APPENDIX E

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The Utilities' Renewable Energy Generation

Pursuant to amendments to Minn. Stat. § 216B.1691, Minnesota utilities must supply a certain percentage of their retail electric sales from renewable energy generation by specific years. The initial Renewable Energy Standard ("RES") the statute establishes for utilities is to make good faith efforts to provide 7% of their retail sales from renewable sources by 2010. By 2025, the RES requires utilities to provide 25% of their retail sales from renewable generation sources.[1]

Pursuant to the MPUC's Data Exemption Order (see Appendix B), the Utilities summarize below their existing renewable generation to meet Minnesota's RES.

Renewable Energy Generation
(as of December 31, 2006)

Otter Tail Power			
Source	**Nameplate**	**Expected Annual Production MWh**	**Cap Factor**
Hydro	4.19	25,000	0.68
Biomass	0	0	0.00
Wind	23.8	78,000	0.37
Total	27.99	103,000	NA

Minnesota Power			
Source	**Nameplate**	**Expected Annual Production MWh**	**Cap Factor**
Hydro	116.9	570,000	0.56
Biomass	104.5	216,000	0.24
Wind	0	0	0.00
Total	221.4	786,000	NA

Minnkota Power			
Source	**Nameplate**	**Expected Annual Production MWh**	**Cap Factor**
Hydro	--	0	--
Biomass	--	0	--
Wind	1.8	5,487	0.35
Total	1.8	5,467	NA

[1] Xcel Energy is required to meet higher RES, e.g., 15% of its retail sales is to be from renewable generation by 201o, and 30% by 2020, of which 25% must be from wind.

Xcel Energy			
Source	**Nameplate**	**Expected Annual Production MWh**	**Cap Factor**
Hydro	277	873,547	0.36
Biomass	176	1,002,144	0.65
Wind	647.5	1,985,235	0.35
Total	1100.5	3,325,755	NA

Note: Bay Front not included because it does not currently qualify for Minnesota RES compliance

Great River Energy			
Source	**Nameplate**	**Expected Annual Production MWh**	**Cap Factor**
Hydro	0	0	0.00
Biomass	30.6	171,998	0.62
Wind	117.8	378,448	0.37
Total	148.4	550,446	NA

Renewable Energy Retail Sales Forecast

Pursuant to the MPUC Data Exemption Order (see Appendix B), the Applicants have calculated the amount of renewable energy the Utilities must sell to meet Minnesota's RES. Table 1 shows the Utilities' forecast of total retail sales for each year a higher RES must be met. Table 2 shows the renewable energy portion of the forecasted total retail sales.

Table 1 Minnesota Retail Sales Forecast (MWh; losses excluded)

Utility	2010 MWh	2012 MWh	2016 MWh	2020 MWh	2025 MWh
Otter Tail Power	2,349,479	2,440,159	2,613,850	2,795,024	3,026,982
Minnesota Power	9,369,871	9,760,626	10,092,373	10,292,209	10,479,217
Minnkota Power	1,973,328	2,059,025	2,240,176	2,426,605	2,359,200
Xcel Energy	33,841,660	34,710,291	36,291,842	38,041,751	40,170,509
Great River Energy	12,871,342	13,609,300	15,223,111	17,188,395	20,190,440

Table 2 Renewable Energy Portion of Minnesota Retail Sales Forecast (MWh; losses excluded)

Utility	2010 MWh	2012 MWh	2016 MWh	2020 MWh	2025 MWh
Otter Tail Power	164,464	292,819	444,355	559,005	756,746
Minnesota Power	655,890	1,171,275	1,715,703	2,058,441	2,619,804
Minnkota Power	138,133	247,083	380,830	485,321	589,800
Xcel Energy	5,076,249	6,247,852	9,072,960	11,412,525	12,051,152
Great River Energy	900,994	1,633,116	2,587,929	3,437,679	5,047,610

Wind Generation Required to Meet Minnesota's RES

Pursuant to the MPUC Data Exemption Order (see Appendix B), the Applicants detail in the three tables below the amount of wind generation that would be required to meet Minnesota's RES, assuming capacity factors for that generation of 30%, 35%, and 40%. Using all wind is intended to be only an example of the amount of renewable energy needed to meet the RES, as the Uilities likely will rely on a mix of renewable generation sources, not just wind, to meet their obligations under the RES.

Table 1 Wind Generation Needed to Meet Minnesota RES Assuming a 30% Capacity Factor

Utility	Renewable Generation-Dec. 2006 (MWh)	2007 Capacity Additions (MW)	2010 (7%)*	2012 (12%)*	2016 (17%)*	2020 (20%)*	2025 (25%)*
			MW Needed				
Otter Tail Power	103,000	60	0	12	70	114	189
Minnesota Power	786,000	101	0	46	253	383	597
Minnkota Power	5,487	0	50	90	140	180	220
Xcel Energy	3,325,755	420	240	690	1,770	2,660	2,900
Great River Energy	550,446	100	30	310	670	1,000	1,610

* RES for Xcel Energy is 15% in 2010; 18% in 2012; 25% in 2016; and 30% in 2020 and 2025 (of which 25% must be wind).

Table 2 Wind Generation Needed to Meet Minnesota RES Assuming a 35% Capacity Factor

Utility	Renewable Generation-Dec. 2006 (MWh)	2007 Capacity Additions (MW)	2010 (7%)*	2012 (12%)*	2016 (17%)*	2020 (20%)*	2025 (25%)*
			MW Needed				
Otter Tail Power	103,000	60	0	2	51	89	153
Minnesota Power	786,000	101	0	25	202	314	497
Minnkota Power	5,487	0	40	80	120	160	190
Xcel Energy	3,325,755	420	150	530	1,450	2,220	2,430
Great River Energy	550,446	100	10	250	560	840	1,370

* RES for Xcel Energy is 15% in 2010; 18% in 2012; 25% in 2016; and 30% in 2020 and 2025 (of which 25% must be wind).

Table 3 Wind Generation Needed to Meet Minnesota RES Assuming a 40% Capacity Factor

Utility	Renewable Generation-Dec. 2006 (MWh)	2007 Capacity Additions (MW)	2010 (7%)*	2012 (12%)*	2016 (17%)*	2020 (20%)*	2025 (25%)*
			MW Needed				
Otter Tail Power	103,000	60	0	0	37	70	127
Minnesota Power	786,000	101	0	9	164	262	422
Minnkota Power	5,487	0	40	70	110	140	170
Xcel Energy	3,325,755	420	80	410	1,220	1,890	2,070
Great River Energy	550,446	100	0	210	480	720	1,180

* RES for Xcel Energy is 15% in 2010; 18% in 2012; 25% in 2016; and 30% in 2020 and 2025 (of which 25% must be wind).

Wind Generation Required Based on Minnesota's Energy Savings Goals

In addition to amending Minn. Stat. § 216B.1691 to require Minnesota utilities to increase the percentage of their retail electric sales from renewable energy generation, the Legislature also amended Minn. Stat. § 216B.241 to require Minnesota utilities to increase their annual energy savings from 1% to 1.5%. Pursuant to the MPUC Data Exemption Order (see Appendix B), the Applicants detail in the six tables below the wind generation necessary to meet the RES when the Utilities' forecasted retail sales are reduced by the 1% and 1.5% energy savings goals.

Table 1 Wind Generation Needed to Meet Minnesota RES Assuming a 30% Capacity Factor and 1% Energy Savings Goal

Utility	Renewable Generation-Dec. 2006 (MWh)	2007 Capacity Additions (MW)	2010 (7%)*	2012 (12%)*	2016 (17%)*	2020 (20%)*	2025 (25%)*
			MW Needed				
Otter Tail Power	103,000	60	0	8	58	92	162
Minnesota Power	786,000	101	0	48	256	387	602
Minnkota Power	5,487	0	50	90	140	180	220
Xcel Energy	3,325,755	420	230	670	1,730	2,610	2,850
Great River Energy	550,446	100	30	300	660	980	1,590

* RES for Xcel Energy is 15% in 2010; 18% in 2012; 25% in 2016; and 30% in 2020 and 2025 (of which 25% must be wind).

Table 2 Wind Generation Needed to Meet Minnesota RES Assuming a 35% Capacity Factor and 1% Energy Savings Goal

Utility	Renewable Generation-Dec. 2006 (MWh)	2007 Capacity Additions (MW)	2010 (7%)*	2012 (12%)*	2016 (17%)*	2020 (20%)*	2025 (25%)*
			MW Needed				
Otter Tail Power	103,000	60	0	0	41	70	130
Minnesota Power	786,000	101	0	27	205	317	501
Minnkota Power	5,487	0	40	80	120	150	190
Xcel Energy	3,325,755	420	130	510	1,420	2,180	2,390
Great River Energy	550,446	100	10	250	550	830	1,350

* RES for Xcel Energy is 15% in 2010; 18% in 2012; 25% in 2016; and 30% in 2020 and 2025 (of which 25% must be wind).

Table 3 Wind Generation Needed to Meet Minnesota RES Assuming a 40% Capacity Factor and 1% Energy Savings Goal

Utility	Renewable Generation-Dec. 2006 (MWh)	2007 Capacity Additions (MW)	2010 (7%)*	2012 (12%)*	2016 (17%)*	2020 (20%)*	2025 (25%)*
			MW Needed				
Otter Tail Power	103,000	60	0	0	28	54	107
Minnesota Power	786,000	101	0	11	167	265	426
Minnkota Power	5,487	0	40	70	110	140	160
Xcel Energy	3,325,755	420	60	400	1,200	1,850	2,040
Great River Energy	550,446	100	0	200	470	710	1,170

* RES for Xcel Energy is 15% in 2010; 18% in 2012; 25% in 2016; and 30% in 2020 and 2025 (of which 25% must be wind).

Table 4 Wind Generation Needed to Meet Minnesota RES Assuming a 30% Capacity Factor and 1.5% Energy Savings Goal

Utility	Renewable Generation-Dec. 2006 (MWh)	2007 Capacity Additions (MW)	2010 (7%)*	2012 (12%)*	2016 (17%)*	2020 (20%)*	2025 (25%)*
			MW Needed				
Otter Tail Power	103,000	60	0	6	53	83	148
Minnesota Power	786,000	101	0	46	253	383	597
Minnkota Power	5,487	0	50	90	140	180	220
Xcel Energy	3,325,755	420	220	660	1,710	2,590	2,830
Great River Energy	550,446	100	30	300	660	980	1,580

* RES for Xcel Energy is 15% in 2010; 18% in 2012; 25% in 2016; and 30% in 2020 and 2025 (of which 25% must be wind).

Table 5 Wind Generation Needed to Meet Minnesota RES Assuming a 35% Capacity Factor and 1.5% Energy Savings Goal

Utility	Renewable Generation-Dec. 2006 (MWh)	2007 Capacity Additions (MW)	2010 (7%)*	2012 (12%)*	2016 (17%)*	2020 (20%)*	2025 (25%)*
			MW Needed				
Otter Tail Power	103,000	60	0	0	37	63	119
Minnesota Power	786,000	101	0	25	202	314	497
Minnkota Power	5,487	0	40	80	120	150	190
Xcel Energy	3,325,755	420	130	500	1,410	2,160	2,370
Great River Energy	550,446	100	10	240	550	820	1,340

* RES for Xcel Energy is 15% in 2010; 18% in 2012; 25% in 2016; and 30% in 2020 and 2025 (of which 25% must be wind).

Table 6 Wind Generation Needed to Meet Minnesota RES Assuming a 40% Capacity Factor and 1.5% Energy Savings Goal

Utility	Renewable Generation-Dec. 2006 (MWh)	2007 Capacity Additions (MW)	2010 (7%)*	2012 (12%)*	2016 (17%)*	2020 (20%)*	2025 (25%)*
			MW Needed				
Otter Tail Power	103,000	60	0	0	25	48	96
Minnesota Power	786,000	101	0	9	164	262	422
Minnkota Power	5,487	0	40	70	100	130	160
Xcel Energy	3,325,755	420	60	390	1,180	1,840	2,020
Great River Energy	550,446	100	0	200	470	710	1,160

* RES for Xcel Energy is 15% in 2010; 18% in 2012; 25% in 2016; and 30% in 2020 and 2025 (of which 25% must be wind).