
Minnesota Energy Efficiency Potential Study: 2020–2029

Appendix B: Detailed Model Results

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Introduction

Minnesota has a thirty-plus year history of leadership in energy efficiency policy and achievements. In order to continue to maximize the benefits of cost-effective energy efficiency resource acquisition by utilities, the project team, consisting of Center for Energy and Environment (CEE), Optimal Energy (Optimal) and Seventhwave, was commissioned to:

- Estimate statewide electric and natural gas energy efficiency and carbon-saving potential for 2020-2029;
- Produce data-driven and stakeholder-informed resources defining market segments, end uses, measures, and programs that could be targeted in the decade ahead to realize the state's cost-effective energy efficiency potential; and
- Engage stakeholders in order to help advance robust energy policies and energy efficiency programs in the state, and to inform future efficiency portfolio goals.

The full report, supporting documentation, and associated presentations can be found at the following website: <https://www.mncee.org/mnpotentialstudy/final-report/>

This appendix provides an overview of the main takeaways from the modeling for each analysis region. This includes going through the cumulative and incremental savings percentage from the three model runs, and providing more details on what end-uses and building types are key to achieving energy savings potential. For more detailed information on measure level modeling results at the utility level, the project team encourages readers to look at the utility reporting tool¹ where one can customize a search that will go into fine levels of detail for all seven model analysis areas and every Minnesota utility.

The data in this appendix are built on the results presented in the main potential study report. For definitions of terms and explanations of tables presented here, please see the main potential study report.²

¹ Utility reporting tool can be found on the project website:

<https://www.mncee.org/mnpotentialstudy/home/>

² Main potential study report can be found on the project website:

<https://www.mncee.org/mnpotentialstudy/home/>

Electric Model Results

Xcel Model Runs Results

Xcel Energy is the largest utility in Minnesota. Xcel serves about 47% of the electricity load in the state. As seen in

Figure 1, Xcel's service Territory is concentrated in the Twin Cities Metro Region, but extends across southern and western Minnesota. Xcel energy has a long history providing cost-effective energy efficiency savings to their customers, consistently meeting and exceeding their 1.5% energy efficiency savings goal. The project team's modeling shows that Xcel energy will be able to continue their history of meeting the 1.5% CIP goal through 2029.

Figure 1: Xcel Energy's Minnesota service territory

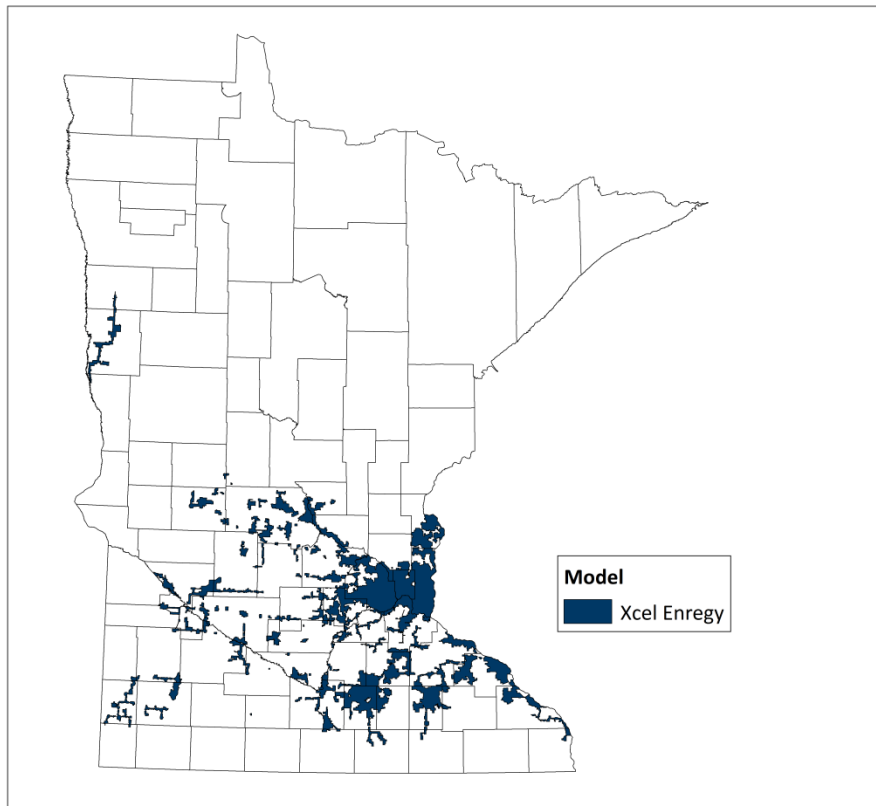


Table 1. Incremental annual savings percent³

Year	Economic	Max achievable	Program
2020	6.1%	2.6%	1.8%
2021	5.8%	2.9%	2.0%
2022	4.5%	2.4%	1.6%
2023	4.4%	2.6%	1.8%
2024	4.3%	2.8%	1.9%
2025	4.2%	2.8%	1.9%
2026	4.2%	2.8%	2.0%
2027	4.2%	2.9%	2.0%
2028	4.2%	2.9%	2.0%
2029	4.0%	2.7%	1.9%
10-year average	4.6%	2.7%	1.9%

Table 2. Incremental annual energy savings in GWh

Year	Economic	Max achievable	Program
2020	2,100	900	600
2021	2,100	1,000	700
2022	1,600	900	600
2023	1,600	900	600
2024	1,600	1,000	700
2025	1,600	1,000	700
2026	1,600	1,100	700
2027	1,600	1,100	800
2028	1,700	1,200	800
2029	1,600	1,100	800
10-year average	1,710	1,020	700

³ The project team used the average savings methodology to incorporate behavioral savings in the annual incremental results.

Table 3. Incremental annual CO2 savings in (tons CO2eq)

Year	Economic	Max achievable	Program
2020	1,037,400	444,600	296,400
2021	1,005,900	479,000	335,300
2022	766,400	431,100	287,400
2023	731,200	411,300	274,200
2024	731,200	457,000	319,900
2025	731,200	457,000	319,900
2026	702,400	482,900	307,300
2027	702,400	482,900	351,200
2028	746,300	526,800	351,200
2029	702,400	482,900	351,200
10-year average	786,000	466,000	319,000

Table 4. Cumulative annual savings percent

Year	Economic	Max achievable	Program
2020	6.7%	2.8%	1.9%
2021	12.1%	5.5%	3.8%
2022	16.2%	7.7%	5.3%
2023	19.8%	9.9%	6.9%
2024	22.3%	11.7%	8.1%
2025	24.8%	13.5%	9.3%
2026	28.1%	16.0%	11.0%
2027	31.0%	18.2%	12.6%
2028	33.3%	20.3%	14.0%
2029	35.9%	22.4%	15.5%

Table 5. Cumulative annual energy savings in GWh

Year	Economic	Max achievable	Program
2020	2,300	1,000	700
2021	4,300	1,900	1,300
2022	5,800	2,800	1,900
2023	7,200	3,600	2,500
2024	8,200	4,300	3,000
2025	9,200	5,000	3,500
2026	10,700	6,100	4,200
2027	12,000	7,100	4,900
2028	13,200	8,000	5,600
2029	14,400	9,000	6,200

Table 6. Cumulative annual CO2 savings (tons CO2eq)

Year	Economic	Max achievable	Program
2020	1,136,200	494,000	345,800
2021	2,059,700	910,100	622,700
2022	2,778,200	1,341,200	910,100
2023	3,290,400	1,645,200	1,142,500
2024	3,747,400	1,965,100	1,371,000
2025	4,204,400	2,285,000	1,599,500
2026	4,697,300	2,677,900	1,843,800
2027	5,268,000	3,116,900	2,151,100
2028	5,794,800	3,512,000	2,458,400
2029	6,321,600	3,951,000	2,721,800

Table 7. Annual utility program energy efficiency spending (\$)

Year	Max achievable	Program
2020	\$ 265,000,000	\$ 104,000,000
2021	\$ 298,000,000	\$ 116,000,000
2022	\$ 323,000,000	\$ 125,000,000
2023	\$ 358,000,000	\$ 138,000,000
2024	\$ 397,000,000	\$ 153,000,000
2025	\$ 408,000,000	\$ 158,000,000
2026	\$ 428,000,000	\$ 168,000,000
2027	\$ 447,000,000	\$ 177,000,000
2028	\$ 463,000,000	\$ 186,000,000
2029	\$ 434,000,000	\$ 177,000,000
10-year average	\$ 382,100,000	\$ 150,200,000

Table 8. Residential electric program potential savings by end use, 2029

End use	Sum of cumul. net MWh (2029)
Space heating	221,000
Appliances	147,000
Refrigeration	104,000
Water heating	102,000
System efficiency	102,000
Cooling	83,000
Plug loads	66,000
Indoor lighting	52,000
Exterior lighting	23,000
Other	15,000
Grand total	914,000

Table 9. Commercial electric program potential savings by end use, 2029

End use	Sum of cumul. net MWh (2029)
Refrigeration	1,113,000
Indoor lighting	971,000
System efficiency	779,000
Ventilation	488,000
Other	330,000
Exterior lighting	184,000
Cooling	135,000
Cooking	91,000
Plug loads	61,000
Space heating	56,000
Water heating	3,000
Process cooling and refrigeration	1,00
Motors - drives	800
Motors - pumps	400
Grand total	4,213,000

Table 10. Industrial electric program potential savings by end use. 2029

End use	Sum of cumul. net MWh (2029)
Motors - drives	256,000
Motors - pumps	153,000
Indoor lighting	134,000
Motors - compressed air	127,000
System efficiency	124,000
Process heating	120,000
Motors - fans/blowers	69,000
Other	65,000
Process cooling and refrigeration	28,000
Grand total	1,076,000

Table 11. Electric program potential savings by segment, 2029

Segment	Sum of cumul. net MWh (2029)
Industrial	1,076,000
Food service	793,000
Healthcare	767,000
Single family	558,000
Education	505,000
Food sales	485,000
Small office	398,000
Large office	288,000
Small retail	246,000
Warehouse	226,000
Other commercial	154,000
Public assembly	123,000
Large retail	115,000
LI Multifamily (5+ units)	103,000
LI Single family	102,000
Multifamily (5+ units)	95,000
Lodging	70,000
Street lighting	30,000
LI Multifamily (2-4 units)	28,000
Multifamily (2-4 units)	28,000
Agriculture	12,000
Grand total	6,202,000

Table 12. Top residential electric measures, 2029

Measure	MWh savings cumul. net 2029
Ductless mini-split air-source heat pump	93,000
Advanced power strips	66,000
Fridge and freezer removal	60,000
LED Tube Replacement Lamps	52,000
Clothes washer	88,000
Energy star Fridge and Freezer	44,000
Home energy reports	42,000
Dehumidifier	36,000
Smart thermostat	65,000
Water heater insulation	31,000

Table 13. Top commercial electric measures, 2029

Measure	2029 cumul. net MWh
Integrated building design	418,000
Variable speed drives	343,000
Lighting controls	269,000
High efficiency small walk-in	266,000
Improved lighting design	251,000
Deep energy retrofits	181,000
LED tube replacement lamps	171,000
Evaporator fan speed controls	169,000
ECM fan motors	159,000
High efficiency built-up refrigeration	150,000

Minnesota Power Model Results

Minnesota Power is the second largest investor-owned electric utility in Minnesota. Minnesota power serves about 12% of the electric load in the state. As seen in Figure 2 Minnesota Power's territory is concentrated in the Northeast around Duluth and the Iron Range, and spreading out to central Minnesota. Minnesota Power has a long history of providing cost-effective energy efficiency programs through CIP. Through Minnesota Powers, residential, low-income, commercial, and industrial programs they consistently meet or exceed the state's energy efficiency resource standard of 1.5%.

Figure 2. Map of Minnesota Power's electric service territory

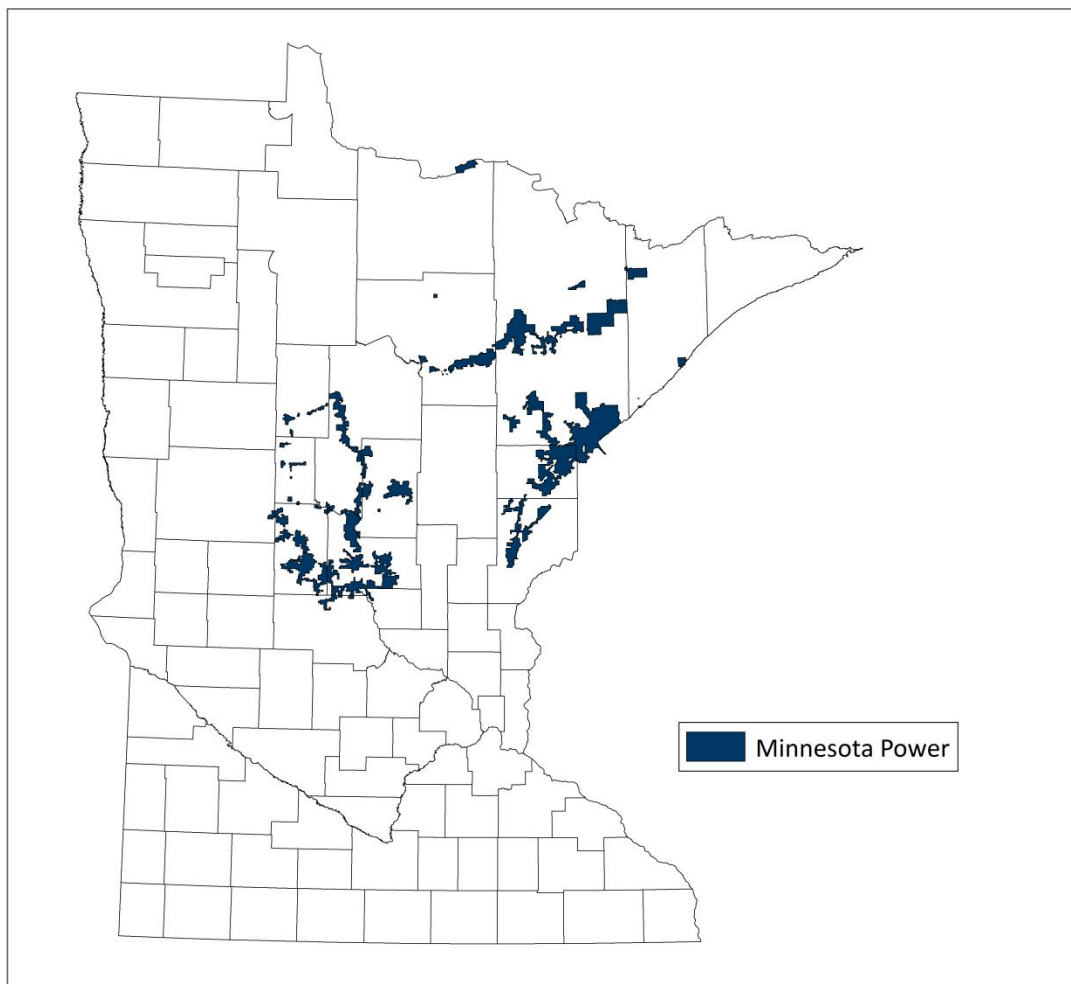


Table 14. Incremental annual savings percent⁴

Year	Economic	Max achievable	Program
2020	6.3%	2.5%	1.7%
2021	6.0%	2.9%	1.9%
2022	4.8%	2.5%	1.6%
2023	4.6%	2.7%	1.8%
2024	4.5%	2.9%	1.9%
2025	4.4%	2.9%	1.9%
2026	4.3%	2.9%	1.9%
2027	4.2%	2.9%	1.9%
2028	4.2%	2.9%	1.9%
2029	4.1%	2.9%	1.9%
10-year average	4.8%	2.8%	1.8%

Table 15. Incremental annual energy savings in GWh

Year	Economic	Max achievable	Program
2020	230	90	60
2021	230	110	70
2022	180	100	62
2023	180	110	70
2024	180	120	80
2025	180	120	80
2026	180	120	80
2027	180	130	80
2028	190	130	90
2029	190	130	90
10-year average	190	120	80

⁴ The project team used the average savings methodology to incorporate behavioral savings in the annual incremental results.

Table 16. Incremental annual CO2 savings in (tons CO2eq)

Year	Economic	Max achievable	Program
2020	115,866	46,806	30,345
2021	109,225	52,467	34,113
2022	88,581	45,868	29,655
2023	84,023	49,154	31,880
2024	84,379	54,201	35,316
2025	83,231	55,216	36,072
2026	80,376	54,314	35,503
2027	80,750	55,548	36,357
2028	82,128	57,199	37,440
2029	81,503	57,070	37,405
10-year average	89,006	52,784	34,409

Table 17. Cumulative annual savings percent

Year	Economic	Max achievable	Program
2020	6.5%	2.7%	1.9%
2021	11.6%	5.2%	3.6%
2022	15.3%	7.3%	5.0%
2023	18.8%	9.3%	6.4%
2024	21.1%	11.0%	7.6%
2025	23.3%	12.6%	8.7%
2026	26.2%	14.8%	10.2%
2027	28.7%	16.7%	11.6%
2028	30.8%	18.6%	12.9%
2029	32.8%	20.3%	14.1%

Table 18. Cumulative annual energy savings in GWh

Year	Economic	Max achievable	Program
2020	200	80	70
2021	370	170	140
2022	500	240	190
2023	630	310	260
2024	730	380	310
2025	820	450	370
2026	950	530	450
2027	1,070	620	520
2028	1,170	710	590
2029	1,280	790	660

Table 19. Cumulative annual CO2 savings (tons CO2eq)

Year	Economic	Max achievable	Program
2020	128,000	52,000	34,000
2021	227,000	100,000	65,000
2022	308,000	143,000	93,000
2023	368,000	181,000	117,000
2024	427,000	220,000	143,000
2025	484,000	262,000	170,000
2026	537,000	302,000	196,000
2027	603,000	352,000	229,000
2028	663,000	400,000	261,000
2029	722,000	447,000	292,000

Table 20. Annual utility program energy efficiency spending (\$)

Year	Max achievable	Program
2020	\$ 26,711,429	\$ 10,016,313
2021	\$ 30,939,994	\$ 11,634,565
2022	\$ 33,195,194	\$ 12,417,343
2023	\$ 37,644,073	\$ 14,144,593
2024	\$ 41,988,683	\$ 15,885,164
2025	\$ 43,194,654	\$ 16,477,402
2026	\$ 45,046,081	\$ 17,342,742
2027	\$ 46,458,967	\$ 18,104,769
2028	\$ 48,664,393	\$ 19,212,884
2029	\$ 49,065,446	\$ 19,721,791
10-year average	\$ 40,290,891	\$ 15,495,757

Table 21. Residential electric program potential savings by end use, 2029

End use	Sum of cumul. net MWh (2029)
Space heating	52,086
Water heating	30,035
Appliances	15,866
System efficiency	13,779
Refrigeration	12,895
Plug loads	6,161
Indoor lighting	4,100
Cooling	3,631
Exterior lighting	2,740
Other	1,316
Grand total	142,609

Table 22. Commercial electric program potential savings by end use, 2029

End use	Sum of cumul. net MWh (2029)
Indoor lighting	120,617
Refrigeration	93,838
System efficiency	78,658
Ventilation	52,661
Other	32,164
Exterior lighting	18,496
Space heating	7,907
Cooling	7,204
Plug loads	6,121
Cooking	5,299
Water heating	580
Motors - drives	244
Motors - pumps	224
Grand total	193

Table 23. Industrial electric program potential savings by end use. 2029

End use	Sum of cumul. net MWh (2029)
Motors - Drives	31,495
Motors - Pumps	18,781
System Efficiency	10,971
Motors - Fans/Blowers	9,938
Indoor Lighting	8,544
Process Heating	8,294
Motors - Compressed Air	6,857
Other	2,801
Grand Total	97,681

Table 24. Electric program potential savings by segment, 2029

Segment	Sum of cumul. net MWh (2029)
Industrial	98,000
Single family	85,000
Healthcare	83,000
Food sales	74,000
Food service	61,000
Education	60,000
Small office	44,000
LI Single family	31,000
Small retail	21,000
Large office	17,000
Lodging	13,000
Warehouse	13,000
Other commercial	12,000
Public assembly	12,000
LI Multifamily (5+ units)	10,000
LI Multifamily (2-4 units)	7,000
Large retail	6,000
Agriculture	5,000
Multifamily (5+ units)	5,000
Multifamily (2-4 units)	4,000
Street lighting	3,000
Grand total	665,000

Table 25. Top program residential electric measures, 2029

Measure	MWh savings cumul. net 2029
Ductless mini-split air source heat pump	19,000
Heat pump water heater	15,000
Central air source heat pump	9,000
Fridge and freezer removal	8,000
Smart thermostat	7,000
Water heater jacket insulation	6,000
Advanced power strip	6,000
Clothes washer	6,000
Home energy report	6,000
ENERGYSTAR fridge and freezer	5,000

Table 26. Top program commercial electric measures, 2029

Measure	2029 cumul. net MWh
Integrated building design	44,000
Variable speed drive	35,000
High-efficiency small walk-in	29,000
Interior lighting design	26,000
Lighting controls	25,000
Evaporator fan speed controls	18,000
Deep energy retrofit	17,000
ECM fan motors	17,000
High-eff built-up refrigeration	17,000
LED tube replacement	16,000

Otter Tail Power Model Results

Otter Tail Power company is an Investor-Owned Utility located in western Minnesota. As seen in Figure 3, their territory is concentrated in rural municipalities in western Minnesota. Overall, Otter Tail Power serves about 4% of the electric load in Minnesota. Otter Tail has a long history providing cost-effective energy efficiency savings to their customers, consistently meeting and exceeding their 1.5% energy efficiency savings goal. The project team's modeling shows that Otter Tail will be able to continue their history of meeting the 1.5% CIP goal through 2029.

Figure 3. Otter Tail Power's Minnesota electric service territory

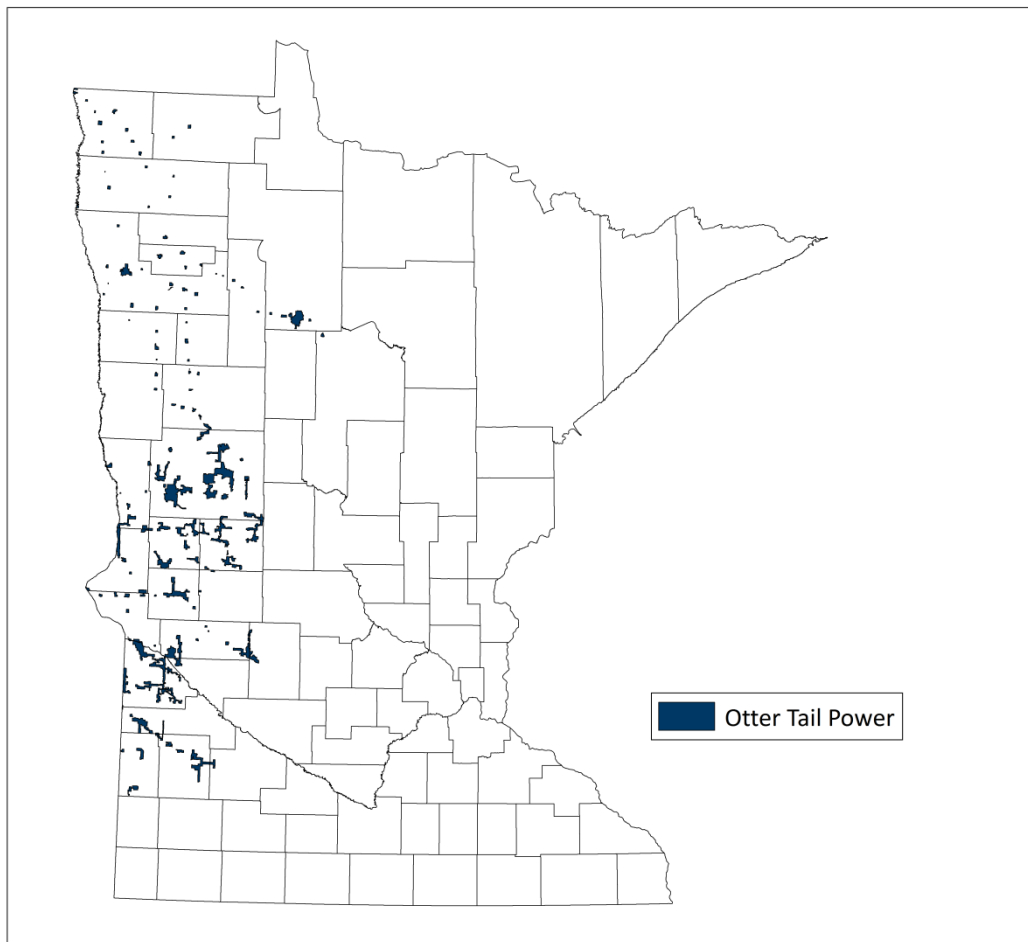


Table 27. Incremental annual savings percent⁵

Year	Economic	Max achievable	Program
2020	6.3%	2.5%	1.6%
2021	6.1%	2.8%	1.8%
2022	4.7%	2.3%	1.5%
2023	4.6%	2.6%	1.7%
2024	4.5%	2.8%	1.8%
2025	4.4%	2.8%	1.9%
2026	4.3%	2.8%	1.9%
2027	4.3%	2.8%	1.9%
2028	4.2%	2.8%	1.9%
2029	4.2%	2.8%	1.9%
10-year average	4.7%	2.7%	1.8%

Table 28. Incremental annual energy savings in GWh

Year	Economic	Max achievable	Program
2020	140	50	40
2021	140	60	40
2022	110	50	40
2023	110	60	40
2024	110	70	40
2025	110	70	50
2026	110	70	50
2027	110	70	50
2028	110	70	50
2029	110	70	50
10-year average	110	70	40

⁵ The project team used the average savings methodology to incorporate behavioral savings in the annual incremental results.

Table 29. Incremental annual CO2 savings in (tons CO2eq)

Year	Economic	Max achievable	Program
2020	69,000	27,000	18,000
2021	66,000	31,000	20,000
2022	52,000	26,000	17,000
2023	49,000	28,000	18,000
2024	49,000	31,000	20,000
2025	49,000	32,000	21,000
2026	47,000	31,000	21,000
2027	47,000	31,000	21,000
2028	47,000	32,000	21,000
2029	48,000	32,000	22,000
10-year average	52,000	30,000	20,000

Table 30. Cumulative annual savings percent

Year	Economic	Max achievable	Program
2020	7.0%	2.7%	1.8%
2021	12.5%	5.3%	3.5%
2022	16.6%	7.4%	4.9%
2023	20.3%	9.6%	6.3%
2024	22.9%	11.4%	7.5%
2025	25.5%	13.2%	8.7%
2026	29.0%	15.7%	10.3%
2027	32.0%	18.0%	11.9%
2028	34.5%	20.1%	13.3%
2029	37.0%	22.1%	14.7%

Table 31. Cumulative annual energy savings in GWh

Year	Economic	Max achievable	Program
2020	160	60	40
2021	290	120	80
2022	390	170	110
2023	480	230	150
2024	550	270	180
2025	630	330	210
2026	720	390	260
2027	810	460	300
2028	890	520	340
2029	960	580	380

Table 32. Cumulative annual CO2 savings (tons CO2eq)

Year	Economic	Max achievable	Program
2020	77,000	30,000	20,000
2021	136,000	58,000	38,000
2022	185,000	82,000	54,000
2023	219,000	104,000	68,000
2024	252,000	125,000	82,000
2025	286,000	148,000	98,000
2026	317,000	172,000	113,000
2027	355,000	200,000	132,000
2028	389,000	226,000	150,000
2029	423,000	253,000	167,000

Table 33. Annual utility program energy efficiency spending (\$)

Year	Max achievable	Program
2020	\$ 14,585,000	\$ 5,582,000
2021	\$ 17,378,000	\$ 6,661,000
2022	\$ 18,424,000	\$ 7,040,000
2023	\$ 21,047,000	\$ 8,074,000
2024	\$ 23,339,000	\$ 9,017,000
2025	\$ 24,510,000	\$ 9,546,000
2026	\$ 25,307,000	\$ 9,952,000
2027	\$ 26,029,000	\$ 10,352,000
2028	\$ 26,905,000	\$ 10,838,000
2029	\$ 27,710,000	\$ 11,336,000
10-year average	\$ 22,523,000	\$ 8,840,000

Table 34. Residential electric program potential savings by end use, 2029

End use	Sum of cumul. net MWh (2029)
Space heating	48,000
Water heating	14,000
System Efficiency	8,000
Appliances	8,000
Refrigeration	7,000
Plug loads	3,000
Indoor lighting	2,000
Cooling	2,000
Exterior lighting	1,000
Other	1,000
Grand total	94,000

Table 35. Commercial electric program potential savings by end use, 2029

End use	Sum of cumul. net MWh (2029)
Indoor lighting	68,000
System Efficiency	54,000
Refrigeration	39,000
Ventilation	36,000
Other	24,000
Exterior lighting	18,000
Cooling	6,000
Space heating	5,000
Plug loads	5,000
Cooking	3,000
Motors - drives	200
Motors - pumps	160
Water heating	85
Process cooling and refrigeration	70
Grand total	258,000

Table 36. Industrial electric program potential savings by end use. 2029

End use	Sum of cumul. net MWh (2029)
Motors - drives	8,000
Motors - pumps	5,000
Motors - compressed air	4,000
System Efficiency	3,000
Indoor lighting	3,000
Process heating	3,000
Motors - fans/blowers	2,000
Other	1,000
Grand total	29,000

Table 37. Electric program potential savings by segment, 2029

Segment	Sum of cumul. net MWh (2029)
Healthcare	104,000
Single family	60,000
Education	40,000
Industrial	29,000
Small office	28,000
LI Single family	21,000
Food sales	14,000
Small retail	12,000
Lodging	12,000
Food service	10,000
Other commercial	10,000
Large office	7,000
LI Multifamily (5+ units)	7,000
Street lighting	7,000
Warehouse	5,000
Large retail	3,000
Multifamily (5+ units)	3,000
Public assembly	3,000
LI Multifamily (2-4 units)	2,000
Agriculture	2,000
Multifamily (2-4 units)	1,000
Grand total	380,000

Table 38. Top program residential electric measures, 2029

Measure	MWh savings cumul. net 2029
Ductless mini-split air-source heat pump	18,000
Central air-source heat pump	12,000
Smart thermostat	6,000
Attic insulation	5,000
Heat pump water heater	4,000
Water heater insulation	4,000
Fridge and freezer removal	4,000
Home energy reports	4,000
Advanced power strip	3,000
Clothes washer	3,000

Table 39. Top program commercial electric measures, 2029

Measure	2029 cumul. net MWh
Integrated building design	27,000
Variable speed drive	25,000
Lighting controls	20,000
Interior lighting design	18,000
LED tube replacement	13,000
ECM fan motors	12,000
Deep energy retrofit	12,000
Building automation	11,000
High-efficiency small walk-in	9,000
Exterior LED	8,000

Southern Cooperatives Model Results

The Southern Cooperatives model includes 26 Cooperative electric. These cooperatives are part of several different G&T organizations and serve 16% of the electric load in the state.

Figure 4. Southern Cooperative's electric service territory

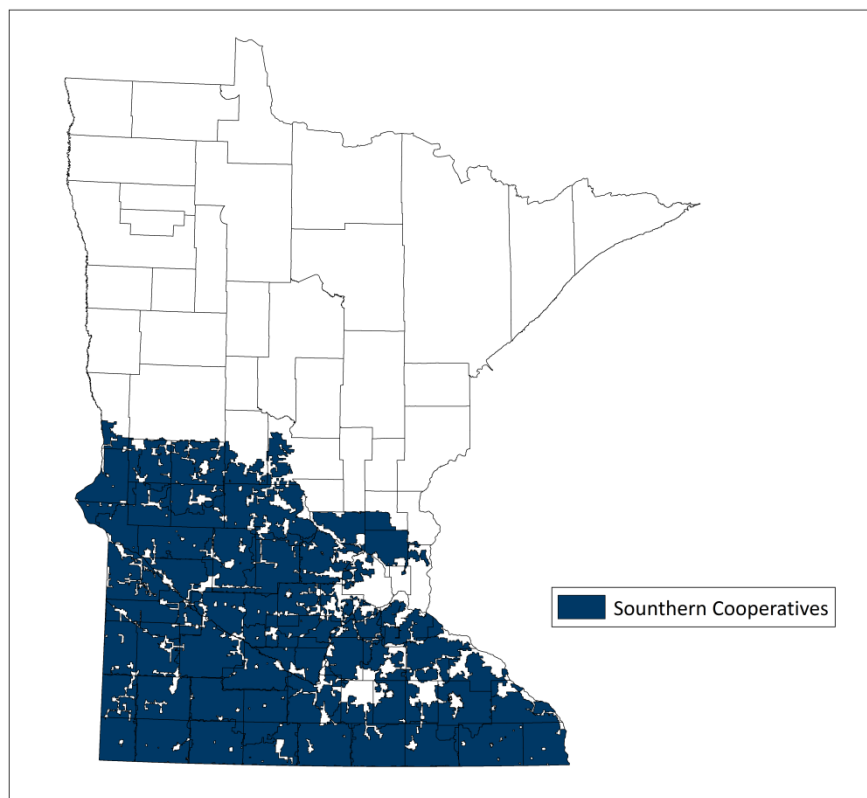


Table 40. Incremental annual savings percent ⁶

Year	Economic	Max achievable	Program
2020	6.1%	2.5%	1.8%
2021	5.8%	2.8%	2.0%
2022	4.2%	2.0%	1.4%
2023	4.1%	2.3%	1.6%
2024	3.9%	2.4%	1.7%
2025	3.8%	2.5%	1.7%
2026	3.7%	2.4%	1.7%
2027	3.7%	2.4%	1.7%
2028	3.6%	2.4%	1.7%
2029	3.5%	2.3%	1.7%
10-year average	4.2%	2.4%	1.7%

Table 41. Incremental annual energy savings in GWh

Year	Economic	Max achievable	Program
2020	810	330	230
2021	800	390	270
2022	590	290	200
2023	590	330	230
2024	590	370	260
2025	600	380	270
2026	600	390	270
2027	610	400	280
2028	610	410	290
2029	620	410	290
10-year average	640	370	260

⁶ The project team used the average savings methodology to incorporate behavioral savings in the annual incremental results.

Table 42. Incremental annual CO2 savings in (tons CO2eq)

Year	Economic	Max achievable	Program
2020	400,000	163,000	114,000
2021	383,000	187,000	129,000
2022	283,000	139,000	96,000
2023	270,000	151,000	105,000
2024	270,000	169,000	119,000
2025	274,000	174,000	123,000
2026	263,000	171,000	119,000
2027	268,000	176,000	123,000
2028	268,000	180,000	127,000
2029	272,000	180,000	127,000
10-year average	295,000	169,000	118,000

Table 43. Cumulative annual savings percent

Year	Economic	Max achievable	Program
2020	7.1%	2.9%	2.0%
2021	12.2%	5.4%	3.8%
2022	15.5%	7.1%	5.0%
2023	18.5%	8.9%	6.2%
2024	20.0%	10.0%	7.0%
2025	21.4%	11.1%	7.8%
2026	24.0%	13.0%	9.1%
2027	26.1%	14.7%	10.3%
2028	27.8%	16.3%	11.4%
2029	29.4%	17.6%	12.4%

Table 44. Cumulative annual energy savings in GWh

Year	Economic	Max achievable	Program
2020	940	380	270
2021	1,680	740	530
2022	2,200	1,000	710
2023	2,700	1,300	910
2024	3,020	1,510	1,060
2025	3,330	1,730	1,210
2026	3,840	2,090	1,460
2027	4,330	2,440	1,710
2028	4,750	2,780	1,950
2029	5,170	3,110	2,180

Table 45. Cumulative annual CO2 savings (tons CO2eq)

Year	Economic	Max achievable	Program
2020	464,000	189,000	134,000
2021	803,000	356,000	252,000
2022	1,052,000	481,000	339,000
2023	1,235,000	593,000	417,000
2024	1,379,000	690,000	484,000
2025	1,524,000	792,000	554,000
2026	1,688,000	917,000	642,000
2027	1,902,000	1,071,000	751,000
2028	2,085,000	1,219,000	855,000
2029	2,270,000	1,365,000	957,000

Table 46. Annual utility program energy efficiency spending (\$)

Year	Max achievable	Program
2020	\$ 92,022,000	\$ 36,719,000
2021	\$ 110,342,000	\$ 43,931,000
2022	\$ 112,987,000	\$ 44,110,000
2023	\$ 133,759,000	\$ 51,932,000
2024	\$ 148,999,000	\$ 58,166,000
2025	\$ 158,148,000	\$ 62,021,000
2026	\$ 162,027,000	\$ 64,456,000
2027	\$ 166,564,000	\$ 67,331,000
2028	\$ 169,847,000	\$ 69,990,000
2029	\$ 174,490,000	\$ 73,396,000
10-year average	\$ 142,918,000	\$ 57,205,000

Table 47. Residential electric program potential savings by end use, 2029

End use	Sum of cumul. net MWh (2029)
Space heating	265,000
Appliances	87,000
System efficiency	77,000
Water heating	65,000
Refrigeration	64,000
Plug loads	33,000
Cooling	31,000
Indoor lighting	21,000
Exterior lighting	14,000
Other	7,000
Grand total	664,000

Table 48. Commercial electric program potential savings by end use, 2029

End use	Sum of cumul. net MWh (2029)
Indoor lighting	324,000
Refrigeration	303,000
System efficiency	238,000
Ventilation	147,000
Other	130,000
Exterior lighting	96,000
Cooling	35,000
Cooking	21,000
Space heating	16,000
Plug loads	16,000
Process cooling and refrigeration	8,000
Motors - drives	8,000
Motors - pumps	3,000
Water heating	1,000
Grand total	1,346,000

Table 49. Industrial electric program potential savings by end use. 2029

End use	Sum of cumul. net MWh (2029)
Motors - drives	44,000
Process heating	25,000
Motors - pumps	23,000
Indoor lighting	21,000
System Efficiency	20,000
Motors - compressed air	16,000
Motors - fans/blowers	11,000
Other	8,000
Grand total	168,000

Table 50. Electric program potential savings by segment, 2029

Segment	Sum of cumul. net MWh (2029)
Single family	500,000
Healthcare	206,000
Food service	169,000
Industrial	168,000
Education	158,000
Food sales	149,000
LI Single family	122,000
Small office	109,000
Agriculture	108,000
Small retail	94,000
Other commercial	91,000
Warehouse	77,000
Street lighting	50,000
Public assembly	43,000
Large office	37,000
Large retail	34,000
Lodging	24,000
LI Multifamily (5+ units)	18,000
Multifamily (5+ units)	16,000
Multifamily (2-4 units)	4,000
LI Multifamily (2-4 units)	4,000
Grand total	1,681,000

Table 51. Top program residential electric measures, 2029

Measure	MWh savings cumul. net 2029
Ductless mini-split air-source heat pump	88,000
Clothes washer	56,000
Central air-source heat pump	53,000
Fridge and freezer removal	39,000
Smart thermostat	34,000
Home energy report	33,000
Advanced power strip	33,000
Water heater insulation	30,000
Dehumidifier	26,000
Attic insulation	26,000

Table 52. Top program commercial electric measures, 2029

Measure	2029 cumul. net MWh
Integrated building design	142,000
Variable speed drive	142,000
Interior lighting design	92,000
Lighting controls	76,000
High-efficiency small walk-in	69,000
LED Street Lighting	50,000
Deep energy retrofit	47,000
Evaporator fan speed controls	47,000
LED tube replacement	47,000
ECM fan motors	45,000

Northern Cooperatives Model Run Results

The Northern Cooperatives model is made up of 18 different cooperative utilities – these utilities serve about 7% of the electric load in the state. These cooperatives provide electricity to a large proportion of the area in the state.

Figure 5. Northern Cooperative's electric service territory

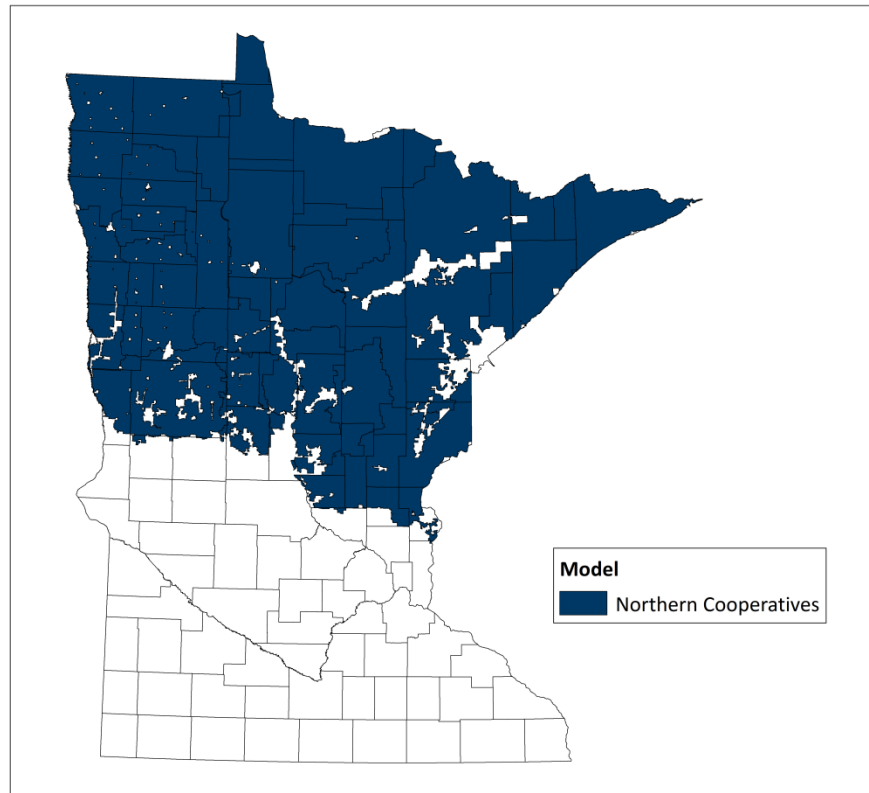


Table 53. Incremental annual savings percent ⁷

Year	Economic	Max achievable	Program
2020	6.0%	2.2%	1.6%
2021	5.8%	2.6%	1.8%
2022	4.4%	2.0%	1.4%
2023	4.3%	2.3%	1.6%
2024	4.2%	2.5%	1.8%
2025	4.1%	2.5%	1.8%
2026	4.0%	2.5%	1.8%
2027	3.9%	2.5%	1.8%
2028	3.8%	2.4%	1.7%
2029	3.8%	2.4%	1.7%
10-year average	4.5%	2.4%	1.7%

Table 54. Incremental annual energy savings in GWh

Year	Economic	Max achievable	Program
2020	360	80	50
2021	360	100	60
2022	280	120	80
2023	280	140	90
2024	280	160	100
2025	280	160	100
2026	290	170	110
2027	290	170	110
2028	290	180	110
2029	290	180	120
10-year average	300	150	90

⁷ The project team used the average savings methodology to incorporate behavioral savings in the annual incremental results.

Table 55. Incremental annual CO2 savings in (tons CO2eq)

Year	Economic	Max achievable	Program
2020	180,000	38,000	24,000
2021	172,000	46,000	29,000
2022	135,000	58,000	37,000
2023	129,000	64,000	40,000
2024	130,000	72,000	45,000
2025	130,000	75,000	47,000
2026	125,000	74,000	46,000
2027	126,000	75,000	47,000
2028	125,000	78,000	49,000
2029	126,000	80,000	50,000
10-year average	138,000	66,000	42,000

Table 56. Cumulative annual savings percent

Year	Economic	Max achievable	Program
2020	7.3%	2.7%	2.0%
2021	12.3%	5.0%	3.6%
2022	15.8%	6.6%	4.7%
2023	19.1%	8.4%	6.0%
2024	21.1%	9.7%	6.9%
2025	22.9%	11.0%	7.8%
2026	25.5%	12.9%	9.2%
2027	27.9%	14.7%	10.5%
2028	29.8%	16.3%	11.6%
2029	31.5%	17.8%	12.7%

Table 57. Cumulative annual energy savings in GWh

Year	Economic	Max achievable	Program
2020	440	170	120
2021	760	310	220
2022	1,000	420	300
2023	1,240	550	390
2024	1,410	650	460
2025	1,570	760	540
2026	1,810	910	650
2027	2,030	1,070	760
2028	2,220	1,220	870
2029	2,410	1,360	970

Table 58. Cumulative annual CO2 savings (tons CO2eq)

Year	Economic	Max achievable	Program
2020	217,000	82,000	59,000
2021	365,000	148,000	106,000
2022	481,000	201,000	143,000
2023	568,000	250,000	178,000
2024	645,000	297,000	211,000
2025	719,000	346,000	246,000
2026	793,000	402,000	286,000
2027	892,000	470,000	335,000
2028	974,000	534,000	381,000
2029	1,057,000	597,000	426,000

Table 59. Annual utility program energy efficiency spending (\$)

Year	Max achievable	Program
2020	\$ 34,950,000	\$ 14,698,000
2021	\$ 42,127,000	\$ 17,721,000
2022	\$ 43,951,000	\$ 18,374,000
2023	\$ 52,114,000	\$ 21,820,000
2024	\$ 59,247,000	\$ 24,928,000
2025	\$ 62,720,000	\$ 26,582,000
2026	\$ 65,130,000	\$ 27,893,000
2027	\$ 67,484,000	\$ 29,264,000
2028	\$ 69,213,000	\$ 30,530,000
2029	\$ 71,619,000	\$ 32,178,000
10-year average	\$ 56,856,000	\$ 24,399,000

Table 60. Residential electric program potential savings by end use, 2029

End use	Sum of cumul. net MWh (2029)
Space heating	251,000
Water heating	79,000
System Efficiency	45,000
Appliances	41,000
Refrigeration	39,000
Plug loads	12,000
Indoor lighting	7,000
Exterior lighting	6,000
Cooling	4,000
Other	3,000
Grand total	487,000

Table 61. Commercial electric program potential savings by end use, 2029

End use	Sum of cumul. net MWh (2029)
Indoor lighting	102,000
Refrigeration	90,000
System efficiency	72,000
Other	45,000
Ventilation	44,000
Exterior lighting	16,000
Space heating	7,000
Cooling	6,000
Cooking	6,000
Plug loads	5,000
Motors - drives	4,000
Motors - pumps	1,000
Process cooling and refrigeration	1,000
Water heating	200
Grand total	399,000

Table 62. Industrial electric program potential savings by end use. 2029

End use	Sum of cumul. net MWh (2029)
Motors - drives	22,000
Motors - pumps	12,000
Indoor lighting	11,000
System efficiency	9,000
Motors - compressed air	8,000
Process heating	8,000
Motors - fans/blowers	6,000
Other	4,000
Grand total	80,000

Table 63. Electric program potential savings by segment, 2029

Segment	Sum of cumul. net MWh (2029)
Single family	344,000
LI Single family	130,000
Industrial	81,000
Education	58,000
Healthcare	46,000
Food sales	42,000
Food service	41,000
Small office	39,000
Lodging	34,000
Agriculture	30,000
Other commercial	26,000
Warehouse	24,000
Small retail	23,000
Public assembly	23,000
Large retail	8,000
LI Multifamily (5+ units)	6,000
Large office	4,000
LI Multifamily (2-4 units)	3,000
Multifamily (5+ units)	2,000
Multifamily (2-4 units)	2,000
Street lighting	1,000
Grand total	967,000

Table 64. Top program residential electric measures, 2029

Measure	MWh savings cumul. net 2029
Ductless mini-split air-source heat pump	82,000
Central air-source heat pump	72,000
Smart thermostat	32,000
Heat pump water heater	28,000
Clothes washer	26,000
Attic insulation	25,000
Fridge and freezer removal	24,000
Water heater insulation	24,000
Home energy reports	19,000
ES fridge and freezer	15,000

Table 65. Top program commercial electric measures, 2029

Measure	2029 cumul. net MWh
Variable speed drive	45,000
Integrated building design	42,000
Interior lighting design	27,000
Lighting controls	25,000
High-efficiency small walk-in	20,000
Deep energy retrofit	15,000
LED tube replacement	14,000
ECM fan motors	14,000
Evaporator fan speed controls	14,000
Evaporator fan motor retrofit	11,000

Southern Municipals Model Results

The Southern Municipals model is made up of 82 different municipal utilities. Many of them are members of a larger G&T organization like MRES – some municipals are independent and offer and report their CIP achievements independently of the G&T organization. Overall, Southern Municipals make up about 11% of the electric load in Minnesota.

Figure 6. Southern Municipals electric service territory

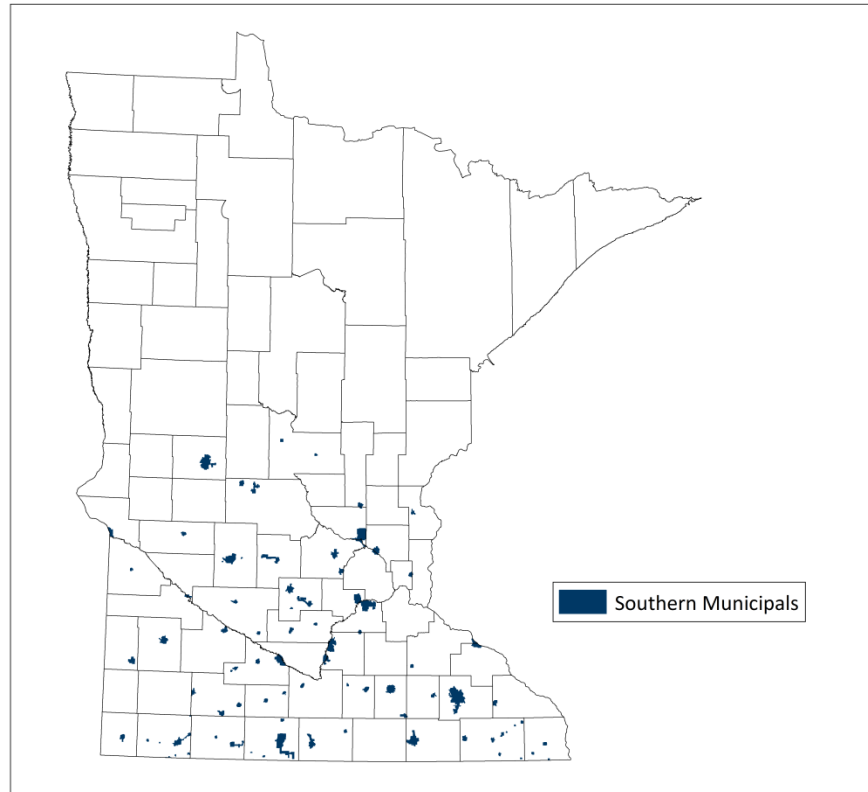


Table 66. Incremental annual savings percent⁸

Year	Economic	Max achievable	Program
2020	5.5%	2.4%	1.7%
2021	5.3%	2.7%	1.9%
2022	4.1%	2.2%	1.5%
2023	4.0%	2.4%	1.6%
2024	3.9%	2.5%	1.7%
2025	3.8%	2.5%	1.7%
2026	3.7%	2.5%	1.7%
2027	3.7%	2.5%	1.7%
2028	3.6%	2.5%	1.7%
2029	3.6%	2.5%	1.7%
10-year average	4.1%	2.5%	1.7%

Table 67. Incremental annual energy savings in GWh

Year	Economic	Max achievable	Program
2020	530	230	160
2021	520	270	180
2022	410	230	160
2023	420	250	170
2024	420	270	190
2025	420	280	190
2026	430	290	200
2027	430	290	200
2028	440	300	210
2029	440	310	210
10-year average	450	270	190

⁸ The project team used the average savings methodology to incorporate behavioral savings in the annual incremental results.

Table 68. Incremental annual CO2 savings in (tons CO2eq)

Year	Economic	Max achievable	Program
2020	260,000	113,000	78,000
2021	250,000	128,000	89,000
2022	199,000	108,000	74,000
2023	190,000	114,000	79,000
2024	192,000	124,000	85,000
2025	192,000	127,000	88,000
2026	187,000	126,000	87,000
2027	189,000	129,000	89,000
2028	192,000	132,000	91,000
2029	194,000	135,000	93,000
10-year average	204,000	124,000	85,000

Table 69. Cumulative annual savings percent

Year	Economic	Max achievable	Program
2020	6.1%	2.6%	1.8%
2021	10.9%	5.2%	3.6%
2022	14.4%	7.1%	4.9%
2023	17.6%	9.1%	6.3%
2024	19.6%	10.6%	7.3%
2025	21.6%	12.1%	8.3%
2026	24.2%	14.1%	9.7%
2027	26.5%	16.0%	11.0%
2028	28.4%	17.6%	12.2%
2029	30.1%	19.2%	13.2%

Table 70. Cumulative annual energy savings in GWh

Year	Economic	Max achievable	Program
2020	580	250	170
2021	1,070	510	350
2022	1,460	720	500
2023	1,830	950	650
2024	2,110	1,140	790
2025	2,390	1,340	920
2026	2,760	1,610	1,110
2027	3,110	1,870	1,290
2028	3,430	2,130	1,470
2029	3,740	2,390	1,650

Table 71. Cumulative annual CO2 savings (tons CO2eq)

Year	Economic	Max achievable	Program
2020	287,000	124,000	86,000
2021	514,000	243,000	168,000
2022	698,000	345,000	238,000
2023	837,000	434,000	299,000
2024	965,000	522,000	359,000
2025	1,092,000	613,000	422,000
2026	1,213,000	707,000	487,000
2027	1,367,000	823,000	567,000
2028	1,504,000	935,000	645,000
2029	1,643,000	1,047,000	723,000

Table 72. Annual utility program energy efficiency spending (\$)

Year	Max achievable	Program
2020	\$ 67,440,000	\$ 26,396,000
2021	\$ 79,488,000	\$ 31,062,000
2022	\$ 84,590,000	\$ 32,621,000
2023	\$ 95,909,000	\$ 36,843,000
2024	\$ 105,118,000	\$ 40,517,000
2025	\$ 109,559,000	\$ 42,375,000
2026	\$ 113,623,000	\$ 44,394,000
2027	\$ 116,028,000	\$ 45,880,000
2028	\$ 118,916,000	\$ 47,620,000
2029	\$ 121,614,000	\$ 49,412,000
10-year average	\$ 101,228,000	\$ 39,712,000

Table 73. Residential electric program potential savings by end use, 2029

End use	Sum of cumul. net MWh (2029)
Space heating	58,000
Appliances	41,000
Water heating	40,000
Refrigeration	30,000
System efficiency	30,000
Cooling	19,000
Plug loads	16,000
Indoor lighting	12,000
Exterior lighting	6,000
Other	4,000
Grand total	256,000

Table 74. Commercial electric program potential savings by end use, 2029

End use	Sum of cumul. net MWh (2029)
Refrigeration	219,000
Indoor lighting	206,000
System efficiency	164,000
Ventilation	98,000
Other	63,000
Exterior lighting	45,000
Cooling	25,000
Cooking	15,000
Plug loads	12,000
Space heating	12,000
Water heating	400
Process cooling and refrigeration	100
Motors - drives	100
Motors - pumps	30
Grand total	860,000

Table 75. Industrial electric program potential savings by end use. 2029

End use	Sum of cumul. net MWh (2029)
Motors - drives	136,000
Indoor lighting	74,000
Motors - pumps	74,000
System efficiency	65,000
Process heating	62,000
Motors - compressed air	51,000
Motors - fans/blowers	35,000
Other	33,000
Grand total	530,000

Table 76. Electric program potential savings by segment, 2029

Segment	Sum of cumul. net MWh (2029)
Industrial	531,000
Healthcare	182,000
Single family	155,000
Food sales	129,000
Education	126,000
Food service	110,000
Small office	87,000
Small retail	49,000
LI Single family	40,000
Warehouse	36,000
Large office	31,000
Large retail	27,000
LI Multifamily (5+ units)	26,000
Other commercial	25,000
Lodging	22,000
Public assembly	19,000
Multifamily (5+ units)	15,000
Street lighting	15,000
LI Multifamily (2-4 units)	10,000
Multifamily (2-4 units)	10,000
Agriculture	1,000
Grand total	1,646,000

Table 77. Top program residential electric measures, 2029

Measure	MWh savings cumul. net 2029
Clothes washer	25,000
Ductless mini-split air-source heat pump	25,000
Heat pump water heater	21,000
Fridge and freezer removal	17,000
Advanced power strip	16,000
Smart thermostat	16,000
ES fridge and freezer	13,000
Home energy reports	12,000
LED Tube Replacement Lamps	12,000
Dehumidifier	11,000

Table 78. Top program commercial electric measures, 2029

Measure	2029 cumul. net MWh
Integrated building design	95,000
Variable speed drive	67,000
Interior lighting design	58,000
Lighting controls	50,000
High-efficiency small walk-in	50,000
Deep energy retrofit	33,000
Evaporator fan speed controls	33,000
ECM fan motors	33,000
LED tube replacement	32,000
High-eff built-up refrigeration	30,000

Northern Municipals Model Results

The Northern Municipals model includes 42 utilities. Northern Municipals serve about 3 % of the electric load in Minnesota. Many Northern Municipals are part of a larger G&T organization however many are independent of a G&T.

Figure 7. Northern Municipals service territory in Minnesota

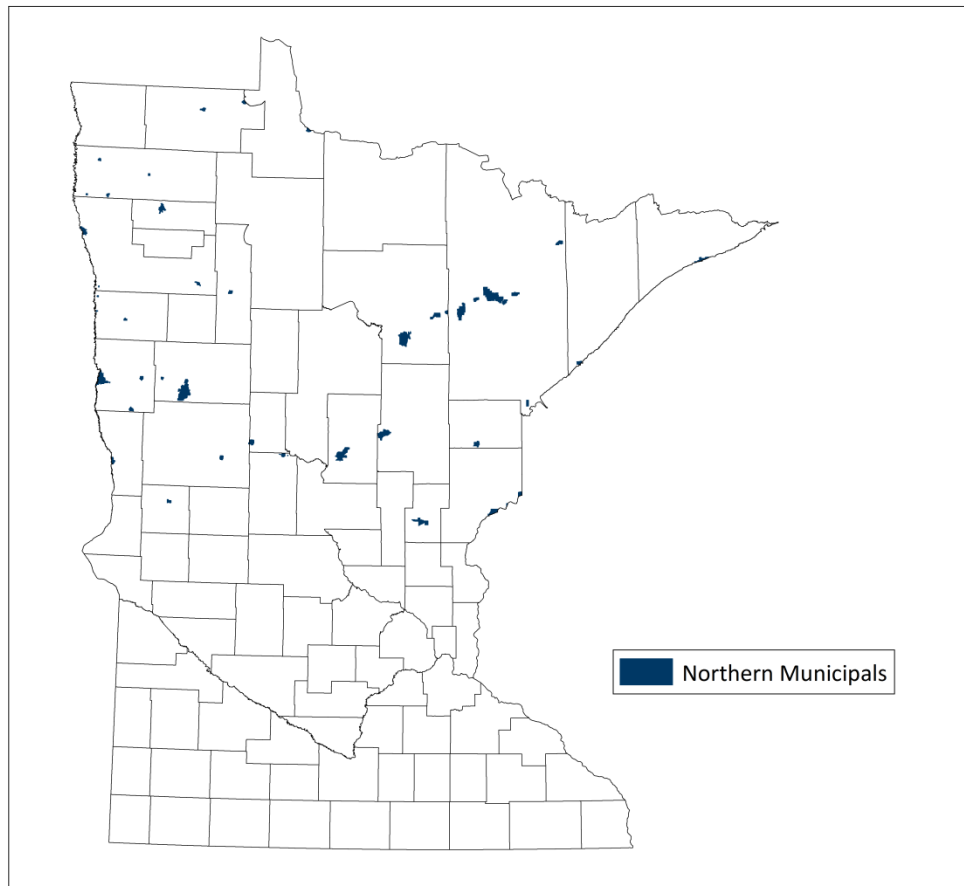


Table 79. Incremental annual savings percent⁹

Year	Economic	Max achievable	Program
2020	5.8%	2.4%	1.7%
2021	5.6%	2.8%	1.9%
2022	4.4%	2.3%	1.6%
2023	4.3%	2.5%	1.7%
2024	4.2%	2.6%	1.8%
2025	4.1%	2.6%	1.8%
2026	4.0%	2.7%	1.8%
2027	3.9%	2.6%	1.8%
2028	3.9%	2.6%	1.8%
2029	3.8%	2.6%	1.8%
10-year average	4.4%	2.6%	1.8%

Table 80. Incremental annual energy savings in GWh

Year	Economic	Max achievable	Program
2020	180	70	50
2021	180	90	60
2022	140	70	50
2023	140	80	60
2024	140	90	60
2025	140	90	60
2026	150	100	70
2027	150	100	70
2028	150	100	70
2029	150	100	70
10-year average	150	90	60

⁹ The project team used the average savings methodology to incorporate behavioral savings in the annual incremental results.

Table 81. Incremental annual CO2 savings in (tons CO2eq)

Year	Economic	Max achievable	Program
2020	89,000	37,000	26,000
2021	85,000	42,000	29,000
2022	69,000	36,000	25,000
2023	66,000	38,000	26,000
2024	66,000	41,000	29,000
2025	66,000	43,000	30,000
2026	64,000	42,000	29,000
2027	64,000	43,000	30,000
2028	65,000	44,000	31,000
2029	66,000	45,000	31,000
10-year average	70,000	41,000	28,000

Table 82. Cumulative annual savings percent

Year	Economic	Max achievable	Program
2020	6.5%	2.7%	1.9%
2021	11.6%	5.2%	3.6%
2022	15.3%	7.3%	5.0%
2023	18.8%	9.3%	6.4%
2024	21.1%	11.0%	7.6%
2025	23.3%	12.6%	8.7%
2026	26.2%	14.8%	10.2%
2027	28.7%	16.7%	11.6%
2028	30.8%	18.6%	12.9%
2029	32.8%	20.3%	14.1%

Table 83. Cumulative annual energy savings in GWh

Year	Economic	Max achievable	Program
2020	200	80	60
2021	370	170	120
2022	500	240	160
2023	630	310	220
2024	730	380	260
2025	820	440	310
2026	950	530	370
2027	1,070	620	430
2028	1,170	710	490
2029	1,280	790	550

Table 84. Cumulative annual CO2 savings (tons CO2eq)

Year	Economic	Max achievable	Program
2020	99,000	41,000	28,000
2021	176,000	80,000	55,000
2022	239,000	113,000	78,000
2023	287,000	143,000	99,000
2024	331,000	172,000	119,000
2025	375,000	203,000	140,000
2026	416,000	235,000	162,000
2027	468,000	273,000	189,000
2028	515,000	310,000	215,000
2029	561,000	347,000	241,000

Table 85. Annual utility program energy efficiency spending (\$)

Year	Max achievable	Program
2020	\$ 21,109,000	\$ 8,425,000
2021	\$ 25,047,000	\$ 9,993,000
2022	\$ 26,435,000	\$ 10,474,000
2023	\$ 29,765,000	\$ 11,813,000
2024	\$ 32,599,000	\$ 12,993,000
2025	\$ 34,125,000	\$ 13,669,000
2026	\$ 35,534,000	\$ 14,334,000
2027	\$ 36,459,000	\$ 14,841,000
2028	\$ 37,602,000	\$ 15,462,000
2029	\$ 38,585,000	\$ 16,054,000
10-year average	\$ 31,726,000	\$ 12,806,000

Table 86. Residential electric program potential savings by end use, 2029

End use	Sum of cumul. net MWh (2029)
Space heating	47,000
Water heating	22,000
Appliances	14,000
System efficiency	11,000
Refrigeration	11,000
Plug loads	5,000
Indoor lighting	4,000
Cooling	4,000
Exterior lighting	2,000
Other	1,000
Grand total	121,000

Table 87. Commercial electric program potential savings by end use, 2029

End use	Sum of cumul. net MWh (2029)
Indoor lighting	67,000
Refrigeration	64,000
System efficiency	52,000
Ventilation	32,000
Other	20,000
Exterior lighting	15,000
Space heating	5,000
Cooling	5,000
Plug loads	4,000
Cooking	4,000
Water heating	112
Motors - drives	10
Motors - pumps	10
Grand total	268,000

Table 88. Industrial electric program potential savings by end use. 2029

End use	Sum of cumul. net MWh (2029)
Motors - drives	50,000
Motors - pumps	24,000
Indoor lighting	18,000
System efficiency	17,000
Motors - compressed air	16,000
Process heating	13,000
Motors - fans/blowers	12,000
Other	6,000
Process cooling and refrigeration	3,000
Grand total	159,000

Table 89. Electric program potential savings by segment, 2029

Segment	Sum of cumul. net MWh (2029)
Industrial	160,000
Single family	70,000
Healthcare	61,000
Education	43,000
Food sales	38,000
Small office	33,000
Food service	27,000
LI Single family	23,000
Small retail	16,000
LI Multifamily (5+ units)	14,000
Warehouse	10,000
Large office	9,000
Lodging	7,000
Other commercial	7,000
Large retail	6,000
Multifamily (5+ units)	6,000
Public assembly	6,000
LI Multifamily (2-4 units)	5,000
Street lighting	5,000
Multifamily (2-4 units)	3,000
Agriculture	0
Grand total	549,000

Table 90. Top program residential electric measures, 2029

Measure	MWh savings cumul. net 2029
Ductless mini-split air-source heat pump	19,000
Clothes washer	9,000
Smart thermostat	8,000
Central air-source heat pump	7,000
Heat pump water heater	6,000
Fridge and freezer removal	6,000
Advanced power strip	5,000
Heat pump water heater	5,000
ES Refrigerator & Freezer	5,000
Water heater insulation	5,000

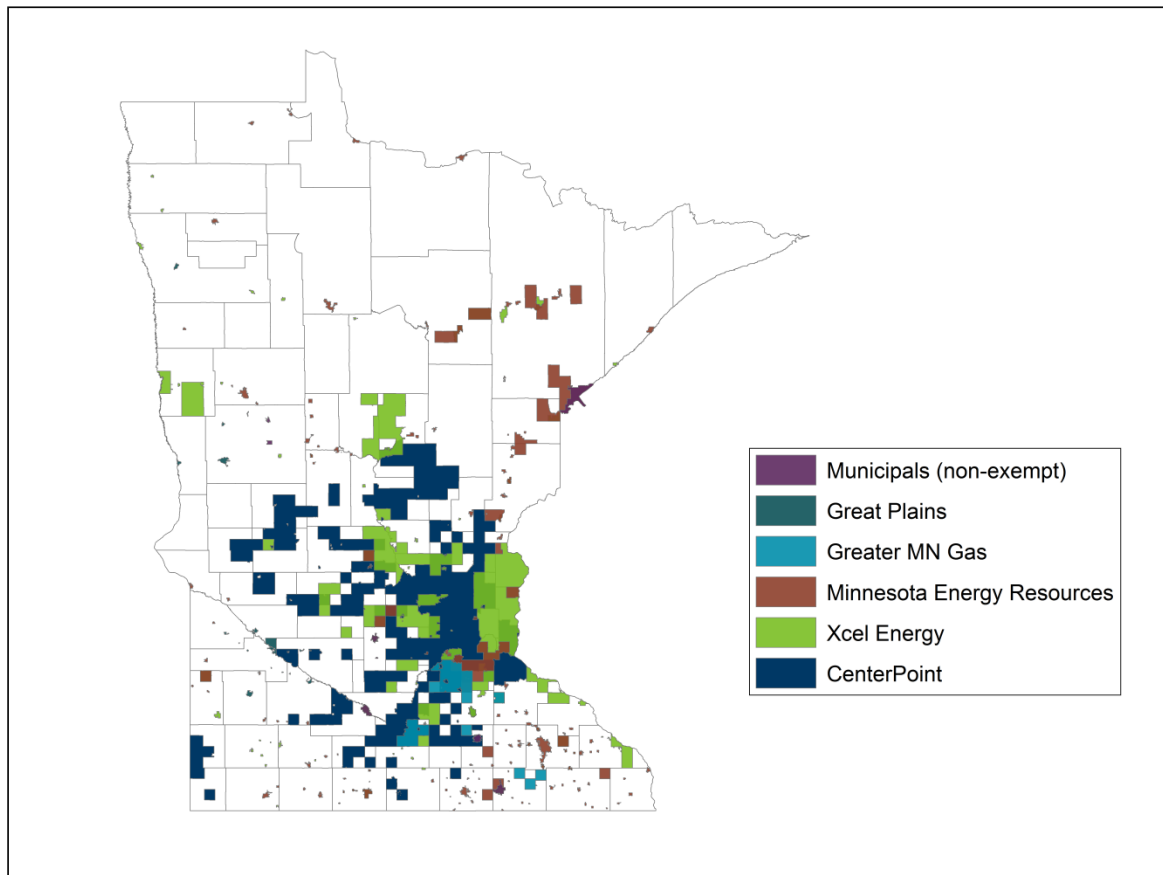
Table 91. Top program commercial electric measures, 2029

Measure	2029 cumul. net MWh
Integrated building design	29,000
Interior lighting design	18,000
Lighting controls	17,000
High-efficiency small walk-in	14,000
Variable speed drive	21,000
Deep energy retrofit	11,000
ECM fan motors	11,000
LED tube replacement	11,000
Evaporator fan speed controls	9,000
High-eff built-up refrigeration	9,000

Natural Gas Model Results

Overall, there are five investor-owned natural gas utilities and six natural gas municipal utilities in Minnesota that participate in the Conservation Improvement Program. These natural gas utilities provide natural gas service to a large portion of the state's population. However, unlike electricity utilities, natural gas utilities do not cover the geography of the entire state – this can be seen in Figure 8. Natural gas utilities have a long history of providing cost-effective energy efficiency solutions for their customers that help them reduce their heating bills, improve comfort, and lower their CO₂ emissions. Below, is an overview of the potential model results for the seven natural gas models analyzed by the project team. This section is intended to give the reader a detailed view of the energy savings that is available to these utilities in the coming decade. However, this section does not include a comprehensive view of the data available, for more information interested parties should seek out the utility reporting tool¹⁰ for more information on the potential that is modeled for these utilities.

Figure 8. Minnesota natural gas utility territory map.



¹⁰ Utility reporting tool can be found on the project website:

<https://www.mncee.org/mnpotentialstudy/home/>

CenterPoint Energy Model Results

CenterPoint Energy is the largest natural gas utility in Minnesota – they provide about 54% of the retail natural gas in the state. As seen in Figure 9 they provide natural gas territory across central and southern Minnesota, concentrated in the Twin Cities metro area. CenterPoint Energy has a long history of providing their customers cost-effective solutions to lower their energy consumption. CenterPoint Energy consistently meets or exceeds the minimum 1.0% savings percentage.

Figure 9. Map of CenterPoint Energy’s Minnesota natural gas territory

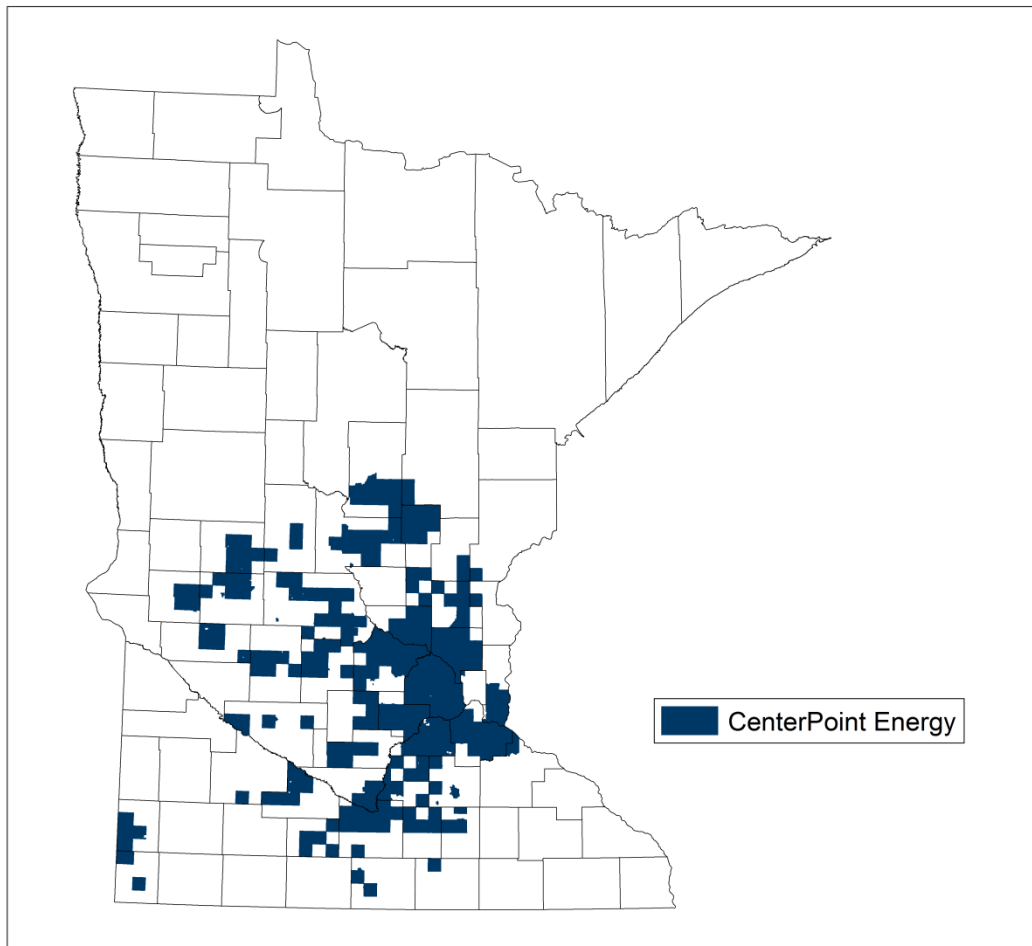


Table 92. Incremental annual savings percent¹¹

Year	Economic	Max achievable	Program
2020	4.8%	1.3%	0.8%
2021	4.6%	1.5%	1.0%
2022	4.5%	1.8%	1.2%
2023	4.4%	2.1%	1.3%
2024	4.3%	2.4%	1.5%
2025	4.2%	2.4%	1.5%
2026	4.0%	2.4%	1.5%
2027	3.9%	2.5%	1.5%
2028	3.8%	2.5%	1.6%
2029	3.7%	2.5%	1.6%
10-year average	4.2%	2.1%	1.3%

Table 93. Incremental annual energy savings in (Dth, thousands)

Year	Economic	Max achievable	Program
2020	8,000	2,100	1,300
2021	7,700	2,500	1,600
2022	7,700	3,100	2,000
2023	7,600	3,600	2,300
2024	7,500	4,100	2,600
2025	7,400	4,300	2,700
2026	7,300	4,400	2,700
2027	7,200	4,500	2,800
2028	7,100	4,700	2,900
2029	7,000	4,800	2,900
10-year average	7,500	3,800	2,400

¹¹ The project team used the average savings methodology to incorporate behavioral savings in the annual incremental results.

Table 94. Incremental annual CO2 savings in (tons CO2eq)

Year	Economic	Max achievable	Program
2020	461,400	120,900	76,000
2021	445,100	147,100	92,500
2022	448,100	181,000	113,600
2023	438,600	209,800	131,200
2024	432,700	239,200	149,000
2025	428,700	249,100	154,900
2026	421,500	255,500	158,400
2027	416,400	260,800	161,400
2028	412,900	270,600	167,000
2029	405,400	277,000	170,400
10-year average	431,100	221,100	137,400

Table 95. Cumulative annual savings percent

Year	Economic	Max achievable	Program
2020	5.5%	1.4%	0.9%
2021	9.6%	2.8%	1.8%
2022	13.7%	4.5%	2.9%
2023	17.6%	6.5%	4.1%
2024	21.4%	8.8%	5.5%
2025	25.0%	11.0%	6.9%
2026	28.3%	13.2%	8.2%
2027	31.4%	15.3%	9.6%
2028	34.1%	17.4%	10.8%
2029	36.7%	19.4%	12.1%

Table 96. Cumulative annual energy savings in (Dth, thousands)

Year	Economic	Max achievable	Program
2020	9,100	2,400	1,500
2021	16,200	4,800	3,000
2022	23,400	7,800	4,900
2023	30,500	11,300	7,100
2024	37,600	15,400	9,600
2025	44,500	19,600	12,300
2026	51,100	23,800	14,900
2027	57,400	28,000	17,500
2028	63,300	32,200	20,100
2029	69,100	36,500	22,700

Table 97. Cumulative annual CO2 savings (tons CO2eq)

Year	Economic	Max achievable	Program
2020	527,400	138,200	86,000
2021	939,700	276,700	173,600
2022	1,354,400	448,900	282,100
2023	1,764,800	653,300	410,400
2024	2,173,700	889,400	557,900
2025	2,573,700	1,132,000	709,100
2026	2,957,800	1,376,800	861,300
2027	3,320,200	1,620,200	1,012,000
2028	3,664,000	1,864,500	1,163,100
2029	4,000,300	2,112,500	1,315,800

Table 98. Annual utility program energy efficiency spending (\$)

Year	Max achievable	Program
2020	223,749,000	84,216,000
2021	272,620,000	102,419,000
2022	326,974,000	121,885,000
2023	385,517,000	142,382,000
2024	441,732,000	161,768,000
2025	455,645,000	165,821,000
2026	465,985,000	169,339,000
2027	475,302,000	173,143,000
2028	490,285,000	178,084,000
2029	493,581,000	177,897,000
10-year average	403,139,000	147,695,000

Table 99. Residential natural gas program potential savings by end use, 2029

End use	Cumulative 2029 energy savings (Dth, thousands)
Space heating	8,160
Water heating	1,020
System efficiency	360
Appliances	40
Grand total	9,580

Table 100. Commercial natural gas program potential savings by end use, 2029

End use	Cumulative 2029 energy savings (Dth, thousands)
Space heating	9,010
System efficiency	1,800
Cooking	520
Water heating	160
Process heating	1
Grand total	11,490

Table 101. Industrial natural gas program potential savings by end use. 2029

End use	Cumulative 2029 energy savings (Dth, thousands)
Process heating	870
System efficiency	390
Space heating	370
Other	50
Grand total	1,670

Table 102. Natural gas program potential savings by segment, 2029

Segment	Cumulative 2029 energy savings (Dth, thousands)
Single Family	6,960
Healthcare	2,940
Food service	2,060
Industrial	1,670
Small office	1,300
Small retail	1,270
LI Single Family	1,190
Education	1,140
Other commercial	730
Food sales	610
Multifamily (5+ units)	580
Public Assembly	520
Large office	430
LI Multifamily (5+ units)	410
Multifamily (2-4 units)	270
Warehouse	200
Large retail	190
LI Multifamily (2-4 units)	170
Lodging	90
Agriculture	1
Grand total	22,740

Table 103. Top residential natural gas measures, 2029

Measure	Cumulative 2029 energy savings (Dth, thousands)
Gas Furnace (94)	2,180
Tier 3 Tstat, Gas heat	2,000
Attic Insulation, Gas Heat	1,170
Gas Boiler (90)	560
Tier 1 Tstat, Gas Heat	520
Aerosol envelope sealing - SF	450
Boilers	420
MD Instant Gas Water Heater	390
Wall Insulation, Ext App, Gas Heat	270
Storage Gas Water Heater	260

Table 104. Top commercial natural gas measures, 2029

Measure	Cumulative 2029 energy savings (Dth, thousands)
Energy Recovery Ventilator, Gas Heat	2,010
Demand Control Ventilation	1,740
Boilers	1,480
Condensing Gas Furnace	1,400
Smart Thermostat, Gas Heat	1,170
Integrated bldg design, Gas	940
Kitchen Demand Control Ventilation	820
Condensing Gas RTU	570
Deep Energy Retrofit, Gas Heat	490
Commissioning, Gas Heat	370

Xcel Energy Natural Gas Model Results

In addition to being the largest electricity utility in Minnesota, Xcel Energy is also the second largest natural gas utility in Minnesota. Xcel Energy sells about 30% of the retail natural gas in Minnesota. Xcel Energy's service territory is concentrated in the metro region, as seen in Figure 10. Xcel Energy has a long history of providing cost effective natural gas savings in Minnesota. The potential modeling shows that Xcel can cost-efficiently save large amounts of gas in the coming decade.

Figure 10. Map of Xcel Energy's natural gas service territory in Minnesota

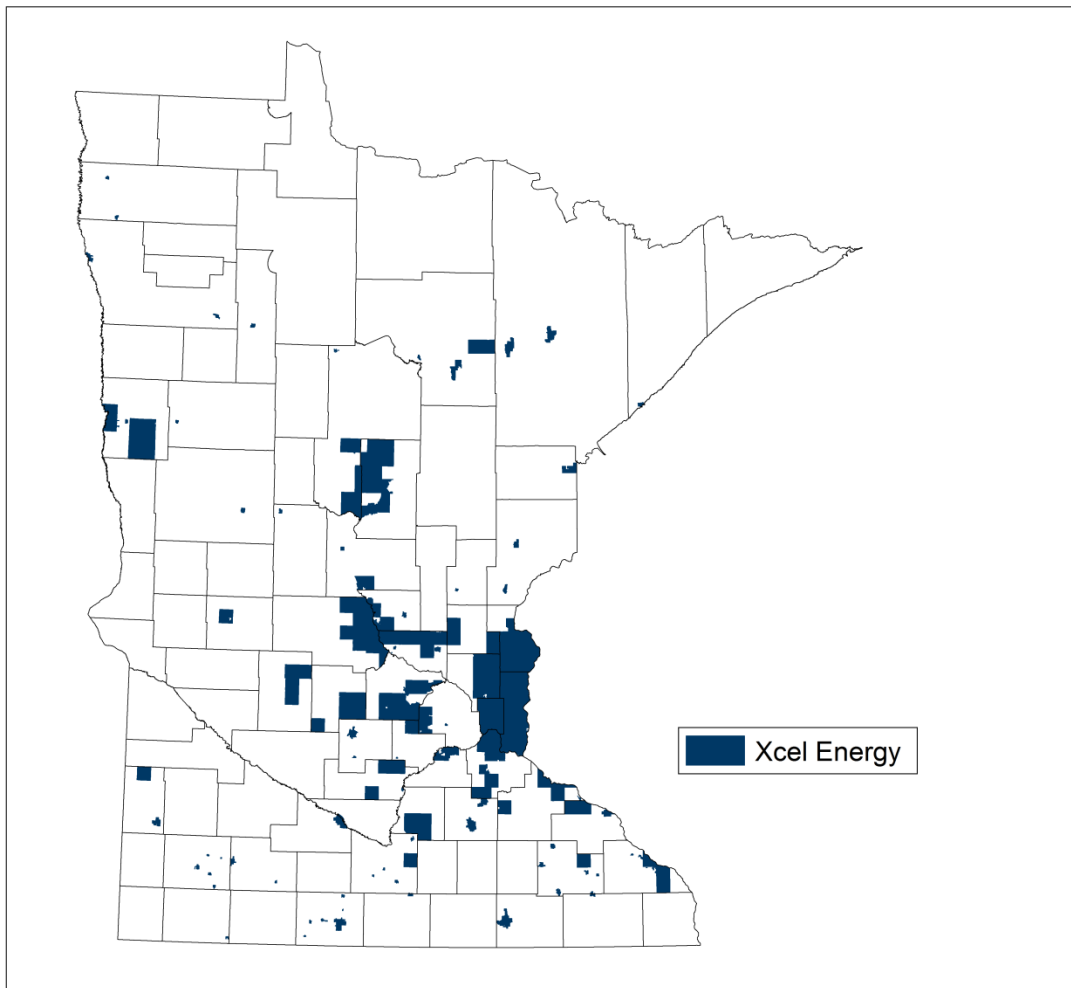


Table 105. Incremental annual savings percent¹²

Year	Economic	Max achievable	Program
2020	4.3%	1.2%	0.7%
2021	4.1%	1.4%	0.9%
2022	4.1%	1.7%	1.1%
2023	3.9%	2.0%	1.2%
2024	3.8%	2.2%	1.4%
2025	3.7%	2.2%	1.4%
2026	3.6%	2.2%	1.4%
2027	3.5%	2.2%	1.4%
2028	3.4%	2.3%	1.4%
2029	3.3%	2.3%	1.4%
10-year average	3.8%	2.0%	1.2%

Table 106. Incremental annual energy savings in (Dth, thousands)

Year	Economic	Max achievable	Program
2020	3,500	972	606
2021	3,400	1,177	739
2022	3,400	1,443	909
2023	3,300	1,668	1,048
2024	3,300	1,884	1,182
2025	3,200	1,935	1,211
2026	3,200	1,974	1,233
2027	3,100	2,009	1,254
2028	3,100	2,081	1,296
2029	3,100	2,133	1,326
10-year average	3,300	1,728	1,080

¹² The project team used the average savings methodology to incorporate behavioral savings in the annual incremental results.

Table 107. Incremental annual CO2 savings in (tons CO2eq)

Year	Economic	Max achievable	Program
2020	202,700	56,200	35,100
2021	195,400	68,100	42,700
2022	195,900	83,500	52,600
2023	191,700	96,500	60,700
2024	189,100	109,000	68,400
2025	187,200	111,900	70,000
2026	184,200	114,200	71,300
2027	182,000	116,200	72,500
2028	180,300	120,400	75,000
2029	177,300	123,400	76,700
10-year average	188,600	99,900	62,500

Table 108. Cumulative annual savings percent

Year	Economic	Max achievable	Program
2020	5.1%	1.4%	0.9%
2021	8.7%	2.7%	1.7%
2022	12.3%	4.3%	2.7%
2023	15.7%	6.1%	3.9%
2024	19.0%	8.2%	5.2%
2025	22.2%	10.2%	6.4%
2026	25.1%	12.2%	7.7%
2027	27.7%	14.1%	8.9%
2028	30.1%	16.0%	10.0%
2029	32.4%	17.8%	11.2%

Table 109. Cumulative annual energy savings in (Dth, thousands)

Year	Economic	Max achievable	Program
2020	4,100	1,100	700
2021	7,200	2,200	1,400
2022	10,300	3,600	2,300
2023	13,300	5,200	3,300
2024	16,300	7,000	4,400
2025	19,300	8,900	5,600
2026	22,100	10,800	6,800
2027	24,800	12,600	7,900
2028	27,300	14,500	9,100
2029	29,800	16,400	10,300

Table 110. Cumulative annual CO2 savings (tons CO2eq)

Year	Economic	Max achievable	Program
2020	237,400	65,300	40,300
2021	415,500	128,800	80,500
2022	593,900	207,700	130,400
2023	769,800	300,700	189,000
2024	944,400	407,000	255,900
2025	1,115,600	515,100	323,800
2026	1,279,300	623,400	391,700
2027	1,433,600	730,500	458,700
2028	1,579,500	837,600	525,700
2029	1,722,400	946,500	593,600

Table 111. Annual utility program energy efficiency spending (\$)

Year	Max achievable	Program
2020	98,848,000	35,937,000
2021	118,375,000	43,164,000
2022	141,240,000	51,285,000
2023	165,430,000	59,674,000
2024	188,416,000	67,565,000
2025	192,893,000	68,913,000
2026	196,195,000	70,132,000
2027	198,954,000	71,395,000
2028	204,814,000	73,413,000
2029	206,661,000	73,676,000
10-year average	171,183,000	61,515,000

Table 112. Residential natural gas program potential savings by end use, 2029

End use	Cumulative 2029 energy savings (Dth, thousands)
Space heating	4,300
Water heating	500
System efficiency	200
Appliances	20
Grand total	5,000

Table 113. Commercial natural gas program potential savings by end use, 2029

End use	Cumulative 2029 energy savings (Dth, thousands)
Space heating	3,000
System efficiency	600
Cooking	200
Water heating	50
Process heating	0
Grand total	3,700

Table 114. Industrial natural gas program potential savings by end use. 2029

End use	Cumulative 2029 energy savings (Dth, thousands)
Process heating	700

Space heating	400
System efficiency	300
Other	40
Grand total	1,500

Table 115. Natural gas program potential savings by segment, 2029

Segment	Cumulative 2029 energy savings (Dth, thousands)
Single Family	3,610
Industrial	1,510
Healthcare	920
LI Single Family	700
Food service	580
Small retail	440
Small office	420
Education	420
Other commercial	280
Multifamily (5+ units)	250
Food sales	240
LI Multifamily (5+ units)	230
Public Assembly	180
Multifamily (2-4 units)	120
LI Multifamily (2-4 units)	120
Large office	120
Large retail	70
Warehouse	60
Lodging	30
Agriculture	0
Grand Total	10,260

Table 116. Top residential natural gas measures, 2029

Measure	Cumulative 2029 energy savings (Dth, thousands)
Gas Furnace (94)	1,150
Tier 3 Tstat, Gas heat	1,050
Attic Insulation, Gas Heat	620
Gas Boiler (90)	290
Tier 1 Tstat, Gas Heat	270

Aerosol envelope sealing - SF	240
MD Instant Gas Water Heater	210
Boilers	200
Wall Insulation, Ext App, Gas Heat	150
Storage Gas Water Heater	140

Table 117. Top commercial natural gas measures, 2029

Measure	Cumulative 2029 energy savings (Dth, thousands)
Energy Recovery Ventilator, Gas Heat	660
Demand Control Ventilation	560
Boilers	480
Condensing Gas Furnace	470
Smart Thermostat, Gas Heat	380
Integrated bldg design, Gas	300
Kitchen Demand Control Ventilation	250
Condensing Gas RTU	190
Deep Energy Retrofit, Gas Heat	160
Commissioning, Gas Heat	120

Minnesota Energy Resources Corporation Model Results

Minnesota Energy Resources sells about 14% of the retail natural gas in Minnesota. As seen in Figure 11 their service territory expands the entirety of Minnesota. Minnesota Energy Resources provides natural gas to International Falls and Austin which are in opposite ends of the state. Minnesota Energy Resources has a long history of providing cost-effective solutions to reduce energy consumption for their customers. Minnesota Energy Resources has consistently met or exceeded their CIP goals.

Figure 11. Map of Minnesota Energy Resource's natural gas service territory in Minnesota.

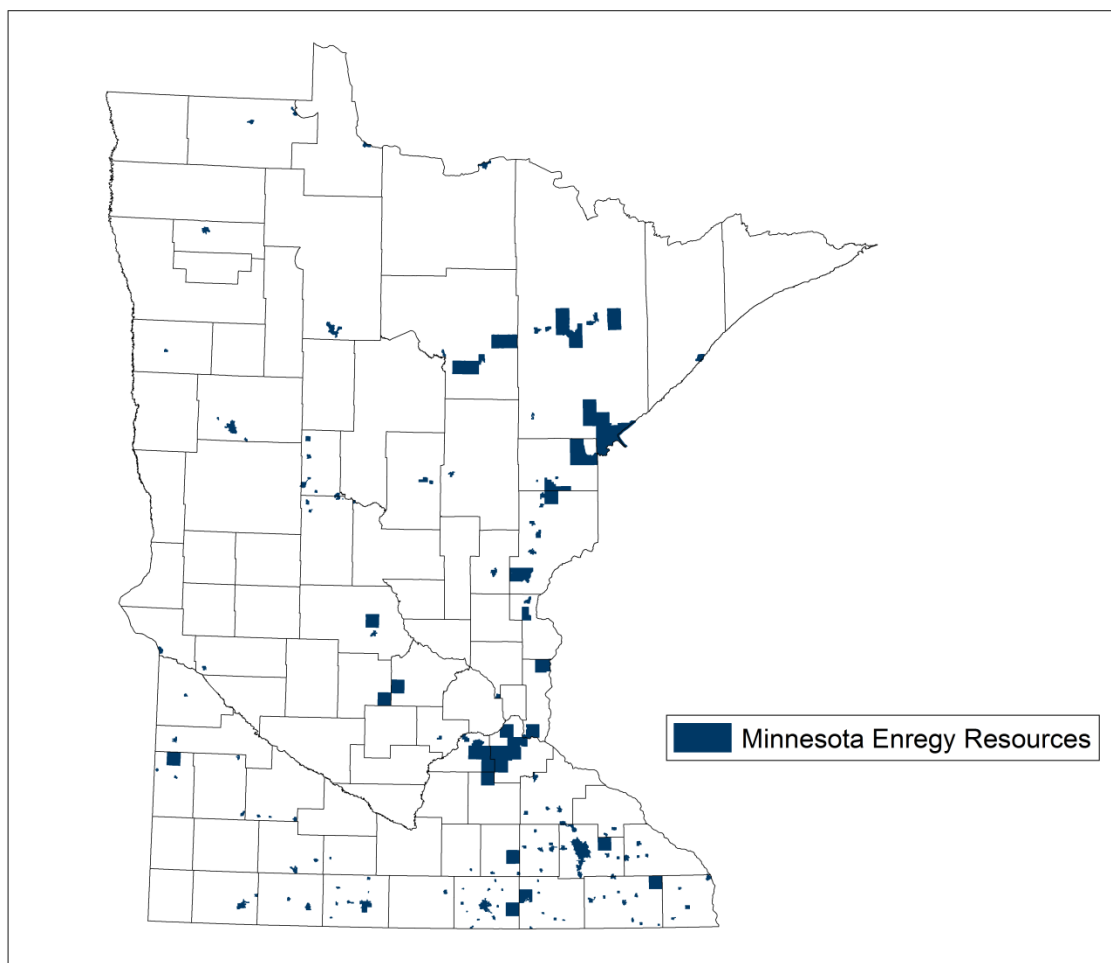


Table 118. Incremental annual savings percent¹³

Year	Economic	Max achievable	Program
2020	3.6%	1.0%	0.6%
2021	3.4%	1.2%	0.8%
2022	3.4%	1.5%	1.0%
2023	3.3%	1.7%	1.1%
2024	3.3%	1.9%	1.2%
2025	3.2%	1.9%	1.2%
2026	3.1%	1.9%	1.2%
2027	3.1%	1.9%	1.2%
2028	3.0%	2.0%	1.3%
2029	3.0%	2.0%	1.3%
10-year average	3.2%	1.7%	1.1%

Table 119. Incremental annual energy savings in (Dth, thousands)

Year	Economic	Max achievable	Program
2020	2,800	800	500
2021	2,800	1,000	600
2022	2,800	1,200	800
2023	2,800	1,400	900
2024	2,700	1,600	1,000
2025	2,700	1,600	1,000
2026	2,700	1,600	1,100
2027	2,700	1,700	1,100
2028	2,700	1,700	1,100
2029	2,700	1,800	1,200
10-year average	2,700	1,400	900

¹³ The project team used the average savings methodology to incorporate behavioral savings in the annual incremental results.

Table 120. Incremental annual CO2 savings in (tons CO2eq)

Year	Economic	Max achievable	Program
2020	164,100	45,300	29,600
2021	160,500	56,700	37,200
2022	161,900	71,100	46,900
2023	160,000	81,700	53,800
2024	158,800	91,200	59,800
2025	158,300	92,700	60,400
2026	156,800	94,500	61,300
2027	155,800	96,600	62,500
2028	155,400	100,400	64,800
2029	154,200	103,400	66,600
10-year average	158,600	83,400	54,300

Table 121. Cumulative annual savings percent

Year	Economic	Max achievable	Program
2020	4.0%	1.1%	0.7%
2021	7.2%	2.2%	1.5%
2022	10.3%	3.7%	2.4%
2023	13.3%	5.3%	3.5%
2024	16.3%	7.1%	4.7%
2025	19.1%	8.8%	5.8%
2026	21.7%	10.5%	6.9%
2027	24.0%	12.1%	7.9%
2028	26.1%	13.6%	8.9%
2029	28.1%	15.1%	9.9%

Table 122. Cumulative annual energy savings in (Dth, thousands)

Year	Economic	Max achievable	Program
2020	3,200	900	600
2021	5,800	1,800	1,200
2022	8,400	3,000	2,000
2023	11,000	4,400	2,900
2024	13,700	5,900	3,900
2025	16,300	7,500	4,900
2026	18,800	9,100	6,000
2027	21,100	10,600	6,900
2028	23,200	12,100	7,900
2029	25,400	13,600	8,900

Table 123. Cumulative annual CO2 savings (tons CO2eq)

Year	Economic	Max achievable	Program
2020	182,700	50,200	32,400
2021	333,900	104,500	68,200
2022	486,500	173,100	113,700
2023	638,700	253,300	166,700
2024	791,200	343,800	226,200
2025	941,800	434,800	285,700
2026	1,085,000	524,800	344,400
2027	1,219,100	613,100	401,900
2028	1,344,200	700,200	458,500
2029	1,467,800	789,100	516,000

Table 124. Annual utility program energy efficiency spending (\$)

Year	Max achievable	Program
2020	73,530,000	27,827,000
2021	90,852,000	34,460,000
2022	108,377,000	40,839,000
2023	127,198,000	47,640,000
2024	143,811,000	53,403,000
2025	147,994,000	54,632,000
2026	150,890,000	55,547,000
2027	153,803,000	56,689,000
2028	158,514,000	58,172,000
2029	162,234,000	59,448,000
10-year average	131,720,000	48,866,000

Table 125. Residential natural gas program potential savings by end use, 2029

End use	Cumulative 2029 energy savings (Dth, thousands)
Space heating	2,300
Water heating	200
System efficiency	100
Appliances	10
Grand total	2,600

Table 126. Commercial natural gas program potential savings by end use, 2029

End use	Cumulative 2029 energy savings (Dth, thousands)
Space heating	2,700
System efficiency	500
Cooking	100
Water heating	40
Process heating	0
Grand total	3,400

Table 127. Industrial natural gas program potential savings by end use. 2029

End use	Cumulative 2029 energy savings (Dth, thousands)
Process heating	1,500
Space heating	800
System efficiency	600
Other	100
Grand total	2,900

Table 128. Natural gas program potential savings by segment, 2029

Segment	Cumulative 2029 energy savings (Dth, thousands)
Industrial	2,930
Single Family	1,850
Healthcare	810
Education	520
LI Single Family	500
Food service	420
Small office	410
Small retail	360
Food sales	300
Other commercial	200
Public Assembly	130
LI Multifamily (5+ units)	100
Large office	70
Multifamily (5+ units)	60
LI Multifamily (2-4 units)	60
Multifamily (2-4 units)	50
Warehouse	50
Large retail	50
Lodging	40
Agriculture	0
Grand Total	8,920

Table 129. Top residential natural gas measures, 2029

Measure	Cumulative 2029 energy savings (Dth, thousands)
Gas Furnace (94)	630
Tier 3 Tstat, Gas heat	560
Attic Insulation, Gas Heat	340
Gas Boiler (90)	160
Tier 1 Tstat, Gas Heat	140
Aerosol envelope sealing - SF	130
MD Instant Gas Water Heater	100
Wall Insulation, Ext App, Gas Heat	80
Boilers	70
Storage Gas Water Heater	70

Table 130. Top commercial natural gas measures, 2029

Measure	Cumulative 2029 energy savings (Dth, thousands)
Energy Recovery Ventilator, Gas Heat	650
Boilers	460
Condensing Gas Furnace	440
Demand Control Ventilation	430
Smart Thermostat, Gas Heat	350
Integrated bldg design, Gas	280
Kitchen Demand Control Ventilation	230
Condensing Gas RTU	190
Deep Energy Retrofit, Gas Heat	150
Commissioning, Gas Heat	110

Great Plains Natural Gas Model Results

Great Plains Natural Gas is a smaller investor owned natural gas utility in Minnesota. As seen in Figure 12 Great Plains is located in cities in Western Minnesota. Great Plains sells about 2% of the retail natural gas in Minnesota. Great Plains offers its customers cost-effective programs to save energy consumption.

Figure 12. Map of Great Plains Natural Gas Minnesota service territory.

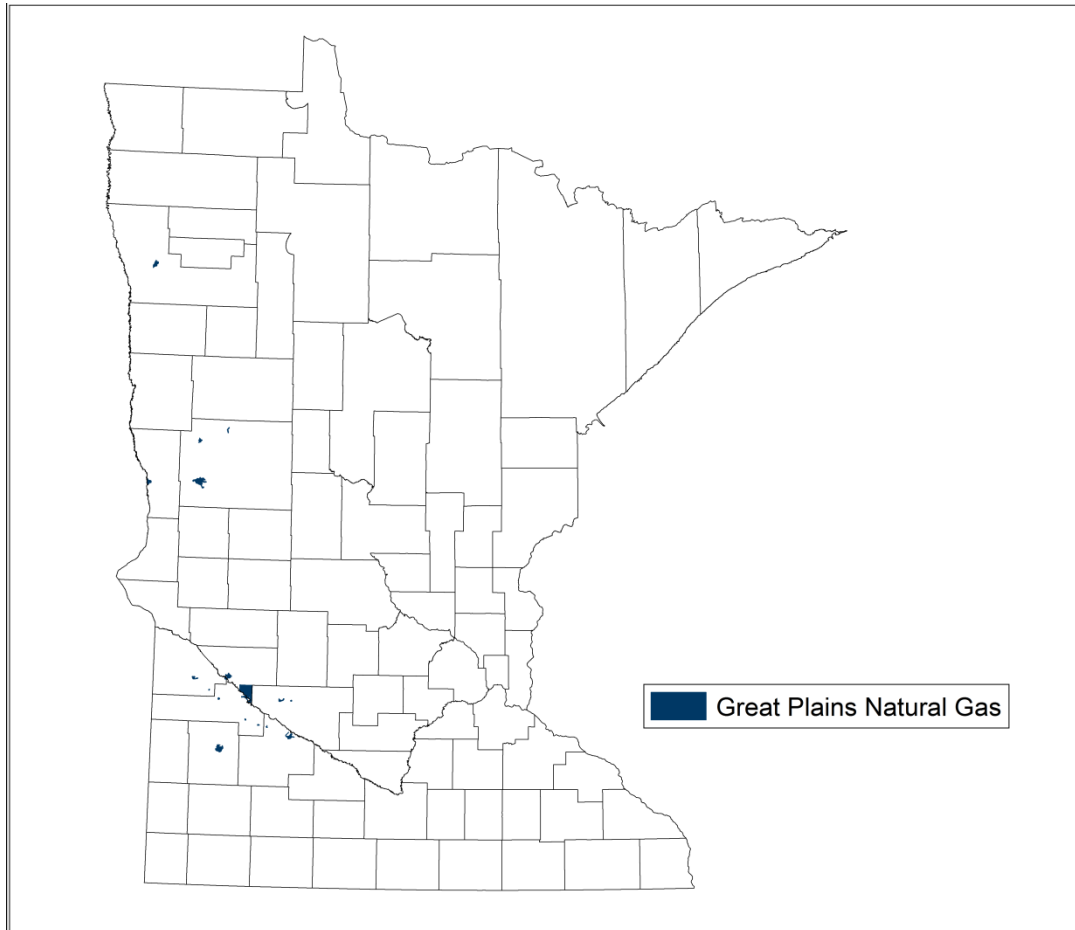


Table 131. Incremental annual savings percent¹⁴

Year	Economic	Max achievable	Program
2020	3.5%	0.9%	0.6%
2021	3.4%	1.2%	0.8%
2022	3.4%	1.5%	1.0%
2023	3.3%	1.7%	1.1%
2024	3.3%	1.9%	1.2%
2025	3.2%	1.9%	1.2%
2026	3.1%	1.9%	1.2%
2027	3.1%	1.9%	1.2%
2028	3.0%	2.0%	1.3%
2029	3.0%	2.0%	1.3%
10-year average	3.2%	1.7%	1.1%

Table 132. Incremental annual energy savings in (Dth, thousands)

Year	Economic	Max achievable	Program
2020	240	70	40
2021	240	80	50
2022	240	100	70
2023	240	120	80
2024	240	140	90
2025	240	140	90
2026	240	140	90
2027	240	150	100
2028	230	150	100
2029	230	160	100
10-year average	240	120	80

¹⁴ The project team used the average savings methodology to incorporate behavioral savings in the annual incremental results.

Table 133. Incremental annual CO2 savings in (tons CO2eq)

Year	Economic	Max achievable	Program
2020	14,200	3,800	2,500
2021	13,900	4,800	3,200
2022	14,100	6,000	4,000
2023	14,000	7,000	4,600
2024	13,900	7,900	5,200
2025	13,800	8,100	5,300
2026	13,700	8,300	5,400
2027	13,600	8,500	5,500
2028	13,600	8,800	5,700
2029	13,400	9,000	5,900
10-year average	13,800	7,200	4,700

Table 134. Cumulative annual savings percent

Year	Economic	Max achievable	Program
2020	3.9%	1.0%	0.7%
2021	7.1%	2.1%	1.4%
2022	10.2%	3.5%	2.3%
2023	13.3%	5.1%	3.4%
2024	16.3%	6.9%	4.6%
2025	19.1%	8.7%	5.8%
2026	21.8%	10.4%	6.9%
2027	24.2%	12.0%	7.9%
2028	26.4%	13.6%	9.0%
2029	28.5%	15.2%	10.0%

Table 135. Cumulative annual energy savings in (Dth, thousands)

Year	Economic	Max achievable	Program
2020	270	70	50
2021	500	150	100
2022	730	250	170
2023	960	370	250
2024	1,190	510	340
2025	1,420	650	430
2026	1,640	780	520
2027	1,850	920	610
2028	2,050	1,060	700
2029	2,240	1,190	790

Table 136. Cumulative annual CO2 savings (tons CO2eq)

Year	Economic	Max achievable	Program
2020	15,600	4,200	2,700
2021	28,800	8,700	5,800
2022	42,200	14,600	9,700
2023	55,600	21,500	14,300
2024	69,100	29,400	19,600
2025	82,400	37,400	24,800
2026	95,100	45,400	30,100
2027	107,100	53,200	35,200
2028	118,400	61,100	40,300
2029	129,600	69,000	45,500

Table 137. Annual utility program energy efficiency spending (\$)

Year	Max achievable	Program
2020	6,523,000	2,523,000
2021	8,101,000	3,133,000
2022	9,639,000	3,696,000
2023	11,319,000	4,301,000
2024	12,804,000	4,815,000
2025	13,199,000	4,927,000
2026	13,436,000	4,993,000
2027	13,692,000	5,090,000
2028	14,091,000	5,207,000
2029	14,407,000	5,311,000
10-year average	11,721,000	4,400,000

Table 138. Residential natural gas program potential savings by end use, 2029

End use	Cumulative 2029 energy savings (Dth, thousands)
Space heating	180
Water heating	20
System efficiency	10
Appliances	1
Grand total	210

Table 139. Commercial natural gas program potential savings by end use, 2029

End use	Cumulative 2029 energy savings (Dth, thousands)
Space heating	260
System efficiency	50
Cooking	10
Water heating	3
Process heating	0
Grand total	320

Table 140. Industrial natural gas program potential savings by end use. 2029

End use	Cumulative 2029 energy savings (Dth, thousands)
Process heating	160
Space heating	40
System efficiency	40
Other	4
Grand total	250

Table 141. Natural gas program potential savings by segment, 2029

Segment	Cumulative 2029 energy savings (Dth, thousands)
Industrial	250
Single Family	130
Healthcare	120
LI Single Family	50
Education	40
Small office	40
Small retail	30
Food service	20
Other commercial	20
Food sales	20
LI Multifamily (5+ units)	10
Warehouse	10
LI Multifamily (2-4 units)	10
Multifamily (2-4 units)	10
Public Assembly	10
Multifamily (5+ units)	10
Large retail	10
Lodging	4
Large office	3
Agriculture	0
Grand Total	790

Table 142. Top residential natural gas measures, 2029

Measure	Cumulative 2029 energy savings (Dth, thousands)
Gas Furnace (94)	50
Tier 3 Tstat, Gas heat	40
Attic Insulation, Gas Heat	30
Gas Boiler (90)	10
Tier 1 Tstat, Gas Heat	10
Aerosol envelope sealing - SF	10
MD Instant Gas Water Heater	7
Wall Insulation, Ext App, Gas Heat	7
Boilers	6
Storage Gas Water Heater	5

Table 143. Top commercial natural gas measures, 2029

Measure	Cumulative 2029 energy savings (Dth, thousands)
Energy Recovery Ventilator, Gas Heat	60
Demand Control Ventilation	60
Boilers	50
Condensing Gas Furnace	40
Smart Thermostat, Gas Heat	30
Integrated bldg design, Gas	30
Condensing Gas RTU	20
Kitchen Demand Control Ventilation	20
Deep Energy Retrofit, Gas Heat	10
Commissioning, Gas Heat	10

Greater Minnesota Gas Model Results

Greater Minnesota Gas is a small investor-owned natural gas utility. As seen in Figure 13, their service territory is located in rural communities south of the metro twin cities area. Greater Minnesota Gas sells about 0.5% of the retail natural gas in Minnesota. Greater Minnesota Gas offers their customers cost-effective programs to reduce their energy use.

Figure 13. Map of Greater Minnesota Gas natural gas service territory.

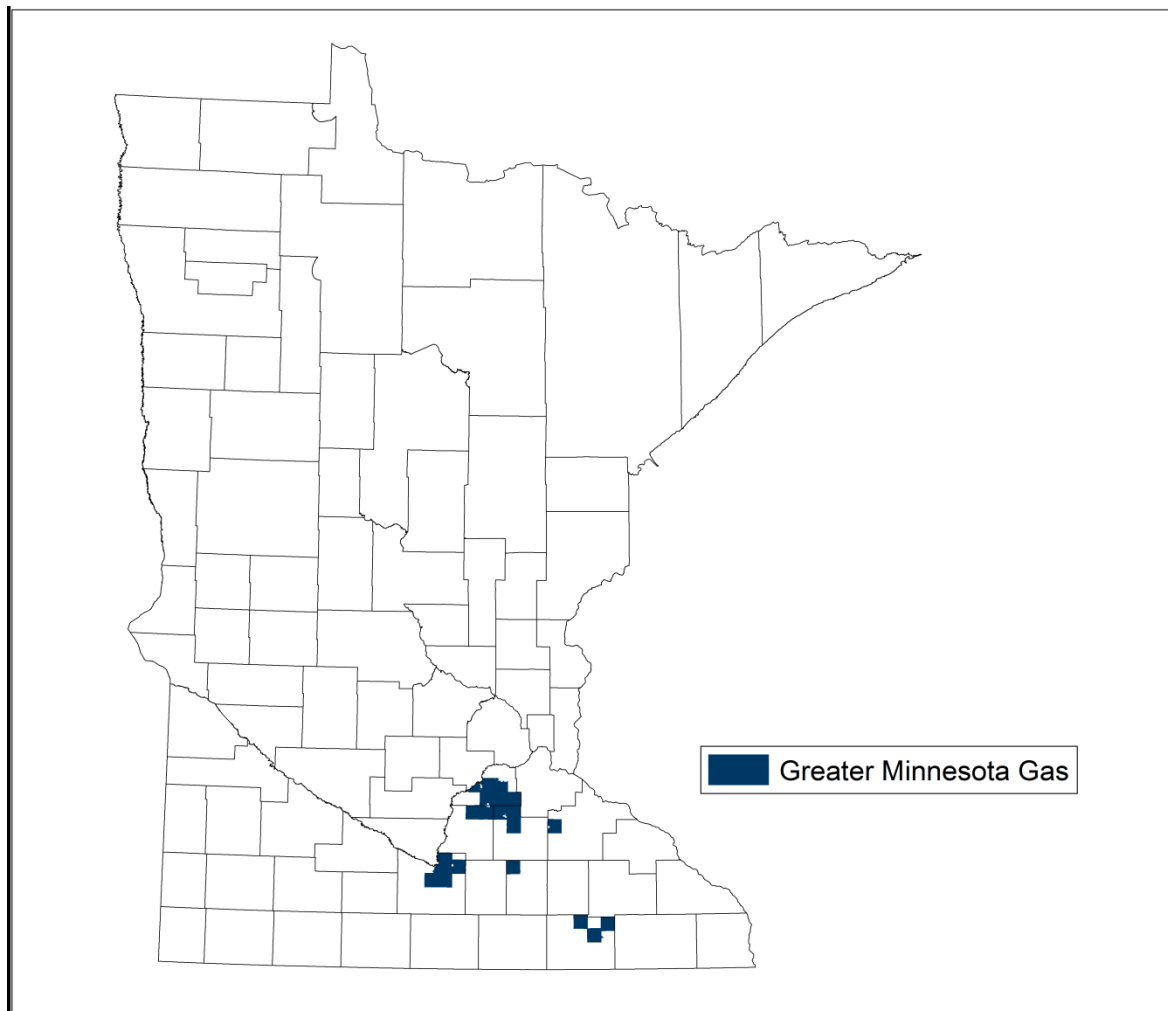


Table 144. Incremental annual savings percent¹⁵

Year	Economic	Max achievable	Program
2020	2.8%	0.9%	0.6%
2021	2.7%	1.1%	0.7%
2022	2.7%	1.3%	0.9%
2023	2.6%	1.5%	1.0%
2024	2.5%	1.6%	1.1%
2025	2.5%	1.6%	1.1%
2026	2.4%	1.6%	1.0%
2027	2.4%	1.6%	1.0%
2028	2.3%	1.6%	1.1%
2029	2.3%	1.6%	1.1%
10-year average	2.5%	1.4%	0.9%

Table 145. Incremental annual energy savings in (Dth, thousands)

Year	Economic	Max achievable	Program
2020	40	10	10
2021	40	20	10
2022	40	20	10
2023	40	20	20
2024	40	30	20
2025	40	30	20
2026	40	30	20
2027	40	30	20
2028	40	30	20
2029	40	30	20
10-year average	40	20	20

¹⁵ The project team used the average savings methodology to incorporate behavioral savings in the annual incremental results.

Table 146. Incremental annual CO2 savings in (tons CO2eq)

Year	Economic	Max achievable	Program
2020	2,500	800	500
2021	2,400	1,000	600
2022	2,400	1,200	800
2023	2,400	1,400	900
2024	2,400	1,500	1,000
2025	2,300	1,500	1,000
2026	2,300	1,500	1,000
2027	2,300	1,500	1,000
2028	2,300	1,600	1,000
2029	2,300	1,600	1,100
10-year average	2,400	1,400	900

Table 147. Cumulative annual savings percent

Year	Economic	Max achievable	Program
2020	3.4%	1.0%	0.7%
2021	5.8%	2.0%	1.3%
2022	8.1%	3.2%	2.1%
2023	10.3%	4.6%	3.0%
2024	12.4%	6.1%	4.0%
2025	14.4%	7.6%	5.0%
2026	16.3%	8.9%	5.9%
2027	18.0%	10.2%	6.7%
2028	19.5%	11.5%	7.6%
2029	21.0%	12.7%	8.4%

Table 148. Cumulative annual energy savings in (Dth, thousands)

Year	Economic	Max achievable	Program
2020	50	20	10
2021	90	30	20
2022	130	50	30
2023	160	70	50
2024	200	100	70
2025	240	120	80
2026	270	150	100
2027	300	170	110
2028	330	200	130
2029	370	220	150

Table 149. Cumulative annual CO2 savings (tons CO2eq)

Year	Economic	Max achievable	Program
2020	3,000	900	600
2021	5,200	1,800	1,200
2022	7,400	2,900	1,900
2023	9,500	4,300	2,800
2024	11,600	5,700	3,800
2025	13,700	7,200	4,700
2026	15,700	8,600	5,700
2027	17,600	10,000	6,600
2028	19,400	11,400	7,500
2029	21,100	12,800	8,500

Table 150. Annual utility program energy efficiency spending (\$)

Year	Max achievable	Program
2020	1,167,000	400,000
2021	1,357,000	471,000
2022	1,601,000	558,000
2023	1,849,000	644,000
2024	2,069,000	720,000
2025	2,082,000	725,000
2026	2,087,000	729,000
2027	2,086,000	734,000
2028	2,136,000	753,000
2029	2,180,000	770,000
10-year average	1,861,000	650,000

Table 151. Residential natural gas program potential savings by end use, 2029

End use	Cumulative 2029 energy savings (Dth, thousands)
Space heating	63
Water heating	7
System efficiency	3
Grand total	73

Table 152. Commercial natural gas program potential savings by end use, 2029

End use	Cumulative 2029 energy savings (Dth, thousands)
Space heating	9
System efficiency	2
Grand total	11

Table 153. Industrial natural gas program potential savings by end use. 2029

End use	Cumulative 2029 energy savings (Dth, thousands)
Process heating	37
System efficiency	15
Space heating	9
Other	2
Grand total	63

Table 154. Natural gas program potential savings by segment, 2029

Segment	Cumulative 2029 energy savings (Dth, thousands)
Industrial	63
Single Family	55
LI Single Family	10
Other commercial	4
LI Multifamily (5+ units)	3
Small office	2
Multifamily (2-4 units)	2
Multifamily (5+ units)	2
Small retail	1
Food service	1
LI Multifamily (2-4 units)	1
Education	1
Warehouse	1
Food sales	0
Public Assembly	0
Agriculture	0
Healthcare	0
Grand Total	146

Table 155. Top residential natural gas measures, 2029

Measure	Cumulative 2029 energy savings (Dth, thousands)
Gas Furnace (94)	18
Tier 3 Tstat, Gas heat	16
Attic Insulation, Gas Heat	9
Gas Boiler (90)	4
Tier 1 Tstat, Gas Heat	4
Aerosol envelope sealing - SF	4
MD Instant Gas Water Heater	3
Wall Insulation, Ext App, Gas Heat	2
Boilers	2
Electronic Ignition Gas Hearth	2

Table 156. Top commercial natural gas measures, 2029

Measure	Cumulative 2029 energy savings (Dth, thousands)
Condensing Gas Furnace	2
Demand Control Ventilation	2
Energy Recovery Ventilator, Gas Heat	2
Smart Thermostat, Gas Heat	2
Boilers	1
Integrated bldg design, Gas	1
Greenhouse Unit Heater	1
Kitchen Demand Control Ventilation	1
Condensing Gas RTU	1
Deep Energy Retrofit, Gas Heat	0