 emissions or lower. The full credit is given during the first year after the phase out year, with a reduction to a 75 percent credit in second year after the phase out year, and a 50 percent credit in third year after the phase out year. No credit will be given in the fourth year after the phase out year.

- **ITC extension (Sec. 13102)** The IRA extends and modifies the existing ITC for investments in renewable energy projects. With the technology neutral provisions, the ITC is now available for projects that begin construction through at least 2023. ITC eligible projects include fuel cell, solar, geothermal, small wind, energy storage, biogas, microgrid controllers, and combined heat and power properties. For the energy storage ITC, the battery no longer has to be co-located with renewables. Similar to the PTC, in order to qualify for the full 30 percent ITC, the project must meet certain prevailing wage and apprenticeship requirements. The credit is increased by 10-percentage points if the project meets certain domestic content requirements, and it can also be increased by 10-percentage points if it is located in an energy community for a total credit rate of up to 50 percent.

- **Technology neutral ITC – new §48E (Sec. 13702)** The IRA adds a new technology-neutral tax credit for investment in facilities that generate clean electricity. This credit replaces the existing ITC for facilities generating electricity from renewable sources (extended in Section 13202 through 2024). To be eligible to receive the credit, the facility must generate electricity with a greenhouse gas emissions rate that is not greater than zero or be a qualified energy storage technology. The base credit is equal to 6 percent of qualified investment (basis). The full credit is 30 percent, which is five times the base credit. The full credit is earned if the facility meets certain prevailing wage and apprenticeship requirements. The credit is further increased by 10-percentage points for facilities meeting certain domestic content requirements, and it can also be increased by 10-percentage points if the project is located in an energy community. Total credit rate is 50 percent if both domestic content and energy community requirements are met. Phase-out starts the later of (a) 2032 or (b) when U.S. greenhouse gas emissions from electricity are 25 percent of 2022 emissions or lower.

- **Zero emission nuclear PTC – new §45U (Sec. 13105**) The IRA introduced a new PTC for production of electricity from a qualified nuclear power facility. This credit is effective for production during 2024-2032. The full credit rate is 1.5 cents/kilowatt hour. The credit is reduced as the market price of wholesale electricity increases. The credit starts phasing out as wholesale electricity prices rise above $25 per megawatt-hour and fully phases out at $43.75 per megawatt-hour. In order to qualify for the full credit rate, the facility must satisfy the previously discussed prevailing wage requirements.

- **Clean hydrogen – new §45V (Sec. 13204)** The IRA introduced a new 10-year PTC for clean hydrogen production. Facilities that begin construction after 2022 and before 2033 qualify. The PTC is computed per kg of clean hydrogen produced multiplied by the applicable amount. The applicable amount is 60 cents (base rate) or $3 (full rate) multiplied by the applicable percentage. The applicable percentage depends on the greenhouse gas emissions associated with the production based on the following schedule:
  - 0 percent if lifecycle emissions are over 4 kg of CO2 per kg of clean hydrogen produced
  - 20 percent if lifecycle emissions are 2.5-4 kg of CO2 per kg of clean hydrogen produced
  - 25 percent if lifecycle emissions are 1.5-2.49 kg of CO2 per kg of clean hydrogen produced
  - 33.4 percent if lifecycle emissions are 0.45-1.49 kg of CO2 per kg of clean hydrogen produced
  - 100 percent if lifecycle emissions are less than 0.45 kg of CO2 per kg of clean hydrogen produced

For example, 100kg of clean hydrogen produced at $3 full rate utilizing less than 0.45kg CO2 per clean hydrogen produced will generate $300 in clean hydrogen PTCs. The facility must satisfy the previously discussed prevailing wage/apprenticeship requirements to claim the full credit. Both wind PTC and clean hydrogen PTC can be claimed with respect to the wind electricity generated. Both the zero-emission nuclear PTC and the clean hydrogen PTC can also be claimed with respect to the nuclear energy electricity generated. However, the clean hydrogen PTC is not allowed if the facility includes carbon capture equipment qualifying for carbon capture credit. Direct pay of this tax credit is available during the first five years of the PTC period. Direct Pay allows the project owner to receive a cash payment from the IRS for the full value of the tax credit in lieu of the tax credit. This PTC is also eligible for tax credit transferability (discussed previously) after the period in which direct pay is available. In addition, electing ITCs in lieu of PTCs is also available.

Tax credits for forecasted DG Solar are not modeled in our plan since they are tariffed. Tax Credits impacting Demand Side Resources are discussed more fully in our recently filed Integrated Distribution Plan filing.

We make every effort to identify and evaluate every opportunity for tax credits, low-interest loans, and other types of federal funding that can reduce the costs of our projects. Our Preferred Plan provides an estimated $700 million in savings between 2024 and 2029, and over $5 billion between 2030 and 2040, for a total of 5.7 billion in estimated savings from the IRA.[1]

We assume the full base credit in our modeling for future generic resource additions. We do not assume bonuses for domestic content or energy community. Most of our acquisitions must follow a competitive bidding process, and therefore, it is more difficult to control location, domestic content, prevailing wage, and various other factors. For our build own transfers and self-build projects, we pass on 100 percent of realized tax credits (net of transaction costs) to our customers. For power purchase agreements, which compete in most of our request for proposals, we do not know the percentage of tax credits passed through in terms of lower rates. However, we assume that the availability of these tax credits allows bidders in our competitive processes to lower their prices from what they would otherwise charge.

[1] Estimated PTC/ITC amount are based on the preferred plan with PVSC dispatch results assuming the NREL 2023 ATB assumed tax credit schedule and qualifying for full tax credits. Actual earned tax credits might differ from these estimates due to curtailment and other conditions.

APPENDIX V – COMMUNITY GOALS

I. INTRODUCTION

An increasing number of Minnesota communities served by the Company have adopted energy, climate, and broader sustainability goals. We are supportive of our communities and aim to help them achieve their energy goals whenever possible. We must balance those community goals in light of our system resource planning process, which charts the course for the size, type, and timing of our system resources and must ensure safe and reliable energy while keeping bills low and complying with applicable laws and regulations, including statewide energy standards.

Our communities' targets vary, but often include goals for increasing the community's share of renewable generation, share of carbon-free generation, energy efficiency goals, and carbon or greenhouse gas reduction goals (usually a percent reduction below a specified baseline year by a specified target year; in some cases, net zero by 2050, with interim milestones). Some communities are also incorporating goals for electric vehicle (EV) adoption or other forms of beneficial electrification and building efficiency into their plans or as elements of broader sustainability or Climate Action Plans. Finally, in addition to a goal to use more renewable energy, some communities have adopted a subsidiary goal that some specified amount of that renewable generation should come from local distributed resources (i.e., small-scale generation connected to the distribution system and sited within jurisdictional boundaries).

Order Point 16 of the Commission's 2019 IRP Order states:[1]

> *"In its next resource plan, Xcel shall account for local clean energy goals, in aggregate, in forecasting and modeling. In particular, the plan should include consideration of local community generation goals for distributed generation."*

In response to this Order Point as well as stakeholder and Commission feedback on our 2021 Integrated Distribution Plan (IDP) and our 2019 IRP, in early 2023, we conducted a survey of the local jurisdictions we serve in Minnesota. Our community relations managers sent the survey via email to 415 cities, townships, and counties in Minnesota. The goal of the survey was to gather complete, detailed information on our communities' goals and specific plans so that we could aggregate and analyze the data in comparison to our forecasts and sensitivities in this Resource Plan. This was necessary not only to attempt to gather a complete picture and holistic representation of our communities' goals, but also because of the widely varying nature of our

[1] ORDER APPROVING PLAN WITH MODIFICATIONS AND ESTABLISHING REQUIREMENTS FOR FUTURE FILINGS, Docket No. E002/RP-19-368, April 15, 2022 (IRP Order).

communities' goals. For example, some community carbon reduction goals use different baseline years. Some goals apply to municipal operations, while others may include residential building energy use. Some communities may have different geographic requirements or carbon accounting approaches. In addition, we understand that some communities may set goals that are intentionally aspirational.

II. SURVEY RESPONSES AND RESULTS

Due to the nature of goal setting in the clean energy landscape, the details and plans vary greatly. For instance, some of our larger cities have very detailed, measurable goals with entire departments devoted to them and complex processes and maps documenting their progress. Other smaller cities have high level vague goals that are no less important to those cities but have fewer resources devoted to them, and therefore have much fewer measurable details and less information to support them. Accordingly, it is hard to summarize such widely varying information from our communities, especially if measurable goals are absent. Due to the wide variation in details, the high-level nature of many plans, and the lack of specific implementation plans and measurable goals, we were not able to confidently aggregate the data and utilize it directly for resource plan modeling purposes, which creates challenges when it comes to system modeling. However, at a high level, below is what we learned from the survey respondents:

Table V-1: Summary of Survey Responses

Survey Responses	Number of Respondents
Invitations Sent	415
Responses	120
Respondents with Goal or Plan[2]	38
Respondents without a Goal or Plan	82
Anonymous respondents with a Goal or Plan	11[3]

Table V-2: Community Goals Summary

Goal Category	Number of Communities	Highest Goal (% by Year)
Distributed Generation	12	30% by 2030
Renewable Energy	18	100% by 2040
Electric Vehicle Adoption	15	100% by 2038
Building Electrification	5	100% by 2038
Carbon Reduction	17	100% by 2028

[2] *Response to Survey Question: "Does your city have a plan that includes at least one of the following: distributed generation, renewable energy, electric vehicle adoption, building electrification (i.e., converting natural gas heating and/or appliances to electric), or carbon reduction from electricity?"*
[3] These 11 respondents that did not identify their community are encompassed in the 38 who had a goal or plan.

In some cases, we were able to supplement the information provided by the survey respondent by reviewing the community's plan document(s) or website. However, due to the limited number of communities that had specific implementation plans and measurable goals, the data we received was not sufficient for us to confidently utilize it for resource plan modeling purposes. Despite this, we believe that our decarbonization and clean energy plans at the system level will meet most communities' goals. In the remainder of this Appendix, we discuss the various ways we support our communities and their clean energy goals, before addressing how our Resource Plan aligns with the themes of community goals identified through our survey and supplemental research. Additionally, we note where our voluntary programs can help our customers and communities achieve their individual objectives.

III. SUPPORT FOR OUR COMMUNITIES AND CLEAN ENERGY GOALS

Xcel Energy has a long history of supporting the communities we serve, and we always want to work with our customers and communities in support of their energy goals. Examples of our partnerships and programs in support of community goals include:

- **Community Relations Managers and Account Managers**. Each community we serve has a Community Relations Manager dedicated to building and maintaining positive relationships and collaborations with municipalities and their residents. Community Relations Managers are a community's first call when exploring new or expanded clean energy and sustainability goals.[4] Dedicated Account Managers help customers – including municipalities – explore program and service options, including renewables, energy efficiency, demand response, rate structures, and more.
- **Partners in Energy (PiE)**. Through the PiE program, the Company provides communities in Minnesota and Wisconsin – as well as Colorado – with no-cost services to develop an energy plan and assistance with implementing that plan. Each community has its own unique energy needs and priorities, and PiE tailors its services to complement each community's vision. Support can include workshop facilitation, outreach support, establishing baselines, scenario planning, documentation, education and outreach, tracking and reporting, and more. There are 38 communities in Minnesota and six in Wisconsin that have participated in or are currently participating in the PiE program.[5] After communities have completed the program, free ongoing support is available. This service includes

[4] https://mn.my.xcelenergy.com/s/community/managers.
[5] https://xcelenergycommunities.com/.

regular meetings, outreach support to promote their energy goals, and energy data tracking.

- **Community Energy Reports**. We provide data and analysis for enrolled communities and municipalities to track their energy and sustainability goals.[6]
- **Renewable Energy Programs**. Our voluntary renewable energy programs – including Renewable*Connect, Renewable*Connect Flex, and net energy metering – were designed to help customers and communities reach their clean energy goals faster.
- **Electric Vehicle Programs**. We have existing, and are developing new, electric vehicle programs to enable fleet electrification, public charging, and more. We have partnered with cities on community charging hubs and offer residential charging programs for customers, which can help cities reach their stated EV penetration goals.
- **Certified Renewable Percentage**. Through our Certified Renewable Percentage offering, retail customers can take credit for the renewable energy portion of electricity delivered through our regular energy mix.[7]
- **Customized support for sustainability initiatives**. In addition to working closely with our communities on energy goals, we partner with our communities when they have non-energy-related sustainability initiatives. For example, we are providing tree clippings from our vegetation management work to the City of Minneapolis in support of the City's biochar program.

In addition to leading the clean energy transition for all our customers – we are committed to working closely with our communities to help them achieve their sustainability goals. While our Resource Plan charts the course to provide Minnesota customers with 100 percent carbon-free energy by 2040, our many voluntary programs and supportive partnerships can help communities achieve specific goals.

IV. MEETING COMMUNITIES' GOALS

A. Clean Energy and Carbon Reduction

Our Preferred Plan complies with Minnesota's 100 percent carbon-free energy standard, which requires the Company to generate or procure carbon-free energy

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[6] https://www.xcelenergy.com/community_energy_reports.

[7] Certified Renewable Percentage is currently available in Minnesota and Wisconsin. *See* https://my.xcelenergy.com/s/energy-portfolio/power-generation/certified-renewable-percentage.

equal to 100 percent of its Minnesota retail sales by 2040. Our Preferred Plan achieves 92 percent carbon reduction by 2040, from 2005 levels.

Communities' decarbonization goals vary, and some go beyond the electric sector, encompassing economy-wide emissions. Based on the information received in response to the survey, we believe that the carbon reductions in our Preferred Plan would accomplish most communities' goals, for those that indicated measurable, community-wide renewable or clean energy goals and/or an electric sector carbon reduction goal.

B. Renewable Energy

Our Preferred Plan exceeds Minnesota's 55 percent Renewable Energy Standard (RES) by 2030. Of all the plans that we reviewed, only four had measurable community-wide, system renewable energy goals. Based on the information we received about these four communities from survey respondents, we believe that Minnesota's statewide RES – and therefore our Preferred Plan – aligns with three communities' renewable energy goals – the Cities of Falcon Heights, Maplewood, and Minneapolis.

As noted above, through our Certified Renewable Percentage offering, retail customers can count the renewable energy portion of electricity delivered through our regular energy mix toward their energy goals. In Minnesota, the third-party verified Certified Renewable Percentage was 42.6 percent in 2022, and we anticipate it will continue to increase as the amount of renewable energy on our system increases.

Several jurisdictions that responded to the survey have indicated a goal of 100 percent renewable energy community-wide and/or for their municipal operations. No scenario modeled as part of this Resource Plan – including the Preferred Plan, as discussed in Chapter 5 – achieves 100 percent renewable energy within the planning period. For our communities with a goal of 100 percent renewable energy community-wide (and any customer with renewable energy-specific goals), voluntary renewable energy programs – including Renewable*Connect, Renewable*Connect Flex and net energy metering – can enable customers to claim up to 100 percent renewable energy accurately (i.e., the customer retains the Renewable Energy Credits).

C. Distributed Generation

The IRP Reference Case scenario reflects full compliance with Minnesota's new distributed solar energy standard (DSES), which requires the Company to generate or procure energy from distributed solar equal to three percent of its Minnesota retail sales by 2030; we estimate that complying with the DSES will require approximately 500 MW of new distributed solar by 2030. The Reference Case also assumes that community solar garden (CSG) deployment reaches its statutory limit. Therefore, our Reference Case – and our Preferred Plan – assumes approximately 2,682 MW of incremental distributed solar through the planning period.[8] We also modeled sensitivities that assume higher levels of "natural" DG adoption – i.e., higher adoption absent any additional incentive payments or other direct actions by Xcel Energy. Finally, we modeled DG solar bundles as a selectable resource option, meaning offering EnCompass choices of different amounts of DG Solar installations for the Company actively procure, similarly to how we procure utility-scale solar. As discussed in Chapter 5: Economic Modeling Framework and Appendix J Distributed Energy Resources, DG bundles selected in the special study may possibly present future opportunities to help achieve community goals.

The IRP process identifies the size, type, and timing of our system's resource needs; it does not identify the location of the resources. As noted above, survey respondents provided data surrounding their distributed generation goals. We believe our Preferred Plan aligns with most of those goals, although we caveat again that the IRP process does not identify resource locations.

D. Electrification and Electric Vehicles

Our High Load modeling sensitivity includes the High EV forecast and High Beneficial Electrification (BE) forecast. The High EV forecast reflects an assumption equal to nearly 670,000 EVs on the road by 2030 and 2 million by 2040, reflecting 20 and 56 percent of registered vehicles in Minnesota, respectively.

Regarding electrification, some jurisdictions indicated goals for building decarbonization. Our High load sensitivity assumes beneficial electrification that exceeds the base forecast. Known electrification projects would be reflected in the base forecast scenario. Quantifying the potential impact of electrification targets for direct use in forecasting and modeling (i.e., converting goals to kW or kWh) is challenging. Given that only a small number of communities have indicated electrification goals, we believe that our High beneficial electrification forecast – which is system-wide – would encompass those goals. Under the High load sensitivity, new load from BE would comprise about 3.5 percent of total energy requirements.

[8] This number includes CSGs, rooftop solar, and the DSES.

V. CONCLUSION

We emphasize again that we are supportive of our communities' clean energy and sustainability goals and aim to help them achieve their objectives. We encourage our communities to work with their Community Relations Manager to discuss their objectives and ways we may be able to help.

We serve 415 cities, townships, and counties across Minnesota, and our integrated Upper Midwest system provides electricity to customers and communities across five states. We are committed to responsible system planning and investments that ensure safe, reliable, affordable electricity for all the communities and jurisdictions we serve. While some customers and communities may have different priorities; indeed, most communities responding to our survey indicated that they did *not* have clean energy-related plans or goals, we are always eager to work with our customers and communities to find ways to help them meet their energy goals while minimizing cross-subsidization.

APPENDIX W – RDF PLANTS

I. INTRODUCTION

The Company is committed to supplying safe, reliable, and affordable energy to our customers while advancing our renewable energy objectives. Xcel Energy's Red Wing, Wilmarth, and French Island Waste-to-Energy Generating Plants are a key component of this strategy by providing a reliable source of baseload power that contributes to the Company's ability to provide reliable renewable energy to Minnesota customers. Unlike other forms of renewable energy, waste-to-energy generating plants can operate around the clock, supplying a consistent source of dispatchable power.

As part of this Resource Plan, the Company extended the life and operations of our Red Wing, Mankato, and French Island renewable Refuse Derived Fuel (RDF) plants. As noted in Appendix H: Resource Options, these plants were slated for retirement in 2027. With this Resource Plan, the Company is extending the operating lives of these plants to 2037, 2037, and 2040 respectively. These plants not only add significant value to our system and help us achieve our renewable energy goals with reliable power, but also provide value to the local communities they serve, including providing: (1) diversification of renewable energy sources; (2) landfill avoided costs and greenhouse gas emissions reductions; (3) encouragement of waste reduction and recycling; (4) green jobs and economic growth; and (5) lower comparative costs thanks to negotiated tipping fees. For these reasons, these plants are a valued resource in not only the Company's generating fleet, but to the communities these plants serve.

Here, the Company provides an overview of the specific operational characteristics of the Red Wing, Wilmarth, and French Island Waste-to-Energy Generating Plants followed by an overview of the environmental and economic benefits of using RDF as a fuel source.

II. XCEL ENERGY'S RDF PLANTS PROFILES

A. Red Wing Waste-to-Energy Generating Plant located in Red Wing, MN

Figure W-1: Red Wing Waste-to-Energy Generating Plant

The Red Wing Waste-to-Energy Generating Plant is in Red Wing, Minnesota.
The Red Wing Waste-to-Energy Generating Plant is an integral part of the Ramsey and Washington Counties' Solid Waste program, as well as the Solid Waste programs of the local community and Goodhue County. From 1987 to 2022, the plant burned almost 6,700,000 tons of RDF, which is equivalent to an amount of municipal solid waste (MSW) the size of a football field piled 1.2 miles high that would otherwise have to be put in landfills. Annually, the plant produces enough electricity to power 50 percent of homes within the City of Red Wing.

The two RDF units at the plant are a 24/7 operation and have a capacity of 23 MW total. The two boilers combined burn an average of 200,000 - 220,000 tons of RDF per year depending on preventive maintenance and project schedules. The RDF storage capacity at the site is about 1,000 tons in an existing storage barn. Relevant plant statistics include:

Capacity:	23 MW total
Maximum and Optimal Capacity Factors:	*86%*
Capital and Operating Costs:	*Approx. $5M O&M and $ 2M Capital per year*
Lifetime:	*December 31, 2027*
Decommissioning Costs:	*$ 15.5M*

The facility operates with 28 employees. Plant employees regularly conduct tours for various local clubs, schools, professional organizations, county employees, and elected officials. Recently, the plant has partnered with various community businesses and the Red Wing High School to provide internship opportunities for students through Learn and Earn programs.

B. Wilmarth Waste-to-Energy Generating Plant located in Mankato, MN

Figure W-2: Wilmarth Waste-to-Energy Generating Plant

The Wilmarth Waste-to-Energy Generating Plant is in Mankato, Minnesota. The Wilmarth Waste-to-Energy Generating Plant is an integral part of the Ramsey and Washington Counties' Solid Waste program, as well as the solid waste programs of their local communities. RDF suppliers include Ramsey and Washington Counties, Minnesota Waste Processing Company (portions of Blue Earth, Nicollet, Le Sueur, and Sibley Counties), and Prairieland (a joint venture of Faribault and Martin Counties). The facility incinerates approximately 2,800 pounds per year of pharmaceutical waste for 13 nearby cities and counties, saving thousands of dollars in disposal costs.

The two RDF units at the plant are a 24/7 operation and have a capacity of 20 MW total. From 1987 to 2022, the plant burned approximately 5,900,000 tons of RDF, which is equivalent to the amount of MSW the size of a football field piled 1.06 miles high. The two boilers combined burn an average of 170,000 – 190,000 tons of RDF per year depending on preventive maintenance and project schedules. The RDF storage capacity at the site is about 1,000 tons in an existing storage barn. Relevant plant statistics include:

Capacity:	20 MW total
Maximum and Optimal Capacity Factors:	*86%*
Capital and Operating Costs:	*Approx. $5M O&M and $ 2M Capital per year*
Lifetime:	*December 31, 2027*
Decommissioning Costs:	*$ 15.9M*

The facility operates with 27 employees. Plant employees regularly conduct tours for various local clubs, schools, professional organizations, county employees, and elected officials.

C. French Island Waste-to-Energy Generating Plant located in La Crosse, WI

Figure W-3: French Island Waste-to-Energy Generating Plant

The French Island Waste-to-Energy Generating Plant is in La Crosse, Wisconsin. French Island is an integral part of the La Crosse County Solid Waste program. Bottom ash, the coarse, granular, incombustible by-product of RDF combustion that is collected from the bottom of furnaces, is beneficially disposed of in the La Crosse County landfill as daily cover. To date, the plant has disposed of and recovered energy from over 2.6 million tons of wood waste and railroad ties and nearly 1.8 million tons of RDF thereby keeping it out of the La Crosse County landfill. Our partnership has saved about 40 percent of the landfill's airspace annually since 1988. The county and the plant have also partnered on ferrous and non-ferrous recycling. The plant recycles over 1,000 tons of ferrous metal and over 250 tons of non-ferrous metals annually.

Unique to the plant is the French Island Resource Recovery Facility, which allows it to accept MSW directly. French Island's Resource Recovery Facility has the capacity to process about 100,000 tons of MSW each year. Processing of the MSW removes non-combustible materials from the waste, then chops and shreds it into a uniformly sized fluffy product known as RDF that is blown into the boilers and burned with wood waste.

The two generating units at the plant are a 24/7 operation and have a capacity of 18 MW total. The French Island Waste-to-Energy Generating Plant Unit 1 and Unit 2 boilers use RDF, unmodified wood waste, and railroad ties as their primary fuels. The two boilers combined burn an average of 55,000 tons of RDF per year and 55,000 – 65,000 tons of wood waste and railroad ties per year. From 1987 to 2022, the plant burned almost 1.8 million tons of RDF, which is equivalent to an amount of MSW the size of a football field piled 0.32 miles high. Relevant plant metrics include:

Capacity:	18 MW Total
Maximum and Optimal Capacity Factors:	*55%*
Capital and Operating Costs: Approx.	*\$5M O&M and \$2M Capital*
Lifetime:	*June 30, 2030*
Decommissioning Costs:	*\$17.0M*

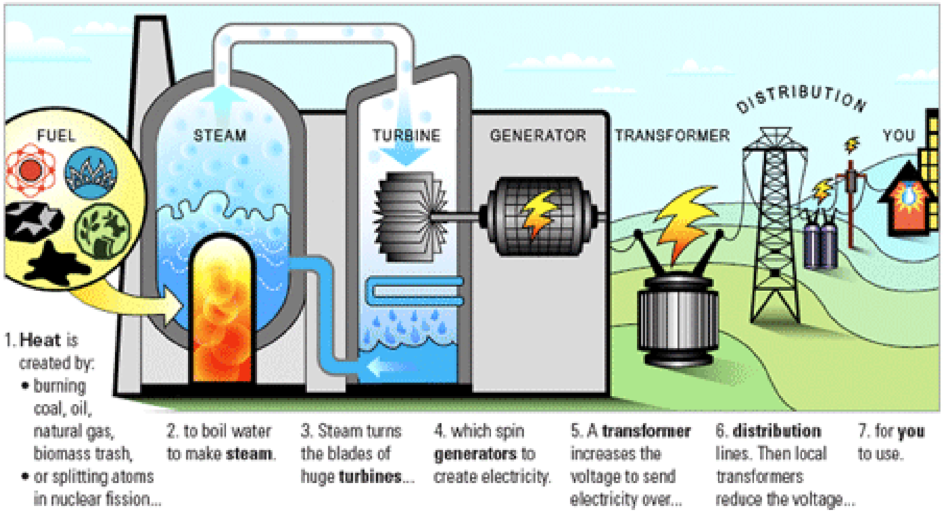
The French Island Waste-to-Energy Generating Facility operates with 31 employees. Recently, plant employees began providing educational outreach about the safe disposal of lithium-ion batteries to help keep them out of the waste stream. Plant employees regularly conduct tours for hundreds of people annually, including local clubs, schools, professional organizations, engineering firms, environmental students, county employees, and elected officials.

Capital improvements for the plants over the next five years will primarily be focused on reliability and environmental compliance. Examples of reliability improvements include boiler section replacements, fuel and ash conveyor rotating assembly replacements, and steam turbine blade replacements. Examples of environmental compliance projects include baghouse bag replacements and continuous emission monitoring analyzer replacements.

III. OPERATIONAL CHARACTERISTICS

The Company's waste-to-energy plants use the same basic principles common to all thermal generators. The process starts with combustion of RDF in a boiler. This combustion releases heat, which is used to boil water. Second, the steam is directed to flow through the blades in the steam turbine. Third, the high-pressure steam spins the turbine blades, converting thermal energy into mechanical energy. The spinning turbine is connected to a shaft in the generator. Fourth, as the turbine spins, the shaft in the generator turns a magnet surrounded by coils of copper wire. This induces the flow of electrons, generating electricity that can then be fed into the grid. This process is outlined in Figure W-4 below.

Figure W-4: Process of Converting RDF into Electricity by Way of Combustion



Though this general process is common to all thermal plants, we discuss the specifics of the plants boiler and combustion systems, emissions controls, and environmental monitoring of the Company's waste-to-energy generating plants below.

A. Boiler and Combustion System

The Red Wing Waste-to-Energy Generating Plant was built in the late 1940's as a coal-fired facility. Unit 1 began commercial operation in October 1949 and Unit 2 began commercial operation in November 1949. The plant was converted from coal to RDF in 1987. Both of Red Wing's units consist of a 40's vintage Foster Wheeler designed refuse derived fuel-fired boiler, which supplies steam to a tandem compound, single flow condensing General Electric steam turbines. The nameplate capacity of each steam turbine is 11.5 MW. The boilers are designed as a natural circulation boiler with a balanced draft furnace and basket style air heater. They can achieve a design rating of 125,000 pounds per hour steam flow at 625 pounds per square inch outlet pressure and 825 degrees Fahrenheit superheater outlet temperature. Cooling water for Unit 1 and Unit 2 is supplied to the condenser from the Mississippi River.

The Wilmarth Waste-to-Energy Generating Plant was built in the late 1940's as a coal-fired facility. Unit 1 began commercial operation in 1948, while Unit 2 began commercial operation in 1951. Wilmarth's two units were converted to burn RDF in 1987. Both units consist of a natural circulation boiler designed by Babcock and Wilcox for 125,000 pounds per hour steam flow at 675 pounds per square inch outlet pressure and 825 degrees Fahrenheit. The boilers also have a balanced draft furnace, and basket style air preheater. The boilers supply steam to two Allis Chalmers steam turbines. Both steam turbines are tandem compound, single flow condensing units with a nameplate rating of 10 MW. Cooling water for Unit 1 and Unit 2 is supplied to the condenser from the Minnesota River.

The French Island Waste-to-Energy Generating Plant was built in the 1940's as a coal-fired facility. Unit 1 began commercial operation in 1940, while Unit 2 began commercial operation in 1948. Both were converted to burn oil in the early 1970's. When oil became too costly, alternative fuels needed to be used. Unit 2 was converted to burn waste wood and RDF in a balanced draft Fluidized Bed Combustion Boiler in the early 1980's, with Unit 1 following in 1987. There are also two oil-fired combustion turbines on-site to meet peak generation demands that have a combined capacity of 159 MW in the winter.

French Island's Unit 1 consists of a refuse derived fuel-fired fluidized bed boiler designed by Energy Products of Idaho for 150,000 pounds per hour steam flow at 450 pounds per square inch outlet pressure and 750 degrees Fahrenheit superheater outlet temperature. Unit 2 consists of a refuse derived fuel-fired fluidized bed boiler designed by Edgemoor Ironworks for 150,000 pounds per hour steam flow at 450 pounds per square inch outlet pressure and 750 degrees Fahrenheit superheater outlet temperature. Both boilers have a balanced draft furnace and a tubular air preheater. They also supply steam to two Allis Chalmers steam turbines. Both steam turbines are tandem compound, single flow condensing units with a normal capacity of 8 MW. Cooling water for Unit 1 and Unit 2 is supplied to the condenser from the Mississippi River.

The Company's waste-to-energy plants have a comprehensive safety and maintenance program, which includes regular inspections of critical components, ongoing maintenance and repair activities, and a comprehensive training program for operators and maintenance personnel. In addition, the plants have several safety features and systems in place to ensure safe and reliable operation.

B. Emission Controls

The Red Wing, Wilmarth, and French Island Waste-to-Energy Generating Plants have received several periodic updates to ensure that they exceed the compliance requirements of all applicable environmental regulations. The plants utilize one or more of the following emissions control systems:

- Flue gas desulfurization systems, which remove sulfur dioxide from the flue gas using a wet or dry scrubbing process.
- Selective non-catalytic reduction (SNCR) systems, which reduce nitrogen oxide emissions by injecting ammonia or urea into the combustion chamber.
- Baghouse filters, which capture particulate matter (such as ash) from flue gas.
- Activated carbon injection systems, which capture mercury and other hazardous air pollutants in the flue gas.
- Continuous emissions monitoring systems, which measure the levels of various pollutants in the flue gas.

The Red Wing Waste-to-Energy Generating Plant employs a combination duct scrubber and baghouse to effectively reduce emissions from burning RDF. The scrubber treats the flue gas with a water spray and dry lime, while the baghouse traps particulate matter, including mercury, dioxins, and metals, by forcing flue gas streams through large, microfiber filter bags.

The Wilmarth Waste-to-Energy Generating Plant employs a combination scrubber and baghouse to effectively reduce emissions from burning RDF. The scrubber treats the flue gas with a water spray and lime slurry while the baghouse traps particulate matter, including mercury, dioxins, and metals, by forcing flue gas streams through large, microfiber filter bags.

The French Island Waste-to-Energy Generating Plant also uses a duct scrubbing system using dry lime injection to help further decrease emissions of sulfur dioxide and hydrogen chloride. Bag houses efficiently collect particulate matter, including mercury, dioxins, and metals such as lead and cadmium, to minimize their release to the air. A selective non-catalytic reduction system on both boilers helps reduce emissions of nitrogen oxides and an activated carbon injection system helps to further reduce emissions of mercury and dioxins/furans.

C. Environmental Monitoring

The Red Wing, Wilmarth, and French Island Waste-to-Energy Generating Plants have several environmental monitoring programs in place to ensure that they operate in compliance with all applicable environmental regulations. These programs include:

- Water Quality Monitoring, which measures thermal limitations of the water discharged from the facilities.

- Annual Air Performance Monitoring, with stack testing for metals as part of their environmental permits with pollution control.
- Quarterly ash testing.

In addition, we conduct continuous air quality monitoring, which monitors the levels of various pollutants (such as carbon dioxide, nitrogen oxide, sulfur dioxide, and particulate matter) of the flue gas leaving the facilities. We've outlined the results of the most recent testing in Table W-1 below.

Table W-1: 2022 Waste-to-Energy Generation Plant Emissions Profiles

OpCo	Plant	Unit	Year	CO_2 MT/MWh*	CO_2 Lbs./MWh*	NOx Lbs./MWh	SO_2 Lbs./MWh
NSP-M	Red Wing	1&2	2022	0.85	1887	5.27	5.59
NSP-M	Wilmarth	1&2	2022	0.66	1470	5.45	5.69
NSP-W	French Island	1&2	2022	0.54	1196	9.67	1.36

* Biogenic CO_2 emissions are excluded for both the MT/MWh and lbs./MWh.

The Company takes great care to ensure that the RDF incinerated at our facilities does not contain unacceptable waste and is reliable for use in our waste-to-energy power plants. The RDF undergoes rigorous testing to ensure that it meets our fuel specifications, and the plants work closely with waste processors and haulers to ensure that RDF is processed in a way that is safe and sustainable.

IV. BENEFITS OF RDF PLANTS

The Company's waste-to-energy generating plants utilize renewable RDF. RDF is produced from MSW that has been processed and shredded. MSW consists of most waste discarded by society that is no longer needed or recyclable. Our waste-to-energy generating plants process a significant amount of MSW (either as RDF or directly as MSW) that would otherwise be sent to landfills, thereby reducing the amount of waste that needs to be landfilled and the associated environmental risks. When RDF is combusted, there is typically a 90 percent reduction in volume and 75 percent in weight.

Our plants utilize solid waste derived from non-recyclable waste, the use of which supports a circular economy by turning waste to energy, increasing the recycling of steel and nonferrous metals, and reducing greenhouse gas emissions. The Company's waste-to-energy generating plants are a valuable part of our generation fleet, and can help address challenges of energy security, climate change, and waste management, making them an important part of a sustainable energy system now, and into the future.

A. Diversification of Energy Sources

The Company's waste-to-energy generating plants contribute to diversification by providing a source of renewable energy that is independent of weather conditions. This reliable source of renewable energy is increasingly important as we continue to transition to higher levels of variable renewable penetration to meet Company and state policy objectives. -RDF acts as a complimentary fuel to solar or wind, as these resources are intermittent. Possessing a reliable source of renewable energy will help to address the issue of intermittency, and through fuel diversity enhances the overall stability of the system. Overall, the Company's waste-to-energy generating plants play a key role in diversifying our energy mix to maintain reliability and improve the sustainability of our system.

B. Landfill Avoided Costs and Greenhouse Gas Emissions Reduction

The Company's waste-to-energy generating plants reduce greenhouse gas emissions by diverting waste from landfills and by supplying advanced pollution control technologies thus contributing to the generation of renewable energy and earning renewable energy credits (RECs). As mentioned previously, RDF plants can process a significant amount of MSW that would otherwise be sent to landfills. This results in avoided landfill development cost, and greenhouse gas emission reductions.

Xcel Energy's waste-to-energy generating plants significantly reduce the volume of waste that would otherwise go to landfills. By diverting waste towards energy conversion, this saves airspace at and prolongs the life of the landfill. This reduces the need for new landfills or expansion of existing sites, resulting in costs savings from avoided landfill development. Though the costs of landfill development may vary depending on the costs for land, construction of infrastructure, managing the landfills, and varying soil conditions, using estimates from existing landfills, we estimate our waste-to-energy generating plants have avoided more than $2.6 million per year in total, as shown in Table W-2.

Table W-2: Estimated Avoid Costs by Landfill

Avoid Costs by Landfill	Annualized
LaCrosse County	$ 332,547
Ponderosa (Blue Earth Co.)	$ 162,133
Pine Bend	$ 2,044,597
City of Red Wind	$ 82,733
Prairieland	$ 44,235
Total Avoided Costs	**$ 2,666,244 per year**

Using these numbers, we estimate the Company's Red Wing, Wilmarth, and French Island Waste-to-Energy Generating Plants have provided a combined adjusted total avoided cost of over $91 million over their operating lives. We expect similar annual avoided costs of approximately $ 2.6 million going forward. While the Company does not realize any portion of these savings, they represent significant value to the plant host communities in terms of avoided cost.

Further, our Red Wing, Wilmarth, and French Island Waste-to-Energy Generating Plants reduce greenhouse gas emissions over the landfill alternative. In our resource planning efforts, generally EnCompass evaluates all the costs to our system of (in this case) operating or retiring the plants, including accounting for the plants' own emissions. However, EnCompass does not account for the emissions that would occur from alternate waste disposal if the plants close. Landfills produce methane, a potent greenhouse gas, and other gases, as waste decomposes. By diverting waste from landfills, waste-to-energy generating plants reduce the overall amount of methane released into the atmosphere.

The Company partnered with the State University of New York at Buffalo to conduct an analysis of greenhouse gas emissions from our waste-to-energy generating plants compared to the landfill alternative. A lifecycle comparison of the two scenarios—operating the plants through 2050 versus closing them and disposing of the waste some other way—was conducted in which the resulting CO_2 equivalent emissions were compared with the emissions of methane, converted to CO_2 equivalent terms using global warming potential. We provide the University at Buffalo's study as Appendix W1: University at Buffalo Waste-to-Energy Report.

As explained in Appendix W1, overall, our waste-to-energy plants provide a net greenhouse gas emissions reduction over the landfill alternative. The study estimates that continued operation of Xcel Energy's Red Wing, Wilmarth, and French Island

Waste-to-Energy Generating Plants from 2023 – 2050 would provide a social cost of carbon savings of $16 million versus the alternative of landfilling the waste.[1]

C. Encouragement of Waste Reduction and Recycling

Based on the findings of the study, the following recommendations were made to further reduce the climate impact of the Company's waste-to-energy facilities:

- Recycling efforts, including pre-combustion sorting of MSW streams and post-combustion sorting of ash, should be expanded.
- Establishing and/or expanding partnerships with the intention of securing a waste feedstock with elevated biogenic fraction should be pursued, especially given external composting efforts that remove food waste from MSW.
- Given the low impact of transportation and supplemental fuel on net GHG emissions, emission reduction effort should focus on the waste stream and MSW incineration.
- Identifying steam customers would displace additional emissions from facility footprints.

Our waste-to-energy facilities are part of the solution for addressing waste management. The Red Wing, Wilmarth, and French Island Waste-to-Energy Generating Plants are not only an important contribution to our generating fleet but are instrumental to meeting the Minnesota Pollution Control Agency (MPCA)'s Solid Waste Management Policy Plans.

The MPCA's waste hierarchy prioritizes waste management strategies to minimize environmental impact. At the top of the hierarchy is waste prevention, which aims to reduce waste generation at the source. This is followed by reuse, which encourages the use of products in their original form rather than disposing of them. Recycling comes next, focusing on converting waste materials into new products. Composting is also a part of this tier, turning organic waste into valuable soil amendments. Composting is followed by waste-to-energy conversion, which is preferable to both the landfill with methane collection and straight landfill alternatives.

We have included the waste hierarchy in Figure W-5. This hierarchy serves as a guideline for individuals, businesses, and policymakers to make more sustainable choices in waste management.

[1] Assuming a 28 times global warming potential for methane. If a 35 times global warming potential is assumed for methane, the carbon savings increases to $73 million.

Figure W-5: MPCA Waste Hierarchy

Waste-to-energy conversion is considered preferable to landfilling for several reasons including the noted energy recovery, but also waste diversion and volume reduction, greenhouse gas emissions reduction, supporting better waste management practices, and supplying green jobs and economic growth. While waste-to-energy conversion of RDF itself is not directly involved in recycling, its utilization does contribute to sustainable waste management practices and indirectly supports recycling efforts.

In fact, studies suggest communities with waste-to-energy plants have a recycling rate approximately five percent higher than the national average.[2]

MSW is a nonhomogeneous product that contains noncombustible materials. Some noncombustible material in MSW can be reclaimed and recycled. The processing of RDF typically involves four main steps. First, the MSW is collected and transported to a resource recovery facility where it is unloaded and sorted. Second, MSW is pre-processed to remove non-combustible materials such as metals, glass, and stones. In the stages of processing following the separation of ferrous metals, disc screening and air classification are used to separate combustible materials. At this state of the process, aluminum beverage cans and other aluminum materials are removed by eddy current separation. The remaining waste is then shredded and screened. Third, the shredded waste is further separated into various components, including RDF, which is a high-energy content fuel consisting of combustible materials such as paper, cardboard, plastics, and textiles. Finally, near the end of the process line, a shredder is used to further reduce and size the RDF product. A second magnet at this location is again used to remove additional ferrous metals before the RDF is ready to be burned.

Through multiple points in the MSW to RDF process, and further in RDF processing, ferrous materials are recovered for recycling. This helps catch recyclable materials that were mistakenly discarded. By incorporating RDF as part of the waste management strategy, recycling efforts are complemented by maximizing resource use and minimizing waste disposal, moving waste management up the waste hierarchy.

The Company's waste-to-energy generating plants are an integral component of the MPCA's Metropolitan Solid Waste Management Policy Plan for 2016 – 2036.[3] The MPCA's Metropolitan Solid Waste Management Policy Plan establishes a framework for managing waste in the seven-county metro through setting regional objectives and strategies by setting goals for source reduction, recycling, and organic recovery; using existing resource recovery facility capacity; and minimizing land disposal. While the Metropolitan Solid Waste Management Policy Plan is a 20-year plan, counties and solid waste management districts outside the seven-county metro area must prepare and implement detailed solid waste management plans every 10 years. Figure W-6 below shows Minnesota counties that rely on Minnesota Resource Recovery Facilities within Minnesota. Outlined by a red line are portions of 13 Minnesota counties that are served by the Company's waste-to-energy plants.

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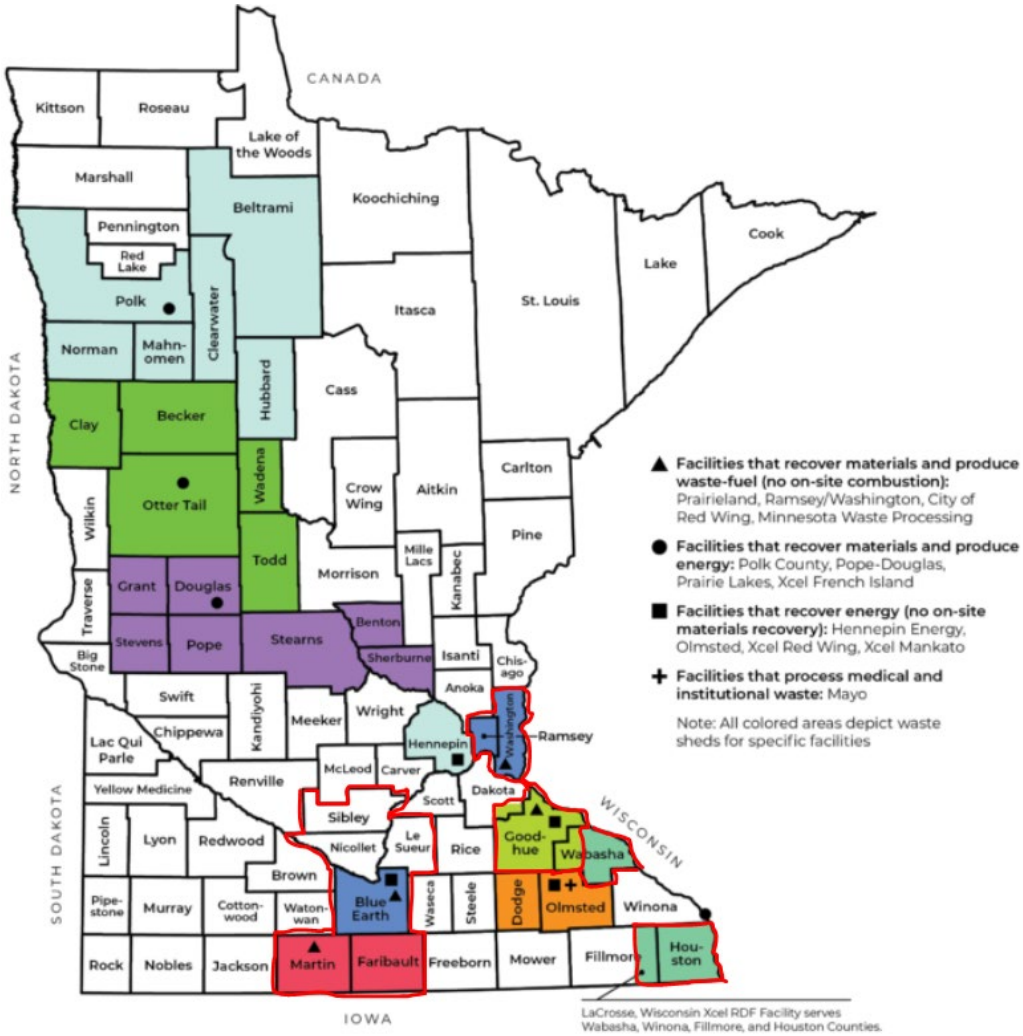
[2] Berenyi, E. B. (2009). *Recycling and Waste-to-Energy: Are They Compatible? 2009 Update*. Westport, CT: Governmental Advisory Associates, Inc. https://www.ecomaine.org/wp-content/uploads/2020/06/Berenyi-GAA-2009.pdf

[3] *See* https://www.pca.state.mn.us/sites/default/files/w-sw7-21.pdf.

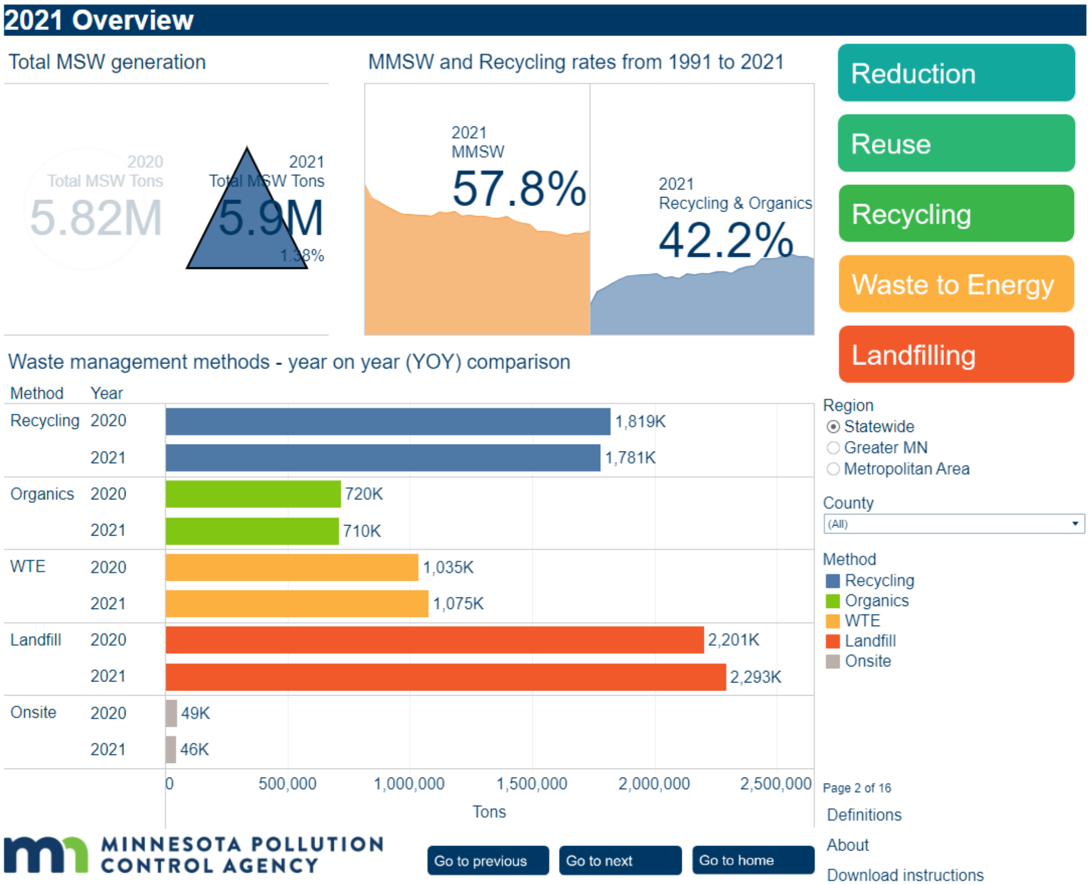
Figure W-6: Minnesota Counties Served by RDF and Waste-to-Energy Generating Plants[4]



The MPCA annually publishes a report summarizing information submitted by all 87 counties and the Western Lake Superior Sanitary District Regarding Select Committee on Recycling and Environment (SCORE) Activities detailing trends in waste generation, management and disposal. Figure W-7 shows the dashboard data from the report. Data from the report helps the MPCA and local units of government develop policy and plans to manage waste in a manner that protects the environment and human health.[5]

[4] Adapted from Minnesota Resource Recovery Association; *see* http://mnresourcerecovery.com/index.php/mrra-facilities/.
[5] *See* https://www.pca.state.mn.us/air-water-land-climate/understanding-solid-waste.

Figure W-7: MPCA 2021 SCORE Report Data for Minnesota Waste Management[6]



According to the SCORE report, in calendar year 2021 in Minnesota, MSW increased year-over-year by 1.4 percent; while the combined recycling and organics rate is 42.2 percent in 2021, which represents a 1.9 percent year-over-year decline from 2020.

In 2021, the Company's waste-to-energy plants converted 6.5 percent (378,461 tons) of Minnesota's total Mixed Municipal Solid Waste (approximately 5.9 million tons) into electricity. Red Wing and Wilmarth Waste-to-Energy Generating Plants together contributed approximately 35 percent of Minnesota's total waste-to-energy conversion. Overall, waste from portions of 13 Minnesota counties is converted to electricity at the Company's waste-to-energy generating plants.

[6] Available at https://public.tableau.com/app/profile/mpca.data.services/viz/2021SCOREReport/2021SCOREreport?:tabs=n.

We are taking steps to further address the recommendations noted in the University at Buffalo's study in a number of ways. For example, we are exploring ways to increase recycling in the waste-to-energy production stream – from evaluating cost sharing of an eddy current investment with our RDF providers to increase their recycling rates for non-ferrous materials, to evaluating using an ash drum magnet to further increase our own ferrous recovery within our plants. We are implementing win-win community service programs, such as free disposal of storm damaged trees to increase the biogenic fraction of our fuel. We are also interested in reducing transportation emissions, and we are in the early stages of evaluating a hydrogen-powered trucking option.

RDF contributes to a circular economy by ensuring that the maximum value is extracted from waste materials. By recovering energy from such waste, RDF helps close the loop by preventing valuable resources from being wasted and contributing to overall sustainability goals. While co-generation or district heating customers would further reduce global warming for the sites because it would decrease methane consumption for building heating, our plants are generally far from large loads. This means the capital investments of such projects are not justified.

D. Green Jobs and Economic Growth

The Company's Red Wing, Wilmarth, and French Island Waste-to-Energy Generating Plants provide several economic benefits to the communities where they are located. The waste-to-energy plants provide stable, well-paying employment opportunities for local workers, helping to stimulate economic growth, and improve quality of life in their community.

Furthermore, the plants supply employment and economic benefits through supporting the local waste streams that supply RDF at our waste-to-energy plants. The Company contracts with various suppliers and municipalities to procure RDF or MSW. RDF suppliers include:

- Recycling and Energy Board made up of Ramsey and Washington Counties.
- Prairieland (a joint venture of Faribault/Martin Counties, which also receives some waste from Truman County).
- The City of Red Wing, Minnesota, (which takes waste from Goodhue County).
- Minnesota Waste Processing Company (a private company that takes waste from portions of Blue Earth, Le Sueur, Sibley, and Nicollet Counties).

Fuel Supply contract negotiations for our next 10-year term have been limited to our largest fuel provider, the Renewable & Energy Center (R&E) representing Washington and Ramsey Counties. Recently, we executed a letter of intent with the Recycling and Energy Board to negotiate in good faith a new 10-year agreement. The maintenance fees and volumes of fuel per year are part of ongoing negotiations. However, once these are understood, we will be reaching out to our other three fuel providers for similar conversations.

The continued operation of local MSW to RDF processing plants support waste recycling steams which require technical expertise, and supply employment opportunities for local workers. By locally sourcing RDF, we are supporting local jobs and businesses, and supplying a market for waste haulers and processors. This supports local economies and creates jobs in the communities where we operate, furthering economic development and improving the quality of life in the community. In 2021, the Company's waste-to-energy plants supported 200 local jobs. Annually, the sites contribute $2 million of tax revenue and spend approximately $3.5 million on goods and services in the community.

In addition to supplying employment opportunities, the Company's waste-to-energy plants help to enhance the overall environmental quality of their communities through reducing the amount of waste that goes into landfills, thereby helping to reduce greenhouse gas emissions and other potential environmental pollutants. The sites ease community fears of ground water contamination from nearby landfills and have also reduced local landfill footprints by 26 million cubic yards from 1987 to 2020. These environmental benefits further contribute to economic growth and social well-being of the communities that they serve.

E. Lower Comparative Costs

The Company's Red Wing, Wilmarth, and French Island Waste-to-Energy Generating Plants charge maintenance fees to help offset the costs of their operation and cover the costs of any needed plant improvements. The maintenance fee refers to the fee charged to waste management companies for disposing of their waste at the generating plant. In other words, it is the cost associated with maintaining the plants so that the waste providers can continue processing and delivering RDF. The maintenance fee serves as a revenue source for the waste-to-energy plants and helps cover the operational and maintenance costs associated with waste management and energy recovery processes.

The maintenance fee is lower than the tipping fee to dispose of unprocessed MSW into a landfill, so this arrangement is financially advantageous to both parties. The Company receives invoices from RDF suppliers which contain two components. The first is the maintenance fee, which is a credit to the Company that offsets the higher plant maintenance costs resulting from the nature of burning RDF and needed plant improvements. The second is a fuel charge component, which is paid by the Company to the suppliers for the RDF burned at the plants.

The fuel charge fee is typically based on the weight or volume of waste delivered to the facility. The maintenance fee is dependent on several factors, including the location, size of the plant, local regulations, waste composition, and market conditions. These fees are negotiated through contracts between the Company and the waste management companies servicing the specific waste-to-energy generating plants. In 2021, each plant collected the following maintenance fees:

Red Wing	$ 4,402,799
Wilmarth	$ 3,163,474
French Island	$ 2,750,679

It is worth noting that maintenance fees can vary widely and may be influenced by factors such as transportation costs, labor expenses, needed capital investments, chemical costs, plant specifics, and the overall competitiveness of the waste management industry in proximity to the plant.

We refund to electric customers the maintenance fee revenues we collect at the Red Wing and Wilmarth plants (with the caveat that we forecast the maintenance fees when determining the amount of the credit in our rate cases). The credit/refund gets credited back in base rates.

V. CONCLUSION AND SUMMARY OF KEY POINTS

The use of RDF as a fuel source at the Red Wing, Wilmarth, and French Island Waste-to-Energy Generating Plants provide significant environmental and economic benefits. Extending the operating lives of the Red Wing, Wilmarth, and French Island is in the best interest of our customers, our employees, and the communities we serve. We have detailed a plan for the continued safe, reliable operation of these facilities, and we are committed to ensuring that the facilities continue to operate in compliance with all applicable regulations and in a manner that supports sustainable waste management practices.

Current and Future Life Cycle Greenhouse Gas Emissions Modeling for Xcel Energy Waste-to-Energy Facilities

Spring 2023

Report Completed by:

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Executive Summary:

Researchers from the University at Buffalo (The State University of New York) completed a life cycle assessment study to quantify greenhouse gas emissions associated with Xcel Energy, Inc. waste-to-energy (WTE) facilities at Red Wing, Wilmarth, and French Island. The study is novel and has added industrial relevance because it considers actual input data for each of the three facilities, provided to the research team by Xcel engineers and scientists. Importantly, comparisons are made between emissions associated with the in-use WTE facilities and landfill alternatives that would be most likely to accept the waste if the incineration facilities did not exist. Emissions for both the in-use and alternative scenarios were modeled from 2019 to 2050, considering expected changes in the respective regional waste management sectors as well as increasingly carbon-neutral electricity production portfolios. Finally, the study considered two different global warming potential (GWP) values for methane, 28 and 35, accounting for the gradually increasing warming impact of methane relative to carbon dioxide. Data from the United States Environmental Protection Agency's Waste Reduction Model (WARM) was used to quantify equivalent CO_2 emissions for all scenarios.

2019-2050 Cumulative Emissions Results: Landfill comparisons highlight the climate benefits of WTE, as 5 of the 6 modeled scenarios show reduced (10 – 58%) cumulative GHG emissions from 2019 to 2050 for WTE compared to landfilling. The 6th scenario (Red Wing, methane GWP = 28) shows similar emissions for both options (2% fewer emissions for landfilling). Given the study's reliance on real inputs, the research team believes that this work serves as a strong endorsement of the climate benefits of WTE compared to landfilling alternatives.

2019 Facility-Level Data: The analysis found that, for 2019, a year considered to be representative of typical operation for all three facilities, GHG emissions for the three Xcel facilities are most substantially caused by the waste combustion process. Compared to this, combustion of supplemental and transportation fuels are not substantial emissions sources. While the masses recycled by the three facilities are small (1-4% of the incoming waste streams, by mass, is recycled), the displaced GHG emissions from this pre-combustion sorting are substantial (negative emissions equaling 11-18% of total facility emissions). The opportunity to sort MSW streams before processing is unique to WTE and should be expanded, as reasonably possible. Displaced emissions due to electricity generation account for about 25% of total facility emissions for Red Wing and Wilmarth, and about 50% for French Island owing to that facility's substantial biogenic waste component.

Recommendations: Based on the findings of this study, the following recommendations are made to further reduce the climate impact of Xcel's WTE facilities:

- Recycling efforts, including pre-combustion sorting of MSW streams and post-combustion sorting of ash, should be expanded.
- Establishing and/or expanding partnerships with the intention of securing a waste feedstock with elevated biogenic fraction should be pursued, especially given external composting efforts that remove food waste from MSW.
- Given the low impact of transportation and supplemental fuel on net GHG emissions, emission reduction effort should focus on the waste stream and MSW incineration.
- Identifying steam customers would displace additional emissions from facility footprints.

Introduction:

The United States (US) generates waste at a rate of 4.5 to 5.0 pounds per day per person (lb/day/person) (US EPA, 2023a). About 35% of this municipal solid waste (MSW) is recycled or composted, leaving nearly 3 lb/day/person for disposal in landfills or waste-to-energy (WTE) facilities – totaling about 170 million tons per year in the US (US EPA, 2023a). It is estimated that US residents waste about 1 lb/day of food, only about 5-6% of which is composted (US EPA, 2023a). Organics collection for post-consumer composting requires sorting at the consumer-level, which, while growing in popularity, remains quite limited across the US. In other words, there is a significant amount of curbside and industrial waste that must be managed in a landfill or a WTE facility – other options do not exist for these types of waste without significant changes in existing waste management infrastructure, including sorting technology. It is notable that WTE facilities are better able to support some degree of pre-processing sorting than landfills, with many already having associated infrastructure in place.

While US society is increasingly aware of its elevated consumption and correspondingly high waste generation rates, from 1990 to 2018, per capita US waste generation was mostly stagnant, fluctuating between 4.4 and 4.8 lb/day (US EPA, 2023a). In 2018, based on mass, landfills are more than four times more popular than WTE for MSW in the US, accounting for about 50% of total waste handled, compared to 12% for WTE. As a contrasting example, Taiwan processes a substantial fraction of its waste in WTE facilities (Chen, 2018; Tsai *et al*., 2006; Tsai *et al*., 2020). Among developed countries, the US is unusually dependent upon landfills. The state of Minnesota has a higher reliance on WTE than much of the rest of the US, but it still only processes about 30% of its MSW in WTE facilities.

In the US, landfilling is, relatively, convenient and inexpensive. There are over 2,500 landfills in the US, compared to only 75 WTE facilities (in 25 states) (US EPA, 2023b; US EPA, 2023c). Factors limiting WTE industry growth, according to the US Environmental Protection Agency (EPA), include no need to conserve space (i.e., the US is a large country), WTE's complicated design and operation, and its elevated capital costs relative to alternative waste management options. Additionally, EPA reports general public opposition to WTE, due in part to an outdated, although previously justified, belief associating WTE facilities with harmful air pollution (US EPA, 2023c). From 1990 to 2005, due to EPA's Maximum Available Control Technology standards, national emissions of particulate matter and mercury from MSW facilities, as examples of representative air pollutants, dropped by 96%. Other significant reductions are well-documented for polychlorinated dibenzo-p-dioxins and dibenzofurans (> 99% reduction, nationally). MN air pollution control standards are even more stringent than federal policies. In other words, strict permits have allowed air pollutant emissions to be maintained well-below regulated levels. Moreover, space and cost issues should not be deciding factors in choosing between waste management technologies – an updated approach is required.

Given the increasing need to address global climate change, resulting from across the board rising greenhouse gas (GHG) concentrations (including both methane [CH_4] and carbon dioxide [CO_2]) and an increasing US focus on reducing methane emissions (see: Global Methane Pledge, US Methane Emissions Reduction Action Plan, New York State Climate Scoping Plan, etc.) due to the substantial difference in Global Warming Potential (GWP) between methane (a landfill product) and CO_2 (a WTE/combustion product), this work proposes that climate implications must be used to inform decision making associated with final management options for waste disposal (The White House, 2021; Climate & Clean Air Coalition, 2023; NYS, 2023).

The decomposition process for biogenic waste in landfills (i.e., waste that originates from plants and plant products in which carbon content was fixed by photosynthesis) in anaerobic conditions generates methane, a fuel and a potent greenhouse gas. If captured, this biologically produced methane can be converted into renewable natural gas and used to displace other gas directly or for electricity production, thereby displacing emissions from fossil fuel combustion. If released, however, the methane is 28 (100-yr Global Warming Potential, GWP) or 86 (20-yr GWP) times as problematic as the equal mass of CO_2. Note that while 28 is the currently favored GWP applied for methane in federal documentation, there is an increasing number of legislators, scientists, and scientific bodies reporting the higher, 20-yr GWP because of methane's short lifetime in the atmosphere (approximately 12 years, compared to approximately 100 years for CO_2). In this report, conservative values of 28 and a slightly elevated 35, based on anticipated increases in GWP levels, are applied. Anthropogenic carbon-based products, often associated with materials produced from fossil fuels and including long-lived plastic materials, and metals contribute minimally to excess GHG emissions at landfills but, of course, would be better handled via upstream recycling.

Currently, state-of-the-art MSW landfills capture up to about 65% of generated methane throughout their estimated 100-year lifetimes, meaning that even in a best-case-scenario, much of the produced methane is released to the atmosphere. Lower values have been reported, including 48% average landfill gas collection efficiency in a recent paper analyzing 396 operating US landfills (Themelis and Bourtsalas, 2021). Those landfills that do collect the gas can flare it (i.e., convert the high GWP CH_4 into low GWP CO_2 through combustion), use it as an energy source, or sell it as "green" natural gas. With that said, many landfills have no existing methane collection system associated with their processing, openly releasing CH_4 into the atmosphere. Flaring also requires supplemental fuel consumption and can generate air pollution, including nitrogen oxides. For landfills without flaring, other air emissions are minimal, but soil and groundwater pollution can be problematic.

Many modeled case studies exist for GHG emissions from both landfills and WTE, considered separately. Often, these are prepared in support of municipality waste management plans. More recently, several studies that quantitatively compare GHGs from the two facility types using models were completed (Aracil *et al*., 2018; Monni, 2012; Woon and Lo, 2013). Results from these analyses consistently disagree, however, and there remains a lack of clarity in the literature about the role ultimate waste disposal options play in reducing GHG emissions. This is due to, at least, variable assumptions regarding waste composition, steam generation, and methane capture rate for landfills and waste composition, steam generation, and transportation distances for WTE. Clarifying the analysis through the use of actual data provided by Xcel is expected to improve accuracy and relevance, providing a better roadmap for others grappling with challenging waste management decisions.

This study, therefore, compares overall GHG emissions from 3 Xcel Energy, Inc. (referred to as "Xcel" from here on) WTE facilities located in Minnesota (MN) and Wisconsin (WI) to the landfills to which the waste would have otherwise been sent. It considers business as usual (using actual 2019 data provided by Xcel) to a scenario in which the WTE facility did not exist and waste was instead disposed of in the landfills near respective waste sources. It also considers temporal variability, forecasting GHG emissions implications to 2050. The goal is to quantify how equivalent CO_2 emissions compare for landfills and WTE, using real inputs. The complete life cycle assessment considers waste source and type, transportation to disposal sites, emissions displaced via electricity generation and methane capture, and residual production/disposal.

Methodology:

Three Xcel WTE facilities were considered throughout this study, described throughout this report as Red Wing, Wilmarth, and French Island. The Red Wing Generating Powerplant is located in Red Wing, MN and is rated at 23 MW of electricity. The Wilmarth Generating Plant is located in Mankato, MN and is rated at 20 MW. The facility was originally constructed as a coal-fired powerplant and was converted to burn MSW in the late 1980s. The French Island Generating Plant is located in La Crosse, WI and was retrofitted to burn refuse-derived fuel (RDF) in 1987. The facility is smaller than the other two plants with a rating of 18 MW and is unique because a significant amount (nearly 50%) of its incoming waste stream is wood, associated with municipal tree waste collection, scrap rail ties, and industrial waste wood sources.

While forecasting into the future was completed as a portion of this study, the initial year of data provided by Xcel was 2019 for all considered facilities. Xcel considered this data set to be representative of a typical operating year, since 2019 is the most recent year wholly unaffected by the impact of the COVID-19 pandemic. Provided data included waste location, waste composition, transportation method, upstream recycling weights and compositions, energy generated, supplemental fuel consumed, and residue produced during the WTE process. Additionally, Xcel made recommendations about the landfill (or compost) alternative sites that would be used if the WTE facilities did not exist. In every case where it was possible, assumptions were made in a conservative (i.e., landfill-friendly) manner for data generation and other model inputs.

GHG Emission Factors: For both landfilling and WTE, as well as displaced emissions associated with recycling, GHG emission factors (positive or negative) were calculated using values and data associated with the EPA's most current Waste Reduction Model (WARM) (US EPA, 2020). While all calculations were completed using Microsoft Excel software, the original input emission factors were extracted from WARM documentation describing how model inputs were developed (US EPA, 2020). These values were modified by the research team to remove the transportation component, as this value was calculated independently (i.e., using data inputs provided by Xcel).

WARM values were also updated to reflect a methane 100-yr global warming potential (GWP) of 28 or 35, and a lifetime landfill gas collection efficiency of 60%. The value of 28 was selected to reflect recent changes made by US EPA and other national and international climate organizations to more accurately reflect current knowledge of the role of methane as a GHG; 35 represents expected continued growth of this value. As noted earlier, the 20-yr GWP for methane, 86, is *not* considered in this report. This is done partially for consistency with state and federal reporting norms, and partially to maintain conservative (i.e., landfill-friendly) assumptions. An assumed landfill methane recovery rate of 60% is intended to represent an above average (although not state-of-the-art) landfill performance for methane capture, as discussed in the section above.

For GHG emission factors associated with the transportation sector, US EPA AP-42 emission factors were considered (US EPA, 2023d). These are conservative values reported using units of CO_2 per mile per kilogram for specific vehicle types. For GHG emissions associated with supplemental fuel use, 30% efficiency was assumed for natural gas boilers at the WTE plants.

Waste Location and Composition: For all facilities, Xcel provided detailed records describing waste composition (based on past waste audits for all facilities) and locations from which, and methods by which, the waste was collected and transported to the three WTE facilities. To match waste categories considered by US EPA's WARM, waste was categorized as fossil fuel-derived carbon (represented by Mixed Plastics), biogenic carbon (represented by Mixed Organics), wood (represented by Branches), and residue (either Bulky Waste Residue or Process Residue rejected before incineration).

For the French Island alternative scenario, it was assumed that not all waste would be landfilled if the facility did not exist – a difference from Red Wing and Wilmarth. Specifically, wood waste was assumed to be distributed across incineration (~50%), animal bedding, mulch, and compost (~34%), and landfilling (~16%) to better capture likely alternatives for this material. Rail ties are uniformly burned, so removing the French Island facility would shift that waste source to another incinerator; likely at a much further distance. In the interest of conservative assumptions (i.e., this would increase GHG emissions for the alternative scenario) and because the exact alternative WTE facility could not be identified, this additional transport was not factored into alternative calculations.

To quantify transportation emissions, route distances for waste transportation vehicles were calculated based on data provided by Xcel, including the primary county from which waste was collected. Reasonable distances from waste collection site to WTE facility or landfill were calculated, assuming round-trip transportation. CO_2 emission factors for diesel fuel sources were extracted from EPA's AP-42 reporting and applied based on weight being transported and distances traveled for both landfill and WTE scenarios (US EPA, 2023d).

Upstream recycling was applied to waste streams before processing in the WTE facilities. While methods and extent of recycling vary for each of the three facilities, negative emissions associated with recycling that would have otherwise *not* been applied in landfill scenarios were included in ultimate calculations. Note that this recycling is not the standard, curbside-sorted municipal recycling that most in the US are familiar with. Rather, to the greatest extent possible, Xcel and their fuel providers apply a sorting process to remove recyclables from the curbside *trash* stream for energy/cost recovery and to protect their WTE systems, making the "no recycling in landfill scenario" assumption reasonable. Recycling data provided by Xcel categorized extracted materials as Ferrous Metal, Non-Ferrous Metal, Bulky Metal, White Goods, Scrap Tires, Electronics, or Mixed Metals, directly corresponding to materials categories included in WARM.

Emissions Forecasting: As noted previously, data provided to the research team by Xcel relates to facility operations in 2019. However, forecasts to 2050 were generated by assuming a few specific scenario changes.

- Consistent with internal Xcel documentation and assumptions, displaced emissions due to generated electricity (for both WTE and landfill scenarios, where relevant) are projected to decline to zero between 2019 and 2050 (a scenario representative of the transition to a carbon-free electricity grid). Xcel provided the projected annual carbon intensities of its electrical generation for the years between 2019 and 2050. Note that this carbon-free scenario is also consistent with new state-level carbon reduction goals coming online throughout the US, including the Scoping Plan for New York State which aims for zero-carbon electricity in 2050 (New York State, 2023).
- A composting facility and eventual anaerobic digester system will come online in MN (Newport Food Scraps Program), removing 30,000 tons of biogenic waste from the Red Wing (~20,000 ton) and Wilmarth (~10,000 ton) facilities (Rischar, 2020). It is assumed that the waste removal will begin shortly (2023) and proceed evenly until reaching maximum amounts in 2028. While the specific impacts of this compost facility addition remain to be determined, assumptions applied in this regard were again determined to be

conservative because removal of organics from the waste stream is expected to substantially decrease modeled GHG emissions of the landfill alternatives.

- Major changes are projected to the operation of the French Island facility. It is assumed that wood waste at French Island will be restricted in the coming years, and that the facility will switch to 24 hours a day, 7 days a week operation in 2030 (from 24/5 today), increasing total handled weight through an increase in MSW being burned.
- Consistent with reported plans, it is assumed that the alternative French Island landfill will cease to generate electricity in the coming years.

Results:

Results and corresponding discussions below are provided on a facility-by-facility basis, with comparisons to modeled landfilling alternatives using 2019 input data. Projections to 2050 are also used to compare the WTE facilities to landfilling. The objective is not to compare the facilities to one another, but rather to compare each facility, individually, to its respective alternative and forecasted scenarios described above.

2019 Waste Composition: Table 1 describes the waste composition and total weights for the three Xcel facilities. The Red Wing facility handles about 50% more weight than Wilmarth and more than 100% more weight than French Island. With that said, waste composition, including recycling rate and bio/fossil ratio, for Red Wing and Wilmarth are similar in spite of the total mass difference. Anecdotally, these two facilities also appear to be comparable to other WTE facilities in the US, especially those processing significant MSW, as opposed to wood or industrial waste.

Table 1. Waste composition and total mass handled for Xcel WTE facilities in 2019

Facility	Total Weight Handled (ton)	Biogenic Waste	Anthropogenic Waste	Recycling	Residue	Wood
Wilmarth	211,371	50%	32%	3%	15%	0%
Red Wing	305,344	47%	32%	4%	18%	0%
French Island	137,188	24%	18%	1%	12%	45%

French Island is quite different from the other facilities because nearly 50% of the waste it processes is wood, consisting of municipal tree scraps, rail ties, and a small fraction of industrial wood waste. Including this in the bio/fossil ratio calculations puts the facility at nearly 70% biogenic waste. Although the GHG implications of wood are quite different from other organic materials, especially in the landfilling scenario, as discussed in sections below, this value remains impressive. Note that while the sources of wood waste at French Island are variable, it was assumed that "Branches" was the best representation in the WARM model for this waste – all were categorized the same way. Because recycling is not relevant for wood, recycling rates at French Island are notably lower than at the other two facilities. For the same reasons, the residue rate is lower for French Island.

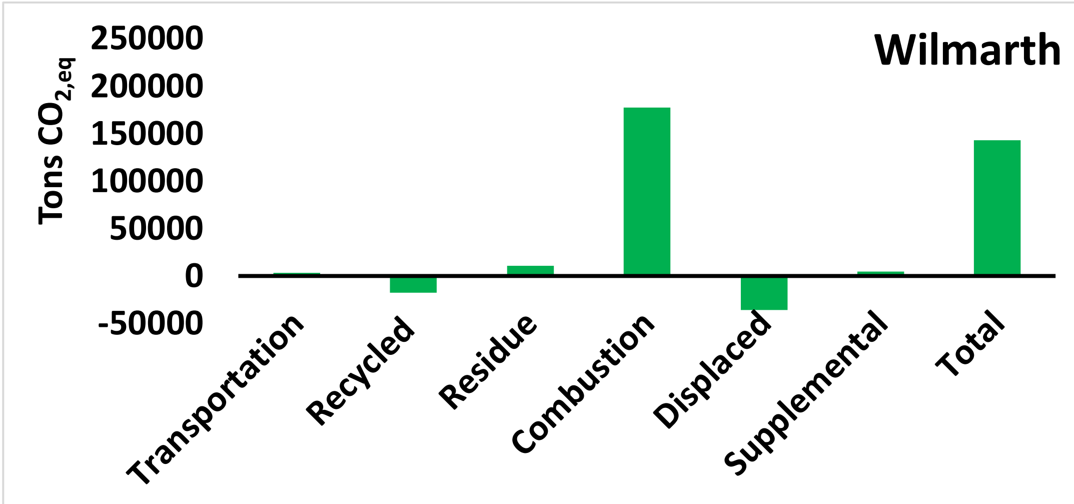
The biogenic fraction of total processed waste is an important metric for WTE facilities, as it represents the fraction of waste and resulting carbon emissions that can be considered biogenic (with GWP = 0). Since the residue value includes both post-combustion and pre-combustion weights, stack testing is used by Xcel to estimate the biogenic fractions, which Xcel reports to be 0.55, 0.55, and 0.74 for Wilmarth, Red Wing, and French Island, respectively.

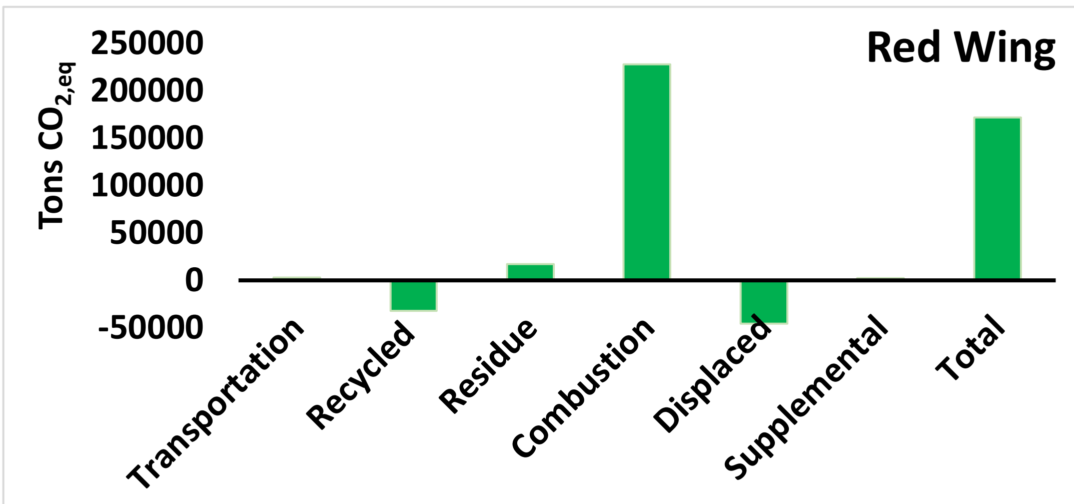
Lifecycle Emissions for Xcel's WTE Facilities: Figure 1 describes categorized GHG emissions for the 3 Xcel facilities based on 2019 data. Note that, because methane emissions have only minor relevance for the WTE facilities, this is not distributed across the two considered GWP scenarios – only consideration of the 28 scenario is described here to better improve clarity. With that said, these small differences with CH_4 GWP are quantified and described in Table 2, which follows in the section below.

Negative emissions are associated with "Displaced" and "Recycled" categories. "Displaced" refers to avoided emissions associated with the electricity that is produced by the WTE facilities. This research assumed that the produced electricity from the WTE systems, in 2019, would displace electricity that would have otherwise been produced using average efficiency combined cycle natural gas systems. WTE facilities provide dispatchable base load generation, which if not available, would need to be replaced by generation with similar capabilities (i.e., natural gas generation under the current grid system). This is more conservative than assuming that coal generation or less efficient simple cycle gas combustion turbines would be displaced. In projections to 2050, Xcel's average grid intensities are used instead of any individual electricity generation type, acknowledging a planned transition to zero carbon electricity by 2050 and associated unknowns of technology deployment in later years.

"Recycled" refers to emissions savings associated with recovery and recycling of metals and other materials from the waste stream before incineration. This recycling goes beyond the traditional municipal recycling programs for the areas from which waste is collected for these facilities, recovering recycled content from the streams that are associated with household/industrial MSW (i.e., the "trash" tote instead of the "recycling" tote). The Red Wing facility has a more robust recycling system upstream of its WTE facility, resulting in disproportionately more recycling than at the other facilities. Note that while the masses recycled are fairly small (1-4% of the incoming waste streams), the GHG impacts are significant (negative emissions equaling 11-18% of total facility emissions).

All three Xcel facilities have net positive emissions, aligning (not linearly) with the amount of waste handled. Positive emissions categories include transportation, combustion, residue, and supplemental fuel.





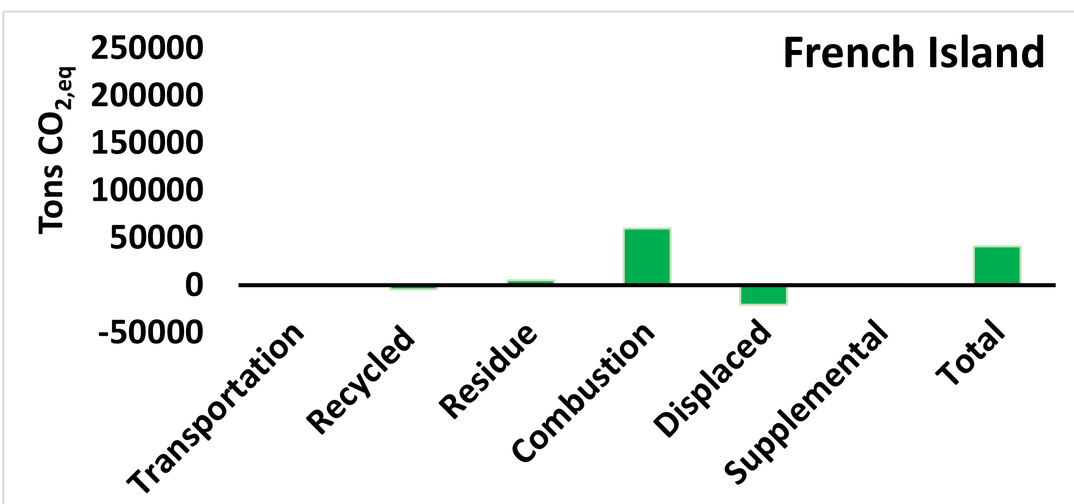


Figure 1. Lifecycle GHG emissions based on 2019 data for Xcel WTE facilities at Wilmarth, Red Wing, and French Island. Total emissions represents the sum of the six considered emissions categories.

Role of Recycling: Recycling has substantial negative impacts on total GHG emissions for all three WTE facilities. Expansion of recycling, should it be economically and logistically feasible, is recommended for two purposes: (1) displacing more emissions via materials recovery, and (2) reducing anthropogenic carbon content in the RDF streams. As noted earlier, WTE facilities are uniquely positioned, relative to other end-of-life management options, to buildout the infrastructure required for recycling. For the three considered Xcel facilities, which all have some of the infrastructure in place already, it is recommended that the company consider expanding upstream sorting capabilities even further. Plastic is particularly problematic at WTE facilities. It burns hot, creating process/engineering control challenges, and it has a high GHG emissions factor (> 3 tons $CO_{2,eq}$/ton) for combustion processes (US EPA, 2020). Plastic is not currently being removed in the recycling streams for the Xcel WTE facilities. As such, it is recommended that Xcel investigate the possibility of working with so-called "Dirty Materials Recovery Facilities (MRFs)" to source waste feedstocks and expand their already-impressive upstream recycling potential. Dirty MRFs apply recycling to residential waste streams, recovering valuable materials for reuse while simultaneously increasing the biogenic fraction of the residual waste. As discussed later in this report, from a climate perspective, this process helps WTE facilities that benefit from high biogenic fractions and hurts landfills that do not benefit from them. The use of these facilities in the recycling sector, while still new, is growing, and partnerships/expansions for Xcel may be justified based on data reported here.

Role of Biogenic Materials: The significant amount of biogenic material at the French Island site reduces its overall emissions relative to mass burned. In most sources, biogenic carbon is considered to have a GWP of zero (or close to zero) when combusted; the WARM model assumes zero for biogenic CO_2 (US EPA, 2020). The justification is, simply, that the material was produced by photosynthesis, removing CO_2 from the atmosphere, so a combustion process that releases that CO_2 back into the atmosphere on a carbon-for-carbon basis has net zero impact. While the kinetics are a bit more variable (e.g., plants grown seasonally vs. instantaneous combustion), it is widely accepted that burning biogenic carbon has no GHG impact – WARM applies this value (GWP = 0) for mixed organic waste. Wood, while biogenic, is a bit more complicated. Trees are not seasonal plants, instead requiring decades (or in some cases centuries) to fix the carbon that makes up their structures. As such, WARM applies a small positive emissions factor for burning these materials – 0.07 ton $CO_{2,eq}$ / ton waste – which, when compared to anthropogenic carbon (> 3 ton $CO_{2,eq}$ / ton mixed plastics, for example), is quite small (US EPA, 2020). This value is determined on a lifecycle basis, but it is noted that many state/federal policies do not consider a full lifecycle and instead apply a value of zero. Because this work is using WARM inputs and making conservative assumptions, the full lifecycle value is used. The combination of 45% wood waste and 24% non-wood biogenic carbon, results in low emissions per unit mass burned at French Island. It is reiterated here that expanded upstream recycling for RDF inputs at any of the facilities would *increase* biogenic fractions further, lowering GHG emissions per unit mass burned.

Role of Transportation and Supplemental Fuel Emissions: Independent of facility, transportation emissions make up a small fraction of total emissions. This is independent of vehicle type (18-wheel truck, standard waste truck, train, etc.) and distance traveled. These results suggest that climate impacts of the combustion process vastly outweigh transportation concerns and are particularly important because they support that waste collection for incineration processes can be accomplished over a wider swath of land without significantly impacting overall GHGs released.

The argument can be used to support the *expansion* of WTE use for end-of-life materials management, also potentially overcoming dated concerns about capital costs and space requirements for landfills discussed earlier (US EPA, 2023c). Like transportation, supplemental fuel consumption has little overall impact on the three facilities' total emissions.

2019 WTE vs. Landfill Alternative Comparisons: Table 2 describes differences in 2019 GHG emissions totals for the existing WTE scenarios and landfilling alternatives.

Table 2. 2019 total GHG emissions for the three Xcel facilities and two methane GWPs, with comparison to landfill alternative scenarios.

Facility	Methane GWP	2019 Actual Emissions (ton $CO_{2,eq}$)	2019 Alternative Emissions (ton $CO_{2,eq}$)
Wilmarth	28	143,122	202,753
	35	145,520	263,033
Red Wing	28	171,240	235,447
	35	175,376	310,198
French Island	28	40,700	22,594
	35	41,810	25,028

For Red Wing and Wilmarth, the actual emissions from the WTE facilities are notably lower than the landfill-based alternatives in both GWP scenarios. This is attributed to multiple factors: (1) pre-combustion recycling at the WTE facilities (and not at the landfills) displaces emissions, (2) landfill alternatives for these two facilities do not generate power on-site (both utilize flaring), and (3) most importantly, methane emissions from the landfills' handling of biogenic materials are substantial and have a high GWP relative to WTE CO_2 emissions.

The 2019 scenario is different for French Island, where the alternative emissions are lower than the existing WTE emissions. As the composition of MSW-based fuel sources are comparable, the difference must be largely attributed to the substantial content of wood at French Island. As discussed earlier, wood, a biogenic carbon material, has slightly positive emissions values associated with its combustion. These same emissions will apply in the alternative scenario for the rail ties that are assumed to still be combusted. However, the remainder of the wood is treated as compost, animal bedding/mulch, or landfill in the alternative scenario. Because of significant carbon storage capacity and less methane generation relative to other biogenic carbon materials, WARM attributes *negative* emissions values to all of these end-of-life options – including landfilling – lowering total GHG emissions for the alternative scenarios (US EPA, 2020). From this perspective, while the wood has minimal impact on the total WTE emissions (i.e., emission factor close to zero), it actually penalizes the French Island facility relative to the alternative scenario (i.e., emission factor less than zero). Carbon storage is a challenging parameter to model, and there is disagreement in the literature regarding its significance (Morris, 2016). For example, it is curious that calculations based purely on climate impact suggest it is *favorable* to landfill all wood that is generated. Most are not likely to assume this, but the carbon storage value of this material suggests a landfill is the preferred destination. So, while use of WARM in this study was necessary to provide consistency with GHG inventory methodology, these considerations must be noted and taken into consideration. The French Island alternative landfill currently generates electricity, reducing the impact of methane emissions by adding a displaced emissions component to the calculations (landfill alternatives for Wilmarth and Red Wing only flare methane).

WTE emissions exhibit little to no sensitivity to methane GWP. Apart from a small amount of landfilled residue (much of which has limited carbon content), inputs into the WTE calculations are independent of this value. Landfill alternative emissions, on the other hand, change by up to about 30% with the rising GWP. This is, of course, expected given the primary GHG emissions source associated with landfills is methane generation and release into the environment. At present, there is a national push to reduce methane emissions. This is largely attributed to methane's shorter lifetime and higher impact in the atmosphere, as discussed in the introduction. Because ambient methane concentrations are low relative to CO_2, its unit impact is magnified. More specifically, band gap saturation continues to reduce the relative impact of a unit mass CO_2 emission into the atmosphere (Archer, 2011). For this reason, the GWP of methane, which is, by definition, a comparison to the relative and decreasing impact of CO_2, continues to grow from 20 in the mid 2000s, to 25 in the mid 2010s, and now 28 in the early 2020s. Growth is expected to continue, justifying use of the GWP = 35 value in this work, so this sensitivity impact is an especially relevant conversation topic for comparing waste management options that do (landfills) or do not (WTE) generate methane.

Emissions Forecasting to 2050: Figures 2 (CH_4 GWP = 28) and 3 (CH_4 GWP = 35) show emissions projections to 2050 for all three facilities (i.e., "In-Use"), modeled landfill-based alternatives, and both GWPs. These calculations assume that methane GWP is fixed (28 or 35) and not changing with time.

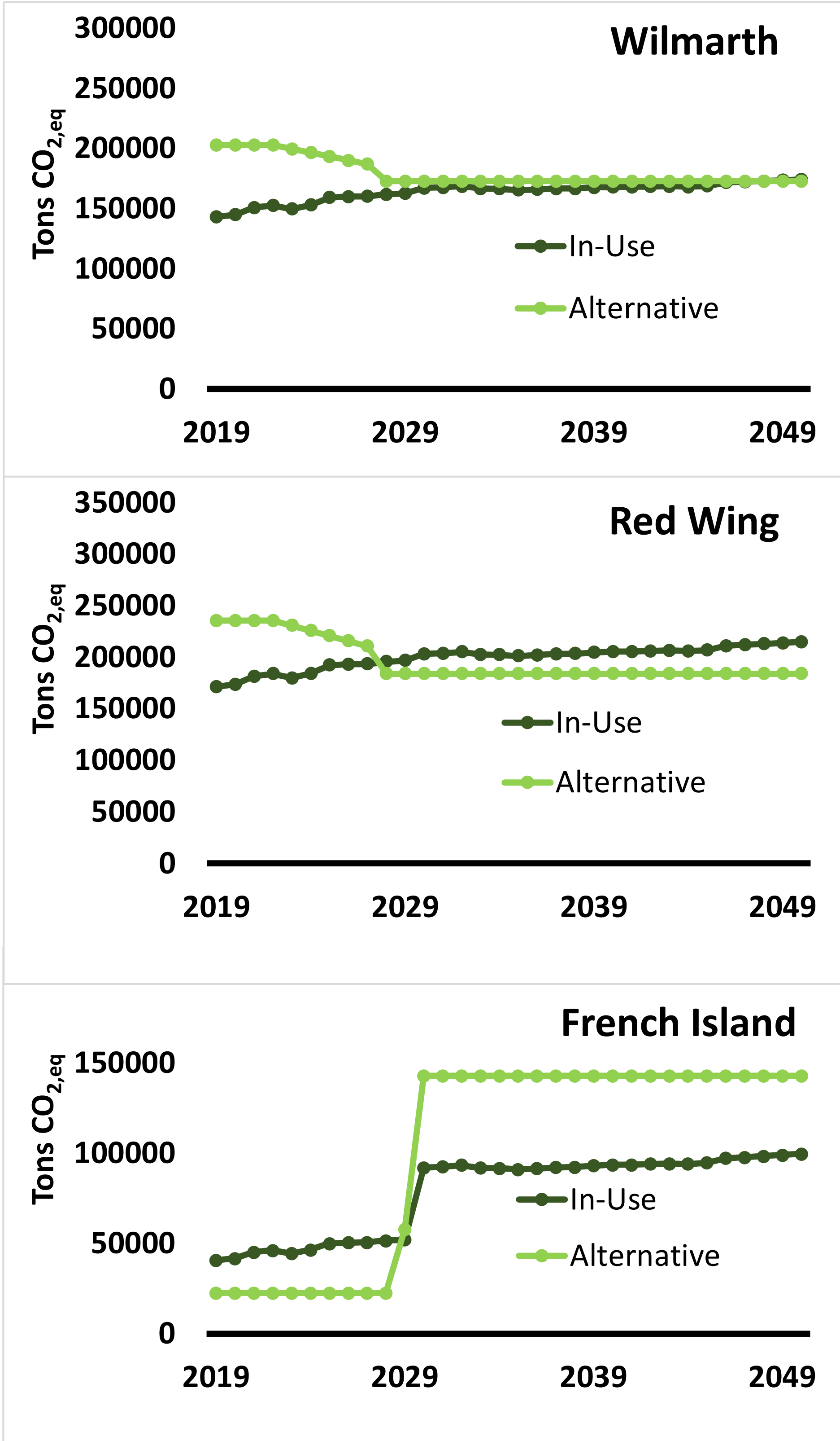


Figure 2. For CH_4 GWP = 28, emissions comparisons for facilities. Note the variable y-axis scale. "In-Use" refers to the existing WTE scenario, while "Alternative" corresponds to landfilling alternatives.

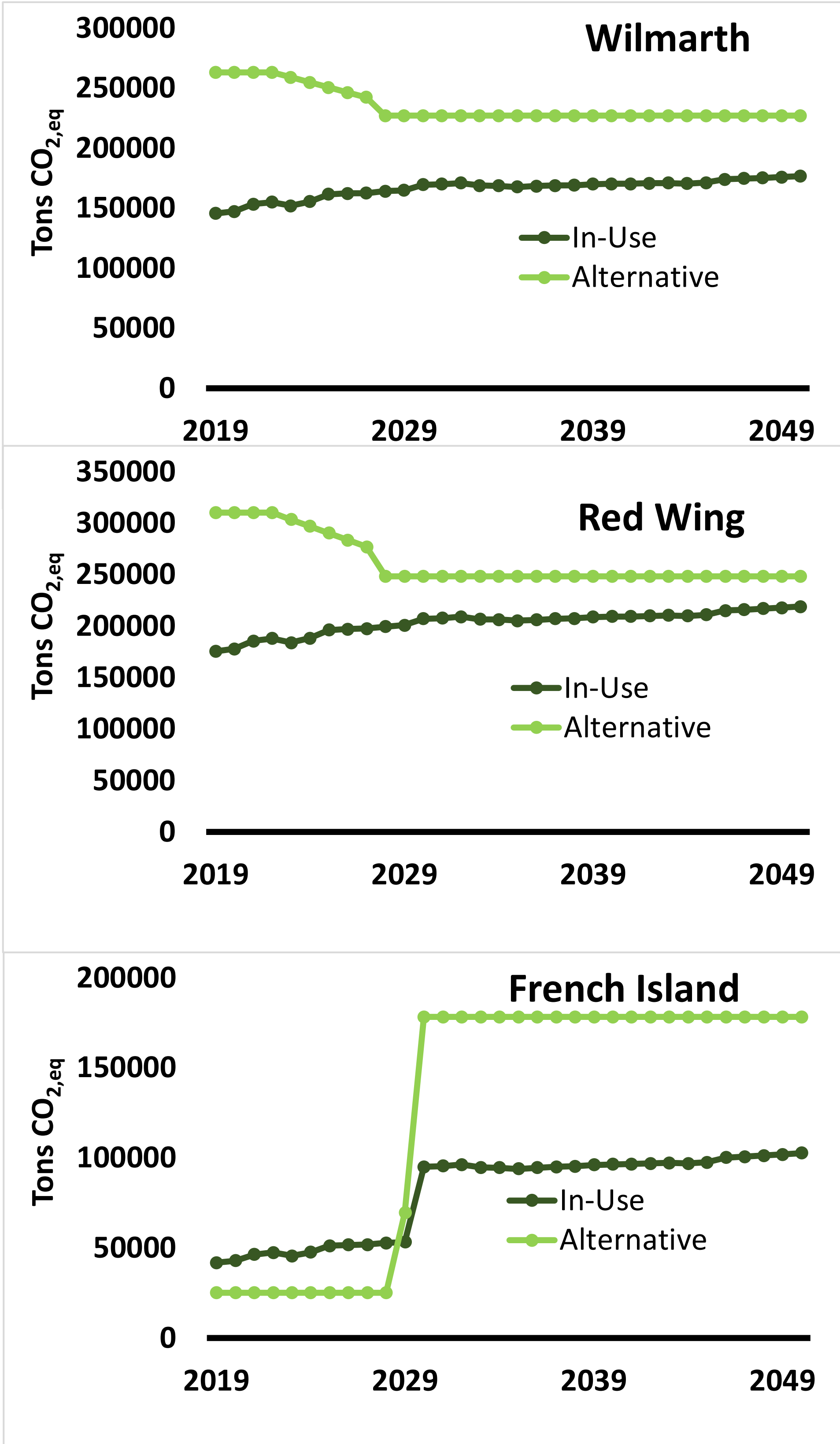


Figure 3. For CH_4 GWP = 35, emissions comparisons for facilities. Note the variable y-axis scale. "In-Use" refers to the existing WTE scenario, while "Alternative" corresponds to landfilling alternatives.

For all facilities, WTE emissions increase gradually with time in the “in-use” scenarios since, as noted, it is conservatively assumed that the value of displaced emissions due to electricity generation will decrease with time due to an increasing fraction of renewables on the overall electricity grid. In other words, WTE facilities are predicted to displace fewer GHG emissions, resulting in increased overall GHG emissions values in coming years. As the Wilmarth and Red Wing landfill alternatives in 2019 do *not* generate electricity, this gradual increase is not observed for those scenarios. The French Island landfill alternative is scheduled to stop generating electricity in the near future, so it too is not substantially impacted by this change.

From 2023-2028, Wilmarth and Red Wing landfill alternatives see substantial drops in GHG emissions. This is due to the removal of 30,000 tons of food scraps, (5,000 tons starting in 2023 and increasing by 5,000 tons for 6 years) which are expected to be composted at a nearby facility (Newport Food Scraps Program). Landfill methane is primarily generated from rapidly decomposing biogenic carbon sources, like food scraps. This reduction, which is less than 10% of the total waste anticipated, has an outsized impact because of the significant GHG effect attributed to organics. Removal of this waste from the WTE facilities, on the other hand, has negligible impact on GHG emissions because (1) transportation impacts are small and (2) food waste is biogenic carbon, which has an emission factor of 0 in the WTE scenarios. In other words, this change does not result in substantial change on total WTE GHG emissions, but it does cause the landfilling alternatives for both facilities to generate less.

Rising emissions in the alternative scenarios for French Island are dramatic. An elbow can be seen in the curve, attributed to two different factors. First, the initial rise is due to a planned transition away from electricity generation at the alternative landfill, removing the displaced emissions component for the alternative scenario to cause an increase in overall emissions. The second change, which has almost twice as much impact, is from a proposed increase in mass processed (40%) at the facility along with a change in composition (replace wood with RDF). These changes are consistent with possible Xcel plans for this facility. Note that the increase in mass and change in composition will increase overall GHG emissions attributed to the facility, but as the forecasting model shows, it will substantially increase emissions in the alternative landfill-based scenarios. This is because, as Wilmarth and Red Wing data show, GHG emissions are lower for mixed MSW being burned versus landfilled, especially when the non-wood biogenic fraction is substantial. WARM assumes that wood is a means of carbon storage/sequestration in landfills, while the biogenic component of MSW is a primary methane source (US EPA, 2020). This is especially true in the landfilling scenario, where the negative carbon storage value associated with wood is a dramatic shift from the positive numbers linked to other biogenic waste (or, for that matter, the '0' value associated with anthropogenic materials like mixed plastics).

In the forecasting scenarios, total GHG emissions through 2050 were calculated for the different scenarios considered. Overall differences over this period between WTE and landfilling alternatives were calculated and are reported in Table 3. Positive "savings" and GHG reductions imply less total GHG emissions from the WTE process compared to landfilling; a negative reduction indicates that the landfilling generates less total GHG emissions than WTE.

Table 3. Total GHG differences (summed emissions from 2019 to 2050) for WTE compared to landfill alternative scenarios.

Facility	Methane GWP	Emissions Savings (ton $CO_{2,eq}$)	GHG Reductions vs. Landfill
Wilmarth	28	512,946	10%
	35	2,211,770	42%
Red Wing	28	-102,067	-2%
	35	1,896,148	29%
French Island	28	788,017	32%
	35	1,492,820	58%

Role of Methane GWP in Forecasting: The influence of methane GWP is significant for landfill emissions modeling. These presumed increases in GWP will have little impact on Xcel's carbon reporting and overall emissions (Table 2) compared to, say, their planned decreases in carbon intensity of electricity generation, but the GWP changes will dramatically shift the conversations around recommended end-of-life materials management. This is most clearly observed for Red Wing, where the 28 GWP scenario for methane indicates that landfilling is slightly more favorable for reducing cumulative emissions through 2050 than WTE, while the 35 GWP scenario shows the opposite. This finding should be interpreted as, when forecasting through 2050, WTE is expected to perform similar to or better than landfilling alternatives, depending on the extent to which methane GWP changes. Given the conservative nature of assumptions used and the general external trends to specifically target methane emissions reductions, these results are believed to be favorable for the WTE industry.

Role of Displaced Emissions in Forecasting: While the displaced emissions from electricity generation are impactful (i.e., in Figure 1), removing their influence does not substantially decrease the climate value of the WTE technology. In this work, the contribution of displaced emissions drops to zero by 2050. Because most of the landfills considered (all of the landfills considered after 2030) do not increase generation of electricity, this change would be expected to disproportionately impact WTE. While this is true, the total savings over the period 2019 to 2050 in all scenarios (but for the 28 GWP Red Wing case) are in favor of WTE in spite of this change. This is a surprising finding, especially given that the alternative landfills in this study are not generating electricity currently (Red Wing and Wilmarth alternatives) or in the near future (French

Island alternative). It is, of course, consistent with Figure 1 in that the released emissions due to combustion dominate the footprint of the WTE facilities.

Role of External Sources in Forecasting: Finally, the relative climate impact of these Xcel facilities is closely linked to decision making that falls outside of their immediate control. The opening of a local compost facility and eventual anaerobic digestor has substantial impact on *both* WTE and landfilling, even if the carbon accounting for Xcel will not change significantly. Again, such rules will not dramatically shift WTE GHG emissions, but widespread changes to the composition of the waste-based fuel source will *dramatically* shift the climate impact of alternatives. The waste management industry is highly dynamic, and upstream decision making associated with the sector as a whole can have downstream, potentially unexpected, consequences. Composting and anaerobic digestion are increasingly popular across the US, but their growing relevance has an immediate impact on *other* end-of-life destinations for waste, namely WTE and landfilling facilities who must now grapple with, potentially, dramatically different feed streams.

Design decisions associated with alternative landfills (e.g., installing/removing electricity generating capacity) can swing scenario modeling, as observed with the French Island alternatives. To this end, technologies like upstream recycling, waste steam displacement for heating (if customers are available), unique waste sourcing/partnerships, and more, which can be more directly controlled by Xcel and provide substantial emissions reductions for their own carbon accounting, have increased importance. Efforts to reduce plastics in the waste feedstock would be particularly impactful from a WTE GHG emissions perspective.

Conclusions and Recommendations:

Results from this study highlight the climate benefits of WTE, as 5 of the 6 modeled scenarios show substantially (10 – 58%) reduced cumulative GHG emissions from 2019 to 2050 for WTE compared to landfilling alternatives. The 6^{th} scenario (Red Wing, methane GWP = 28) shows similar emissions for both options (2% fewer emissions for the landfill alternative). This study considered actual waste composition and mass, transportation, electricity, and supplemental fuel inputs, making it less reliant on models than much of the research efforts published in the peer-reviewed literature to date. As such, the research team believes it serves as a strong endorsement of the climate benefits of WTE compared to landfilling alternatives.

Specific recommendations from this work include the following:

- Increased emphasis on pre-combustion sorting for recycling. This is a unique advantage for WTE, and improved recycling is expected to decrease cumulative GHG emissions and, potentially, generate income.
- Increased emphasis on post-combustion sorting for recycling, including added eddy current separation for isolating non-ferrous metals. Similar to pre-combustion sorting, this is expected to decrease GHG footprints, decrease masses being sent to landfills, and, potentially, be a revenue stream.
- Xcel should explore opportunities to exert more control over their MSW streams. This is highlighted by the modeled benefits of reduced wood combustion at French Island, in favor of MSW. For Red Wing and Wilmarth, specific partnerships aimed at increasing the biogenic fraction of waste being burned (either through more biogenic content or less

anthropogenic content) are shown in these results to be favorable from a climate perspective.

- GHG reduction efforts should focus on the waste combustion process, as opposed to diesel (transportation) or natural gas (supplemental fuel) combustion processes.
- If the customers exist, the sale of residual steam to neighboring facilities currently generating their own (i.e., through combustion of natural gas) should be investigated as a possible way to further displace GHG emissions.

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Greenhouse Gas Emissions Associated with Xcel Energy Waste-to-Energy Facilities, Compared to Landfilling

Dr. John D. Atkinson [1], Dr. Michael Shelly [2], et al.

[1] Department of Civil, Structural, and Environmental Engineering, State University of New York at Buffalo, NY

[2] RENEW Institute, State University of New York at Buffalo, NY

Motivation

- Waste generation (lbs per person, per day) increased 63% since 1960; approximately stable since 2010 [1]
  - Population Growth = Growth in total waste to be managed
- Waste that cannot be composted or recycled **must** be processed in waste-to-energy (WTE) facilities or landfills
  - 75% of non-recycled/composted US waste is landfilled
- Material end-of-life decisions often based on cost and public opinion; Need to consider climate and sustainability
- Climate projections state immediate need to reduce CH_4 emissions, due to short lifetime and high warming potential
  - Landfills release CH_4; WTE releases CO_2

Objectives

- For Xcel WTE facilities, determine Greenhouse Gas (GHG) performance relative to actual landfilling alternatives
- Quantify total CO_2-eqs for each scenario by considering:
  - Transportation Emissions
  - Waste Composition
  - Processing Emissions, including Recycling, Landfill Type
  - Displaced Emissions from Electricity Generation
- Forecast future emissions considering changes in displaced emission impact, composting, and landfill updates

Methodology

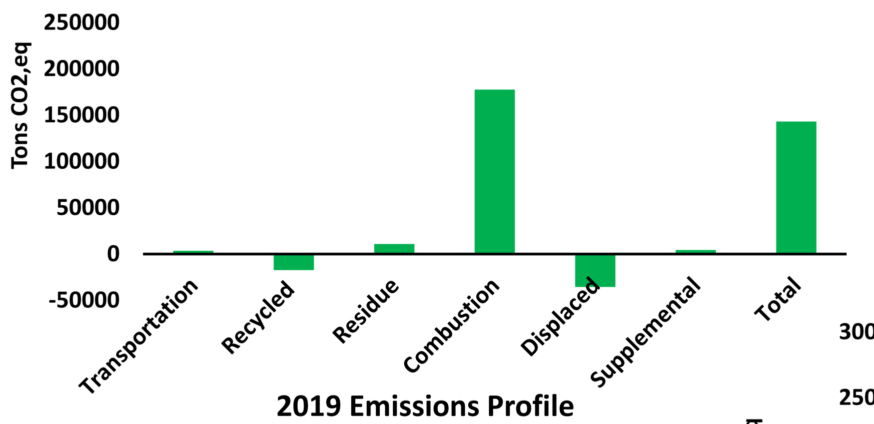
- Modeled waste from actual waste at Xcel Energy's Wilmarth (MN), Red Wing (MN), and French Island (WI) facilities:
  - Biogenic Waste (modeled as *mixed biogenic waste*)
  - Anthropogenic Waste (modeled as *mixed plastics*)
  - Wood (including rail ties and mixed wood waste, modeled as *branches*, only French Island)
  - Recyclables (including *ferrous, non-ferrous, bulky, e-waste, white goods, and tires*)
  - Processing Residue (landfilled)

Facility	Anthropogenic	Biogenic	Wood	Residue	Recycled
Wilmarth	32%	50%	0%	15%	3%
Red Wing	32%	47%	0%	18%	4%
French Island	18%	24%	45%	12%	1%

- Emission outputs modeled using emissions factors from USEPA Waste Reduction Model [2]
- Assume lifetime landfill gas capture efficiency = 60%; landfill emissions linked to full life cycle
- Assume displaced emissions initially from less natural gas electricity, at 60% efficiency; phasing out to zero displaced emissions by 2050 from growing renewable electricity
- Assume French Island facility will expand to 24/7 operation and replace wood waste with MSW in 2030
- Consider methane global warming potentials of 28 and 35 [3]

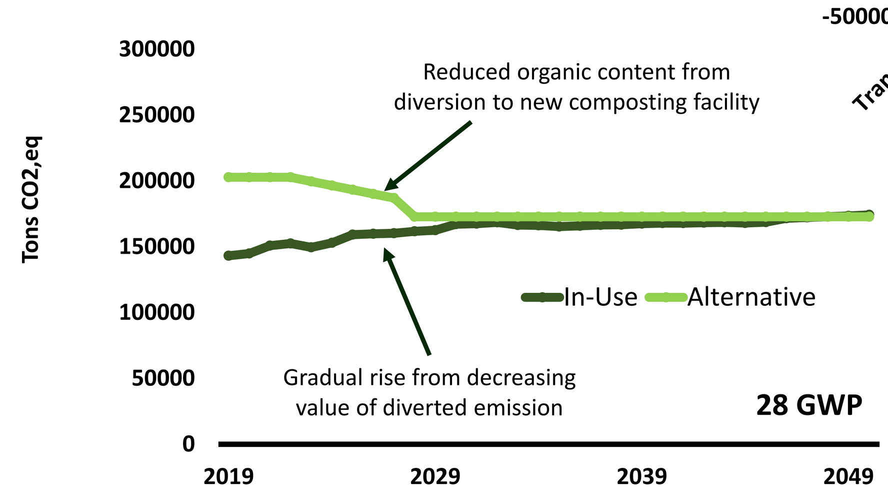
Current Emissions and Future Projections

Wilmarth

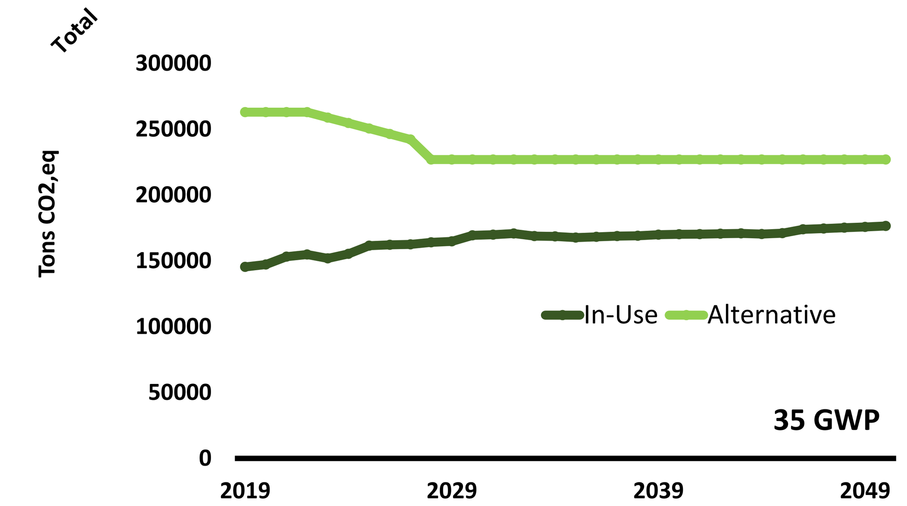


New composting site reduces bio/fossil ratio, decreasing landfill emissions (less methane) and increasing WTE emissions (less displaced power)

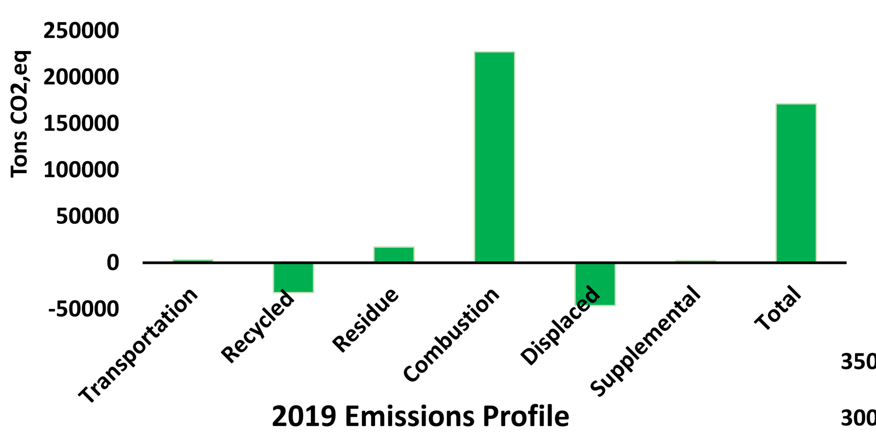
Assumes displaced emissions from electricity generation (landfill & WTE) will approach zero by 2050, inline with Xcel's carbon-free electricity vision



Wilmarth facility has favorable GHG emissions in both scenarios; an improvement of 10-42% depending on methane GWP

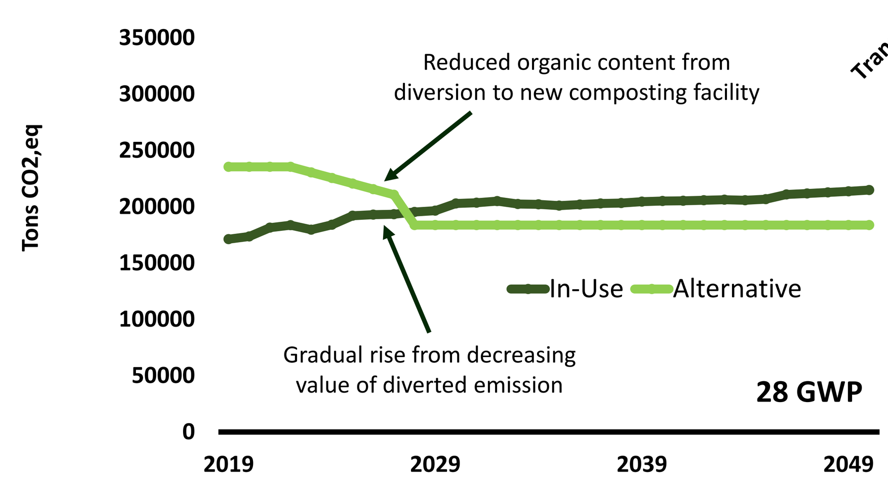


Red Wing

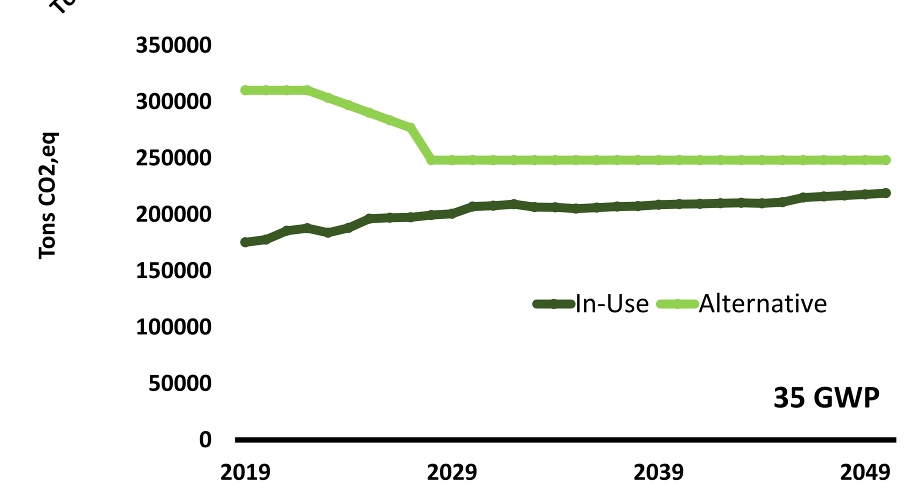


Added residual content, which is landfilled, increases Red Wing GHG emissions

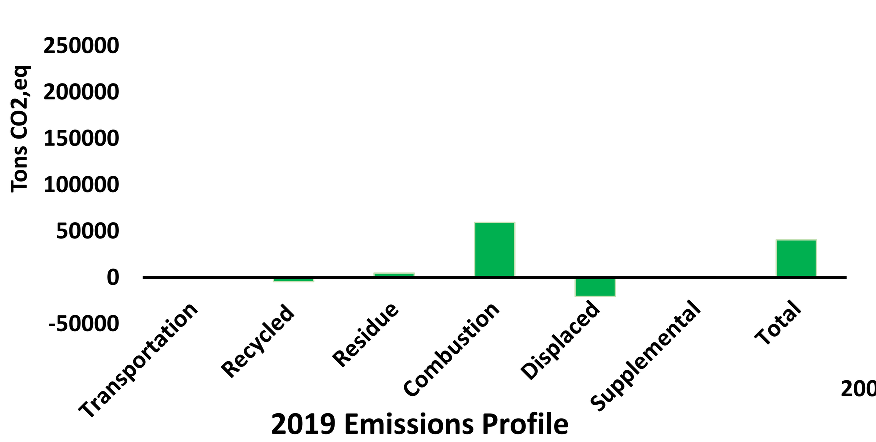
Despite scale of Red Wing facility, impacts of transportation and supplemental fuel use negligible relative to total GHG emissions



While the 28 GWP scenario results in comparable emissions, considering increased methane GWP leads to total GHG savings of 29%

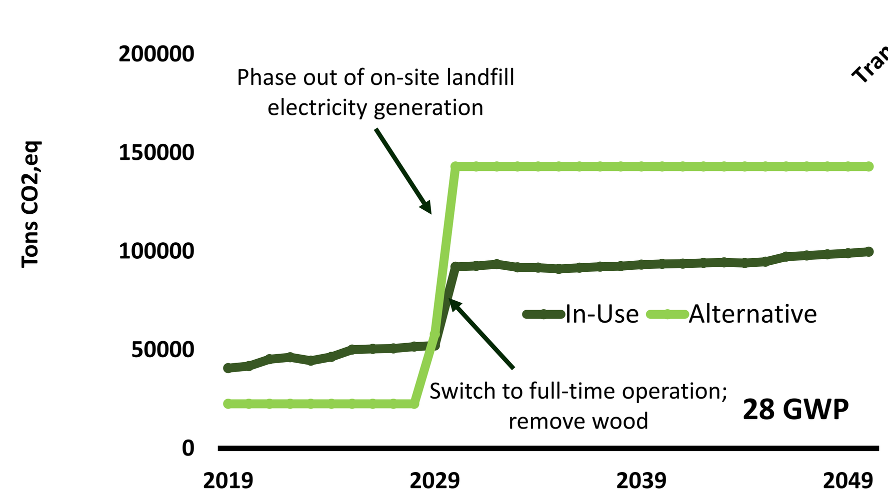


French Island

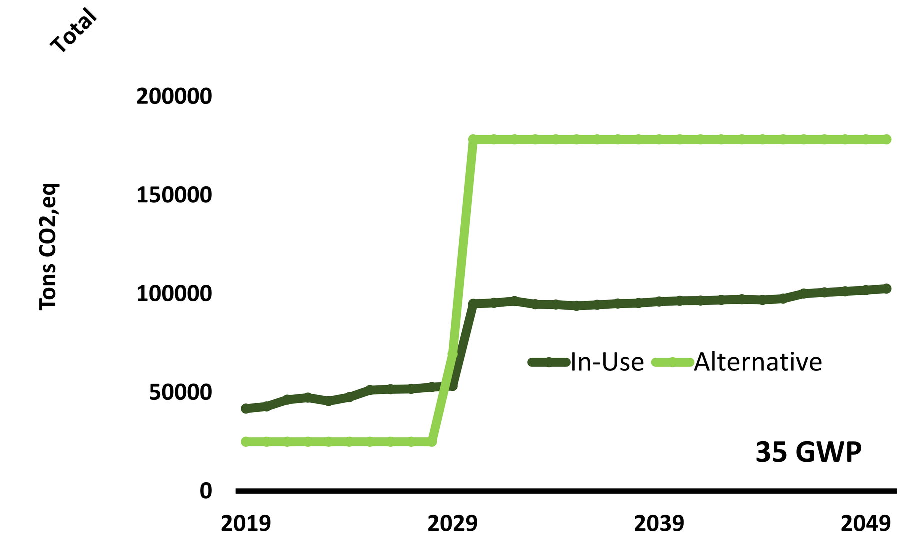


Significant wood source impacts comparison: Combusted wood = small positive GHGs; Landfilled wood = negative GHGs (sequestration)

Phase out of on-site electricity production increases landfill footprint, making WTE more GHG-favorable post-2030



Considering planned growth in French Island capacity and phase out of wood, WTE technology has 32-58% lower total GHG emissions, depending on methane GWP



Total Emissions Savings by 2050

Facility	Methane GWP	Emissions Savings (ton CO_2 eq)	Global Warming Savings vs Landfill
Wilmarth	28	512,946	+10%
Wilmarth	35	2,211,770	+42%
Red Wing	28	-102,067	-2%
Red Wing	35	1,896,148	+29%
French Island	28	788,017	+32%
French Island	35	1,492,820	+58%

- WTE emissions savings largely attributed to high impact of methane, which is expected to grow with time
- Even with **conservative** and **defensible** assumptions, WTE emissions generally lower that landfill

Conclusions

- Transportation emissions represent a small (<3%) contribution to total emissions, for all scenarios
- Opportunity to sort recycling before WTE handling lowers total emissions (11-18%) for WTE option
- Wood waste challenging, owing to boundary conditions and differences in emissions from burning, landfilling
- WTE remains favorable even as displaced emissions approach zero (i.e., 2050 assumptions)
- Increasing relevance and impact of CH_4 shown to increase the importance of WTE in waste handling portfolio
- Landfill type has significant impact – on-site electricity generation needed for landfill to be competitive with WTE
- Co-generation or waste heat recovery and expanded recycling programs recommended to reduce carbon footprint of facilities further

References

[1] EPA. *Advancing Sustainable Materials Management: 2014 Fact Sheet*, 2018.

[2] EPA, *Documentation for Greenhouse Gas Emission and Energy Factors Used in the Waste Reduction Model*, 2020

[3] IPCC, *6th Assessment Report*, 2022

Acknowledgements

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All results and methods presented in this poster were developed exclusively by the listed authors, with supplemental data and information used in calculations and assumptions originating from collaborators at Xcel's MN and WI facilities and Corporate Offices.

APPENDIX X – ADVANCED TECHNOLOGIES

I. INTRODUCTION

On June 14, 2022, in compliance with Order Point 11,[1] the Company submitted our COMPLIANCE FILING: ADVANCED TECHNOLOGY in Docket No. E002/RP-19-368, which discussed the Company's dedication to our role in advancing emerging technology as part of our 2050 vision, and to realizing benefits of advanced technologies for our customers. This appendix expands upon and provides updates about many of the topics addressed in that compliance filing, and addresses part of Order Point 12:

> *Xcel shall include in its next resource plan a deeper analysis of (1) storage options, including options combining solar generation and battery storage, and (2) the role of hydrogen and clean fuel alternatives in Xcel's resource mix.*

The balance of Order Point 12 – a discussion of supply-chain and life-cycle carbon impacts of the generation and storage resources – can be found in Appendix Y: Life Cycle Emissions Impacts.

Xcel Energy has a Company-wide vision to provide our customers in all the states we operate in with 100 percent carbon-free electricity by 2050. This vision directly aligns with the State of Minnesota's policy goals and statutes, including the state's latest standard requiring utilities to achieve 100 percent carbon-free energy by 2040. Our Preferred Plan achieves compliance with Minnesota's carbon-free energy standard and sets us on the path to realizing our 2050 carbon-free vision.

The Company recognizes that advanced and evolving technologies will play a critical role in helping us eliminate the remaining carbon emissions from our system while maintaining safe, affordable, and reliable electric service at times when renewable energy output is low. As such, we are dedicated to supporting emerging and advanced technologies that can help us meet our corporate and our states' energy goals while providing benefits to our customers. Such advanced technologies include (1) storage options, including options combining solar generation and battery storage, (2) virtual power plants (VPPs), (3) hydrogen and clean fuel alternatives, and (4) small modular nuclear reactors (SMRs) and other advanced and emerging nuclear technologies. Each

[1] Within 60 days, Xcel shall file a report discussing the work it is doing to support the integration of advanced technologies (including, but not limited to, hydrogen fuel and utility scale energy storage) into its system.

of these advanced and emerging technologies has the potential to play a key role in helping the Company achieve our carbon free goals, and we will continue looking for ways to support the integration of advanced technologies into our system to help accelerate the clean energy transition.

II. PRIORITIZING ADVANCED TECHNOLOGY

While "leading the clean energy transition" has long been one of Xcel Energy's strategic priorities, the nature of that leadership itself continues to evolve as we reduce carbon emissions, retire legacy generation assets, and add more renewable energy to our system. As a company, we are also evolving to meet the new and changing needs of our customers, communities, and stakeholders.

The Company has implemented the Carbon-Free 2050 (CF2050) initiative, which develops the strategy for and deployment of technology solutions for the carbon-free goals in generation. CF2050 leverages capabilities across the Company, including individuals from policy, energy supply, finance, resource planning, regulatory, and innovation. The CF2050 meets regularly to track and identify opportunities in the clean energy transition that are being enabled by policy and emerging technology. For example, recent actions by the federal government for grant funding and tax credits may significantly reduce the cost of hydrogen produced from clean resources. The Company tracks these and other federal initiatives with help from CF2050 and other channels.

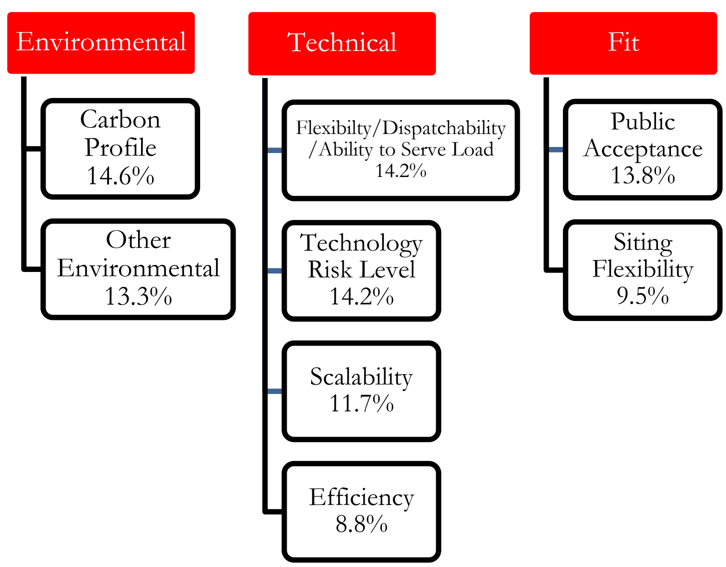
The CF2050 initiative is responsible for tracking, assessing, promoting, and prioritizing emerging technologies that have the potential to help the Company achieve our carbon-free electricity vision.

- Tracking refers to efforts to identify new technologies and developers, hold introductory meetings, and record the information using channels from our investment pipeline, Electric Power Research Institute (EPRI), and networking with accelerators, national labs, and other means.
- The task of assessing technologies is led by a dedicated group within the Company that is also part of the CF2050 initiative. The process determines the viability of a technology, its maturity, projected cost, ability to scale, and in some cases demonstrating the technology on our system. These activities also benefit from information from our investment pipeline, EPRI, research institutions, and collaboration with industry associations.

- Promoting technologies that may help achieve our net-zero energy provider goals includes sponsoring EPRI research initiatives, applying for grant funding that can further our goals, and investing in venture capital funds that serve the utility industry (e.g., Energy Impact Partners).

Prioritizing technology is a semiquantitative process that emerges from a technology assessment designed to rank technologies, identify policy mechanisms for support, and determine strategies that account for customers, carbon goals, and our investors. We rank technologies by having subject matter experts (policy, finance, and technology) score technologies on the criteria of "environmental", "technical", and "fit" (see Figure X-1). The rankings are then used to determine the next steps based on policy support and strategy.

Figure X-1: Emerging Technology Prioritization Criteria



The Company is constantly evaluating advanced and emerging technologies for attractive and potentially viable options. Through our evaluations of myriad technologies, the Company has identified three categories that will likely be key in helping achieve our carbon-free electricity vision. These categories are detailed in Table X-1 below.

Table X-1: CF2050 Emerging Technology Categories

Category	Description
Zero-Carbon Generation	• Advanced and emerging renewable generation: geothermal, new solar panel technology, power from waste streams, … • Advanced nuclear: small modular reactors, molten salt/metal reactors, fusion, … • Carbon capture fossil generation: combine cycle gas with carbon capture.
Clean Fuels	• Renewable natural gas from various sources. • Clean hydrogen from water electrolysis powered by renewables or nuclear OR form hydrocarbon reforming with carbon capture. • Other molecules from renewable sources: ammonia, methanol, …
Storage	• Battery: lithium, iron-air, calcium-antimony, … • Thermal: water, solid media (bricks, rocks, sand,…), molten salt, … • Chemical (clean): hydrogen, ammonia, … • Mechanical: pumped hydro, compressed/liquid air, flywheel, …

III. INDUSTRY COLLABORATION AND OPPORTUNITIES

As discussed in our June 2022 filing, in addition to our internal efforts, we work with various coalitions, nonprofits, and research organizations to gain a deeper understanding of the emerging technology landscape and to help move promising technologies toward commercial viability, with the aim of putting these new technologies to work for our customers and communities. Our sponsorship and collaboration with the EPRI is one that has played an important role in helping us keep abreast of technological innovations in the areas of grid modernization, reliability, integrated planning, solar integration, advanced generation, battery storage, and distributed energy resources (DER) interconnection. We participate in several EPRI research programs, including the Low-Carbon Resources Initiative (LCRI) – which is led by EPRI – and GTI Energy.

LCRI is a five-year, focused research and development initiative that is committed to creating the pathways needed to advance low-carbon technologies for large-scale deployment. The goal is to create risk-informed understanding of options and technologies for enabling a clean energy future from 2030 and beyond through global partnerships and demonstrations, applied engineering developments, and technology acceleration of the most promising options.[2] We also sponsor and support

[2] *See* https://www.epri.com/research/sectors/lcri.

Incubatenergy, which is a startup incubator that EPRI organizes and offers emerging technology developers opportunities to engage, demonstrate, and learn with utility industry collaborations.

Further, we are the lead electric utility on the steering committee of the Carbon-Free Technology Initiative (CFTI), a partnership between investor-owned utilities (through the Edison Electric Institute), the Clean Air Task Force, and other nonprofits and industry stakeholders. CFTI seeks to "achieve net-zero emissions in the U.S. electricity sector by promoting policies to ensure the commercial availability of affordable, carbon-free, 24/7 power technologies by the early 2030s."[3] Through CFTI, we recommend policies that would increase federal funding for energy innovation R&D and create dedicated programs and initiatives at the U.S. Department of Energy (DOE) focused on technologies like advanced renewables, long-duration energy storage, advanced geothermal, zero-carbon fuels, advanced nuclear, and carbon capture. CFTI was instrumental in the Bipartisan Infrastructure Law (Infrastructure Investment and Jobs Act or BIL), which – among other things – created the new DOE Office of Clean Energy Demonstrations (OCED).[4]

OCED is tasked with implementing several multibillion-dollar demonstration programs funded through the BIL and, importantly, partnering with the private sector. We support OCED's mission and see a host of opportunities in the programs and projects created by the BIL, which include projects to support long duration energy storage, carbon capture, hydrogen, advanced nuclear reactors, energy storage, grid reliability and resiliency, and more. We will continue to work with DOE, including OCED and other offices, and will evaluate all funding and partnership opportunities as they become available.

In addition, in April of 2023, Breakthrough Energy Catalyst (Catalyst) agreed to commit $20 million in contingent grant funding to support our long duration energy storage pilots with Form Energy, to be split between Minnesota and Colorado. With this grant, Breakthrough Energy will be a valuable partner in technology demonstrations we are developing. Additionally, Catalyst is accepting project proposals for a range of technologies until December 31, 2027. We will continue to evaluate pilots and projects that we may submit to Catalyst's request for proposals (RFP) to drive commercialization of new technologies while improving the economics of demonstration projects and pilots.[5]

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[3] *See* https://www.carbonfreetech.org/.
[4] *See* https://www.energy.gov/office-clean-energy-demonstrations.
[5] U.S. Request for Proposals https://www.breakthroughenergy.org/catalyst-us-rfp.

Xcel Energy also uses shareholder resources to invest in strategic venture capital funds that are serving the utility industry. They include Energy Impact Partners, Energize Ventures, Buoyant Ventures, and MSP Equity. These funds provide thought leadership, access to promising new technologies, and the ability for the Company to invest in this ecosystem at a reduced risk position. Energy Impact Partners in particular, is a leader in the field and invests directly in hardware solutions.

We also look forward to working collaboratively with emerging technology companies to evaluate and potentially to develop new pilot projects. As part of our process in vetting and evaluating new technologies and industry collaborations, we work to ensure that any potential technologies we intend to implement exceed our high threshold for operational viability, system benefits, cost effectiveness, customer benefits, and stakeholder acceptance. Further, external funders such as DOE or Breakthrough Energy also require their own rigorous application and due diligence processes before awarding funding. Such due diligence and high standards would be reflected in a subsequent proposal to the Commission.

IV. BATTERY STORAGE

As previously stated, Xcel Energy has a Company-wide vision to provide our customers in all states we operate in with 100 percent carbon-free electricity by 2050. This vision directly aligns with the State of Minnesota's policy goals and statutes, including the state's latest standard requiring utilities to achieve 100 percent carbon-free energy by 2040, and we are on track to achieve the new clean energy standard. We recognize that advanced and evolving technologies, including energy storage, will play a critical role in helping us eliminate the remaining carbon emissions from our system while maintaining safe, affordable, and reliable electric service at times when renewable energy output is low. As such, we are dedicated to supporting emerging technologies that can help us meet the Company's and the state's energy goals while providing benefits to our customers. Battery technologies continue to advance, and the Company is actively monitoring the industry and evaluating new battery technologies, such as the 10 MW/1,000 MWh, long-duration energy storage system pilot project at Sherco, which the Commission approved on August 1, 2023.[6] Long-duration energy storage will be especially crucial in futures with high penetrations of variable renewable energy, and batteries that can store multiple days' worth of electricity are in development with encouraging early-stage results.

[6] Docket No. E002/M-23-119

Applications for grid-scale battery storage are typically categorized by the dispatchable duration, or just duration, the storage asset can provide at its nameplate capacity rating. Thus, a four-hour, 10 MW lithium-ion battery can dispatch 10 MW of electricity for four hours but *could* alternately dispatch 5 MW of electricity for eight hours. The two main categories for storage are short duration – approximately four hours or less – and long duration – anything over eight hours. The concept of long duration storage and its applications are still emerging, which provides some reasoning for the broad range of duration ranging from eight to 100 hours and beyond. Short duration storage serves applications in load management including peaking, frequency modulation, mitigation of renewable curtailment, and uninterrupted power. Long duration energy storage (LDES) is under consideration to be paired with renewable generation to provide reliability, firm capacity, seasonal storage, and mitigation of curtailment. We classify storage by the principal types of energy: battery (electrochemical), thermal, mechanical, and chemical. There are several technologies employed or being developed for grid-scale battery storage applications as described below.

A. Battery Energy Storage System (BESS)

BESSes are rechargeable batteries that can store and distribute energy from different sources (grid, solar power, etc.). They can be used for myriad purposes, such as balancing the electric grid, providing backup power, and improving grid stability. BESSes are the most direct way to store electricity for both short and long duration applications. Lithium-based batteries, the most dominant type, are used in shorter duration applications (0-4 hours) for peak demand response and grid services. Lithium battery manufacturing is the most mature which has made it the primary technology for batteries today. Lithium-based batteries have the highest energy density of all batteries and consequently they are the primary technology for transportation and mobility. This presents a possible bottleneck on the lithium supply chain and has driven some innovation around lithium chemistries and considering repurposing used electric vehicle batteries for grid applications.

Grid batteries, however, can be deployed in a way to reduce the need for the high energy density of lithium batteries which has sprouted a vibrant ecosystem of new battery chemistries and designs like flow batteries. The common themes of these technologies are earth-abundant materials, reducing safety risks relative to lithium batteries, and targeting longer-duration use cases. The iron-air battery is a great example, where technology developers like Form Energy offer a product that can provide 100 hours of dispatch duration. Lead-acid, sodium, calcium-antimony, vanadium, organic, and BESSes are other battery types being pursued by the industry.

B. Thermal Energy Storage (TES)

One of the simplest, lowest-cost, and most versatile solutions for energy storage is to use heat. It is both a mature technology and one that is undergoing substantial innovation. TES solutions can use hot water, molten salt, rocks, bricks, concrete, graphite, and sand as the medium that stores heat. TES requires an energy conversion device that is most often a steam turbine, but photovoltaic and thermoelectric devices are also being employed in newer technologies.

TES can be used in several ways to benefit our customers. For example, coal plants can be converted into heat batteries when the coal boiler is replaced with a TES system. The plant is charged by renewables and can be used to reduce curtailment, congestion, and power generation from "spinning mass". Steam turbines, grid connection infrastructure, and other aspects of the plant can be kept in service, maximizing their economic investment. As a converted heat battery plant needs essentially the same workforce as a coal plant and can provide a similar tax base, it can be an excellent solution to enable a stable, just energy transition. TES can also serve our customers who have steam or industrial process heat contracts with the Company, and are interested in decarbonizing their operations.

TES for heat and power is still an emerging solution and needs time for demonstrations and pilots to prove out the concept and develop best practices. For example, the Company conducted an extensive assessment using molten salt as a solution to "repower" coal plants as thermal batteries. Molten salt was selected because it was considered commercially mature. While molten salt has some commercial deployment, costs of the salt medium and insights from operators of the technology suggested a simpler solution would be more beneficial. Thus, the results of the assessment indicate the Company should continue to pursue TES, but with a different technology. While there is currently no standout technology alternative, small commercial deployments using bricks, rocks, sand, or even water are emerging. The Company will continue to monitor these developments and their potential to add benefit for our customers.

C. The Company's Role in Advancing Battery Technologies

The Company is advancing the prevalence of utility scale battery technologies on our grid through a partnership with Form Energy and through our acquisition processes. We are additionally looking to continue utilizing customer-owned batteries to support the grid, as discussed in Section IV of this appendix.

1. Form Energy

On August 1, 2023, the Commission approved our petition for a long-duration energy storage system pilot project at Sherco, using Form Energy's cutting-edge iron-air battery storage technology.[7] The Pilot – which will be a 10 MW/1,000 MWh, fully integrated modular energy storage system offering 100-hour (multi-day) duration that can deliver grid-scale reliable capacity year-round – is on track to meet the planned in-service date of before the end of 2025. The expected life of Form Energy's energy storage system is 10 years.

This Pilot proposes to gain experience and insights related to the operation of energy storage systems on our grid. Specifically, we hope to better understand the value of energy storage systems with:

- Dispatching during extended renewable droughts;
- Controlling frequency or voltage;
- Mitigating transmission congestion;
- Providing emergency power supplies during outages;
- Reducing curtailment of existing renewable energy generators;
- Reducing peak power costs; and
- Reducing carbon emissions by facilitating the efficient integration of new renewables.

Beyond these Pilot learnings, we hope to help advance a more just energy transition by siting the project in a community directly impacted by the clean energy transition.

Iron-air batteries offer distinct economic and technical benefits when compared to lithium-ion battery technologies. For example, the duration of its output is far greater than is available from lithium-ion batteries, a characteristic that is needed to ensure reliability during extended renewable energy droughts. Additionally, the battery's technology is based on iron—which is extremely prevalent—as opposed to rare-earth elements.

The Company proposed developing the Pilot at the Sherco facility site to further support the Becker community's economic transition, support new solar resources, and qualify for the ITC bonus credit, which will further reduce costs to customers. Under the Inflation Reduction Act (IRA), the Pilot will not only qualify for the standard 30 percent investment tax credit (ITC), but also an additional 10 percent bonus for being

[7] Docket No. E002/M-23-119.

developed at our Sherco facility site, which qualifies as an "energy community." Form Energy's commitment to meeting domestic content requirements may also qualify the Pilot for an additional 10 percent bonus.

To further reduce project costs, we pursued competitive grants from DOE and others. The Company was awarded a grant of up to $70 million in funding from the DOE for Xcel Energy's two long-duration energy storage pilot projects with Form Energy, including the Commission-approved Pilot at the Sherco site. The DOE grant is contingent on negotiation and project logistics; therefore, the specific amount to be directed to the Pilot at Sherco is still yet to be determined. However, we will continue to update the record in Docket No. 23-119 as more details are made available. We are pleased that this grant will help keep bills low for customers as we lead the clean energy transition and deploy innovative new technologies that will provide reliable, low-cost renewable energy to our customers.

2. *Firm Dispatchable Resources*

On May 14, 2023, the Company issued a Notice Petition in compliance with the Commission's April 15, 2022, Order, regarding the Company's 2020-2034 IRP. The Notice Petition initiated a competitive resource acquisition process seeking proposals for up to 800 MW of Firm Dispatchable Resources in accordance with the IRP order and the Xcel-Bid Contested Case/Track 2 bidding process. As part of the IRP Order, the Commission found that the Company more likely than not needs up to 800 MW of firm dispatchable resources to provide capacity and energy to the Company's system. The firm dispatchable resources will assist the Company in achieving state and Company decarbonization goals. The resources acquired through this process will also provide several attributes, such as availability over extended durations, support for system restoration, and renewable integration in addition to the 800 MW of capacity and energy.

Assessing individual resource attributes has become an increasingly vital component of resource planning as capacity adequacy decouples from energy and other attributes. As we transition to a system with greater shares of variable renewable resources and fewer baseload resources, it is essential that new firm dispatchable resource additions be evaluated with respect to a broader set of attributes required to ensure the grid is stable, reliable, flexible, and has sufficient energy to serve customers in every hour of every day. To ensure sufficient availability, we request that the Commission require that proposals include data on the ability to provide energy adequacy over long duration events.

3. Acquisition Process

To increase the amount of battery storage on our system, the Company has included storage as a parameter in our last two RFPs. The 2022 RFP was unique in its breadth and scope.[8] The first of its kind in NSP, the RFP sought distribution- and transmission-interconnected projects, as well as solar and solar-plus-storage hybrids, and evaluated all projects against the same criteria to solicit the best value projects for our customers. While the response was robust, due to market conditions and through negotiations with counterparties, only two projects – neither of which included storage – were viable and ultimately chosen. However, the Company is committed to including storage in our resource mix and will likely look to include storage in our future RFPs across our jurisdictions.

V. VIRTUAL POWER PLANTS

Our electric grid is becoming more complex and increasingly will need to leverage DER. The use of the term "Virtual Power Plant" (VPP) has become more prominent in the energy industry over the past few years as the number of distributed and connected energy resources has increased. Today, the Company in fact operates its DR programs much like a VPP, and has recently launched its Renewable Battery Connect program in Colorado, which is specifically identified as a VPP.[9] The Company is in the process of developing and deploying a similar program in Minnesota.

A. What is a Virtual Power Plant?

While there is no uniform definition across the industry, the Company shares our interpretation of VPPs here. The Company considers a VPP to be:

> An aggregation of controllable DERs managed at a scale that provides grid services or attributes, including energy and negative energy, ancillary services, and capacity. DERs aggregated to create a VPP could be utility or customer owned, in-front of or behind the meter. DER assets in a VPP could include, but are not limited to, photovoltaic solar, energy storage, electric vehicles, and demand-responsive devices such as water heaters, air conditioning units, thermostats, and appliances. A VPP has benefits, such as the ability to deliver peak load electricity or load-following power generation on short notice.

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[8] Docket No. 22-403.

[9] See SolarEdge joins Xcel Energy's virtual power plant incentive program in Colorado, PV Magazine, available at: https://pv-magazine-usa.com/2023/08/24/solaredge-joins-xcel-energys-virtual-power-plant-incentive-program-in-colorado/.

> Such a VPP could replace a conventional power plant while providing higher efficiency and more flexibility, which allows the system to react better to load fluctuations. Resources that are part of a VPP may also be able to provide local grid benefits (to the extent that the resources are in close proximity to a local constraint) such as reducing loading on a distribution feeder.

The "virtual" component of the term indicates that the resources that compose a VPP are not a singular piece of infrastructure, such as a traditional power plant. Instead, the observed and desired outcome of the VPP results from the aggregation of many heterogeneous and geographically diverse resources (typically aggregated through a software control platform). The net performance observed by the aggregation is what we consider to be the impact of the VPP. As noted in the above definition, VPPs can provide different types of products and solve different system needs. Therefore, it is important that design and requirements for VPPs be tailored to specific grid use cases, such as reducing bulk system peak demand or targeting locational constraints.

In the IDP, the Commission defined DER as "*supply and demand side resources that can be used throughout an electric distribution system to meet energy and reliability needs of customers; can be installed on either the customer or utility side of the electric meter.' This definition may include, but is not limited to, distributed generation, energy storage, electric vehicles, demand side management, demand response, and energy efficiency*." The Company can contemplate VPP scenarios that could include all or some of the DER resources the Commission has defined.

DER assets aggregated to create a VPP could be utility or customer-owned, or in-front of or behind the meter. Such assets could include, but are not limited to, photovoltaic solar, energy storage, electric vehicles, and demand-responsive devices, such as water heaters, air conditioning units, thermostats, and appliances. A VPP has benefits, such as delivering peak-load electricity or load-following power generation on short notice. Such a VPP could replace a conventional power plant while possibly providing higher efficiency and more flexibility, allowing the system to react more robustly and quickly to load fluctuations. Resources that are part of a VPP may also be able to provide local grid benefits (to the extent that the resources are located close to a local constraint), such as reducing loading on a distribution feeder.

B. Demand Response Programs

The Company currently operates our demand response programs much like a VPP, as our customer-sited resources are aggregated to react to specific management calls. Examples of existing aggregated resources include Electric Rate Savings, AC Rewards, and Saver's Switch, as well as pay-for-performance programs such as Peak Partner

Rewards. In addition, the Company expects to launch a specific VPP program – as part of our Demand Response portfolio in 2024 – like our Renewable Battery Connect program in our Colorado Service Territory. We provide additional details regarding the pilot below.

C. Distributed Energy Resources Management System (DERMS)

The Company considers the popularity of the VPP term to be associated with emerging applications such as DERMS, which are more sophisticated management systems that provide greater capabilities to enable a broader set of DER aggregation scenarios. They include but are not limited to, combining multiple technology types in an aggregation, establishing platforms and protocols that provide more interoperability and ease of execution, more beneficial groupings of DER, and more flexible settings and scheduling that can be adjusted to reflect changing system conditions.

The purpose of a DERMS is to enhance the integration and utilization of DER to meet the needs of the grid, customers, the market, and regulatory entities. A DERMS would serve to enable the growing interactions between customers and the distribution grid, and our journey to utilize and manage DER will occur over the next decade. A phased implementation approach for DERMS enables the Company to meet policy, regulatory, customer, and business needs. This also balances our investment pacing with the technology launch and performance validation. We are also anticipating FERC Order 2222 to drive new business requirements, new operational dynamics between distribution and transmission, and potential market implications between retail and wholesale markets. We expect DERMS to be a part of the solution to meet FERC Order 2222. The deployment of DERMS is an emerging approach to connect and manage DER on the utility system. As penetration levels of DER increase on our system, there is an increasing need to have more visibility and active management and coordination with DER to maintain a secure, reliable, and resilient distribution system.

Technology vendors provide DERMS software, which help provide underlying logic and or capabilities that allow utilities to manage a group of DERs to better support distribution or bulk system needs. A DERMS would interact with other systems, such as ADMS and devices in the field through two-way communication including, but not limited to, FAN, AMI, and the internet. DERMS can be viewed as a system that can aggregate and group DER in ways that provide more value to the grid and to customers who participate in programs that support the grid, such as APP programs. Potential use cases could involve leveraging energy storage to reduce peak usage or integrating more renewables, or managed charging scenarios for electric vehicles. More sophisticated DER forecasting capabilities may help us evaluate how to integrate higher levels for

DER as adoption increases, particularly for larger DER on the distribution system. Additionally, DERMS would help enable the centralized control and optimal dispatch of flexible interconnections and would aid Operations in the coordination and management of NWAs.

There is a timing balance of whether technology systems are mature enough to meet evolving and growing system needs, but the Company believes the implementation of DERMS is a necessary step to integrate higher levels of DER. Currently, we are examining DERMS capabilities in the market and will explore vendor capabilities in more detail through at least the first half of 2024. The Company is working with Electric Power Research Institute (EPRI) on a research project to gain feedback on the Company's proposed use cases, develop an overall conceptual control and communication system architecture, and determine overall system capabilities and interfaces with our planning and operational systems (such as ADMS). EPRI has been working with utilities to understand DERMS for over a decade, and we are excited to leverage their expertise to develop an overall DERMS roadmap. All this research will help support our technology assessment and the results are also expected to expand industry knowledge on leveraging DER to serve the needs of the grid and the customer. More work also needs to be done to understand some of the new fulfillment requirements for a DERMS system, including understanding start-up requirements, resource and training needs, and ongoing operational teams needed to support DERMS once in operation.

To support the goals for increasing DER and electrification, balancing DERMS deployment and infrastructure investment is critical. For example, the Company anticipates using DERMS and leveraging DER flexibility to extend utilization of existing grid infrastructure. However, the ability to reach long-term goals will also depend on infrastructure investments.

D. Battery Connect

The Residential Battery Connect Demand Response Pilot (marketed to customers as Renewable Battery Connect) ran in Xcel Energy's Colorado service territory between March 2021 and September 2022. The Pilot provided an incentive to customers who agreed to let Xcel Energy control the functionality of their battery storage systems. The primary objectives of the Pilot, which is a VPP program, included understanding battery performance on days with and without intervention from the Pilot, exploring the demand management capabilities of battery storage systems, and gathering feedback from participants about the Pilot.

Participants in the Pilot had solar panels and battery storage systems installed at their residences, which were generally charged in the morning from solar energy. The batteries were discharged during peak usage periods in the afternoon to lessen the demand of energy from the grid. When the batteries were forced to be dispatched, they provided an incremental increase in charging or discharging, even if the batteries were already engaged in those activities. Additionally, discharge events did not necessarily leave our customers without any remaining battery energy. In fact, there were many event days when customers were able to utilize their batteries after the discharge event was complete.

The Pilot was successful in achieving its objectives of obtaining analysis in 1) customer interest and satisfaction, 2) assessment of the battery baseline, and 3) evaluation of battery performance. Customer interest and satisfaction were primarily evaluated using respondent surveys and Pilot stakeholder interviews. Overall, most respondents were satisfied with the enrollment for the Pilot, had a high satisfaction (94 percent) rate with the Pilot overall, and would recommend the program to family and friends. More details about the learnings and takeaways from the Pilot can be found in our forthcoming 2024-26 Colorado DSM Triennial plan.[10]

Because of the Pilot's success, the Company is looking to bring the program to Minnesota through a modification of our Energy Optimization and Conservation 2024-2026 Triennial Plan. The Company intends to pair these rebates with our Solar-Powered Storage Incentive Program (Storage Program) filed with the Department on November 1, 2023.[11] Using the Colorado program as a proxy, the Company estimates that about 10 percent of customers with batteries will participate in the Storage Program. Additionally, the Company has found that a typical customer battery can provide about 1kW of load relief for the duration of an event. It is worth noting that there are more batteries in the Company's Colorado territory than there are in the Company's Minnesota territory (about 1,800 vs. 500), and as such the impact of a battery demand response program in Minnesota will likely be negligible during the short-term planning period of this IRP.

VI. HYDROGEN

A versatile fuel for energy production and storage, hydrogen is expected to play a strategic role in the energy transition. Clean hydrogen can be produced in one of two ways. The most common way clean hydrogen is produced is through chemical reforming from

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[10] Docket No. 23A-0589EG.
[11] Docket No. E002/M-23-459.

natural gas (steam methane reforming or autothermal processes) when carbon capture is also employed. The other way clean hydrogen can be produced is by using electricity that was generated with carbon-free resources (renewables, nuclear) to split water with (a process known as "electrolysis"). Electrolysis is the method that the Company is focused on exploring for use on our system when paired with renewable and nuclear energies.

Hydrogen can be used to produce electricity through combustion in gas turbines (alone or blended with natural gas), fuel cells (not combustion), and other devices. Hydrogen can also be blended with natural gas to help decarbonize the heating of homes and businesses. It can help decarbonize the manufacture of chemicals, fuels, plastics, steel, and other industries that are referred to as 'hard to decarbonize', as it can replace traditional, emissions producing fuels that are used to power these processes.

Hydrogen can also be used to store energy through using renewable energy that exceeds the instantaneous system load – and would therefore otherwise be curtailed or create congestion on the transmission system – to make clean hydrogen. However, hydrogen stores energy less efficiently than natural gas (although substantially more than current battery technologies), so there are challenges to storing and transporting surplus amounts. Therefore, converting hydrogen into ammonia is being explored as a possible solution to address the storage and transportation challenges. This is accomplished by reacting the hydrogen with nitrogen extracted from the air to ammonia. This ammonia can be more efficiently and cost effectively stored and transported. That ammonia could be used by the fertilizer industry; alternate uses by other industries are in research and development as well.

The Company is invested in developing this advancing technology to serve our customers and help meet Company and state decarbonization goals. The federal government has provided several opportunities for grants using clean hydrogen, which we have successfully pursued and discuss below, and the Inflation Reduction Act provides for a $3 per kilogram production tax credit for clean hydrogen. Hydrogen was modeled as part of a special study, which is discussed in Chapter 5: Economic Modeling Framework, with assumptions outlined in Appendix F: EnCompass Modeling Assumptions and Inputs.

A. Heartland Hydrogen Hub/MN Hydrogen Vision

Xcel Energy applied for funding through the DOE's Office of Energy Efficiency and Renewable Energy (EERE) Regional Clean Hydrogen Hubs initiative. The application was filed by the Energy & Environmental Research Center (EERC) with Xcel Energy as one of the hub partners. The DOE reviewed applications and notification of awards were announced in October 2023. The Heartland Hydrogen Hub (HH2H) was selected for an award of up to $925 million dollars, subject to contract negotiations with the

DOE and between HH2H partners. The diversity of hydrogen supply in our proposal, including utilizing wind, solar, and nuclear, as well as the potential to utilize hydrogen in the Minnesota agricultural sector as ammonia and as a fuel in the power sector, were strengths in the application.

Xcel Energy's proposed two 'nodes' (as described in the application) for hydrogen production and use in the hub application. The first node takes advantage of the large amount of wind energy in southwestern Minnesota and eastern South Dakota, which are often curtailed, due to constraints on the transmission system. The Company's plan is to use this congested, low-cost wind to produce green hydrogen. The hydrogen would be sold to a Minnesota ethanol producer. The hydrogen would be converted to ammonia and then combined with captured CO2 (from the ethanol production) converted to urea fertilizer and sold to local MN farm coops. This area is heavily agricultural and uses large quantities of anhydrous ammonia and solid urea for fertilizer and commodity farming.

The second node of the hub utilizes the combined wind, solar and nuclear (Monticello Nuclear Generating Plant) resources to produced green hydrogen at strategic locations within Xcel Energy's MN territory. The locations, determined during the early detailed planning of the hub, will optimize connection to the clean energy resources, as well as proximity to various offtake options.

The HH2h timeline spans over 10 years and proposes investments, by Xcel Energy, of up to $2 Billion dollars. Project detailed design will begin after award negotiations – which are a staged process – are complete. There are four successive funding phases through 2035. The DOE will review and evaluate deliverables in each phase. Based on these evaluations, the DOE will decide whether each hub can advance to the next phase. With multiple hydrogen production and end-use initiatives included in the Heartland Hydrogen Hub, the Company expects to receive a large portion of the federal award. The total amount, how it's distributed across projects and timing will depend on additional negotiations and the outcomes of the normal regulatory process.

VII. NEXT GENERATION NUCLEAR TECHNOLOGIES

Nuclear power is a clean source of energy because it does not produce carbon dioxide and other air pollutants. Nuclear generating plants are operated such that the output is nearly constant, and several are currently licensed by the Nuclear Regulatory Commission for 80 years of operation. This makes it a strategic supply of reliable power to serve as base load capacity. The cost of nuclear power is high compared to other generating technologies, but the long lifetime of plants and the reliable, constant power are substantial benefits. The Company has organized a task force, that includes members of the CF2050 initiative, evaluating emerging trends in the nuclear energy industry in both fission and fusion.

A. Fission Based Technologies and Small Modular Nuclear Reactors

Small Modular Nuclear Reactors (SMRs) are a popular technology in the nuclear space. These scaled-down – between 50 to 300 MW – employ the familiar nuclear fission process (splitting atoms to generate heat for steam turbines) employed by the Company's Prairie Island and Monticello nuclear generating stations. A new (or repowered) SMR facility would typically have three to ten SMRs, instead of the one or two large reactors found at traditional light water nuclear sites. An advantage of SMRs over traditional nuclear plants is that SMRs can lower the cost of nuclear power by increasing the number of factory-built components that can be used, thereby enabling more efficient construction. Because they are also designed to be dispatchable, they are also more flexible than traditional nuclear plants– as the operating utility can choose how many to turn on and when – and can therefore better integrate with wind and solar generation. Additionally, because of their size, SMRs can be located on sites that would not support traditional nuclear units, brownfield industrial sites, and sites closer to electric demand centers.

Two approaches to fission-based SMRs have emerged which can be summarized as Generation (Gen.) III+ and Gen. IV. Gen. III+ are reactor designs that emerged in the early 1990s that are in use today but have been scaled down to the SMR size. The advantage of this approach lies in the speed of adoption of a known technology and obtaining approval by the Nuclear Regulatory Commission (NRC). Gen IV reactor designs apply novel concepts in fuel use, coolants, and "fast" reactors that provide benefits in safety and fuel management.

Nuclear fission has challenges with public acceptance, permitting with NRC, and fuel supply and disposal. A significant endeavor to increase safety in all SMR designs is essential to convince the public that nuclear power should be considered for investment. It is expected in the industry that the NRC will become more efficient in processing permits based on signals from policymakers in this ecosystem. The challenges with fuel lie both in the supply chain and with spent fuel. Currently, some nuclear fuel is supplied by companies in Russia and the Ukraine. Also, Gen IV reactors are being designed with new types of fuel that will require development of a supply chain. Spent fuel will always require long-term storage. However, the Gen IV reactors are designed to use fuel more efficiently that produces a waste product with lower hazards. Fuel recycling is not allowed in the US but changes to that policy could also unlock substantial benefits for nuclear fission.

In 2023, several utility companies in the U.S. announced planning phases that include SMRs being deployed in the 2030s as part of their carbon-free plans. These utilities include PacifiCorp, Idaho Power, Duke Energy Carolinas, Duke Energy Progress, and the Tennessee Valley Authority.

B. Fusion Based Technologies

Nuclear fusion is the same process that occurs in our Sun and all stars. Fusion happens when two atoms combine to form a new, single atom. For electricity producing purposes, two atoms of hydrogen will be fused to produce helium and heat, the latter being a byproduct of the process, which can be used to power steam turbines to produce electricity.

The expectation with nuclear fusion is that it will be safer than fission, as the requisite fuel is safer to handle, and the process does not produce long-lived radioactive waste. However, the technology for nuclear fusion is a challenge, as containing the nuclear fusion reaction is as akin to containing a very small star. A solution to this hurdle has been sought since the 1950s, and recently, due to increased investment and innovation, some breakthroughs have occurred. In late 2022, DOE announced that sustained nuclear fusion was achieved at the National Ignition Facility housed at Lawrence Livermore National Laboratory. On July 30, 2023, the National Ignition Facility achieved another fusion ignition breakthrough, producing a higher yield in net energy gains than what was achieved in December of 2022. Also in 2022, a few other key milestones were announced by leading fusion energy developers that indicates progress in the field. All the progress is centered on sustaining and containing fusion, yet a significant amount of work is needed to engineer a system that can extract the produced energy once it can be sustained and contained. Commercially viable fusion energy may be decades away from reality, but the recent progress in this field and the technology's potential for clean energy warrant giving fusion attention and support.

C. The Company's Role in Advancing Next Generation Nuclear Technologies

A buildout of advanced nuclear plants provides many opportunities to provide new, reliable baseload generation, as well as challenges to building these first-of-a-kind plants, including ensuring adequate supply chains for major components and equipment and reliable fuel availability. The DOE has aggressively supported and provided funding for the development of advanced nuclear technologies, with a goal of ensuring that the U.S. remains the global leader in the industry. The biggest program to date is the Advanced Reactor Demonstration Program (ARDP), which announced awards in 2020 (i.e., 50 percent cost-share funding). The ARDP was originally designed as a seven-year program; currently the reactors that received the demonstration awards are expected to be online by 2030.

In addition to ARDP, the IRA, which was signed into law in August 2022, directs new federal spending toward reducing carbon emissions. It contains new tax credits that provide incentives for utilities to build and operate advanced nuclear plants. The clean electricity production tax credit (PTC) or investment tax credit (ITC) is available for any new plant that produces zero greenhouse gas emissions placed into service after December 31, 2024. Advanced nuclear plants, with reliable, clean, and zero-carbon generation, qualify for this technology-neutral PTC or ITC. For more detail on each tax credit, see the full text of the IRA.

The Company has engaged in activities to ensure we are prepared to learn from advanced nuclear projects that will benefit our customers and help the Company reach state and corporate decarbonization goals, one of which was the Utah Associated Municipal Power Systems (UAMPS) and NuScale Power's Carbon Free Power Project (CFPP). Unfortunately, UAMPS and NuScale made the decision to end the project because the small number of municipal power systems that intended to invest in the project did not need the full power output the plant would have provided, yet they would have been responsible for covering the full cost of commissioning the project. This placed significant financial risk on those municipal power systems that remained, and this risk outweighed the reward for them. Additionally, the project was facing increased costs and challenging market dynamics.

While it is disappointing that the project was terminated, the work associated with the project has brought the industry closer to the next generation of nuclear energy being available. The Company was excited to be part of the project in a non-ownership, consulting, and advising role, as it placed us at the cutting edge of new nuclear technologies. As the Company continues to pursue our carbon-free electricity vision and the standards set forth by the State of Minnesota, we are committed to evaluating emerging clean energy technologies that hold potential to provide safe, reliable, and affordable electricity on a 24/7 basis. While the CFPP has ended, this is not the end of new nuclear initiatives, as nuclear will remain an important part of the clean energy future. We will continue to follow advanced nuclear technologies, including SMRs, and evaluate the role they may play within our larger energy portfolio in the future, including how they can complement renewable resources, like solar and wind.

VIII. SUMMARY OF TECHNOLOGY STATUS

As we have discussed in this appendix, the advanced technologies the Company is monitoring are in various stages of development, with some being ready to provide value to our system and customers and others needing extensive research and development. Table X-2 below summarizes the status of each technology discussed in this appendix.

Table X-2: Status of Advanced Technologies

Technology	Feasibility
BESS	Being deployed on our system.
TES	Emerging solution. Needs time for demonstrations and pilots to prove out the concept and develop best practices.
VPP	The Company currently offers demand response programs and is looking to add more VPP programs. A DERMS system is needed to enhance integration and utilization.
Hydrogen	The Company received Federal funding for the development of the Heartland Hub, subject to contract negotiations with the DOE.
Fission and SMR	Several utilities have expressed plans to utilize SMRs on their systems. The technology is ready, but faces policy challenges.
Fusion	Commercially viable fusion is likely decades away.

IX. CONCLUSION

The integration of battery storage, VPPs, hydrogen, and next generation nuclear technologies onto our system has the potential to provide our customers with safe, reliable, and cost-effective benefits while helping the Company and the State of Minnesota achieve decarbonization goals. While each of these technologies are in different stages of development, the Company is committed to working with industry partners in the exploration and ultimate integration of these existing and emerging technologies to accelerate the clean energy transition.

APPENDIX Y – LIFE CYCLE EMISSIONS IMPACTS

I. INTRODUCTION

Order Point 12 of the Commission's April 15, 2022 Order in Docket No. E002/RP-19-368 requires the Company in its next Resource Plan to work with stakeholders to develop a fair basis for comparing the full supply-chain and life-cycle carbon impacts of the generation and storage options to help the Commission evaluate the "adverse socioeconomic effects and adverse effects upon the environment" of each resource option under consideration, pursuant to Minn. R. 7843.0500, subp. 3.C. Further, Order Point 23.I. requires a discussion of the full supply chain and life cycle carbon impacts of the ongoing nuclear generation and storage at each facility.

A thorough analysis of life cycle carbon impacts allows for a fair comparison between different electricity generation and storage technologies. Focusing solely on the operational phase of electricity generation can overlook significant carbon emissions associated with other stages of the technology's life cycle. Understanding the complete carbon footprint of a technology involves considering emissions not only during electricity generation but also throughout the entire supply chain, including raw material extraction, manufacturing, transportation, and end-of-life. By examining the carbon impacts throughout the life cycle of different electric generation alternatives, we can obtain a comprehensive assessment of the environmental footprint. This enables us to make informed decisions, foster innovation, and more effectively address climate change.

We conducted a literature review to gather data and insights on the full supply-chain and life cycle carbon impacts of different generation and storage technologies. Further, this review explores the specific case of nuclear generation and storage to evaluate its life cycle carbon impacts. When conducting a comprehensive review, it is important to understand the variety of assumptions, methodologies, and scopes in the literature studies to ensure that potential bias and limitations of the studies are considered. Moreover, the available body of literature is less robust for emerging technologies.

At our November 15, 2022 stakeholder workshop, we discussed our approach to life cycle analysis and received no feedback or suggestions for alternative approaches.[1]

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[1] This approach also aligns with the discussion during the Commission's February 8, 2022 Deliberations. *See* Transcript at pp. 113-115.

Table Y-1 summarizes the scope and background of the studies reviewed.

Table Y-1: Studies Reviewed

Study	Publication Date	Technology Scope	Notes
NREL Life Cycle GHG Emissions from Electricity Generation	September 2021	Renewables; Storage; Non-Renewable, Thermal with Carbon-Capture	Reviewed and harmonized hundreds of GHG life cycle assessments
IPCC WGIII AR5 Energy Systems	2014	Renewables; Storage; Non-Renewable, Thermal with Carbon-Capture	Comparative life cycle GHG emissions
CARB-GREET Technical Support Document	2018	Renewables; Non-Renewable	Summary of carbon intensities – one-time emissions associated with manufacturing and construction are excluded
UW-Madison – Life Cycle Air Emissions from Utility-Scale Energy Storage Facilities	2003	Utility-Scale Storage	Life cycle GHG emissions from utility-scale advanced battery energy storage systems including manufacturing and operation
Hydrogen Council – Hydrogen Decarbonization Pathways	January 2021	Hydrogen	Analysis of the full life cycle of blue hydrogen combustion with a 95 percent capture efficiency used as a conservative assumption as a representative scenario for green hydrogen is not available
Life Cycle Greenhouse Gas Emissions of Nuclear Electricity Generation - Systematic Review and Harmonization, Ethan S. Warner (NREL), Garvin A. Heath	2012	Nuclear	Systematic review and harmonization of life cycle assessment literature of nuclear electricity generation technologies

The studies show that renewable energy sources generally exhibit much lower life cycle emissions compared to fossil fuel-based technologies. The reviewed literature also suggests that nuclear power, with carbon emissions comparable to renewable resources, can contribute to reducing carbon emissions when compared to fossil fuel-based alternatives. Finally, the studies on energy storage technologies show significantly less emissions than any fossil resource when paired with renewable resources or other carbon-free energy sources. It is important to note that the carbon emissions associated with storage technologies are heavily dependent on the source and carbon intensity of the energy stored.

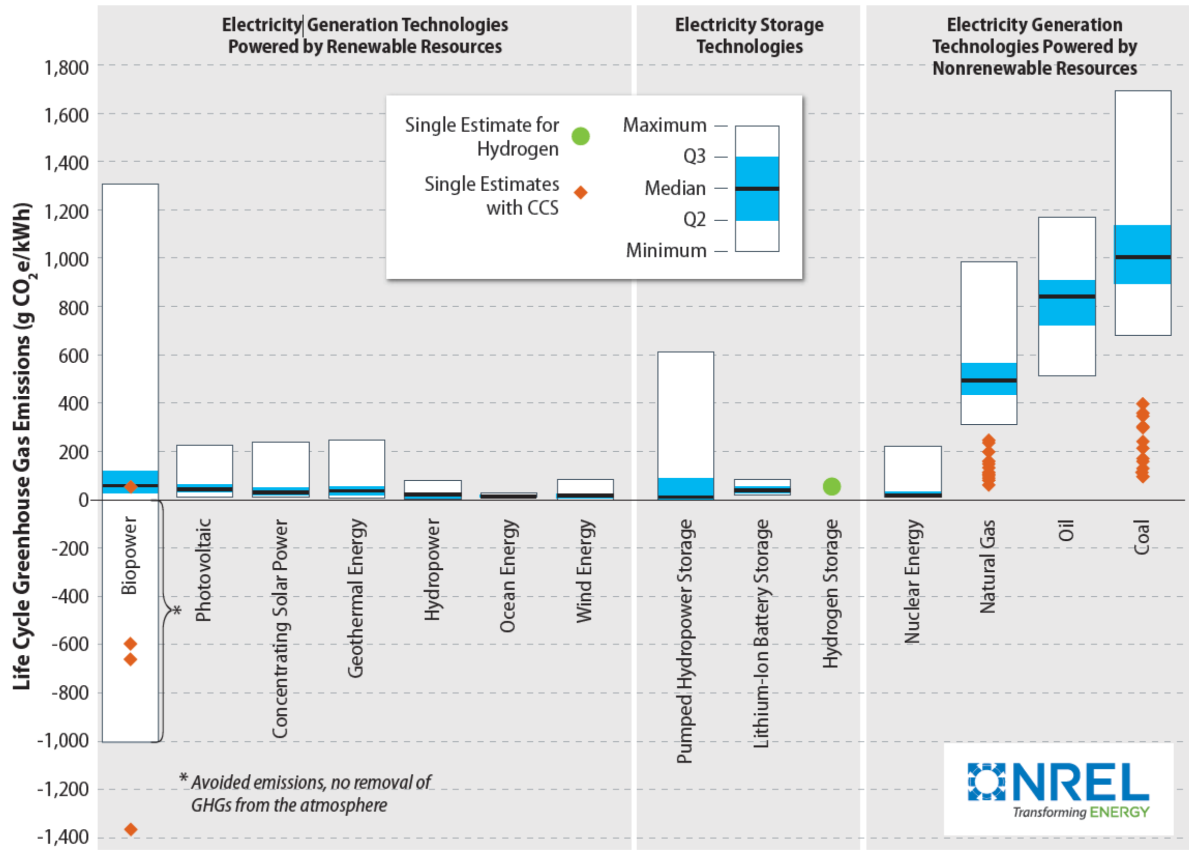
II. LIFE CYCLE CARBON EMISSION INTENSITIES OF GENERATION RESOURCE OPTIONS IN REVIEWED LITERATURE

A. National Renewable Energy Laboratory (NREL)[2]

NREL's "Life Cycle Greenhouse Gas Emissions from Electricity Generation: 2021 Update" reviews and harmonizes hundreds of greenhouse gas (GHG) life cycle assessments (LCAs) for electricity generation technologies to reduce uncertainty around estimates and increase the value of these assessments to the policymaking and research communities. The harmonized data shows that life cycle GHG emissions from solar, wind, and nuclear are considerably lower and less variable than from unabated natural gas and coal, even when including one-time upstream emissions associated with manufacturing and construction in addition to fuel cycle.

[2] NREL, "Life Cycle Greenhouse Gas Emissions from Electricity Generation: Update." Available at https://www.nrel.gov/docs/fy21osti/80580.pdf.

Figure Y-1: NREL – Life Cycle Greenhouse Gas Emission Estimates[3]



Estimates	276 (+4)	46	36	35	149	10	186	16	29	1	99	80 (+13)	24	164 (+11)
References	57 (+2)	17	10	15	22	5	69	4	3	1	27	47 (+11)	10	53 (+9)

3 *Id.* at Figure 2.

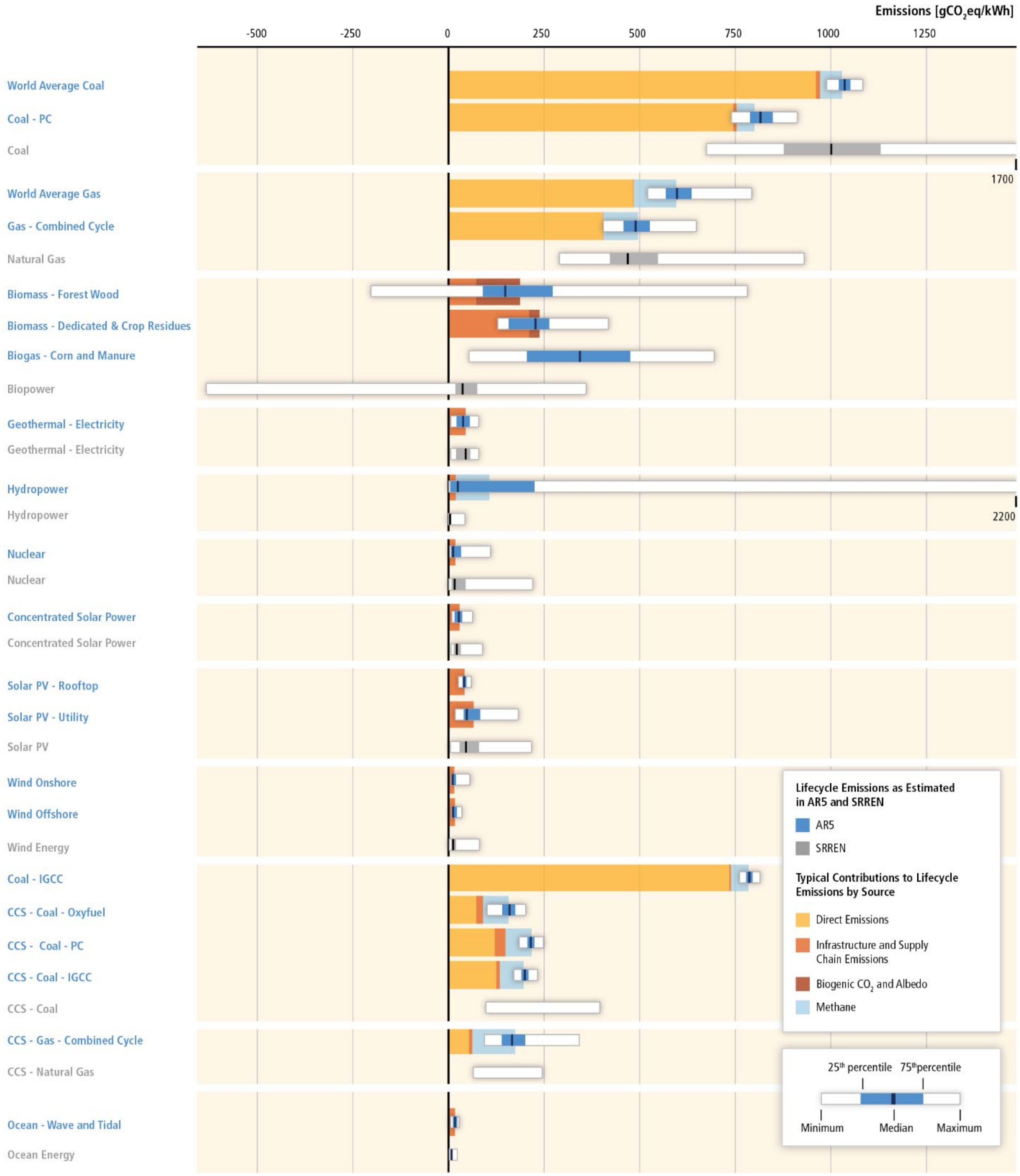
B. Intergovernmental Panel on Climate Change (IPCC)

In the IPCC's 2014 Fifth Assessment Report (AR5), the Working Group III (WGIII) assessed literature on the scientific, technological, environmental, economic, and social aspects of mitigation of climate change since 2007, when the Fourth Assessment Report (AR4) was released.[4] "Chapter 7: Energy Systems" includes a comparative life cycle GHG emissions from electricity supplied by commercially available technologies (fossil fuels, renewable, and nuclear power) and projected emissions of future commercial plants of currently pre-commercial technologies (fossil systems with carbon capture and storage [CCS] and ocean energy).[5] Subsequent IPCC reports have not included a life cycle analysis of GHG emissions for energy systems. Figure Y-2 below shows distributions of life cycle emissions with harmonization of literature values for WGIII AR5 (blue) and the full range of published values for Special Report on Renewable Energy Sources and Climate Change Mitigation (SRREN) (gray) for comparison. In this analysis, life cycle includes manufacturing and fuel cycle.

[4] Climate Change 2014, Mitigation of Climate Change, "Working Group III Contribution to the Fifth Assessment Report of the International Panel on Climate Change." Available at https://www.ipcc.ch/report/ar5/wg3/.

[5] Bruckner T., I.A. Bashmakov, Y. Mulugetta, H. Chum, A. de la Vega Navarro, J. Edmonds, A. Faaij, B. Fungtammasan, A. Garg, E. Hertwich, D. Honnery, D. Infield, M. Kainuma, S. Khennas, S. Kim, H.B. Nimir, K. Riahi, N. Strachan, R. Wiser, and X. Zhang, 2014: Energy Systems. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Chapter 7 at p. 539. Data available at ipcc_wg3_ar5_annex-iii.pdf.

Figure Y-2: IPCC – Comparative Life Cycle GHG Emissions from Generation Resources[6]



[6] *Id.* at Figure 7.6.

C. California Air Resources Board (CARB)

The California Air Resources Board's Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) Technical Support Document includes a summary of carbon intensities by electric generation type from Argonne National Laboratory (ANL).[7] GREET's initial use was for the transportation sector, however, it also contains robust information to calculate the carbon intensity of electricity. Its use case has been expanding to other sectors. A summary of carbon intensities by generation type are shown in Table Y-2 below. One-time emissions associated with manufacturing and construction are excluded in this analysis. These emissions are generally of similar magnitude across technologies and much smaller than emissions from ongoing operations and thus are not as essential to inform comparison.

Table Y-2: Summary of Carbon Intensities for California Average Grid Electricity Used as a Transportation Fuel in California[8,9]

	Electricity Resources Mix	Energy Inputs, Btu/MMBtu	Feedstock Production		Power Generation	
			Emission Factor, gCO2e/MMBtu	Contribution to CI, gCO2e/MMBtu	Emission Factor, gCO2e/MMBtu	Contribution to CI, gCO2e/MMBtu
Residual Oil	0.15%	4,714	14,820	69.86	253,578	402.28
Natural Gas	50.87%[10]	1,130,708	13,824	15,631	123,600	67,249
Coal	4.13%	127,364	5,515	702.39	289,776	12,807
Biomass	2.25%	106,711	2,242	239.22	8,713	210.13
Nuclear	9.18%	98,167	3,625	355.84	0	0
Hydro	11.87%	126,907	0	0	0	0
Geothermal	4.38%	46,805	0	0	26,669	1,248
Wind	9.06%	96,886	0	0	0	0
Solar PV	8.11%	86,771	0	0	0	0
Subtotal	100%			16,998		81,916
Tailpipe Emissions				0		0

[7] California Air Resources Board, "CA-GREET3.0 Lookup Table Pathways, Technical Support Documentation." August 13, 2018. Available at https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/ca-greet/lut-doc.pdf.
[8] *Id.* at Table E.2.
[9] Values may not round to sum due to rounding.
[10] In the CA-GREET3.0 model, all undefined energy resources are assumed to be from natural gas. This value represents the sum of the reported natural gas used in the electricity mix (36.48%) and the undefined energy categories (14.39%), as the total share of natural gas (50.87%) in the CA Electricity Resources Mix.

	Electricity Resources Mix	Energy Inputs, Btu/MMBtu	Feedstock Production		Power Generation	
			Emission Factor, gCO2e/MMBtu	Contribution to CI, gCO2e/MMBtu	Emission Factor, gCO2e/MMBtu	Contribution to CI, gCO2e/MMBtu
Total CI, gCO2e/MMBtu			**98,914**			
Total CI, GCO2e/MJ			**93.75**			

D. Utility-Scale Energy Storage Life Cycle Carbon Emissions

The U.S. Department of Energy (DOE) funded a study from the University of Wisconsin-Madison on life cycle emissions from utility scale storage.[11] Life cycle carbon emissions, including manufacturing and operation, from utility-scale advanced Vanadium-Redox and Polysulphide battery energy storage systems (BESS) along with pumped hydro and compressed air storage evaluated in this study are summarized in Table Y-3.

Table Y-3: Life Cycle GHG Emission for Utility-Scale Energy Storage Systems[12]

Parameter	Pumped Hydro Storage (PHS)	Compressed Air Energy Storage (CAES)	Vanadium-Redox Battery Energy Storage System (BESS)	Polysulphide BESS
Estimated Plant Life (years)	60	40	20	20
Estimated Capacity Factor (%)	20	20	20	20
Generation Emission Multiplier (Energy Ratio)	1.35	0.735	1.33	1.54
Construction and O&M Related Emission Rate (kg CO_2e/MWh)	6	4	40	33
Fuel Related Emissions Rate (kg CO_2e/MWh)	0	288	0	0

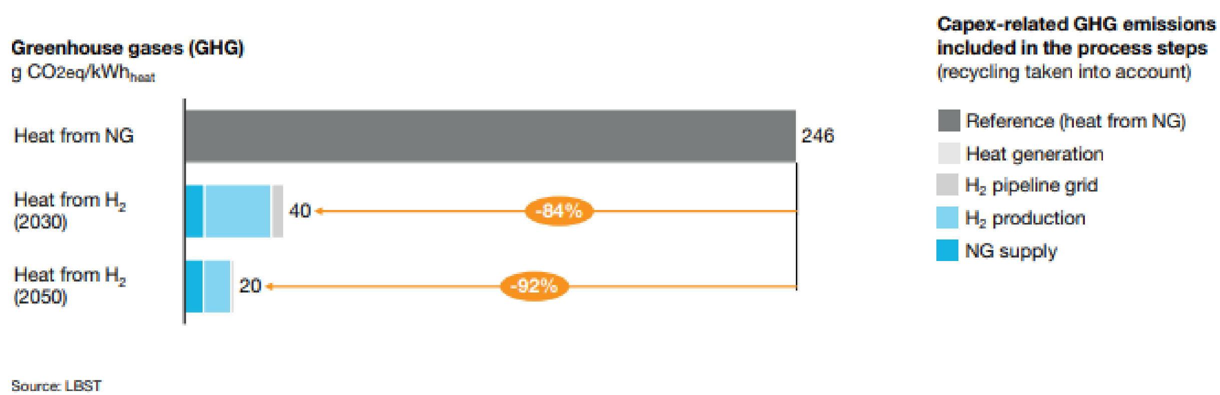
[11] Paul Denholm and Gerald L. Kulcinski, University of Wisconsin, Madison, WI. "Life-Cycle Air Emissions from Utility-Scale Energy Storage Facilities: Comparative Analysis and Policy Implications." Available at https://www.sandia.gov/ess-ssl/EESAT/2003_papers/Denholm.pdf.
[12] *Id.* at p. 1.

CAES is a hybrid storage/generation system that requires natural gas fuel. As such, for carbon emissions unrelated to stored electricity, CAES exhibits the highest emissions among the considered storage options. BESS involve energy-intensive manufacturing resulting in a higher construction and operations-related carbon emission rate as compared to other storage systems. When paired with renewable energy resource, BESS rank second in terms of carbon emissions. PHS paired with renewable energy resources has the lowest carbon emissions because of long-lasting components, among other factors.

E. Life Cycle Assessment of Hydrogen Decarbonization Pathways

The Hydrogen Council's report on decarbonization pathways provides an analysis of the full life cycle of blue hydrogen combustion with a 95 percent capture efficiency used as a conservative assumption as a representative scenario for green hydrogen since green hydrogen is not available.[13] This analysis considered use of blue hydrogen in a heating boiler but is appropriate for consideration to assessing impacts from combustion turbines as simple cycle combustion turbines have similar efficiencies. As shown below in Figure Y-3, the GHG emission intensity per kWh produced using hydrogen is estimated to be over 80 percent lower than the fossil fuel reference (natural gas used in boiler or furnace) by 2030. In the future, the emissions intensity of low-carbon hydrogen will be driven by the Inflation Reduction Act (IRA) Production Tax Credit (PTC) threshold of 4kg CO2e/kg H2 production.

Figure Y-3: Industrial Heat from Blue Hydrogen in Northern Europe[14]



[13] Hydrogen Council, "Hydrogen decarbonization pathways, A life-cycle assessment." January 2021. Available at https://hydrogencouncil.com/wp-content/uploads/2021/04/Hydrogen-Council-Report_Decarbonization-Pathways_Part-1-Lifecycle-Assessment.pdf.
[14] *Id.* at Exhibit 7.

III. NUCLEAR FUEL STORAGE

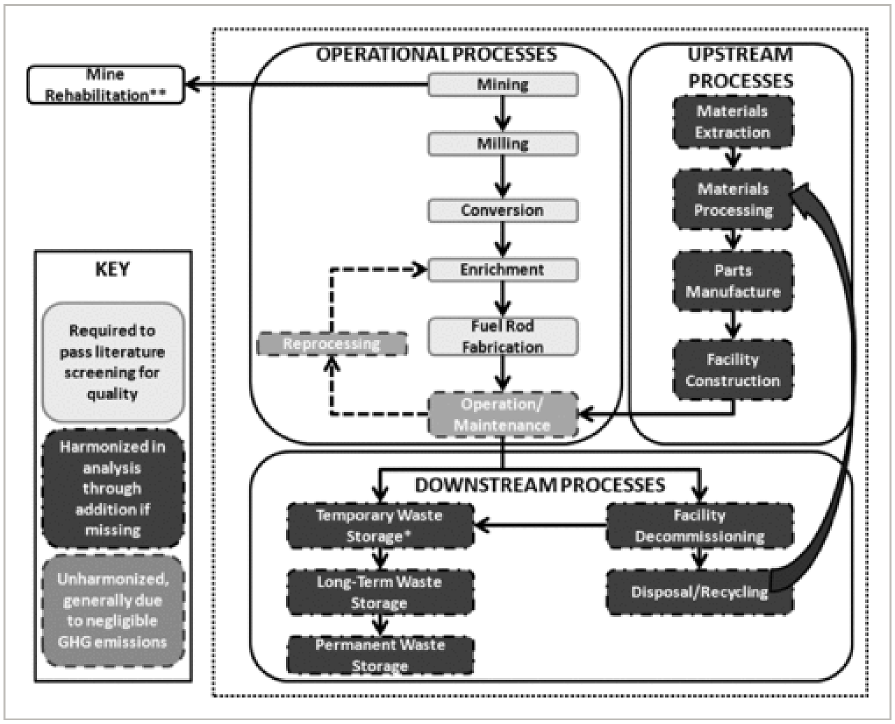
The DOE, Office of Energy Efficiency and Renewable Energy, funded a systematic review and harmonizaton of LCA literature of nuclear electricity generation technologies to examine and reduce, if possible, the variability in life cycle GHG estimates to better inform decision making.[15] Results were included in NREL's "Life Cycle Greenhouse Gas Emissions from Electricity Generation: 2021 Update" described above.

Figure Y-4 below illustrates the life cycle of electricity generated from nuclear power, as defined in this study. The dotted box defines the system boundary achieved through harmonization. The life cycle phases are grouped into three aggregate categories:

- Upstream processes: One-time processes occuring prior to operation – includes facility construction and material supplies.
- Operational processes: GHGs continuously emitted during generation of electricity – includes uranium mining and rehabilitation, milling, conversion, enrichment, fuel rod fabrication, transportation, facility operation and maintenance, and reprocessing.
- Downstream processes: Processes that occur after the facility retires – includes facility decommissioning; nonradioactive waste disposal/recycling; and temporary, long-term, and permanent spent fuel storage.

[15] Life Cycle Greenhouse Gas Emissions of Nuclear Electricity Generation - Systematic Review and Harmonization, Ethan S. Warner (NREL), Garvin A. Heath. Available at https://doi.org/10.1111/j.1530-9290.2012.00472.x.

Figure Y-4: LCA Harmonization System Boundaries (dotted line box) for Nuclear Power Electricity Generation[16]

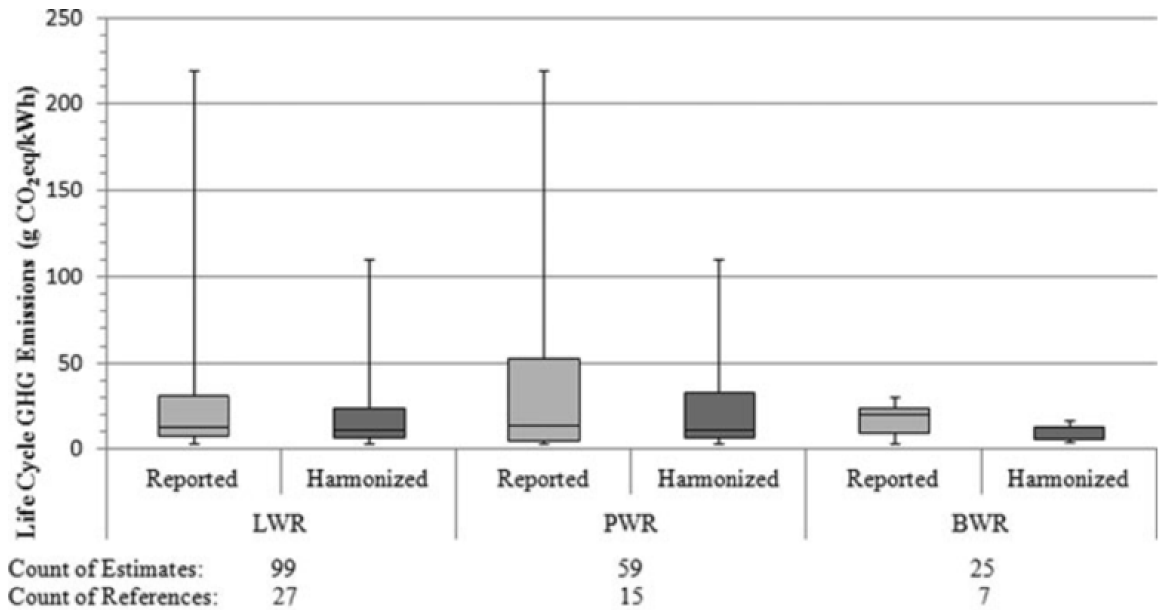


*Applies only to highly radioactive waste.
** Occurs once, but its impact on electrcity generaton is tempered by fuel demand.

Figure Y-5 below displays published and harmonized life cycle GHG emissions by nuclear reactor type. Whiskers represent minimums and maximums. Boxes represent 25th percentile, median estimate and 75th percentile. As shown on Figure Y-5, harmonized life cycle GHG emissions from PWRs and BWRs (including fuel storage), such as those operating at the Prairie Island and Monticello nuclear plants, are well below fossil fuel-based electricity generation sources summarized in Section IV.

[16] *Id* at Figure 1.

Figure Y-5: Nuclear Life Cycle GHG Emissions[17]



*LWR = light water reactor; PWR = pressurized water reactor; BWR = boiling water reactor

While the study reports results for LWRs, PWRs, and BWRs, the discussion focuses on the broader LWR category. Life cycle emissions of PWR and BWR systems employing similar performance characteristics (e.g., lifetime, thermal efficiency, and capacity factor) showed minimal differences from LWRs. For LWRs, "operational processes contribute a majority of life cycle GHG emissions (78 percent). Life cycle GHG emissions for upstream processes and downstream processes make up 14 percent and 8 percent of published estimates of total life cycle GHG emissions, respectively."[18] Several recommendations for further study were given, including more detailed assumptions for electricity use and waste storage; however, it was noted that consequential analyses are unlikely to fundamentally change the comparison of nuclear power to fossil fuel-based electricity generation sources.

IV. CONCLUSION

As shown in Table Y-4 below, the literature reviewed provides valuable insights into the full supply-chain and life cycle carbon impacts of energy generation and storage resource options.

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[17] *Id* at Figure 2.
[18] *Id.* at p. S82.

Table Y-4: Literature Review Summary of Resource Life Cycle Carbon Intensities

Life Cycle Carbon Intensity	NREL Study[19]	IPCC AR5[20]	GREET[21]	UW-Madison	H2 Council
Resource	**gCO2e/kWh**	**gCO2e/kWh**	**gCO2e/kWh[22]**	**gCO2e/kWh**	**gCO2e/kWh**
Natural Gas (avg.)	486	490	422	-	-
Nuclear[23]	13	12	1.2	-	-
Biomass	52	230	29	-	-
Wind	13	11	0	-	-
Solar PV	43	48	0	-	-
Hydropower	21	24	0	-	-
Battery Storage[24]	33	-	-	33-40	-
Low-C Hydrogen[25]	38[26]	-	-	-	20-40

Renewable energy sources and storage paired with renewable generation generally exhibit much lower life cycle emissions compared to fossil fuel-based technologies. Nuclear power is often considered a low-carbon energy option due to its minimal carbon emissions during the operational phase; the life cycle carbon impacts of nuclear power depend on several factors, including uranium mining, fuel processing, plant construction, and waste management. In conclusion, our literature review suggests that nuclear power can contribute to reducing carbon emissions when compared to fossil fuel-based alternatives.

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19 Median results shown.
20 Median results shown.
21 GREET default assumptions do not include the imbedded one-time emissions from manufacturing and construction of equipment.
22 Life cycle GHG emission from each type of generation converted from values provided in Table Y-2 to a per KWh basis using the conversion of 293.07 kWh/MMBtu from example equations.
23 Nuclear life cycle in NREL and IPCC studies includes temporary, long-term, and permanent waste storage; GREET includes fuel production.
24 Available studies are not as robust for these emerging technologies. Generally, the carbon intensity (CI) of storage is dependent on the associated electricity generation, and the CI of low-carbon hydrogen in the future will be driven by the IRA PTC threshold of 4kg CO2e/kg H2 production.
25 *Id.*
26 Value from one 2005 fuel cell study.

APPENDIX Z – NON-TECHNICAL SUMMARY

I. INTRODUCTION

The 2024-2040 Upper Midwest Integrated Resource Plan (the 2024 Plan or Preferred Plan) builds on the strong foundation of cost-effective carbon reduction that we have been working toward since our Commission approved 2019 Plan. The 2024 Plan documents how the Company will provide for the capacity and energy needs of our customers over the course of the planning period. It is comprised of a portfolio of forward-looking projects and resources designed to continue providing safe, reliable, and affordable service to our customers while continuing our ambitious carbon-reduction strategy, even as we forecast significant increases in customer load from electrification and other sources.

Here, we provide an overview of our 2024 Plan. The 2024 Plan demonstrates that we are well positioned to meet our customers' needs over the next fifteen years in a reliable, environmentally responsible, and cost-conscious manner. Specifically, the 2024 Plan models an 88 percent reduction in carbon emissions by 2030; $464 million in Present Value of Revenue Requirements (PVRR) savings by 2040; $785 million in Present Value of Societal Cost (PVSC) savings by 2040 and over $1 billion by 2050; results in sufficient firm dispatchable resource additions to ensure reliability; and leads to less than a one percent average annual increase in rates based on generic market pricing of new generation.

The Company has been thoughtfully planning and executing the transition of our power supply portfolio for more than a decade, rapidly decarbonizing, maintaining a reliable transmission system, and providing customers with affordable electricity rates. These benefits build off the progress made in our last resource plan (2019 Plan). Following Commission approval of the 2019 Plan, the Company has taken a number of steps needed to transform our energy system into one that will provide cleaner energy to our customers, while remaining safe, reliable, and affordable.

Since our 2019 Plan, we have achieved several notable accomplishments. First, we successfully retired Sherco Unit 2. Second, we have added additional dry cask storage at our Monticello Nuclear Generating Plant. This addition will enable the facility to continue providing carbon-free, reliable baseload power. Third, we have started the construction of Sherco Solar 1, 2, and 3. These projects will add a combined capacity of 710 MWs of solar energy. Fourth, we have initiated a long-duration energy storage pilot. This pilot will test a new 10 MW long duration iron-air storage technology.

Lastly, the Company has also initiated proceedings to construct transmission lines for replacement generation at both Sherco and King, which will allow for the cost-effective integration of thousands of megawatts of additional renewable resources on our existing system.

Building on our ongoing efforts to transform our energy system, and based on extensive collaboration with our stakeholders, the key components of our Preferred Plan include:

- Adding thousands of megawatts of additional renewable resources to our system, including customer-sited DERs;
- Integrating and investing in energy storage systems, including adding short-duration storage systems to our fleet;
- Extending the life of our nuclear fleet;
- Ensuring reliability through additional firm dispatchable generation; and
- Continuing to increase Energy Efficiency and Demand Response resources to help reduce overall system demand.

The 2024 Plan leverages existing grid connections and proven technologies, as well as emerging technologies like battery storage to provide a balanced mix of resources while preserving our fundamental commitment to reliability at nominal cost to customers. The 2024 Plan demonstrates how the Company's power supply strategy reflects the value of our customers, balances the priorities of a carbon-free future against reliability and affordability, and supports Minnesota's energy priorities.

II. CHANGING PLANNING LANDSCAPE

The 2024 Plan builds on our previous 2019 Plan and extends our resource planning to 2040. Over the last several years, the Company has witnessed a number of changes and developments that have impacted our planning process. Several of these developments, such as policy changes at the federal and state level, present greater opportunities to meet our carbon-reduction goals. Others, such as MISO's adoption of a seasonal resource adequacy construct, are directed at different policy ends like ensuring that we and other utilities continue to maintain a reliable system. Collectively, these changes provide different considerations that the Company needed to navigate as we developed our Preferred Plan.

Some of the key planning developments over the planning period that impact our resource needs and operations, include changes in:

- Market Constructs,
- Federal and State Policies,
- Community & Employee Considerations,
- Customer Preferences, and
- Supply & Technology Trends.

First, we note the change in resource adequacy in regional market constructs leading from an annual resource accreditation to seasonal resource accreditation. The new seasonal construct is designed to address significant increases in emergency events that occur year-round, driven by factors including generation retirements, reliance on intermittent resources, seasonal variations, outages resulting from extreme weather events, and declining excess reserve margin. The 2024 Plan has incorporated the seasonal construct into the planning process and modeling, allowing for more precise planning and resource allocation based on the specific needs and resource availability of each season. Modeling tools have been adjusted, and our models have become more complex because they now have to ensure sufficient capacity across system peaks in all four seasons as opposed to the single peak hour in a year. We have also adjusted our long-term planning assumptions because our models use trends or averages from several years of data in order to accurately predict what will happen in the future. However, we only have one year of data for existing generation assets to use when figuring out how much capacity we will need for each season.

Second, the impacts of evolving environmental regulations and diverse regional and state policies will continue to require us to be responsive to new policy directives. Federal incentives for decarbonization in both utility generation as well as residential use are driving an enormous increase in the renewable market. The Inflation Reduction Act (IRA)—the largest climate investment ever by the US government—is expected to more than triple US clean energy production in less than 10 years, which would result in about 40 percent of the country's energy coming from renewable sources such as wind, solar and energy storage by 2030. However, carbon-free energy requirements are not exclusive to federal policy. As noted, state policy goals also influence our planning. Minnesota enacted new legislation requiring utilities serve 100 percent of their state retail load with carbon free energy by 2040. Besides the new carbon-free goal, Minnesota has seen other significant legislative developments since our 2019 Plan that impact how we conduct our resource planning. In particular, the cost of carbon, distributed solar energy standard, the updated renewable energy standard, and new carbon-free energy standard each impact our 2024 Plan. We see similar 100 x 2040 goals in Wisconsin and Michigan.

Third, community and employee considerations are impacting our planning process by causing us to rethink how we make decisions. We have taken efforts to engage and elicit community and stakeholder feedback and incorporate that feedback into how we do business, such as working to enhance equitable outcomes and broaden participation in energy decision-making by the communities we serve. We also know that our decarbonization goals impact the communities we work in and serve. We are also committed to transitioning our system while proactively working with the communities where plants are located and the employees who work in those plants.

Fourth, our planning recognizes customer preferences. The NSP System continues to serve a diverse mix of customers with varied interests and preferences. While most customers continue to prioritize affordability, we have seen increasing interest in customer choice around how and from where they consume energy, sustainability, carbon reduction, and other clean energy objectives. We are taking these interests into consideration in planning our resource mix for the future, recognizing and incorporating the energy preferences of our municipal, commercial and industrial, and residential customers through program development and offerings.

Finally, we are planning and incorporating technology and supply trends around generation and energy storage. The 2024 Plan assumes that wind and solar capital costs will continue to decline. We also expect technological advancements to continue to improve capacity factors, as tracking and PV module technologies have continued to improve and inverter loading ratios have increased with falling capital costs. We continue to monitor industry activity around other emerging technologies that may contribute to achievement of our goals.

At the same time, the planning for, and managing of, the integrated NSP System requires us to balance the needs and policy goals of all stakeholders and jurisdictions we serve. It is important to recognize that not all states we serve have the same energy policies and environmental goals. We believe that proactive leadership in the face of new and proposed environmental regulation, customer expectations, emerging technologies, and changes to the NSP System will allow us to both meet our customer and stakeholder goals as we affirmatively address these trends rather than being shaped by them.

III. MINIMUM SYSTEM NEEDS

Our planning process requires that we identify the minimum number of resources our system will need throughout the planning period. This provides a baseline upon which we have developed the Reference Case, our modeling scenarios, and our Preferred Plan.

Our forecast begins with the capacity or peak demand, which indicates the total generating capacity (in MWs) needed to meet our customers' needs during the highest demand hour each year. We also evaluate the total energy (in MWhs) that we anticipate our customers will use annually. The peak demand and total energy requirements together guide us in identifying the best generating resources to meet customer needs. We include a "reserve margin" as prescribed by MISO to account for potential uncertainties in resource availability or demand level. By subtracting the resources, we currently have or expect to have from this "reserve margin," we can identify our net surplus or need. Each of these components are illustrated below in Figure Z-1:

Figure Z-1: Net Resource Need/Surplus Calculation

Customer Needs Forecast
Plus MISO Reserve Margin

Equals **Total Capacity Obligation**
Minus Demand Response Capability
Minus Generation Capacity (measured by seasonal accredited capacity)
Minus Generation Adjustments

Equals **Net Resource Need/Surplus**

We anticipate a net surplus through 2026 and a deficiency thereafter, starting first in the spring and summer of 2027. From this point, our modeling underlying our resource planning identifies the best combination to meet any net resource deficiencies and the resulting energy mix.

A. Reference Case Expansion Plan and Energy Mix

We incorporate all the relevant elements into the EnCompass modeling tool, which allows us to explore how we best meet our customer and policy requirements under a variety of conditions and at a reasonable cost. We work with internal and external subject matter experts to develop starting assumptions that reflect their expert opinion of likely future conditions. We then test the robustness of the plan through sensitivity analysis and special studies by individually changing key assumptions and re-running the plans under these changed assumptions.

IV. THE PREFFERRED PLAN

Our Preferred Plan continues to deliver on our obligations to provide safe, reliable, and affordable service to our customers while furthering our ambitious carbon-reduction strategy. Specifically, our 2024 Plan was developed to respond to emerging load growth that we anticipate, while providing a reliable and affordable system that furthers our carbon reduction goals. The result is a plan that will add thousands of megawatts of additional renewable resources, retire emitting baseload generation, and add flexible, dispatchable generation and storage resources to support the shift to renewables. We will also extend the lives of our carbon-free baseload nuclear generators.

A. Planning Objectives.

The 2024 Plan was developed to address the planning landscape in which we operate based on three key considerations: (1) load growth, (2) reliability; and (3) affordability. Each planning objective is addressed below.

1. Load Growth

The last several decades of our industry can be characterized as a period of relatively flat annual growth for electric consumption. However, we anticipate that the period of slow consumption growth is ending, and we expect to see the demand for our service increase at a greater pace. While further improvements in energy efficiency and demand response capabilities will continue to provide substantial value to our customers, we anticipate that emerging uses of electricity will result in greater consumption growth than we have needed to plan for in recent years. Specifically, our base case forecasts now anticipate average annual growth rates of 1.8 percent in our peak demand and 2 percent for our energy forecast over the 2024-2040 planning period. This is a marked divergence from what we have anticipated in the past. This expected growth in demand from electrification coincides with our aggressive goals to decarbonize our system.

2. Reliability

This anticipated increase in the growth of electricity consumption comes amid renewed attention to the reliability of the electric system. The foundational service we provide to our customers is safe and reliable electricity, and we must be prepared to meet our customers' energy demands twenty-four hours a day, 365 days a year. The closing of our (and other utilities') baseload coal units and substantial additions of intermittent renewable resources has and will continue to provide many benefits to our customers and communities. Because of these retirements and changing resource accreditation methodologies, overreliance on the market creates substantial risk of high prices and the possibility that sufficient resources simply will not be available when they are needed.

To address these risks while continuing to optimize the cost-effectiveness of our fleet, we used a modified analysis to develop our 2024 Plan, and we did not allow our model to rely on the MISO market to meet our capacity obligations. We did, however, set those capacity obligations using MISO's coincident peak and planning reserve margin (PRM), and we allowed the model to benefit from access to the MISO market to optimize the dispatch of resources to serve our customers. This two-step analysis results in an expansion plan that takes advantage of the potential cost savings of participating in the MISO market, while not being reliant on the MISO market to meet our resource needs. In addition, by continuing to plan to MISO's coincident peak and PRM, our analytical approach ensures that we are not adding resources that are not necessary to meet our customers' needs.

In addition to planning to meet our planning obligations without reliance on MISO, we have taken steps to further refine our energy adequacy analysis. We conducted an energy adequacy back casting analysis to ensure our system has the reliable energy it needs to serve all customers at every hour, of every day. Further, we examined the inertial floor of our system to assess how the grid would perform in the absence of traditional baseload generation. Our studies go beyond traditional EnCompass modeling to verify the need for firm dispatchable resources and inertia to ensure reliable service for our customers.

3. Affordability

We understand the importance of keeping the cost of our service reasonable for our customers and providing cost-effective solutions for our energy needs. That is why we plan our expansion with stakeholders in mind with an expansion plan that can be implemented at reasonable cost to our customers. Our average residential customer's electricity bill has remained below the national average, and our goal continues to be that our customers will experience average annual bill increases that are below the rate of inflation. In order to keep costs low for our customer, we took care to leverage additional policy incentives that will benefit our customers. In particular, the passage of federal tax incentives that lowers costs, saving customers a projected $5.7 billion in tax credits in renewable savings over the course of the expansion plan.

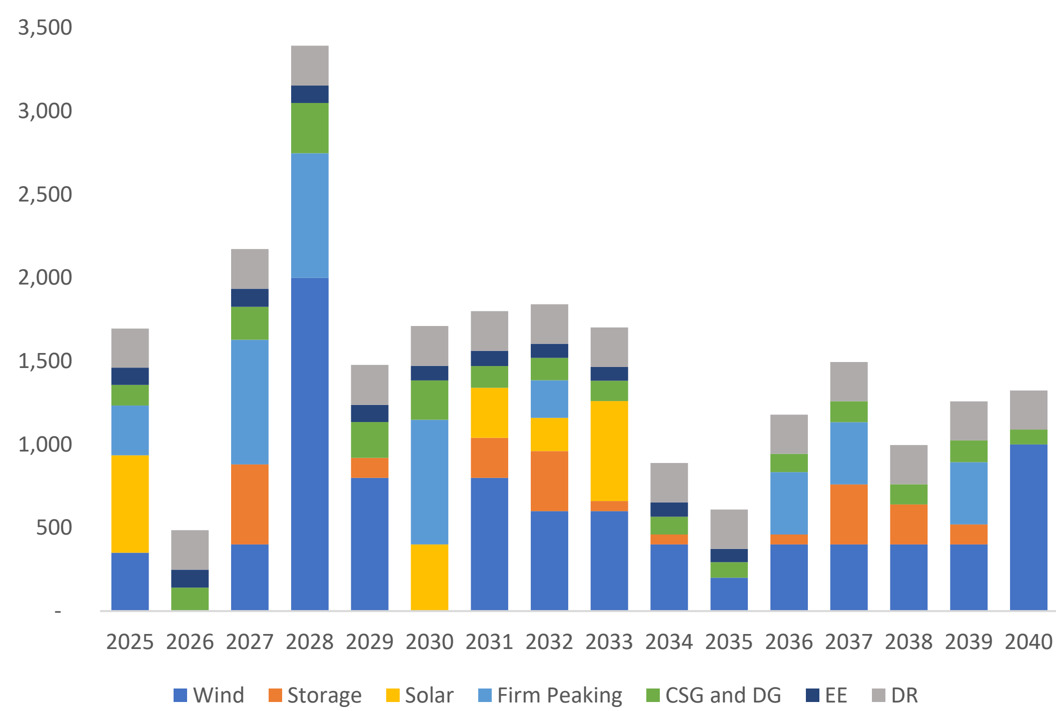
B. Preferred Plan

As stated, proactive investments to maintain a reliable and resilient regional power grid are necessary as more low-cost renewable energy is brought online, existing power plants are retired, electrification continues to grow, and extreme weather events become more frequent. The 2024 Plan is designed to accelerate our carbon-reduction efforts while maintaining a safe, reliable, and affordable system for our customers and communities throughout the planning period.

Key Components of our Preferred Plan include adding thousands of megawatts of additional renewable resources to our system and incrementally retiring emitting baseload generation, while also incorporating flexible, dispatchable generation to enable grid reliability throughout this transition. We propose extending operations of our carbon-free nuclear units and extending operations of our Refuse Derived Fuel (RDF) waste to energy generating plants. Finally we are supporting the beneficial electrification of certain end uses and enabling demand flexibility, which will help to reduce carbon emissions in other sectors while also allowing for load shifting to help integrate more renewables.

Figure Z-2 below outlines the proposed timing, type, and size of resource additions comprising our Preferred Plan.

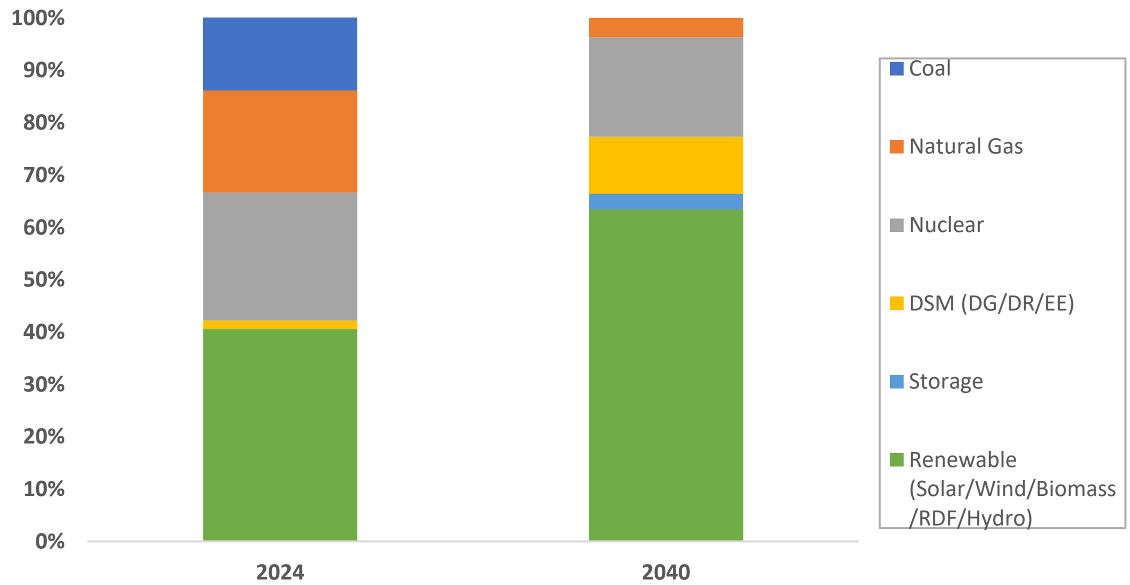
Figure Z-2: Preferred Plan Resource Additions (MW)



	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
Wind	350	0	400	2,000	800	0	800	600	600	400	200	400	400	400	400	1,000
Storage	0	0	480	0	120	0	240	360	60	60	0	60	360	240	120	0
Solar	585	0	0	0	0	400	300	200	600	0	0	0	0	0	0	0
Firm Peaking	298	0	748	748	0	748	0	225	0	0	0	374	374	0	374	0
CSG and DG	124	140	198	301	215	237	131	134	123	106	94	110	125	121	130	90
EE	103	108	108	105	103	87	91	85	82	86	80	0	0	0	0	0
DR	234	237	238	239	239	239	238	237	237	236	236	235	235	235	234	234

Our Preferred Plan outlined above would result in the energy mix shown in Figure Z-3 below.

Figure Z-3: NSP System 2024 and 2040 Preferred Plan Energy Mix



C. Action Plans

1. Five-Year Plan (2024-2030)

Our 2024 Plan does not identify any incremental capacity needs until 2027. However, from 2027 through 2030, our Preferred Plan contemplates adding over 6,000 MWs of incremental generation. Below, we discuss the near-term actions by resource type that underly expansion plan, recognizing that the resource additions may need to be smoothed during the implementation process to create a portfolio of projects that can be constructed effectively within the constraints of the market for equipment and labor.

a. Wind

Our 2024 Plan proposes to add 3,200 MWs of wind additions through 2030. 2,800 MWs of the 3,200 MWs near-term wind total is attached to the MN Energy Connection Sherco Generation tie line, which was proposed in our 2019 Plan. We are pursuing 1200 MWs of this wind through the recently approved MN Development Transfer Resource Acquisition Process. We expect to begin further procurement activities and the proceedings through a Commission approved bidding process in the next year. The remaining 400 MWs of generation is generic and non-location specific.

b. Solar

Our 2024 Plan adds 400 MWs of solar using the King Interconnection in 2030. Beyond these additions, we do not include any new utility scale solar projects between 2024 through 2030, other than those already approved by the Commission and included in our Base Case. On the distributed solar side, we have incorporated forecasted growth into our 2024 Plan using the maximum possible level of non-legacy community solar gardens and levels of three percent distributed solar energy standard solar.

c. Firm Dispatchable

Our 2024 Plan calls for 2,244 MWs of firm dispatchable resources by 2030. These resources are split between 748 MWs in 2027, 748 MWs in 2028, and 748 MWs in 2030. Approximately 374 MWs of the 2028 need is located on our re-optimized Sherco Generation tie line and is pending regulatory approvals from the Commission. The rest of the firm dispatchable additions are generic.

We have already opened a proceeding before the Minnesota Commission to consider up to 800 MWs of firm dispatchable resources.[1] The 800 MWs are included in the 2,244 MWs proposed in our 2024 Plan, however our modeling for this plan identifies a need exceeding 800 MWs of firm dispatchable resources. As part of the proceeding, the Company has submitted three proposals totaling in excess of 800 MWs. Third party providers have also submitted proposals.

d. Battery Energy Storage Systems

We plan to add approximately 600 MWs of storage by 2030. The 600 MWs of storage is comprised of a modeled 480 MWs of generic storage in 2027, and 120 MWs as part of our re-optimized Sherco Generation tie line in 2029. We expect to solicit these resources as part of a request for proposals under a commission approved bidding process.

e. Nuclear Extension

In order to support the extension of our nuclear generation plants to at least 2050, steps will need to be taken in the near future. We plan on filing a certificate of need with the Commission on February 7, 2024, for additional dry fuel storage to support

[1] Docket No. E002/CN-23-212.

continued operation of Prairie Island through 2053/2054. We plan to submit our application in 2026 with the Nuclear Regulatory Commission to extend the Prairie Island Nuclear Generating Plant operating license from 2033/2034 to 2053/2054.

With respect to Monticello, we plan to begin construction of the concrete pad at Monticello in 2026. Shortly after a Commission decision on the 2024 Plan, we will also seek another certificate of need for the dry fuel storage necessary to support the additional 10-year life extension of Monticello.

Throughout the planning process, we continue to collaborate with the Prairie Island Indian Community, the City of Red Wing, the City of Monticello, Goodhue County, Wright County, and other community interests to ensure transparency and continuous partnership.

f. Refuse Derived Fuel Waste to Energy Extension

Finally, all three of our renewable RDF waste to energy generating plants are slated for retirement in 2027, and we plan to extend the life and operations of our Red Wing, Mankato, and French Island RDF plants to 2037, 2037, and 2040 respectively. These plants not only add significant value to our system and help us achieve our renewable energy goals with reliable power, but also provide value to the local communities they serve. We plan to address the extension of these plants in our upcoming annual remaining lives filing.

2. *Long-Term Plan*

In addition to our immediate five-year action plan, our 2024 Plan relies on model-selected resources in the 2031-2040 period that we envision could be part of our energy future including that include:

- Adding an additional 1,100 MWs of incremental utility-scale solar;
- Adding an additional 5,200 MWs of incremental wind and repowering existing wind resources when economical;
- Adding an additional 1,500 MWs of incremental Battery Energy Storage Systems;
- Adding approximately 1,347 MWs of incremental firm peaking resources;
- Developing additional regional transmission infrastructure;
- Growing our DR portfolio to approximately 1,385 MW by 2040; and
- Continuing plans to achieve average annual energy savings, through our energy efficiency programs between 2031-2040.

Our 2024 Plan presents a pathway to achieve Minnesota's 100 percent carbon free by 2040 law. While these modeled additions project what our system would look like in 2040, we note that ingenuity, new technologies, and transmission will be necessary in order to ensure we can achieve our longer-term goals of 100 percent carbon-free electricity across the NSP system by 2050.

While our 2024 Plan examines the generation side of the equation, the Company is working on creating a long-term Vision study to examine the 2040 and 2050 timeframes to determine what transmission investments might be needed to achieve a 100 percent carbon free energy plan. The study will include a comprehensive look at load growth, including varying electrification and adoption rates, generation profiles and locational data, and finally, transmission needed to accommodate the future carbon goals. We look forward to leveraging these studies to inform our planning as they become available.

V. ECONOMIC MODELING FRAMEWORK.

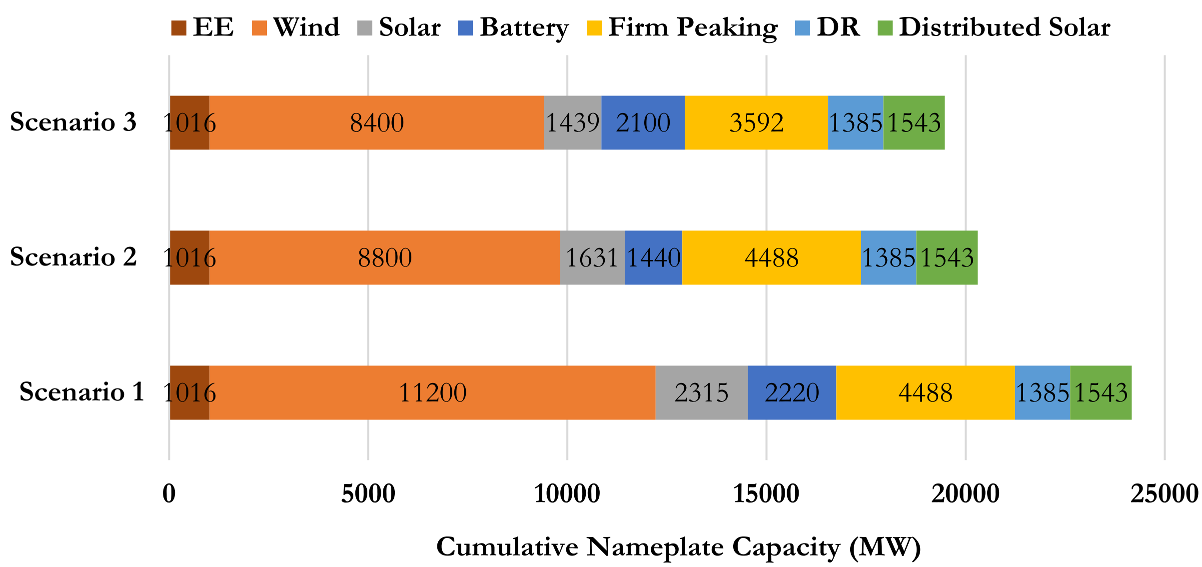
To develop the 2024 Plan, we use a modeling tool called Encompass. EnCompass is a software tool that estimates the costs of various resource expansion plan options, evaluates specific capacity alternatives, and measures the potential risks of new environmental legislation and other policy scenarios. This tool allows us to assess different scenarios under a variety of possible futures to help us meet customer and policy requirements cost-effectively under various conditions. We create starting assumptions with the help of internal and external experts, reflecting likely future conditions. We test the robustness of the plans through sensitivity analysis.

Starting with our Reference Case, we created scenarios that examine different potential life extensions and retirement dates for our nuclear units and the resulting new resources needed to meet customers' needs, achieve our policy goals and obligations, and maintain affordable rates. The scenarios include analysis of:

- Scenario 1: Reference Case; Retire Prairie Island in 2033/34, Monticello in 2040 (updates all baseline resources, including Wheaton and Blue Lake repowers, RDF extension, Inver Hills extension);
- Scenario 2: Prairie Island Extension; Retire Prairie Island in 2053/54, Monticello in 2040; and
- Scenario 3: Extend All Nuclear; Retire Prairie Island in 2053/2054, Monticello in 2050.

After identifying the scenarios, we used EnCompass to identify the expansion plans for each of the three primary scenarios, and their resulting cost and emissions impacts. Completing baseload scenario runs, as described above, allows us to examine scenario outcomes side-by-side, to evaluate their benefits and drawbacks. Among other factors, we examine the resource expansion profile and carbon emissions outcomes, present value costs, and several indicators of risk for each scenario. The cumulative expansion plan additions through the planning period for the three scenarios are shown below in Figure Z-4.

Figure Z-4: Expansion Plans by Scenario (MW, Cumulative Nameplate Capacity Resource Additions by Resource Type, 2024-2040)



As shown above in Figure Z-4, Scenario 3 results in fewer additions of firm peaking and wind capacity relative to both Scenarios 1 and 2. The extension of the nuclear units offset additions of other resources need for capacity and energy. While Scenario 2 includes the same amount of cumulative firm peaking resources through 2040, those additions are delayed by the extension of Prairie Island, and few firm peaking resources are needed over the 20-year life extension. Moreover, the nuclear extensions provide a certain and stable source of energy to our system as we transition our generation fleet.

The cost impact of the three scenarios is shown below in Table Z-1. The table shows the net present value (NPV) delta of modeled costs compared to Scenario 1 (the

Reference Scenario), with negative values representing customer savings relative to the Reference Scenario.[2]

Table Z-1: Scenario PVSC/PVRR Deltas from Reference Case ($2024 millions)

PVSC Production Cost	Delta in NPV ($m) 2024-2040	NPV ($m) 2024-2040	Delta in NPV ($m) 2024-2047	NPV ($m) 2024-2047	Delta in NPV ($m) 2024-2050	NPV ($m) 2024-2050
Scenario 1 PVSC	$0	**$51,037**	$0	**$63,635**	$0	**$68,788**
Scenario 2 PVSC	($413)	**$50,624**	($437)	**$63,198**	($513)	**$68,275**
Scenario 3 PVSC	($785)	**$50,252**	($941)	**$62,695**	($1,025)	**$67,762**
PVRR Production Cost	**Delta in NPV ($m) 2024-2040**	**NPV ($m) 2024-2040**	**Delta in NPV ($m) 2024-2047**	**NPV ($m) 2024-2047**	**Delta in NPV ($m) 2024-2050**	**NPV ($m) 2024-2050**
Scenario 1 PVRR	$0	**$34,678**	$0	**$44,948**	$0	**$48,927**
Scenario 2 PVRR	($97)	**$34,581**	$291	**$45,239**	$391	**$49,317**
Scenario 3 PVRR	($464)	**$34,215**	$46	**$44,994**	$239	**$49,166**

The Scenario 3 plan was the lowest cost plan in terms of PVSC in all time periods assessed. As our nuclear plants provide a source of carbon-free energy to our system, extension of these resource results in overwhelming benefits due to the avoidance of carbon emissions from other resources. It also is the lowest cost plan in terms of PVRR through 2040, and nearly breakeven through 2047 compared to the Reference Case. The only outlier is when PVRR is assessed through 2050, which shows Scenario 3 adds $239 million in NPV compared to the Reference Case. We note, however, that the replacement capacity added at the end of the expansion plan to replace Prairie Island in Scenario 2 and Prairie Island and Monticello in Scenario 3, significantly impacts overall cost.

Given current technologies, the model makes significant additions of firm dispatchable resources in the late 2040s in anticipation of the retirement of the nuclear fleet. Under the PVRR assumptions, no cost is included on the emissions from these resource additions. We expect technological advancements will provide resource options that are not currently available when the plants near the end of their extended lives. Therefore, the significant firm dispatchable additions in the late 2040s may not

[2] Note that these PVRR and PVSC deltas shown depict NPV for 2024-2040.

provide a reliable indication of the costs that far out in time. As a result, we provide cost comparisons over three different time horizons. The most relevant of these horizons—through 2040, when resource and cost assumptions are most known—shows the extension of our nuclear fleet provides significant economic benefits even when the benefits of avoided emission are not included.

A final step in our analysis process evaluated the performance of the baseload study plans under different sensitivities. A summary of examined sensitivities is presented in Table Z-2 below.

Table Z-2: Sensitivities

Category	Scenario Descriptions
Standard	PVSC – Base, i.e., with Mid Reg Cost ($40) >2028 + Mid Draft EPA <2028 + (Draft EPA - Reg Cost) starting in 2028
	PVRR – Base, i.e., no carbon cost and environmental externality
Sensitivities on All Three Nuclear Scenarios	
Fuel prices	High Fuel/Market Price
	Low Fuel/Market Price
Load	High Load
	Low Load
Technology cost	High Technology Cost
	Low Technology Cost
	Edison MISO Market Prices for wind and solar
Cost of carbon	High Reg Cost ($75) >2028 + High Draft EPA <2028 + (Draft EPA - Reg Cost) starting in 2028
	Low Reg Cost ($5) >2028 + Low Draft EPA <2028 + (Draft EPA - Reg Cost) starting in 2028
	Draft EPA - High ($0 Reg Cost)
	Draft EPA - Mid ($0 Reg Cost)
	Draft EPA - Low ($0 Reg Cost)
Market Access	Market access off in dispatch runs
Environmental Policy	Good Neighbor Rule applied in both Minnesota and Wisconsin + EPA Rule 111
Combination	High technology cost + high load
	Low technology cost + low load
Carbon Free 100x50	Carbon constraint to reach 100x50 carbon free goal

The PVRR and PVSC for each sensitivity consistently shows the Preferred Plan, Scenario 3, as yielding the most customer benefits on a PVSC basis across nearly all sensitivities. Based on these analyses, we believe our Preferred Plan meets all our key planning objectives, balances outcomes and costs, and provides us with the strategic flexibility to address the planning landscape.

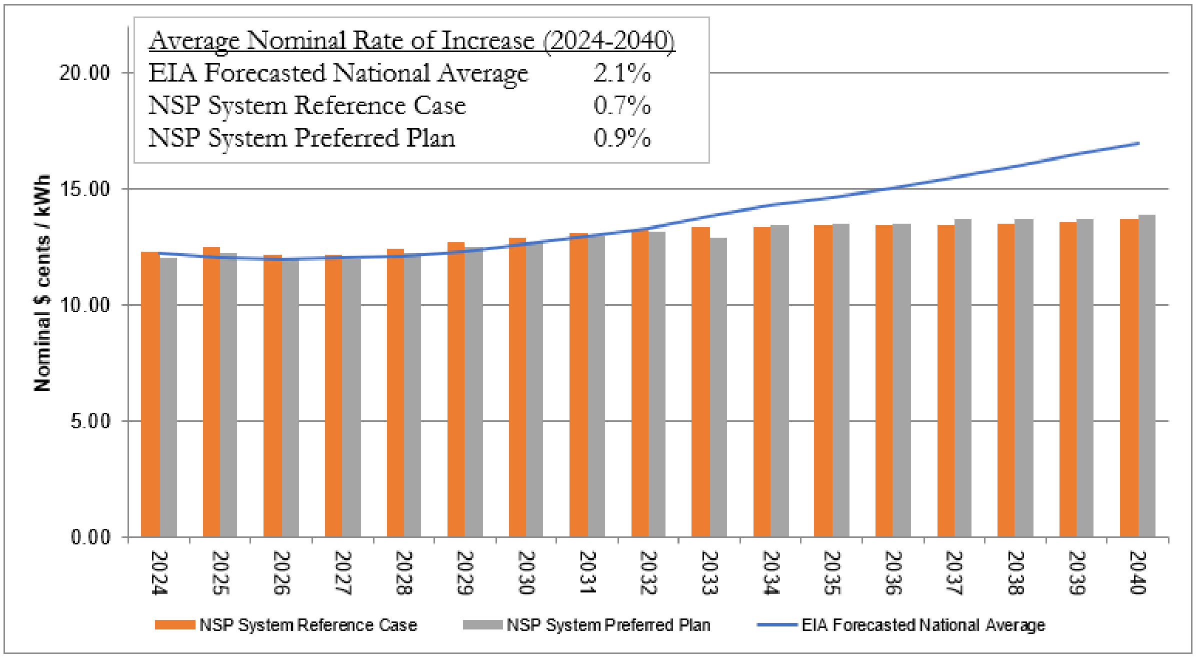
VI. RATE IMPACTS

Resource plans, among other things, are evaluated in part on their ability to keep the customers' bills and the utility's rates as low as practicable, given regulatory and other constraints. Our analysis of the present rate and bill impacts of our Preferred Plan shows that while the Preferred Plan's rate impact is higher than the reference case, it is lower than the national average forecasted by the Energy Information Administration.

Our Preferred Plan results in an estimated average annual increase in revenue requirements less than the Base Case and just over 1 percent overall. With our Preferred Plan, we can achieve significant CO_2 emissions reductions, with cost impacts that are roughly half of the expected national average increase in electricity prices. Both the Base Case and The Plan are designed to meet the Company's clean energy goals, and state policy objectives.

As shown in this report, our Preferred Plan maintains affordability and reliability while continuing our trend of carbon reduction benefits relative to our Base Case. See Figure Z-5 below.

Figure Z-5 Preferred Plan Average Rate Impact for the NSP System



We have been adding cost-effective renewable resources to our system to reduce emissions. We believe that our Preferred Plan keeps customers' bills and rates as low as practicable while continuing our transition to a carbon-free system. As we continue our transition to a carbon-free system, we remain committed to being the energy provider of choice for our customers, and keeping rates low is a key part of that commitment.

VII. CONCLUSION

The backbone of resource planning is ensuring we have the right resources in place to keep the lights on for our customers and to be ready to accommodate customer load growth reliably and in a timely fashion. We continue to take measured and thoughtful action to balance the key factors of load growth, reliability, and affordability to ensure our customers receive the greatest value both now and over time, and that the fundamentals of our electric business remain sound.

The Company has led the clean energy transition for nearly two decades. We share the state's vision to deliver 100 percent clean energy in Minnesota by 2040. By planning ahead and charting an orderly, gradual transition of our generation fleet, we believe we can achieve our stated goals while managing impacts to host communities and employees, preserving the reliability and stability of our system, and maintaining affordability for our customers.

We have presented a Preferred Plan that seeks to (1) maintain or improve the adequacy and reliability of utility service; (2) keep the customers' bills and our rates as low as practicable, given constraints; (3) minimize adverse socio-economic effects and adverse effects upon the environment; (4) enhance our ability to respond to changes in the financial, social, and technological factors affecting our operations; and (5) limit the risk of adverse effects from financial, social, and technological factors outside of our control. For these reasons and as discussed throughout our 2024 Plan filing, we believe our Preferred Plan is in the public interest and merits the Commission's approval.