

July 19, 2019

Daniel P. Wolf
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, Minnesota 55101

RE: **Comments of the Minnesota Department of Commerce, Division of Energy Resources**
Docket No. E002/M-13-867

Dear Mr. Wolf:

On May 20, 2019, the Minnesota Public Utilities Commission (Commission) issued a *Notice for Comment Period* seeking comment on Northern States Power, d/b/a Xcel Energy's (Xcel's) proposal for an alternative method for calculating the Value of Solar (VOS) avoided distribution cost for its Solar*Rewards Community Solar Garden (CSG) Program.

Attached are the comments of the Minnesota Department of Commerce (Department) in this matter. The Department is available to answer any questions the Commission may have.

Sincerely,

/s/ SUSAN L. PEIRCE
Public Utility Rate Coordinator

SLP/ja
Attachment



Before the Minnesota Public Utilities Commission

Comments of the Minnesota Department of Commerce

Division of Energy Resources

Docket No. E002/M-13-867

I. BACKGROUND INFORMATION

On April 1, 2014, the Commission approved the Department's proposed methodology to calculate the Value of Solar (VOS). The VOS methodology is intended to meet the requirements of Minn. Stat. §216B.164, Subd, 10 reflect the value of distributed solar generation to the "utility, its customers and society."

On September 6, 2016, the Commission issued an Order approving the use of the VOS methodology as the basis for the bill credit in Xcel Energy's (Xcel or the Company) Solar*Rewards Community (CSG) Program. In addition, the Commission directed Xcel to calculate a location-specific avoided distribution cost starting with its 2018 VOS rate filing.

In its March 22, 2019 *Order Approving Xcel's Update to the 2019 System-wide Value-of-Solar Tariff Rate with Modifications*, the Commission directed Xcel to file a more fully developed alternative method for calculating the VOS's avoided distribution cost by May 1, 2019.

On May 1, 2019, Xcel submitted their avoided distribution cost methodology.

On May 20, 2019, the Commission issued a *Notice of Comment Period* seeking comment on Xcel's proposed avoided distribution cost methodology, seeking responses to these questions:

- Does Xcel's proposal comply with Commission Order?
- Is the proposal sufficiently developed for Commission consideration?
- Does it yield accurate results that are fair and reasonable for all VOS stakeholders?

On June 7, 2019, at the request of the Minnesota Solar Energy Industries Association, the Commission granted an extension until July 19, 2019 to file initial comments.

II. SUMMARY OF XCEL'S PROPOSAL

Xcel's proposed avoided distribution cost methodology is based on a method discussed with stakeholders and included in the Department's December 14, 2018 Reply comments. The avoided distribution cost aims to quantify the costs of distribution capacity projects that could be avoided as a result of distributed generation projects.

The current VOS methodology estimates avoided distribution costs based on the system capacity distribution costs divided by the change in peak demand over a ten year period. Under this method, when peak demand has fallen, resulting in a negative number for the component, the avoided distribution cost for that year is zeroed out. (The proposed system-wide methodology for 2019 had such a result.) When peak demand increases, the avoided distribution cost for that year increases, sometimes by a large amount. As a result, the value for the avoided distribution cost component of the VOS can swing significantly from year to year.

Xcel's proposed methodology would use capacity-related distribution projects for the two most recent historical years and estimates for three forecast years, along with the resulting distribution capacity increases to estimate an average per kW cost of distribution capacity. Xcel states that the resulting per kW cost would represent the maximum amount of avoided distribution costs that could be incurred, because it assumes that all capacity additions could be avoided as a result of solar generation projects. Because all distribution capacity upgrades are unlikely to be avoided or deferred, Xcel proposes to reduce the per kW cost by 50 percent to reflect the expectation that not all projects will be avoided between solar providers and Company subscribers.

In response to Department IR No. 36, (Attachment A to these comments) the Company calculated that the avoided distribution cost using its proposed methodology for 2019 would be \$80/kW and \$0.18 per kWh, compared with a value of zero using the current methodology.

III. DEPARTMENT RECOMMENDATION

The Department has reviewed Xcel's proposed methodology and is generally supportive. The use of historical and forecasted capacity additions and the costs of those additions appears to be reasonable. Using a combination of historical and forecasted distribution capacity additions and costs rather than just forecasted information as originally proposed should provide some guard against forecast errors. Moreover, the forecasted cost per kW is largely consistent with the historical costs as reflected in the Company's response to DOC IR No. 36 (Attachment A).

The Department continues to have some concern with Xcel's proposal to reduce the estimated per kW cost of distribution capacity additions by 50 percent. In response to Department IR No. 37 (Attachment B) regarding the 50 percent reduction Xcel stated:

If a project is included in the Company Avoided Distribution Cost component, customers will pay the deferral value to subscribers on each kWh of energy produced by the Community Solar Garden (CSG). If the project is not actually deferred customers will also pay upfront for the project in base rates (i.e., they will not see any deferral benefits in base rates). The Company proposes the application of a 50 percent factor to acknowledge there is some likelihood that the distribution projects will not be deferred.

A representative amount of distribution costs are always included in a rate case determination of base rates so whether a project results in a deferral of any distribution spending or not, customers will be paying for some of those costs in base rates, unless adjustments are made in a future rate proceeding to remove those costs from base rates.

As currently being considered, the value of the avoided distribution cost is intended to reflect state-wide avoided costs. As a result, the specific placement of a CSG may or may not align with a location in which distribution projects may be deferred. Consequently, the Department does not object to splitting the avoided distribution cost between Xcel's ratepayers and the CSGs as a means of reflecting the risk that distribution projects may not be deferred.

The Commission may wish to direct Xcel to report annually on its planned and actual distribution spending along with the placement of CSGs as means of evaluating the reasonableness of Xcel's avoided distribution cost methodology.

III. DEPARTMENT RECOMMENDATIONS

The Department recommends that the Commission approve Xcel's proposed avoided distribution cost methodology for calculating the Value of Solar and direct Xcel to report annually on its planned and actual distribution spending along with the placement of CSGs to assist with evaluating the reasonableness of Xcel's avoided distribution cost methodology.

/ja

- Not Public Document – Not For Public Disclosure
- Public Document – Not Public Data Has Been Excised
- Public Document

Xcel Energy Information Request No. 36
Docket No.: E002/M-13-867
Response To: MN Department of Commerce
Requestor: Sue Peirce
Date Received: June 10, 2019

Question:

Topic: VOS Methodology

Please provide an Excel spreadsheet with formulas intact showing the calculation of Xcel's proposed avoided distribution cost and resulting VOS. Include supporting information on the historical and projected distribution capacity costs, and where in the calculation the reduction of distribution costs by 50 percent occurs.

Response:

Please see Attachment A for the calculation of the \$80 cost per kW for the Avoided Distribution Cost Component. Please see attachment B for the 2019 VOS calculation that incorporates the \$80 cost per kW in the Avoided Distribution Cost Component. The result is Avoided Distribution Cost Component of 0.18 cents per kWh.

Preparer: Nick Paluck
Title: Rate Consultant
Department: Regulatory Analysis
Telephone: 612.330.2905
Date: June 20, 2019

VOS Distribution Capacity Cost per kW

(A) System actual cost per KWH (sum of planning areas)

Year	New Distribution Capacity (MW)	Capital Cost - Capacity Related Projects (\$M)
2016	125.200	\$15.936
2017	43.300	\$10.270
2018	76.800	\$10.280
2019	34.800	\$3.945
2020	52.400	\$12.765
Total	332.500	\$53.197
Cost per kW		\$159.99

Distribution Cost per kW	\$160
Deferral reduction factor	50%
Effective Avoided Distribution Cost per kW	\$80

(B) Planning area actual cost per KW based on Anticipated Capital Capacity Related Investment:

141 Minneapolis	#DIV/0!	144 SouthEast	\$185	151 St. Paul	#DIV/0!
142 Minnetonka	\$79	147 Maple Grove	#DIV/0!	154 NorthWest	\$160
143 Edina	\$74	150 Newport	\$351	156 White Bear Lake	\$155

141 Minneapolis

Year	New Dist. Capacity (MW)	Capital Cost - Capacity projects (\$M)
2018	0.000	\$0.119
2019	0.000	\$0.000
2020	0.000	\$0.850
Total	0.000	\$0.969
Cost per kW		#DIV/0!

142 Minnetonka

Year	New Dist. Capacity (MW)	Capital Cost - Capacity projects (\$M)
2018	26.000	\$2.064
2019	0.000	\$0.000
2020	0.000	\$0.000
Total	26.000	\$2.064
Cost per kW		\$79

143 Edina

Year	New Dist. Capacity (MW)	Capital Cost - Capacity projects (\$M)
2018	14.300	\$1.279
2019	0.000	\$0.000
2020	11.900	\$0.650
Total	26.2	\$1.929
Cost per kW		\$74

144 SouthEast

Year	New Dist. Capacity (MW)	Capital Cost - Capacity projects (\$M)
2018	21.600	\$2.298
2019	0.000	\$0.200
2020	14.000	\$4.100
Total	35.6	\$6.598
Cost per kW		\$185

147 Maple Grove

Year	New Dist. Capacity (MW)	Capital Cost - Capacity projects (\$M)
2018	0.000	\$0.024
2019	0.000	\$0.000
2020	0.000	\$0.000
Total	0.0	\$0.024
Cost per kW		#DIV/0!

150 Newport

Year	New Dist. Capacity (MW)	Capital Cost - Capacity projects (\$M)
2018	14.900	\$1.131
2019	0.000	\$0.200
2020	0.000	\$3.900
Total	14.9	\$5.231
Cost per kW		\$351

151 St. Paul

Year	New Dist. Capacity (MW)	Capital Cost - Capacity projects (\$M)
2018	0.000	\$0.200
2019	0.000	\$0.000
2020	0.000	\$0.250
Total	0.0	\$0.450
Cost per kW		#DIV/0!

154 NorthWest

Year	New Dist. Capacity (MW)	Capital Cost - Capacity projects (\$M)
2018	0.000	\$3.015
2019	34.800	\$3.545
2020	12.600	\$1.015
Total	47.4	\$7.575
Cost per kW		\$160

156 White Bear Lake

Year	New Dist. Capacity (MW)	Capital Cost - Capacity projects (\$M)
2018	0.000	\$0.150
2019	0.000	\$0.000
2020	13.900	\$2.000
Total	13.9	\$2.150
Cost per kW		\$155

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Table 13. Economic value of avoided transmission capacity cost.

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Note: Table 1, 2 and 16 were not included as they are not required for the VOS calculation. Table 7 (Losses to be considered) are included in Fig. ES-1

Figure ES-1. VOS Calculation Table: economic value, load match, loss savings and distributed PV value

CURRENT POSITION	Economic Value	Load Match	Distributed Loss Savings	Distributed PV Value
<i>25 Year Levelized Values</i>	(\$/kWh)	(%)	(%)	(\$/kWh)
Avoided Fuel Cost	\$0.0241		9.8%	\$0.0265
Avoided Plant O&M - Fixed	\$0.0047	48.6%	11.0%	\$0.0025
Avoided Plant O&M - Variable	\$0.0013		9.8%	\$0.0014
Avoided Generation Capacity Cost	\$0.0431	48.6%	11.0%	\$0.0232
Avoided Reserve Capacity Cost	\$0.0035	48.6%	11.0%	\$0.0019
Avoided Transmission Capacity Cost	\$0.0340	48.6%	11.0%	\$0.0183
Avoided Distribution Capacity Cost	\$0.0030	55.2%	12.6%	\$0.0018
Avoided Environmental Cost	\$0.0338		9.8%	\$0.0371
Avoided Voltage Control Cost				
<u>Solar Integration Cost</u>				
TOTAL				\$0.1127

Figure ES-2. 1st-Year VOS Rate calculation

Year	Discount Factor	Escalation Factor	VOS Levelized	Disc.	VOS Inflation Adj. (\$/kWh)	Disc
2019	1.000	1.000	\$0.113	\$0.113	\$0.0919	0.092
2020	0.940	1.023	\$0.113	\$0.106	\$0.0940	0.088
2021	0.883	1.046	\$0.113	\$0.099	\$0.0961	0.085
2022	0.829	1.069	\$0.113	\$0.093	\$0.0982	0.081
2023	0.779	1.093	\$0.113	\$0.088	\$0.1004	0.078
2024	0.732	1.118	\$0.113	\$0.083	\$0.1027	0.075
2025	0.688	1.143	\$0.113	\$0.078	\$0.1050	0.072
2026	0.688	1.169	\$0.113	\$0.078	\$0.1074	0.074
2027	0.688	1.195	\$0.113	\$0.078	\$0.1098	0.076
2028	0.571	1.222	\$0.113	\$0.064	\$0.1123	0.064
2029	0.536	1.249	\$0.113	\$0.060	\$0.1148	0.062
2030	0.504	1.277	\$0.113	\$0.057	\$0.1174	0.059
2031	0.473	1.306	\$0.113	\$0.053	\$0.1200	0.057
2032	0.445	1.335	\$0.113	\$0.050	\$0.1227	0.055
2033	0.418	1.365	\$0.113	\$0.047	\$0.1255	0.052
2034	0.393	1.396	\$0.113	\$0.044	\$0.1283	0.050
2035	0.393	1.428	\$0.113	\$0.044	\$0.1312	0.052
2036	0.347	1.460	\$0.113	\$0.039	\$0.1341	0.047
2037	0.326	1.493	\$0.113	\$0.037	\$0.1372	0.045
2038	0.306	1.526	\$0.113	\$0.034	\$0.1402	0.043
2039	0.288	1.561	\$0.113	\$0.032	\$0.1434	0.041
2040	0.270	1.596	\$0.113	\$0.030	\$0.1466	0.040
2041	0.254	1.632	\$0.113	\$0.029	\$0.1499	0.038
2042	0.239	1.668	\$0.113	\$0.027	\$0.1533	0.037
2043	0.224	1.706	\$0.113	\$0.025	\$0.1568	0.035
				\$1.489		\$1.497

Table 3. Fixed Assumptions to be used for the VOS calculations

Fuel Prices			Environmental Externalities		
Guaranteed NG Fuel Prices			Environmental Discount Rate	5.32%	per year
2019	\$2.769	\$/mmBtu	Environmental Costs	separate table	
2020	\$2.692	\$/mmBtu	Economic Assumptions		
2021	\$2.681	\$/mmBtu	General Escalation Rate	2.25%	per year
2022	\$2.717	\$/mmBtu	Treasury Yields		
2023	\$2.779	\$/mmBtu	1 Year	2.28%	
2024	\$2.846	\$/mmBtu	2 Year	2.50%	
2025	\$2.914	\$/mmBtu	3 Year	2.62%	
2026	\$2.980	\$/mmBtu	5 Year	2.76%	
2027	\$3.045	\$/mmBtu	7 Year	2.86%	
2028	\$3.115	\$/mmBtu	10 Year	2.90%	
2029	\$3.189	\$/mmBtu	20 Year	2.98%	
2030	\$3.267	\$/mmBtu	30 Year	3.07%	
Fuel Price Escalation	2.25%				
PV Assumptions					
PV Degradation Rate	0.50%				
PV Life	25				

Table 4. Environmental costs by year.

Year	Analysis Year	CO2 Cost \$/mmBtu	PM 2.5 Cost \$/mmBtu	CO Cost \$/mmBtu	NOx Cost \$/mmBtu	Pb Cost \$/mmBtu	SO2 Cost \$/mmBtu	Total Cost \$/mmBtu
2019	0	\$2.693	\$0.020	\$0.000	\$0.280	\$0.000	\$0.003	\$2.997
2020	1	\$2.835	\$0.021	\$0.000	\$0.286	\$0.000	\$0.004	\$3.145
2021	2	\$2.954	\$0.021	\$0.000	\$0.293	\$0.000	\$0.004	\$3.271
2022	3	\$3.077	\$0.022	\$0.000	\$0.299	\$0.000	\$0.004	\$3.401
2023	4	\$3.204	\$0.022	\$0.000	\$0.306	\$0.000	\$0.004	\$3.535
2024	5	\$3.335	\$0.022	\$0.000	\$0.313	\$0.000	\$0.004	\$3.674
2025	6	\$3.470	\$0.023	\$0.000	\$0.320	\$0.000	\$0.004	\$3.817
2026	7	\$3.610	\$0.024	\$0.000	\$0.327	\$0.000	\$0.004	\$3.965
2027	8	\$3.754	\$0.024	\$0.000	\$0.335	\$0.000	\$0.004	\$4.117
2028	9	\$3.903	\$0.025	\$0.000	\$0.342	\$0.000	\$0.004	\$4.274
2029	10	\$4.057	\$0.025	\$0.000	\$0.350	\$0.000	\$0.004	\$4.436
2030	11	\$4.216	\$0.026	\$0.000	\$0.358	\$0.000	\$0.004	\$4.603
2031	12	\$4.397	\$0.026	\$0.000	\$0.366	\$0.000	\$0.005	\$4.793
2032	13	\$4.584	\$0.027	\$0.000	\$0.374	\$0.000	\$0.005	\$4.989
2033	14	\$4.777	\$0.027	\$0.000	\$0.382	\$0.000	\$0.005	\$5.192
2034	15	\$4.977	\$0.028	\$0.000	\$0.391	\$0.000	\$0.005	\$5.401
2035	16	\$5.183	\$0.029	\$0.000	\$0.400	\$0.000	\$0.005	\$5.616
2036	17	\$5.396	\$0.029	\$0.000	\$0.409	\$0.000	\$0.005	\$5.839
2037	18	\$5.616	\$0.030	\$0.000	\$0.418	\$0.000	\$0.005	\$6.069
2038	19	\$5.843	\$0.031	\$0.000	\$0.427	\$0.000	\$0.005	\$6.306
2039	20	\$6.077	\$0.031	\$0.000	\$0.437	\$0.000	\$0.005	\$6.551
2040	21	\$6.319	\$0.032	\$0.000	\$0.447	\$0.000	\$0.006	\$6.804
2041	22	\$6.548	\$0.033	\$0.000	\$0.457	\$0.000	\$0.006	\$7.043
2042	23	\$6.783	\$0.034	\$0.000	\$0.467	\$0.000	\$0.006	\$7.290
2043	24	\$7.026	\$0.034	\$0.000	\$0.478	\$0.000	\$0.006	\$7.544

Table 5. VOS Data table -- required format showing assumptions used in the VOS calculation.

	Input Data	Units		Input Data	Units
Economic Factors			Power Generation - Continued		
Start Year for VOS applicability	2019	Year	Other		
Discount Rate (After-tax WACC)	6.43%	Percentage	Solar weighted Heat Rate	7,493	BTU per kWh
Load Match Analysis			Fuel Price Overhead	-\$0.060	\$ per MMBtu
ELCC (no loss)	48.6%	% of rating	Generation life	40	years
PLR (no loss)	55.2%	% of rating	Heat Rate degradation	0.10%	per year
Loss Savings - Energy	9.8%	% of PV output	O&M cost (first year) - Fixed	\$5.51	per kW-yr
Loss Savings - PLR	12.6%	% of PV output	O&M cost (first year) - Variable	\$0.0010	\$ per kWh
Loss Savings - ELCC	11.0%	% of PV output	O&M cost escalation rate	2.25%	per year
PV Energy			Reserve planning margin	8.2%	
		kWh per kW-AC	Years until new Generation is needed	0	
Actual- First year annual energy	1,621	kWh per kW-AC	Distribution		
Simulated - First year annual energy	1,452	kWh per kW-AC	Capacity-related distribution capital costs -System	\$0	\$ per kW
year annual energy			Capacity-related distribution capital costs - Mpls	N/A	\$ per kW
Transmission			Capacity-related distribution capital costs - Mtka	N/A	\$ per kW
Capacity-related transmission capital cost	\$49.00	\$ per kW	Capacity-related distribution capital costs -Edina	N/A	\$ per kW
Power Generation			Capacity-related distribution capital costs - SE	N/A	\$ per kW
Peaking CT, simple cycle			Capacity-related distribution capital costs -MG	N/A	\$ per kW
Installed Cost	\$525	\$/kW	Capacity-related distribution capital costs - Newport	N/A	\$ per kW
Heat Rate	9,978	BTU/kWh	Capacity-related distribution capital costs - St. Paul	N/A	\$ per kW
Intermediate CCGT			Capacity-related distribution capital costs - NW	N/A	\$ per kW
Installed Cost	\$1,051	\$/kW	Capacity-related distribution capital costs - WBL	N/A	\$ per kW
Heat Rate	6,354	BTU/kWh	Distribution capital cost escalation	2.25%	per year
			Peak Load (Weather Normalized)	6,493	MW
			Peak Load Growth	-0.50%	per year

Table 6. Azimuth and Tilt Angles

	Array KW	% of Total	Azimuth	Tilt	
1	854	2.1%	80	23	
2	2,138	5.3%	140	20	
3	2,285	5.7%	167	17	
4	8,531	21.3%	180	12	
5	3,132	7.8%	180	21	
6	7,130	17.8%	180	26	
7	5,226	13.1%	180	30	
8	2,497	6.2%	180	35	
9	739	1.9%	180	41	
10	3,085	7.7%	180	48	
11	1,215	3.0%	186	26	
12	585	1.5%	198	27	
13	1,171	2.9%	212	21	
14	731	1.8%	233	24	
15	643	1.6%	271	21	
TOTAL	39,961	100%	178.8	24.5	Weighted Average

Table 8. Economic Value of Avoided Fuel Costs.

Year	Guaranteed NG Price	Burner Tip NG Price	Heat Rate	Prices		p.u. PV Production	Costs		Discount Factor	Disc. Costs	
				Utility	VOS		Utility	VOS		Utility	VOS
				\$/mmBtu	\$/mmBtu		mmBtu/kWh	\$/kWh		\$/kWh	(kWh)
2019	\$2.77	\$2.70895	7,493	\$0.020	\$0.0241	1,452	\$29	\$35	1.000	\$29	\$35
2020	\$2.69	\$2.63	7,500	\$0.020	\$0.0241	1,444	\$28	\$35	0.978	\$28	\$34
2021	\$2.68	\$2.62	7,508	\$0.020	\$0.0241	1,437	\$28	\$35	0.952	\$27	\$33
2022	\$2.72	\$2.65	7,515	\$0.020	\$0.0241	1,430	\$29	\$35	0.925	\$26	\$32
2023	\$2.78	\$2.71	7,523	\$0.020	\$0.0241	1,423	\$29	\$34	0.899	\$26	\$31
2024	\$2.85	\$2.78	7,530	\$0.021	\$0.0241	1,416	\$30	\$34	0.873	\$26	\$30
2025	\$2.91	\$2.85	7,538	\$0.021	\$0.0241	1,409	\$30	\$34	0.847	\$26	\$29
2026	\$2.98	\$2.91	7,546	\$0.022	\$0.0241	1,402	\$31	\$34	0.821	\$25	\$28
2027	\$3.04	\$2.97	7,553	\$0.022	\$0.0241	1,395	\$31	\$34	0.797	\$25	\$27
2028	\$3.12	\$3.04	7,561	\$0.023	\$0.0241	1,388	\$32	\$34	0.774	\$25	\$26
2029	\$3.19	\$3.11	7,568	\$0.024	\$0.0241	1,381	\$33	\$33	0.751	\$24	\$25
2030	\$3.27	\$3.19	7,576	\$0.024	\$0.0241	1,374	\$33	\$33	0.729	\$24	\$24
2031	\$3.34	\$3.26	7,583	\$0.025	\$0.0241	1,367	\$34	\$33	0.708	\$24	\$23
2032	\$3.42	\$3.33	7,591	\$0.025	\$0.0241	1,360	\$34	\$33	0.687	\$24	\$23
2033	\$3.49	\$3.41	7,599	\$0.026	\$0.0241	1,353	\$35	\$33	0.667	\$23	\$22
2034	\$3.57	\$3.49	7,606	\$0.027	\$0.0241	1,347	\$36	\$33	0.647	\$23	\$21
2035	\$3.65	\$3.57	7,614	\$0.027	\$0.0241	1,340	\$36	\$32	0.628	\$23	\$20
2036	\$3.73	\$3.65	7,621	\$0.028	\$0.0241	1,333	\$37	\$32	0.609	\$23	\$20
2037	\$3.82	\$3.73	7,629	\$0.028	\$0.0241	1,326	\$38	\$32	0.591	\$22	\$19
2038	\$3.90	\$3.81	7,637	\$0.029	\$0.0241	1,320	\$38	\$32	0.573	\$22	\$18
2039	\$3.99	\$3.90	7,644	\$0.030	\$0.0241	1,313	\$39	\$32	0.556	\$22	\$18
2040	\$4.08	\$3.98	7,652	\$0.030	\$0.0241	1,307	\$40	\$32	0.539	\$21	\$17
2041	\$4.17	\$4.07	7,660	\$0.031	\$0.0241	1,300	\$41	\$31	0.522	\$21	\$16
2042	\$4.27	\$4.17	7,667	\$0.032	\$0.0241	1,294	\$41	\$31	0.506	\$21	\$16
2043	\$4.36	\$4.26	7,675	\$0.033	\$0.0241	1,287	\$42	\$31	0.490	\$21	\$15

Validation: Present Value	\$601	\$601
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Table 9. Economic value of avoided plant O&M - fixed

Year	O&M Fixed	Utility Capacity	PV Capacity	Prices		p.u. PV Production	Costs		Discount Factor	Disc. Costs	
				Utility	VOS		Utility	VOS		Utility	VOS
				\$/kWh	\$/kWh		(\$)	(\$)		(\$)	(\$)
2019	\$5.51	1.00	1.00	\$0.0038	\$0.0047	1,452	\$5.51	\$6.80	1.000	\$5.51	\$6.80
2020	\$5.63	0.999	0.995	\$0.0039	\$0.0047	1,444	\$5.61	\$6.76	0.940	\$5.27	\$6.35
2021	\$5.76	0.998	0.990	\$0.0040	\$0.0047	1,437	\$5.71	\$6.73	0.883	\$5.05	\$5.94
2022	\$5.89	0.997	0.985	\$0.0041	\$0.0047	1,430	\$5.82	\$6.69	0.829	\$4.83	\$5.55
2023	\$6.02	0.996	0.980	\$0.0042	\$0.0047	1,423	\$5.93	\$6.66	0.779	\$4.62	\$5.19
2024	\$6.16	0.995	0.975	\$0.0043	\$0.0047	1,416	\$6.04	\$6.63	0.732	\$4.42	\$4.85
2025	\$6.16	0.994	0.970	\$0.0043	\$0.0047	1,409	\$6.01	\$6.59	0.688	\$4.14	\$4.54
2026	\$6.16	0.993	0.966	\$0.0044	\$0.0047	1,402	\$5.99	\$6.56	0.688	\$4.12	\$4.51
2027	\$6.58	0.992	0.961	\$0.0047	\$0.0047	1,395	\$6.38	\$6.53	0.688	\$4.39	\$4.49
2028	\$6.73	0.991	0.956	\$0.0048	\$0.0047	1,388	\$6.49	\$6.50	0.571	\$3.71	\$3.71
2029	\$6.88	0.990	0.951	\$0.0049	\$0.0047	1,381	\$6.61	\$6.46	0.536	\$3.55	\$3.47
2030	\$7.04	0.989	0.946	\$0.0051	\$0.0047	1,374	\$6.73	\$6.43	0.504	\$3.39	\$3.24
2031	\$7.20	0.988	0.942	\$0.0052	\$0.0047	1,367	\$6.86	\$6.40	0.473	\$3.25	\$3.03
2032	\$7.36	0.987	0.937	\$0.0053	\$0.0047	1,360	\$6.98	\$6.37	0.445	\$3.11	\$2.83
2033	\$7.52	0.986	0.932	\$0.0055	\$0.0047	1,353	\$7.11	\$6.34	0.418	\$2.97	\$2.65
2034	\$7.52	0.985	0.928	\$0.0055	\$0.0047	1,347	\$7.08	\$6.30	0.393	\$2.78	\$2.48
2035	\$7.87	0.984	0.923	\$0.0058	\$0.0047	1,340	\$7.38	\$6.27	0.393	\$2.90	\$2.46
2036	\$8.04	0.983	0.918	\$0.0059	\$0.0047	1,333	\$7.51	\$6.24	0.347	\$2.60	\$2.16
2037	\$8.22	0.982	0.914	\$0.0061	\$0.0047	1,326	\$7.65	\$6.21	0.326	\$2.49	\$2.02
2038	\$8.41	0.981	0.909	\$0.0063	\$0.0047	1,320	\$7.79	\$6.18	0.306	\$2.38	\$1.89
2039	\$8.60	0.980	0.905	\$0.0064	\$0.0047	1,313	\$7.94	\$6.15	0.288	\$2.28	\$1.77
2040	\$8.79	0.979	0.900	\$0.0066	\$0.0047	1,307	\$8.08	\$6.12	0.270	\$2.18	\$1.65
2041	\$8.99	0.978	0.896	\$0.0068	\$0.0047	1,300	\$8.23	\$6.09	0.254	\$2.09	\$1.55
2042	\$9.19	0.977	0.891	\$0.0069	\$0.0047	1,294	\$8.38	\$6.06	0.239	\$2.00	\$1.44
2043	\$9.40	0.976	0.887	\$0.0071	\$0.0047	1,287	\$8.54	\$6.03	0.224	\$1.91	\$1.35

\$0.0047

Validation: Present Value

\$86

\$86

Table 10. Economic value of avoided plant O&M - variable

Year	Prices		p.u. PV Production (kWh)	Costs		Discount Factor (risk free)	Disc. Costs	
	Utility	VOS		Utility	VOS		Utility	VOS
	\$/kWh	\$/kWh		(\$)	(\$)		(\$)	(\$)
2019	\$0.001	\$0.0013	1,452	\$1	\$2	1.000	\$1	\$2
2020	\$0.001	\$0.0013	1,444	\$2	\$2	0.940	\$1	\$2
2021	\$0.001	\$0.0013	1,437	\$2	\$2	0.883	\$1	\$2
2022	\$0.001	\$0.0013	1,430	\$2	\$2	0.829	\$1	\$1
2023	\$0.001	\$0.0013	1,423	\$2	\$2	0.779	\$1	\$1
2024	\$0.001	\$0.0013	1,416	\$2	\$2	0.732	\$1	\$1
2025	\$0.001	\$0.0013	1,409	\$2	\$2	0.688	\$1	\$1
2026	\$0.001	\$0.0013	1,402	\$2	\$2	0.646	\$1	\$1
2027	\$0.001	\$0.0013	1,395	\$2	\$2	0.607	\$1	\$1
2028	\$0.001	\$0.0013	1,388	\$2	\$2	0.571	\$1	\$1
2029	\$0.001	\$0.0013	1,381	\$2	\$2	0.536	\$1	\$1
2030	\$0.001	\$0.0013	1,374	\$2	\$2	0.504	\$1	\$1
2031	\$0.001	\$0.0013	1,367	\$2	\$2	0.473	\$1	\$1
2032	\$0.001	\$0.0013	1,360	\$2	\$2	0.445	\$1	\$1
2033	\$0.001	\$0.0013	1,353	\$2	\$2	0.418	\$1	\$1
2034	\$0.001	\$0.0013	1,347	\$2	\$2	0.393	\$1	\$1
2035	\$0.001	\$0.0013	1,340	\$2	\$2	0.369	\$1	\$1
2036	\$0.002	\$0.0013	1,333	\$2	\$2	0.347	\$1	\$1
2037	\$0.002	\$0.0013	1,326	\$2	\$2	0.326	\$1	\$1
2038	\$0.002	\$0.0013	1,320	\$2	\$2	0.306	\$1	\$1
2039	\$0.002	\$0.0013	1,313	\$2	\$2	0.288	\$1	\$0
2040	\$0.002	\$0.0013	1,307	\$2	\$2	0.270	\$1	\$0
2041	\$0.002	\$0.0013	1,300	\$2	\$2	0.254	\$1	\$0
2042	\$0.002	\$0.0013	1,294	\$2	\$2	0.239	\$1	\$0
2043	\$0.002	\$0.0013	1,287	\$2	\$2	0.224	\$1	\$0

Validation: Present Value	\$23	\$23
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Table 11. Economic value of avoided generation capacity cost.

Year	Capacity Cost	Utility Capacity	PV Capacity	Prices		PV Production	Costs		Discount Factor	Disc. Costs	
				Utility	VOS		Utility	VOS		Utility	VOS
	\$/kW-yr	pu.	kW	\$/kWh	\$/kWh	(kWh)	(\$)	(\$)		(\$)	(\$)
2019	\$62	1.00	1.00	\$0.043	\$0.0431	1,452	\$62	\$63	1.000	\$62	\$63
2020	\$62	0.999	0.995	\$0.043	\$0.0431	1,444	\$62	\$62	0.940	\$58	\$59
2021	\$62	0.998	0.990	\$0.043	\$0.0431	1,437	\$62	\$62	0.883	\$54	\$55
2022	\$62	0.997	0.985	\$0.043	\$0.0431	1,430	\$61	\$62	0.829	\$51	\$51
2023	\$62	0.996	0.980	\$0.043	\$0.0431	1,423	\$61	\$61	0.779	\$48	\$48
2024	\$62	0.995	0.975	\$0.043	\$0.0431	1,416	\$61	\$61	0.732	\$45	\$45
2025	\$62	0.994	0.970	\$0.043	\$0.0431	1,409	\$61	\$61	0.688	\$42	\$42
2026	\$62	0.993	0.966	\$0.043	\$0.0431	1,402	\$60	\$60	0.646	\$39	\$39
2027	\$62	0.992	0.961	\$0.043	\$0.0431	1,395	\$60	\$60	0.607	\$37	\$37
2028	\$62	0.991	0.956	\$0.043	\$0.0431	1,388	\$60	\$60	0.571	\$34	\$34
2029	\$62	0.990	0.951	\$0.043	\$0.0431	1,381	\$60	\$60	0.536	\$32	\$32
2030	\$62	0.989	0.946	\$0.043	\$0.0431	1,374	\$59	\$59	0.504	\$30	\$30
2031	\$62	0.988	0.942	\$0.043	\$0.0431	1,367	\$59	\$59	0.473	\$28	\$28
2032	\$62	0.987	0.937	\$0.043	\$0.0431	1,360	\$59	\$59	0.445	\$26	\$26
2033	\$62	0.986	0.932	\$0.043	\$0.0431	1,353	\$59	\$58	0.418	\$25	\$24
2034	\$62	0.985	0.928	\$0.043	\$0.0431	1,347	\$58	\$58	0.393	\$23	\$23
2035	\$62	0.984	0.923	\$0.043	\$0.0431	1,340	\$58	\$58	0.369	\$21	\$21
2036	\$62	0.983	0.918	\$0.044	\$0.0431	1,333	\$58	\$58	0.347	\$20	\$20
2037	\$62	0.982	0.914	\$0.044	\$0.0431	1,326	\$58	\$57	0.326	\$19	\$19
2038	\$62	0.981	0.909	\$0.044	\$0.0431	1,320	\$58	\$57	0.306	\$18	\$17
2039	\$62	0.980	0.905	\$0.044	\$0.0431	1,313	\$57	\$57	0.288	\$16	\$16
2040	\$62	0.979	0.900	\$0.044	\$0.0431	1,307	\$57	\$56	0.270	\$15	\$15
2041	\$62	0.978	0.896	\$0.044	\$0.0431	1,300	\$57	\$56	0.254	\$14	\$14
2042	\$62	0.977	0.891	\$0.044	\$0.0431	1,294	\$57	\$56	0.239	\$14	\$13
2043	\$62	0.976	0.887	\$0.044	\$0.0431	1,287	\$56	\$56	0.224	\$13	\$12
					\$0.0431						
Validation: Present Value										\$783	\$783

Table 12. Economic value of avoided reserve capacity cost.

Year					Prices					Disc. Costs		
	Capacity Cost	Reserve Margin	Utility Capacity	PV Capacity	Utility	VOS	PV Production	Utility	VOS	Discount Factor	Utility	VOS
	\$/kW-yr	%	pu.	kW	\$/kWh	\$/kWh	(kWh)	(\$)	(\$)		(\$)	(\$)
2019	\$62	8.2%	1.00	1.00	\$0.003	\$0.0035	1,452	\$5	\$5	1.000	\$5	\$5
2020	\$62	8.2%	0.999	0.995	\$0.003	\$0.0035	1,444	\$5	\$5	0.940	\$5	\$5
2021	\$62	8.2%	0.998	0.990	\$0.003	\$0.0035	1,437	\$5	\$5	0.883	\$4	\$4
2022	\$62	8.2%	0.997	0.985	\$0.003	\$0.0035	1,430	\$5	\$5	0.829	\$4	\$4
2023	\$62	8.2%	0.996	0.980	\$0.004	\$0.0035	1,423	\$5	\$5	0.779	\$4	\$4
2024	\$62	8.2%	0.995	0.975	\$0.004	\$0.0035	1,416	\$5	\$5	0.732	\$4	\$4
2025	\$62	8.2%	0.994	0.970	\$0.004	\$0.0035	1,409	\$5	\$5	0.688	\$3	\$3
2026	\$62	8.2%	0.993	0.966	\$0.004	\$0.0035	1,402	\$5	\$5	0.646	\$3	\$3
2027	\$62	8.2%	0.992	0.961	\$0.004	\$0.0035	1,395	\$5	\$5	0.607	\$3	\$3
2028	\$62	8.2%	0.991	0.956	\$0.004	\$0.0035	1,388	\$5	\$5	0.571	\$3	\$3
2029	\$62	8.2%	0.990	0.951	\$0.004	\$0.0035	1,381	\$5	\$5	0.536	\$3	\$3
2030	\$62	8.2%	0.989	0.946	\$0.004	\$0.0035	1,374	\$5	\$5	0.504	\$2	\$2
2031	\$62	8.2%	0.988	0.942	\$0.004	\$0.0035	1,367	\$5	\$5	0.473	\$2	\$2
2032	\$62	8.2%	0.987	0.937	\$0.004	\$0.0035	1,360	\$5	\$5	0.445	\$2	\$2
2033	\$62	8.2%	0.986	0.932	\$0.004	\$0.0035	1,353	\$5	\$5	0.418	\$2	\$2
2034	\$62	8.2%	0.985	0.928	\$0.004	\$0.0035	1,347	\$5	\$5	0.393	\$2	\$2
2035	\$62	8.2%	0.984	0.923	\$0.004	\$0.0035	1,340	\$5	\$5	0.369	\$2	\$2
2036	\$62	8.2%	0.983	0.918	\$0.004	\$0.0035	1,333	\$5	\$5	0.347	\$2	\$2
2037	\$62	8.2%	0.982	0.914	\$0.004	\$0.0035	1,326	\$5	\$5	0.326	\$2	\$2
2038	\$62	8.2%	0.981	0.909	\$0.004	\$0.0035	1,320	\$5	\$5	0.306	\$1	\$1
2039	\$62	8.2%	0.980	0.905	\$0.004	\$0.0035	1,313	\$5	\$5	0.288	\$1	\$1
2040	\$62	8.2%	0.979	0.900	\$0.004	\$0.0035	1,307	\$5	\$5	0.270	\$1	\$1
2041	\$62	8.2%	0.978	0.896	\$0.004	\$0.0035	1,300	\$5	\$5	0.254	\$1	\$1
2042	\$62	8.2%	0.977	0.891	\$0.004	\$0.0035	1,294	\$5	\$5	0.239	\$1	\$1
2043	\$62	8.2%	0.976	0.887	\$0.004	\$0.0035	1,287	\$5	\$5	0.224	\$1	\$1
						\$0.0035						
Validation: Present Value											\$64	\$64

Table 13. Economic value of avoided transmission capacity cost.

Year				Prices		PV Production (kWh)	Costs		Discount Factor	Disc. Costs	
	Capacity Cost	Utility Capacity	PV Capacity	Utility	VOS		Utility	VOS		Utility	VOS
	\$/kW-yr	pu.	kW	\$/kWh	\$/kWh		(\$)	(\$)		(\$)	(\$)
2019	\$49	1.00	1.00	\$0.034	\$0.0340	1,452	\$49	\$49	1.000	\$49	\$49
2020	\$49	0.999	0.995	\$0.034	\$0.0340	1,444	\$49	\$49	0.940	\$46	\$46
2021	\$49	0.998	0.990	\$0.034	\$0.0340	1,437	\$49	\$49	0.883	\$43	\$43
2022	\$49	0.997	0.985	\$0.034	\$0.0340	1,430	\$48	\$49	0.829	\$40	\$40
2023	\$49	0.996	0.980	\$0.034	\$0.0340	1,423	\$48	\$48	0.779	\$38	\$38
2024	\$49	0.995	0.975	\$0.034	\$0.0340	1,416	\$48	\$48	0.732	\$35	\$35
2025	\$49	0.994	0.970	\$0.034	\$0.0340	1,409	\$48	\$48	0.688	\$33	\$33
2026	\$49	0.993	0.966	\$0.034	\$0.0340	1,402	\$48	\$48	0.646	\$31	\$31
2027	\$49	0.992	0.961	\$0.034	\$0.0340	1,395	\$47	\$47	0.607	\$29	\$29
2028	\$49	0.991	0.956	\$0.034	\$0.0340	1,388	\$47	\$47	0.571	\$27	\$27
2029	\$49	0.990	0.951	\$0.034	\$0.0340	1,381	\$47	\$47	0.536	\$25	\$25
2030	\$49	0.989	0.946	\$0.034	\$0.0340	1,374	\$47	\$47	0.504	\$24	\$24
2031	\$49	0.988	0.942	\$0.034	\$0.0340	1,367	\$47	\$47	0.473	\$22	\$22
2032	\$49	0.987	0.937	\$0.034	\$0.0340	1,360	\$47	\$46	0.445	\$21	\$21
2033	\$49	0.986	0.932	\$0.034	\$0.0340	1,353	\$46	\$46	0.418	\$19	\$19
2034	\$49	0.985	0.928	\$0.034	\$0.0340	1,347	\$46	\$46	0.393	\$18	\$18
2035	\$49	0.984	0.923	\$0.034	\$0.0340	1,340	\$46	\$46	0.369	\$17	\$17
2036	\$49	0.983	0.918	\$0.034	\$0.0340	1,333	\$46	\$45	0.347	\$16	\$16
2037	\$49	0.982	0.914	\$0.034	\$0.0340	1,326	\$46	\$45	0.326	\$15	\$15
2038	\$49	0.981	0.909	\$0.034	\$0.0340	1,320	\$45	\$45	0.306	\$14	\$14
2039	\$49	0.980	0.905	\$0.034	\$0.0340	1,313	\$45	\$45	0.288	\$13	\$13
2040	\$49	0.979	0.900	\$0.034	\$0.0340	1,307	\$45	\$44	0.270	\$12	\$12
2041	\$49	0.978	0.896	\$0.035	\$0.0340	1,300	\$45	\$44	0.254	\$11	\$11
2042	\$49	0.977	0.891	\$0.035	\$0.0340	1,294	\$45	\$44	0.239	\$11	\$11
2043	\$49	0.976	0.887	\$0.035	\$0.0340	1,287	\$44	\$44	0.224	\$10	\$10
					\$0.0340						
Validation: Present Value										\$618	\$618

Table 14. Determination of deferrable distribution costs.

Year	Distribution Project Costs	% Capacity Related	Capacity Related		
	\$	%	\$		
2017	155,018,178	6.6%	10,270,204		
2016	165,929,956	9.6%	15,936,132		
2015	134,867,264	12.1%	16,309,114		
2014	129,899,465	16.3%	21,147,768		
2013	142,118,822	20.3%	28,825,462		
2012	109,286,058	20.8%	22,683,879		
2011	100,102,075	7.5%	7,502,291		
2010	98,267,667	11.0%	10,823,959		
2009	82,821,606	10.6%	8,749,417		
2008	100,420,422	29.5%	29,595,797		
TOTAL 10-YEAR PERIOD	1,218,731,513		171,844,023		

Table 15. Economic value of avoided distribution capacity cost.

Year	Conventional Distribution Planning					Deferred Distribution Planning			
	Distribution Cost	New Dist. Capacity	Capital Cost	Disc Capital Cost	Amortized	Def. Dist. Capacity	Def. Capital Cost	Disc Capital Cost	Amortized
	\$/kW-yr	(MW)	(\$M)	(\$M)	\$M/yr	(MW)	(\$M)	(\$M)	\$M/yr
2019	\$80	50	\$4	\$4	\$5				\$5
2020	\$82	50	\$4	\$4	\$5	50	\$4.1	\$3.8	\$5
2021	\$84	50	\$4	\$4	\$5	50	\$4.2	\$3.7	\$5
2022	\$86	49	\$4	\$3	\$5	50	\$4.2	\$3.5	\$5
2023	\$87	49	\$4	\$3	\$5	49	\$4.3	\$3.4	\$5
2024	\$89	49	\$4	\$3	\$5	49	\$4.4	\$3.2	\$5
2025	\$91	49	\$4	\$3	\$5	49	\$4.5	\$3.1	\$5
2026	\$93	48	\$5	\$3	\$5	49	\$4.5	\$2.9	\$5
2027	\$96	48	\$5	\$3	\$5	48	\$4.6	\$2.8	\$5
2028	\$98	48	\$5	\$3	\$5	48	\$4.7	\$2.7	\$5
2029	\$100	48	\$5	\$3	\$5	48	\$4.8	\$2.6	\$5
2030	\$102	47	\$5	\$2	\$5	48	\$4.9	\$2.4	\$5
2031	\$104	47	\$5	\$2	\$5	47	\$4.9	\$2.3	\$5
2032	\$107	47	\$5	\$2	\$5	47	\$5.0	\$2.2	\$5
2033	\$109	47	\$5	\$2	\$5	47	\$5.1	\$2.1	\$5
2034	\$112	46	\$5	\$2	\$5	47	\$5.2	\$2.0	\$5
2035	\$114	46	\$5	\$2	\$5	46	\$5.3	\$2.0	\$5
2036	\$117	46	\$5	\$2	\$5	46	\$5.4	\$1.9	\$5
2037	\$119	46	\$5	\$2	\$5	46	\$5.5	\$1.8	\$5
2038	\$122	45	\$6	\$2	\$5	46	\$5.6	\$1.7	\$5
2039	\$125	45	\$6	\$2	\$5	45	\$5.7	\$1.6	\$5
2040	\$128	45	\$6	\$2	\$5	45	\$5.8	\$1.6	\$5
2041	\$131	45	\$6	\$1	\$5	45	\$5.9	\$1.5	\$5
2042	\$133	45	\$6	\$1	\$5	45	\$6.0	\$1.4	\$5
2043	\$136	44	\$6	\$1	\$5	45	\$6.1	\$1.4	\$5
2039	\$140					44	\$6.2	\$1.3	
					\$61				\$59

Continued - Table 15. Economic value of avoided distribution capacity cost. *EXAMPLE*

Prices		PV Production	Costs		Discount Factor	Disc. Costs	
Utility \$/kWh	VOS \$/kWh		Utility (\$)	VOS (\$)		Utility (\$)	VOS (\$)
\$0.00270	\$0.0030	1,452	\$4	\$4	1.000	\$4	\$4
\$0.00273	\$0.0030	1,444	\$4	\$4	0.940	\$4	\$4
\$0.00276	\$0.0030	1,437	\$4	\$4	0.883	\$3	\$4
\$0.00279	\$0.0030	1,430	\$4	\$4	0.829	\$3	\$4
\$0.00281	\$0.0030	1,423	\$4	\$4	0.779	\$3	\$3
\$0.00284	\$0.0030	1,416	\$4	\$4	0.732	\$3	\$3
\$0.00287	\$0.0030	1,409	\$4	\$4	0.688	\$3	\$3
\$0.00290	\$0.0030	1,402	\$4	\$4	0.646	\$3	\$3
\$0.00293	\$0.0030	1,395	\$4	\$4	0.607	\$2	\$3
\$0.00296	\$0.0030	1,388	\$4	\$4	0.571	\$2	\$2
\$0.00299	\$0.0030	1,381	\$4	\$4	0.536	\$2	\$2
\$0.00302	\$0.0030	1,374	\$4	\$4	0.504	\$2	\$2
\$0.00305	\$0.0030	1,367	\$4	\$4	0.473	\$2	\$2
\$0.00308	\$0.0030	1,360	\$4	\$4	0.445	\$2	\$2
\$0.00311	\$0.0030	1,353	\$4	\$4	0.418	\$2	\$2
\$0.00314	\$0.0030	1,347	\$4	\$4	0.393	\$2	\$2
\$0.00317	\$0.0030	1,340	\$4	\$4	0.369	\$2	\$1
\$0.00321	\$0.0030	1,333	\$4	\$4	0.347	\$1	\$1
\$0.00324	\$0.0030	1,326	\$4	\$4	0.326	\$1	\$1
\$0.00327	\$0.0030	1,320	\$4	\$4	0.306	\$1	\$1
\$0.00330	\$0.0030	1,313	\$4	\$4	0.288	\$1	\$1
\$0.00334	\$0.0030	1,307	\$4	\$4	0.270	\$1	\$1
\$0.00337	\$0.0030	1,300	\$4	\$4	0.254	\$1	\$1
\$0.00340	\$0.0030	1,294	\$4	\$4	0.239	\$1	\$1
\$0.00344	\$0.0030	1,287	\$4	\$4	0.224	\$1	\$1
					-		
	\$0.0030		Validation: Present Value			\$54	\$54

Table 17. Economic value of avoided environmental costs

Environmental Discount Rate 5.32%

Year	Env. Cost \$/mmBtu	Solar Weighted Heat Rate mmBtu/MWh	Prices		p.u. PV Production (kWh)	Costs		Discount Factor (risk free)	Disc. Costs	
			Utility \$/kWh	VOS \$/kWh		Utility (\$)	VOS (\$)		Utility (\$)	VOS (\$)
2019	\$3.00	7,493	\$0.022	\$0.0338	1,452	\$33	\$49	1.000	\$33	\$49
2020	\$3.15	7,500	\$0.024	\$0.0338	1,444	\$34	\$49	0.950	\$32	\$46
2021	\$3.27	7,508	\$0.025	\$0.0338	1,437	\$35	\$49	0.902	\$32	\$44
2022	\$3.40	7,515	\$0.026	\$0.0338	1,430	\$37	\$48	0.856	\$31	\$41
2023	\$3.54	7,523	\$0.027	\$0.0338	1,423	\$38	\$48	0.813	\$31	\$39
2024	\$3.67	7,530	\$0.028	\$0.0338	1,416	\$39	\$48	0.772	\$30	\$37
2025	\$3.82	7,538	\$0.029	\$0.0338	1,409	\$41	\$48	0.733	\$30	\$35
2026	\$3.96	7,546	\$0.030	\$0.0338	1,402	\$42	\$47	0.696	\$29	\$33
2027	\$4.12	7,553	\$0.031	\$0.0338	1,395	\$43	\$47	0.661	\$29	\$31
2028	\$4.27	7,561	\$0.032	\$0.0338	1,388	\$45	\$47	0.627	\$28	\$29
2029	\$4.44	7,568	\$0.034	\$0.0338	1,381	\$46	\$47	0.596	\$28	\$28
2030	\$4.60	7,576	\$0.035	\$0.0338	1,374	\$48	\$46	0.566	\$27	\$26
2031	\$4.79	7,583	\$0.036	\$0.0338	1,367	\$50	\$46	0.537	\$27	\$25
2032	\$4.99	7,591	\$0.038	\$0.0338	1,360	\$52	\$46	0.510	\$26	\$23
2033	\$5.19	7,599	\$0.039	\$0.0338	1,353	\$53	\$46	0.484	\$26	\$22
2034	\$5.40	7,606	\$0.041	\$0.0338	1,347	\$55	\$45	0.460	\$25	\$21
2035	\$5.62	7,614	\$0.043	\$0.0338	1,340	\$57	\$45	0.437	\$25	\$20
2036	\$5.84	7,621	\$0.045	\$0.0338	1,333	\$59	\$45	0.414	\$25	\$19
2037	\$6.07	7,629	\$0.046	\$0.0338	1,326	\$61	\$45	0.394	\$24	\$18
2038	\$6.31	7,637	\$0.048	\$0.0338	1,320	\$64	\$45	0.374	\$24	\$17
2039	\$6.55	7,644	\$0.050	\$0.0338	1,313	\$66	\$44	0.355	\$23	\$16
2040	\$6.80	7,652	\$0.052	\$0.0338	1,307	\$68	\$44	0.337	\$23	\$15
2041	\$7.04	7,660	\$0.054	\$0.0338	1,300	\$70	\$44	0.320	\$22	\$14
2042	\$7.29	7,667	\$0.056	\$0.0338	1,294	\$72	\$44	0.304	\$22	\$13
2043	\$7.54	7,675	\$0.058	\$0.0338	1,287	\$75	\$43	0.288	\$21	\$13

Validation: Present Value	\$673	\$673
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Table 18. Calculation of inflation-adjusted VOS

Year	Discount Factor	PV Production	Escallation Factor	VOS Levelized	Disc.	VOS Inflation Adj. (\$/kWh)	Disc
2019	1.000	1452	1.000	\$0.113	\$164	\$0.0919	133.405
2020	0.940	1444	1.023	\$0.113	\$153	\$0.0940	127.525
2021	0.883	1437	1.046	\$0.113	\$143	\$0.0961	121.904
2022	0.829	1430	1.069	\$0.113	\$134	\$0.0982	116.530
2023	0.779	1423	1.093	\$0.113	\$125	\$0.1004	111.394
2024	0.732	1416	1.118	\$0.113	\$117	\$0.1027	106.484
2025	0.688	1409	1.143	\$0.113	\$109	\$0.1050	101.790
2026	0.688	1402	1.169	\$0.113	\$109	\$0.1074	103.560
2027	0.688	1395	1.195	\$0.113	\$108	\$0.1098	105.361
2028	0.571	1388	1.222	\$0.113	\$89	\$0.1123	88.914
2029	0.536	1381	1.249	\$0.113	\$83	\$0.1148	84.995
2030	0.504	1374	1.277	\$0.113	\$78	\$0.1174	81.249
2031	0.473	1367	1.306	\$0.113	\$73	\$0.1200	77.668
2032	0.445	1360	1.335	\$0.113	\$68	\$0.1227	74.244
2033	0.418	1353	1.365	\$0.113	\$64	\$0.1255	70.972
2034	0.393	1347	1.396	\$0.113	\$60	\$0.1283	67.843
2035	0.393	1340	1.428	\$0.113	\$59	\$0.1312	69.023
2036	0.347	1333	1.460	\$0.113	\$52	\$0.1341	61.994
2037	0.326	1326	1.493	\$0.113	\$49	\$0.1372	59.262
2038	0.306	1320	1.526	\$0.113	\$46	\$0.1402	56.649
2039	0.288	1313	1.561	\$0.113	\$43	\$0.1434	54.152
2040	0.270	1307	1.596	\$0.113	\$40	\$0.1466	51.766
2041	0.254	1300	1.632	\$0.113	\$37	\$0.1499	49.484
2042	0.239	1294	1.668	\$0.113	\$35	\$0.1533	47.303
2043	0.224	1287	1.706	\$0.113	\$33	\$0.1568	45.218
					\$2,069		\$2,069

- Not Public Document – Not For Public Disclosure
- Public Document – Not Public Data Has Been Excised
- Public Document

Xcel Energy	Information Request No.	37
Docket No.:	E002/M-13-867	
Response To:	MN Department of Commerce	
Requestor:	Sue Peirce	
Date Received:	June 10, 2019	

Question:

Topic: VOS Methodology

Please provide a detailed explanation and any supporting documentation to support Xcel’s proposal to apply a 50% reduction factor to the avoided distribution costs in calculating the VOS. Include an explanation of how the Company believes its customers could pay twice for capacity-related distribution projects that are not deferred by the addition of Solar*Rewards Community projects.

Response:

If a project is included in the Company Avoided Distribution Cost component, customers will pay the deferral value to subscribers on each kWh of energy produced by the Community Solar Garden (CSG). If the project is not actually deferred, customers will also pay upfront for the project in base rates (i.e., they will not see any deferral benefits in base rates). The Company proposes the application of a 50% factor to acknowledge there is some likelihood that the distribution projects will not be deferred.

Preparer:	Nick Paluck
Title:	Rate Consultant
Department:	Regulatory Analysis
Telephone:	612.330.2905
Date:	June 20, 2019

CERTIFICATE OF SERVICE

I, Sharon Ferguson, hereby certify that I have this day, served copies of the following document on the attached list of persons by electronic filing, certified mail, e-mail, or by depositing a true and correct copy thereof properly enveloped with postage paid in the United States Mail at St. Paul, Minnesota.

Minnesota Department of Commerce
Comments

Docket No. E002/M-13-867

Dated this **19th** day of **July 2019**

/s/Sharon Ferguson

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