APPENDIX B: DEMAND SIDE MANAGEMENT

This Appendix of the 2021 Integrated Resource Plan ("2021 IRP") contains information regarding Minnesota Power's planning and strategies for demand side management ("DSM"), Energy Efficiency ("EE") and Conservation Improvement Programs ("CIP"). Minnesota Power's performance and planning outlooks for DSM, EE and CIP are broken into two parts in this Appendix:

1. Minnesota Power's Energy Efficiency Resource Alternatives and Conservation Program Strategy; and
2. Order Point 14 Considerations, Potential energy-efficiency competitive-bidding process.

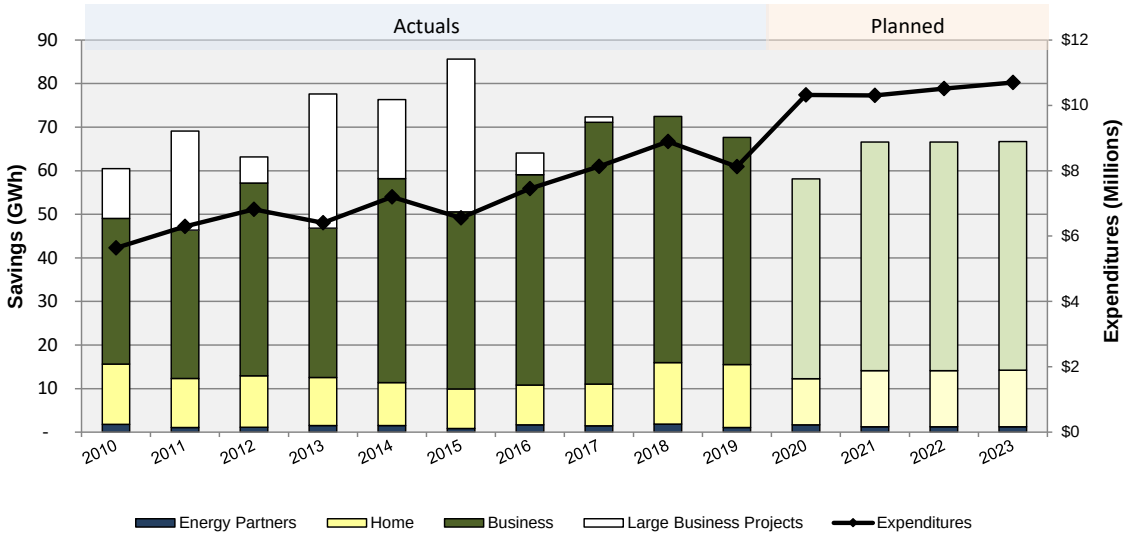
Part 1: Minnesota Power's Energy Efficiency Resource Alternatives and Conservation Program Strategy

Minnesota Power (or the "Company") is committed to providing sustainable energy-efficiency programs, as demonstrated by its strong historical CIP achievements. Since the Minnesota Next Generation Energy Act of 2007 ("NGEA"), Minnesota Power has been refining and expanding upon its proven conservation program platform to deliver cost-effective savings and customer value. The Company remains dedicated to continuous program improvement and views ongoing CIP initiatives as part of its broader *Energy**Forward*** resource strategy; a strategy designed to provide a safe, reliable and affordable power supply while identifying sustainable solutions for reducing carbon emissions further. Part 1 discusses the development of the Company's energy conservation targets included in the 2021-2023 CIP Triennial Plan filing[1] and the 2021 IRP baseline assumptions, as well as two increased EE alternative resource scenarios.

Figure 1 below reflects historical (first year) savings achievements and the proposed savings goals for 2021-2023, as filed in the 2021-2023 CIP Triennial Plan. Minnesota Power, together with its customers, community stakeholders and trade allies, has achieved success through its energy conservation programs, delivering energy savings at or above the state's 1.5 percent energy-savings goal since 2010 when the goal went into effect, all while maintaining focus on targeted program objectives – quality installations, informed decisions, EE and safety. The proposed goal for 2021-2023 and the assumed EE in the baseline forecast reflect the Company's intent to continue achieving savings of 2.5 percent which is well above the state's 1.5 percent goal.

[1] Docket No. E015/CIP-20-476.

Figure 1: Minnesota Power Historical CIP Achievements and 2021-2023 Goal



2021 IRP Baseline Assumptions and the 2021-2023 CIP Triennial

For purposes of both CIP Triennial planning and 2021 IRP modeling, Minnesota Power started with the 2020-2029 Minnesota State Demand Side Management Potential Study ("Potential Study") funded by the Department of Commerce and led by the Center for Energy and Environment ("CEE")[2]. The energy savings goals filed in the 2021-2023 CIP Triennial Plan are largely aligned with the Potential Study "Program", which will be referred to as the Baseline scenario (adjustments were made and discussed below and in Appendix A). Additionally, to align resource planning EE assumptions and modeling with CIP planning, the Company used the adjusted Baseline scenario that informed the CIP Triennial goals as the baseline EE assumption built into the custom demand forecast. These savings targets are well above the State of Minnesota's 1.5 percent energy-savings goal for CIP,[3] which equates to roughly 40 GWh on Minnesota Power's system. The adjusted Baseline scenario assumes roughly 65 GWH in 2021-2023 and ranges from 73 GWh in 2024 to 80 GWh by 2029. The average annual savings in the period after the current CIP Triennial (2024-2029) is roughly 77 GWh. This is in line with the Minnesota Public Utilities Commission's Order Point 12 from the Company's integrated resource plan ("IRP") filed in 2015,[4] which directed the Company to assume a planning goal of 76.5 GWh of EE. The savings goals in the CIP Triennial Plan and the efficiency levels assumed in the baseline assumptions for the IRP are aggressive, but the Company believes these are achievable. However, it is important to note that the significant impact of the COVID-19 pandemic, including a disruption in program services in the EE industry and potential long-term impacts, was not known or accounted for in the Baseline or alternative energy savings

[2] https://mn.gov/commerce-stat/pdfs/mn-energy-efficiency-potential-study.pdf
[3] Minn. Stat. § 216B.241, subd. 1c(b) ("Each individual utility and association shall have an annual energy-savings goal equivalent to 1.5 percent of gross annual retail energy sales unless modified by the commissioner under paragraph (d). The savings goals must be calculated based on the most recent three-year weather-normalized average.").
[4] Order Approving Resource Plan with Modifications, Docket No. E015/RP-15-690 (July 18, 2016) ("Minnesota Power's average annual energy savings goal is set at 76.5 GWh.").

scenarios. Therefore, it is important to take a reasonable approach to long-term EE assumptions to minimize risk and uncertainty.

Summary of Alternative Energy Efficiency Scenarios

Based on the aforementioned Potential Study, current CIP strategy, and analysis of historic performance and future opportunities, Minnesota Power provided two alternative EE scenarios with additional energy and capacity savings above the Baseline scenario (built into the base/expected 2020 Annual Electric Utility Forecast Report ("AFR2020") forecast). The Company further developed cost projections consistent with each outlook. The two alternative energy efficiency scenarios evaluated in the IRP analysis are:

1. "High" Scenario: modeled to reflect the midpoint between "Very High" and "Baseline" scenario (Program scenario from the Potential Study) scenarios, and
2. "Very High" Scenario: modeled after the adjusted Potential Study "Max Achievable" scenario.

Minnesota Power worked closely with CEE to update the original assumptions used in the Potential Study for the Minnesota Power-specific projections, in order to accurately capture the Company's specific territory, customer base, system, and historical experience with CIP.

The process of updating the CEE potential projections and method used to incorporate them into the load forecast are documented in the Company's AFR2020, included as Appendix A. These scenarios were incorporated in the EnCompass modeling process as supply side alternatives in the capacity expansion plan analysis.

The alternative efficiency scenarios ("High" and "Very High") considered in the IRP analysis begin in year 2024. These alternatives were not modeled as an option for 2021-2023 in light of currently-approved levels and due to limited ability to significantly increase EE above the approved 2021-2023 CIP Triennial Plan in the short-term. The potential study projected energy savings for the years 2021-2029. All three EE scenarios therefore assume new program implementation (and new savings) each year through 2029, after which no new saving programs were assumed. For the purposes of modeling the alternative scenarios in the 2021 IRP, only the additional costs and additional first year GWh/GW savings above the baseline are included. A high-level summary of the baseline EE (assumed in the forecast) and the increased efficiency scenarios modeled in the resource plan are shown in Table 1 and includes the following:

- % of Sales: Represents the level of 2024 savings under each scenario as a percentage of average weather normalized 2017-2019, non-CIP exempt retail sales—the baseline for the 2021-2023 CIP Triennial Plan.[5]
- Energy: Total estimated first year energy savings associated with each scenario for the year 2024.
- Energy Above Base: The additional GWh associated with each scenario in terms of first year savings as compared to the baseline plan (EE assumed in forecast).
- Summer Peak: Estimated first year GW demand savings coincident with Midcontinent Independent System Operator ("MISO") summer peak for the year 2024.

[5] In accordance with Minnesota Rules part 7690.1200, 2017-2019 weather-normalized average retail energy sales were used to calculate the electric savings goal for Minnesota Power's 2021-2023 Triennial CIP. This equated to 2,646,854,358 kWh, net of CIP exempt customers at the time of the Triennial Filing. Savings as a percent of sales in Table 1 were calculated using this figure.

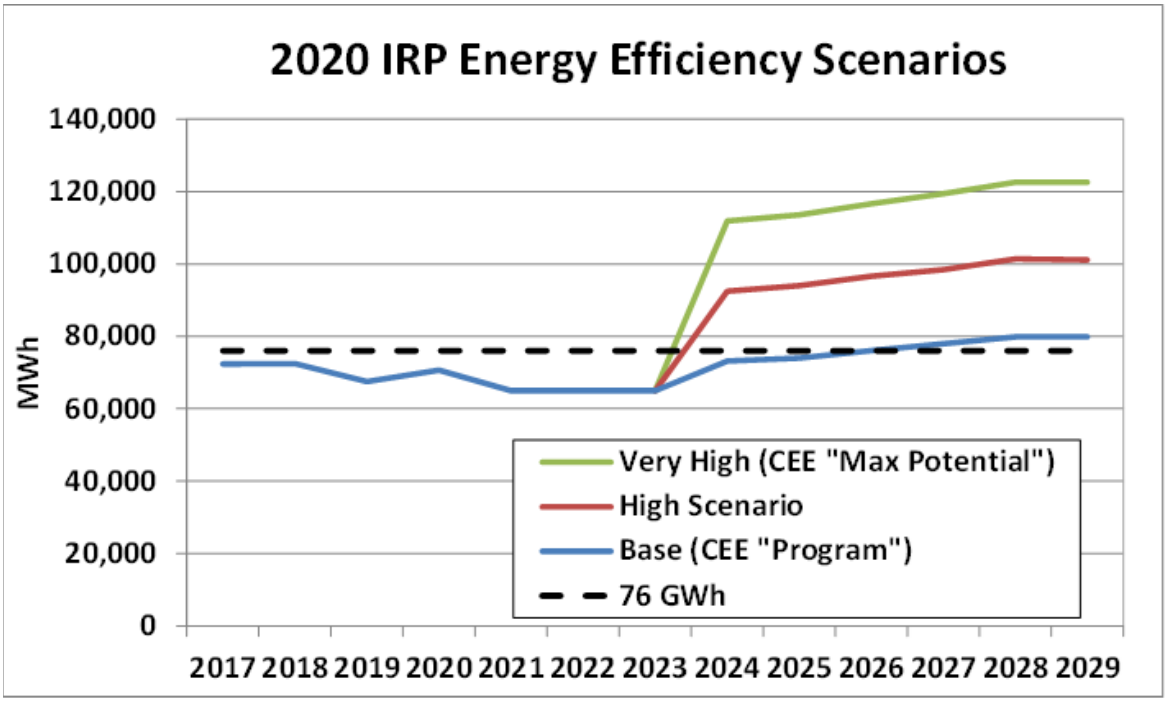
- Summer Peak Reduction Above Base: The additional first year GW demand savings associated with the scenario as compared to the baseline plan.
- Incentives: Rebates to incentivize customers to install/complete an efficiency measure.
- Non-Incentives: All other costs incurred by the Company to implement the 2024 EE plan.
- Total Cost: The estimated total program costs assumed to achieve the level of savings associated with each scenario in the year 2024.
- Total Cost Above Base: The estimated additional spending needed to achieve the incremental savings as compared with the existing plan for the year 2024.

Table 1: Summary of Energy Efficiency Scenarios

Scenarios		*First Year Annual Savings at the Generator (Energy: GWh/ Peak: MW)				First Year Program Costs (Million $)			
Plan	% of Sales** (Rounded)	Energy	Energy Above Base	MP Summer Peak	Summer Peak Reduction Above Base	Incentives	Non-Incentive	Total	Total Cost Above Base
Adjusted Base (CEE "Program")	2.76%	73.2	–	6.4	–	$10.42	$5.41	$15.81	$0
High	3.49%	92.5	19.3	8.1	1.7	$17.16	$6.86	$24.02	$8.19
Adjusted Very High (CEE "Max Achievable")	4.22%	111.8	38.7	9.7	3.3	$31.97	$8.31	$40.28	$24.45

Figure 2 below reflects the first year EE savings (measured at the generator) assumed in each year through 2029 for each of the three scenarios.

Figure 2: 2020 IRP Energy Efficiency Scenarios



Energy Efficiency Scenario Development and Assumptions

As previously noted, the Minnesota statewide Potential Study was the starting point for developing the baseline and alternative EE scenarios. As part of the Potential Study, CEE developed and defined two "achievable" potential scenarios. The following excerpt from the Final Report defines these two scenarios:

> *"In addition to total economic potential (i.e., the total potential if all possible measures were installed that meet cost-effectiveness criteria), two program scenarios were calculated:*
>
> - *Maximum achievable potential: This is the subset of economic potential that is achievable considering market barriers, given the most aggressive program scenario possible. This study assumed financial incentives would cover 100 percent of the incremental cost of each measure, along with very aggressive marketing and program designs to achieve maximum market penetration of the measures.*
> - *Program potential: The program potential is a subset of the maximum achievable, given constraints in implementation. This study assumed that financial incentive levels are dropped to 50 percent of the incremental cost of each measure, which is a typical scenario used for planning purposes in Minnesota, and a good benchmark for aggressive programs nationally. The project team still assumed aggressive marketing and program designs for this scenario."*

Savings Targets and Contributions

The goal of the Potential Study was to produce a statewide EE potential report, and while some regional and investor-owned utility ("IOU"-specific) inputs were used in the methodology, other major inputs were developed at the statewide level. CEE leveraged the load forecast file in

the Company's most recent prior IRP (2015), which was a 2014 vintage and fairly optimistic in its outlook for customer demand growth. The Company recognized this likely resulted in an inflated estimate of kWh savings potential relative to its current, more moderate outlook, and conferred with CEE on reasonable methods for updating the potential savings estimates. The Company worked with CEE to update its model with the most current customer outlook and CIP exemptions to produce a more accurate estimate of Minnesota Power's potential savings. Once the savings potential was updated for the Baseline and Very High (Max Potential) scenarios, a third scenario was created (High scenario) with a target savings level at the mid-point between the adjusted Baseline (Program) and Very High levels.

Additionally, the Minnesota Power-specific savings contributions by class and technology included in the original Potential Study were evaluated and ultimately modified to better reflect Minnesota Power's history and anticipated opportunities based on experience and internal analysis. As a result of this process, for 2021-2023, these contributions were modified to reflect historical patterns, accounting for changes that impact measure and savings opportunities, including market penetration and updates to approved measures and savings calculations as defined in the Technical Reference Manual ("TRM").[6] Updated avoided costs and net benefit estimates were also taken into account to evaluate changes in cost-effectiveness for various technologies compared to in the past. The most significant change to the assumed measure contributions for 2021-2023 was an increase in lighting measures. The Potential Study originally assumed changes to lighting standards would significantly impact savings opportunity from lighting in CIP portfolios as early as 2022. However, the TRM used for the 2021-2023 CIP Triennial Plan was not updated to reflect changes in the calculation of lighting savings, allowing for utilities to maintaining higher levels of planned savings through lighting measures.

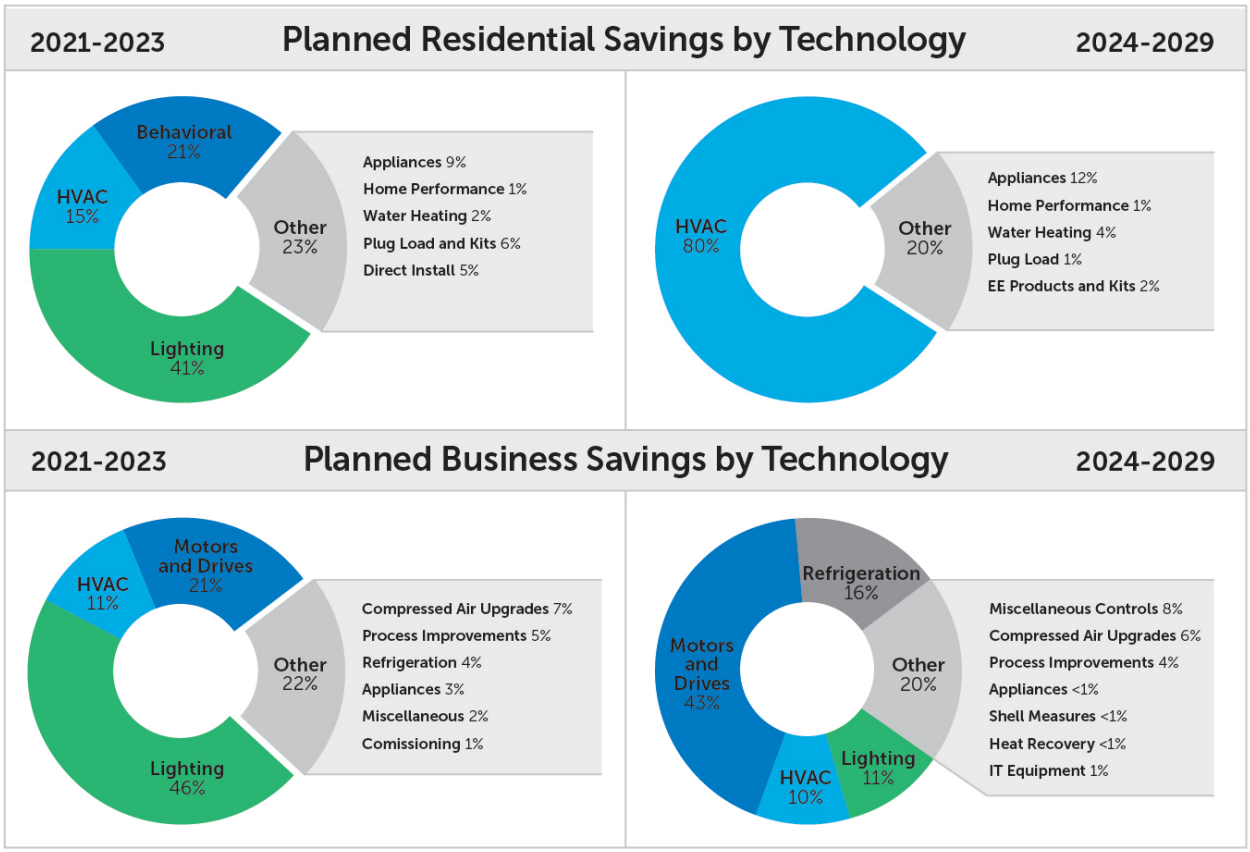
Beyond 2023, in the Baseline scenario, Minnesota Power updated the savings contributions by technology in each class to reflect anticipated reductions in lighting savings opportunity, which for both residential and commercial/industrial ("C/I") classes have historically accounted for the majority of the savings achievements. For residential, this resulted in a significant shift to Heating Ventilation & Air Conditioning ("HVAC") savings and for C/I this resulted in a noticeable shift away from lighting into other evolving technologies such as motors and Heating Ventilation Air Conditioning & Refrigeration ("HVACR").

For the alternative savings scenarios (High and Very High) – all measures in the Baseline scenario were scaled by the same percentage to achieve the targeted levels for each.

The graphs in Figure 3 below reflect Baseline savings contributions by technology for the 2021-2023 period and for 2024 and beyond:

[6] State of Minnesota Technical Reference Manual for Energy Conservation Improvement Programs (Jan. 20, 2020), https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPoup&documentId={D0CDC86F-0000-C832-A29A-F7752BF4A0D9}&documentTitle=20201-159365-02.

Figure 3: Planned Savings by Technology



Scenario Cost Development

Cost assumptions were developed for each scenario for 2024 through 2029. For use in the 2021 IRP analysis, the costs associated with the High and Very High scenarios are incremental to the Baseline scenario. All costs were estimated for the year 2024 and escalated each year proportional to the change in energy savings.

Baseline Scenario

2024 cost assumptions for the Baseline scenario were developed to serve as the baseline costs against which the costs for the two higher scenarios would be compared. These costs were developed using the assumptions defined in the potential study and therefore reflect:

- Customer incentives (rebates) equal to 50 percent of the measures incremental cost where incremental cost is the difference between the cost of the standard efficiency product or action, or sometimes purchasing nothing/taking no action, compared to the cost of the efficient product or action.
- Aggressive program design and marketing. Non-incentive costs increase linearly with savings.

High Scenario

There is no equivalent scenario from the statewide Potential Study for this scenario, as it represents the midpoint between the adjusted Baseline scenario and the adjusted Very High (max achievable) scenario. The Company assumed:

- Customer incentives (rebates) would be set at 65 percent of incremental measure costs. This is roughly halfway between recent historical rebate levels and the max scenario (100 percent).
- Aggressive program design and marketing. Non-incentive costs increase linearly with savings.

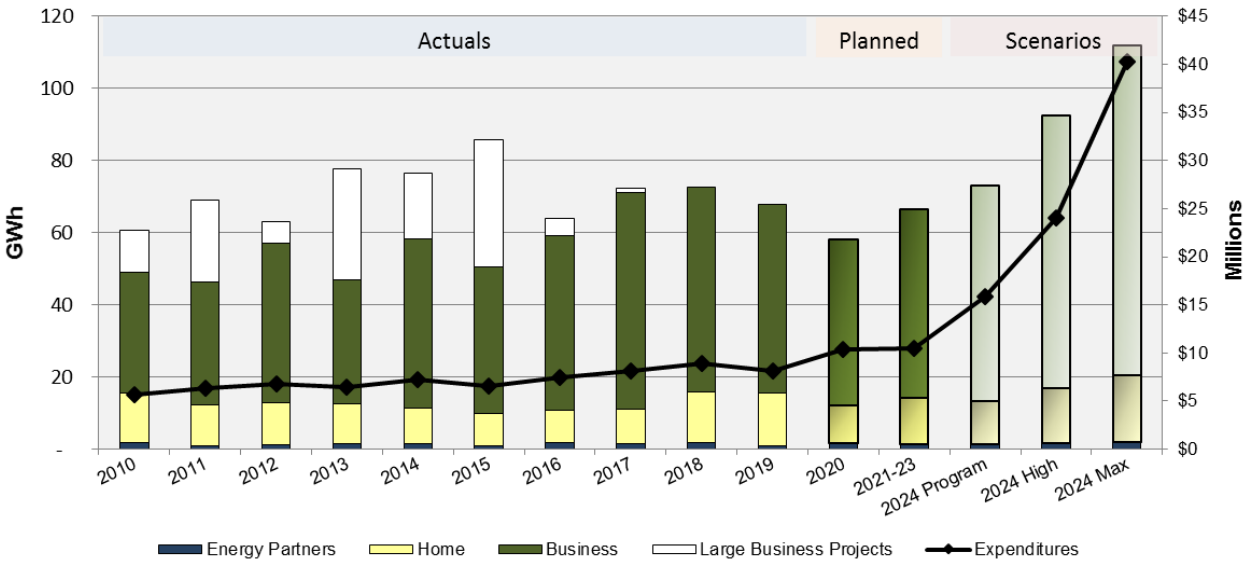
Very High (Max Achievable) Scenario

Like the Baseline scenario, Minnesota Power based incentive costs for the Very High scenario on the potential study scenario description:

- Customer incentives (rebates) are assumed at 100 percent of incremental measure costs.
- Aggressive program design and marketing. Non-incentive costs scale linearly with savings.

Figure 4 below expands on the Minnesota Power Historical CIP Performance graph (Figure 1) to include the planned costs and savings for 2020 and 2021-2023 (as filed in the respective triennial plans), and 2024 costs and savings as modeled for the Baseline and two alternative scenarios used in the 2021 IRP analysis:

Figure 4: Historical, Planned, and Modeled CIP Energy Savings (First Year) and Costs

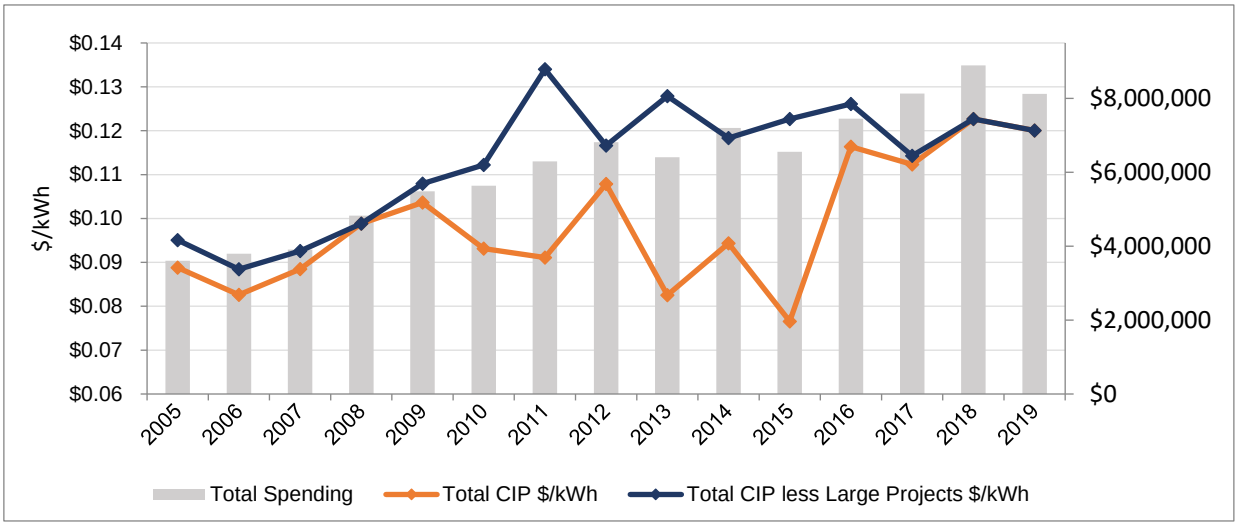


Discussion of Increasing Costs

Minnesota Power largely drew from the Potential Study assumptions to determine scenario costs for the 2021 IRP. The Company's own analysis of historical and anticipated cost trends indicates strong alignment with and support of the Potential Study assumptions. Specifically, stronger incentive levels and more aggressive program development and marketing will be critical to deliver at the levels discussed in the 2021 IRP.

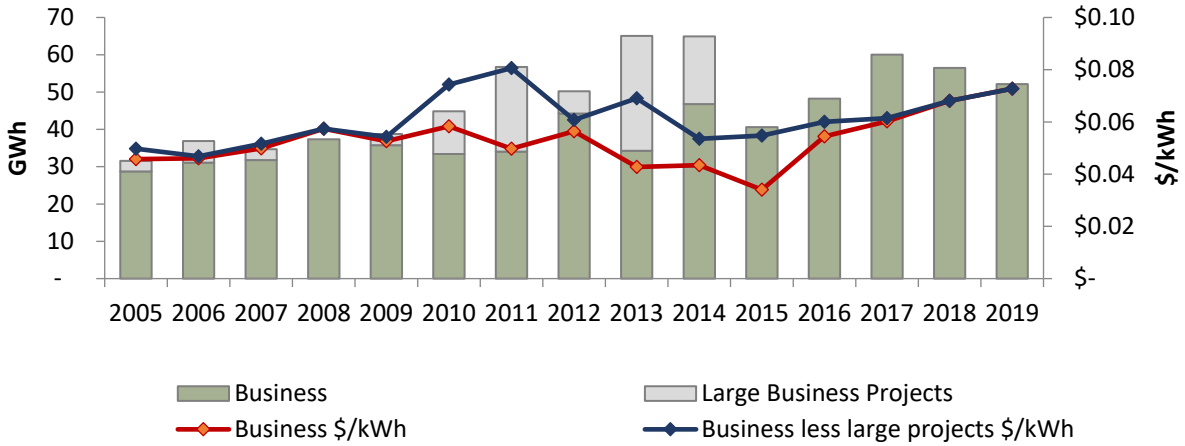
Further, costs have been increasing steadily over the past several years, in part due to the loss of large project opportunities. Between 2010 and 2015, such opportunities accounted for about 30 percent of total savings and only 4 percent of total spending. Figure 5 below reflects the (first year) cost per kWh saved trend between 2005 and 2019. Between 2010 and 2015, where significant large project savings were realized, the average cost per kWh saved was $0.09/kWh – compared to an average of $0.12/kWh between 2016 and 2019 when opportunities for these types of projects were no longer available.

Figure 5: Total Spending and Cost per kWh Trending



C/I savings have historically comprised the vast majority of the Company's savings achievements. Between 2005 and 2019, C/I savings accounted for approximately 80 percent of CIP savings – ranging from 73 percent to 88 percent in any given year. Similarly, C/I costs are a significant driver of overall costs. Figure 6 below shows how C/I costs per kWh have trended over time. Over the last three years, C/I costs per kWh saved have steadily increased even as savings have decreased. This suggests that in order to achieve higher savings goals, the cost per kWh saved will not only continue to trend up, it will increase more significantly with higher levels of EE. This increase will likely be further compounded as the opportunity for cost-effective lighting projects decreases.

Figure 6: Commercial and Industrial Cost per kWh (First-year Savings)



With the absence of large C/I projects, costs have increased over the last several years. However, cost-effective, efficient lighting products and projects across all customer sectors made their way to the forefront of Minnesota Power's CIP programs. Lighting measures became an obvious and easy energy saving option for customers to identify and adopt, especially as they also became increasingly cost-effective for consumers. Customer awareness and acceptance increased as LEDs became the primary option on the market. These factors, in combination with strategic program design, resulted in lighting making up the majority (over 50 percent) of savings over the last several years, helping to keep program costs lower despite the loss of large C/I projects.

However, with changing codes and standards impacting lighting measure baselines and significant market saturation of commercial efficient lighting, beginning in 2024 the majority of additional lighting opportunity is expected to go away. The Company will need to find ways to replace the most cost-effective and prevalent measure in its existing portfolio, which in 2019 accounted for nearly 37 GWh in savings (54 percent of total 2019 savings). The types of technologies that will need to replace those savings will be more costly measures that customers may not be as ready (or financially able) to adopt without significant education and incentives to do so. Increased education and outreach, along with higher rebate levels drive the increase in costs assumed in the 2024 Baseline scenario as compared to the 2021-2023 (filed) budgets.

Scenario Details

The following tables include the plan parameters for each scenario (savings, costs, participation for Baseline, High, and Very High scenarios).

Table 2: Year 2024 Energy and Demand Savings (MISO Summer Peak)

	Program	High	Very High	Program	High	Very High
	kWh - Generator	kWh - Generator	kWh - Generator	kW - Generator	kW - Generator	kW - Generator
Residential	12,019,394	15,202,866	18,423,077	1,377.1	1,742.9	2,111.2
HVAC	9,653,139	12,212,160	14,794,019	1,133.8	1,434.8	1,737.9
Home Performance	85,203	99,404	127,805	3.4	4.0	5.2
Energy Efficiency Products and Kits	272,032	344,568	417,620	23.8	30.1	36.5
Water Heating	449,076	569,730	690,423	37.2	47.2	57.2
Appliances	1,491,432	1,890,102	2,288,021	171.1	216.8	262.5
Plug Load	68,512	86,901	105,188	7.8	9.9	12.0
Admin Costs	0	0	0	0.0	0.0	0.0
Low Income	1,319,275	1,666,899	2,031,465	139.0	176.3	213.4
HVAC	50,927	58,157	83,974	13.4	16.9	20.4
Water Heating	535,470	678,921	822,080	44.4	56.3	68.2
Appliances	360,715	457,940	553,927	40.3	51.2	61.9
Energy Efficiency Products and Kits	372,162	471,881	571,483	40.9	51.9	62.9
Admin Costs	0	0	0	0.0	0.0	0.0
Business	59,826,687	75,624,419	91,373,241	4,866.8	6,143.8	7,395.2
Lighting	6,617,469	8,241,744	9,995,622	883.8	1,103.5	1,340.2
Refrigeration	9,621,879	12,232,833	14,838,140	655.2	829.3	1,002.9
Motors and Drives	25,946,629	32,872,342	39,949,432	946.9	1,195.5	1,443.4
HVAC	6,075,527	7,642,025	9,208,522	1,468.1	1,850.3	2,232.6
Compressed Air Upgrades	3,679,508	4,785,381	5,660,022	158.1	204.7	242.0
Process Improvements	2,253,887	2,575,871	3,219,838	163.2	186.6	233.2
Appliances	207,143	263,613	313,837	48.3	61.3	73.1
Shell Measures	269,540	394,856	402,419	1.7	2.0	2.4
Heat Recovery	170,483	230,992	250,778	86.8	130.3	130.3
Miscellaneous Controls	4,525,664	5,715,246	6,827,273	368.5	462.7	554.1
IT Equipment	458,959	669,518	707,358	86.2	117.6	140.9
Admin Costs	0	0	0	0.0	0.0	0.0
Indirect Impact	0	0	0	0.0	0.0	0.0
Grand Total	**73,165,356**	**92,494,183**	**111,827,783**	**6,383.0**	**8,062.9**	**9,719.8**

Table 3: Year 2024 Participation

	Program	High	Very High
	Participants	Participants	Participants
Residential (Measures)	9,439	11,962	14,489
HVAC	2,328	2,949	3,572
Home Performance	6	7	9
Energy Efficiency Products and Kits	698	884	1,071
Water Heating	3,006	3,812	4,617
Appliances	2,845	3,605	4,366
Plug Load	556	705	854
Admin Costs	0	0	0
Low Income (Measures)	6,409	8,125	9,840
HVAC	94	118	144
Water Heating	2,707	3,431	4,155
Appliances	622	790	956
Energy Efficiency Products and Kits	2,986	3,786	4,585
Admin Costs	0	0	0
Business (Projects)	968	1,226	1,482
Lighting	121	152	185
Refrigeration	78	100	121
Motors and Drives	366	465	564
HVAC	264	333	402
Compressed Air Upgrades	29	38	45
Process Improvements	7	8	10
Appliances	37	47	56
Shell Measures	9	11	13
Heat Recovery	9	11	13
Miscellaneous Controls	45	57	68
IT Equipment	3	4	5
Admin Costs	0	0	0
Indirect Impact	0	0	0
Grand Total	**16,816**	**21,313**	**25,811**

Table 4: Year 2024 Costs

	Program	High	Very High
Residential	$2,559,353.02	$3,883,875.36	$6,511,717.62
HVAC	$1,553,904.76	$2,560,462.35	$4,770,536.21
Home Performance	$25,410.89	$41,871.06	$78,012.24
Energy Efficiency Products and Kits	$5,865.83	$9,665.49	$18,008.30
Water Heating	$15,358.79	$25,307.62	$47,151.97
Appliances	$76,151.80	$125,479.92	$233,788.43
Plug Load	$6,072.98	$10,006.81	$18,644.23
Admin Costs	$876,587.97	$1,111,082.11	$1,345,576.24
Low Income	$291,046.68	$425,437.51	$674,977.75
HVAC	$17,026.96	$28,056.36	$52,273.33
Water Heating	$8,953.71	$14,753.57	$27,488.19
Appliances	$100,274.73	$165,228.71	$307,846.55
Energy Efficiency Products and Kits	$22,418.33	$36,940.04	$68,824.98
Admin Costs	$142,372.95	$180,458.83	$218,544.70
Business	$10,130,018.60	$16,103,811.76	$28,725,696.97
Lighting	$841,029.45	$1,385,814.80	$2,581,986.70
Refrigeration	$1,816,645.37	$2,993,395.86	$5,577,158.07
Motors and Drives	$2,523,251.68	$4,157,713.61	$7,746,461.57
HVAC	$1,405,354.45	$2,315,687.09	$4,314,482.13
Compressed Air Upgrades	$261,445.31	$430,799.16	$802,645.28
Process Improvements	$479,785.07	$790,570.73	$1,472,955.18
Appliances	$32,908.50	$54,225.33	$101,030.14
Shell Measures	$28,227.85	$46,512.74	$86,660.40
Heat Recovery	$152,354.21	$251,043.21	$467,732.22
Miscellaneous Controls	$959,192.95	$1,580,519.94	$2,944,752.36
IT Equipment	$83,405.00	$137,431.42	$256,055.94
Admin Costs	$1,546,418.76	$1,960,097.87	$2,373,776.98
Indirect Impact	$2,845,049.47	$3,606,122.45	$4,367,195.43
Grand Total	**$15,825,467.77**	**$24,019,247.08**	**$40,279,587.77**

Table 5: Baseline Scenario Cumulative Effects

year	Administration	Incentives	Total	kW	Summer Coin kW	Winter Coin kW	kWh	kW	Summer Coin kW	Winter Coin kW	kWh
2024	$5,410,429.15	$10,415,038.65	$15,825,467.80	12,939	6,383	6,180	73,165,356	12,939	6,383	6,180	73,165,356
2025	$5,512,787.14	$10,612,077.08	$16,124,864.22	13,083	6,433	6,238	73,992,182	26,021	12,816	12,418	147,157,537
2026	$5,643,574.95	$10,863,842.70	$16,507,417.65	13,432	6,607	6,391	76,103,887	39,450	19,422	18,806	223,248,792
2027	$5,776,670.66	$11,120,051.03	$16,896,721.69	13,783	6,772	6,556	77,977,293	53,141	26,145	25,284	300,733,290
2028	$5,944,155.48	$11,442,458.15	$17,386,613.64	14,143	6,953	6,720	79,906,922	67,190	33,048	31,924	380,137,737
2029	$5,941,977.80	$11,438,266.12	$17,380,243.91	14,142	6,953	6,720	79,905,018	81,235	39,950	38,562	459,528,328
2030	$0.00	$0.00	$0.00	0	0	0	0	81,137	39,898	38,478	459,001,824
2031	$0.00	$0.00	$0.00	0	0	0	0	80,995	39,826	38,360	458,245,514
2032	$0.00	$0.00	$0.00	0	0	0	0	80,529	39,550	37,949	455,706,460
2033	$0.00	$0.00	$0.00	0	0	0	0	80,152	39,321	37,615	453,650,748
2034	$0.00	$0.00	$0.00	0	0	0	0	79,301	38,782	36,921	448,165,605
2035	$0.00	$0.00	$0.00	0	0	0	0	78,435	38,234	36,213	442,598,403
2036	$0.00	$0.00	$0.00	0	0	0	0	76,566	36,685	34,622	430,246,558
2037	$0.00	$0.00	$0.00	0	0	0	0	74,684	35,126	33,024	417,837,180
2038	$0.00	$0.00	$0.00	0	0	0	0	73,092	33,733	31,689	406,972,381
2039	$0.00	$0.00	$0.00	0	0	0	0	63,276	28,593	28,172	345,400,838
2040	$0.00	$0.00	$0.00	0	0	0	0	53,836	23,720	24,993	286,577,308
2041	$0.00	$0.00	$0.00	0	0	0	0	44,160	18,746	21,759	226,194,881
2042	$0.00	$0.00	$0.00	0	0	0	0	33,069	13,997	17,361	163,447,735
2043	$0.00	$0.00	$0.00	0	0	0	0	21,746	9,142	12,899	99,380,815
2044	$0.00	$0.00	$0.00	0	0	0	0	9,908	3,991	8,127	33,904,849
2045	$0.00	$0.00	$0.00	0	0	0	0	7,014	2,898	5,669	23,777,119
2046	$0.00	$0.00	$0.00	0	0	0	0	4,047	1,779	3,150	13,393,670
2047	$0.00	$0.00	$0.00	0	0	0	0	1,063	650	619	2,958,141
2048	$0.00	$0.00	$0.00	0	0	0	0	531	325	309	1,478,688

Table 6: High Scenario Cumulative Effects

year	Administration	Incentives	Total	kW	Summer Coin kW	Winter Coin kW	kWh	kW	Summer Coin kW	Winter Coin kW	kWh
2024	$6,857,761.25	$17,161,485.81	$24,019,247.06	16,362	8,063	7,813	92,494,183	16,362	8,063	7,813	92,494,183
2025	$6,976,564.68	$17,458,790.31	$24,435,354.99	16,629	8,196	7,953	94,059,438	32,991	16,259	15,766	186,553,621
2026	$7,139,531.26	$17,866,612.72	$25,006,143.98	17,074	8,412	8,150	96,619,127	50,062	24,669	23,914	283,156,772
2027	$7,302,400.68	$18,274,191.98	$25,576,592.67	17,395	8,583	8,323	98,410,169	67,340	33,190	32,137	380,942,274
2028	$7,513,916.18	$18,803,507.62	$26,317,423.80	17,917	8,831	8,556	101,428,868	85,138	41,958	40,592	481,735,556
2029	$7,507,429.90	$18,787,275.74	$26,294,705.64	17,879	8,827	8,547	101,174,504	102,894	50,720	49,036	582,259,545
2030	$0.00	$0.00	$0.00	0	0	0	0	102,770	50,654	48,930	581,593,691
2031	$0.00	$0.00	$0.00	0	0	0	0	102,591	50,563	48,780	580,636,908
2032	$0.00	$0.00	$0.00	0	0	0	0	102,000	50,214	48,260	577,420,840
2033	$0.00	$0.00	$0.00	0	0	0	0	101,524	49,924	47,838	574,820,361
2034	$0.00	$0.00	$0.00	0	0	0	0	100,469	49,253	46,970	568,065,110
2035	$0.00	$0.00	$0.00	0	0	0	0	99,356	48,549	46,063	560,889,411
2036	$0.00	$0.00	$0.00	0	0	0	0	96,992	46,592	44,049	545,258,616
2037	$0.00	$0.00	$0.00	0	0	0	0	94,612	44,601	41,997	529,515,369
2038	$0.00	$0.00	$0.00	0	0	0	0	92,598	42,820	40,276	515,722,358
2039	$0.00	$0.00	$0.00	0	0	0	0	80,140	36,281	35,781	437,534,740
2040	$0.00	$0.00	$0.00	0	0	0	0	68,135	30,061	31,706	362,741,808
2041	$0.00	$0.00	$0.00	0	0	0	0	55,822	23,715	27,553	286,063,076
2042	$0.00	$0.00	$0.00	0	0	0	0	41,838	17,713	21,987	206,958,437
2043	$0.00	$0.00	$0.00	0	0	0	0	27,499	11,568	16,332	125,712,436
2044	$0.00	$0.00	$0.00	0	0	0	0	12,551	5,050	10,297	42,955,125
2045	$0.00	$0.00	$0.00	0	0	0	0	8,891	3,668	7,190	30,146,320
2046	$0.00	$0.00	$0.00	0	0	0	0	5,134	2,250	4,000	16,998,416
2047	$0.00	$0.00	$0.00	0	0	0	0	1,358	823	796	3,793,798
2048	$0.00	$0.00	$0.00	0	0	0	0	679	412	398	1,896,517

Table 7: Very High Scenario Cumulative Effects

year	Administration	Incentives	Total	kW	Summer Coin kW	Winter Coin kW	kWh	kW	Summer Coin kW	Winter Coin kW	kWh
2024	$8,305,093.35	$31,974,494.41	$40,279,587.76	19,758	9,720	9,439	111,827,783	19,758	9,720	9,439	111,827,783
2025	$8,440,342.21	$32,495,200.64	$40,935,542.86	20,088	9,899	9,595	113,621,147	39,846	19,619	19,034	225,448,930
2026	$8,635,487.58	$33,246,507.59	$41,881,995.17	20,618	10,176	9,882	116,648,550	60,460	29,793	28,913	342,077,974
2027	$8,828,130.71	$33,988,180.97	$42,816,311.68	21,099	10,422	10,099	119,397,418	81,417	40,140	38,891	460,718,885
2028	$9,083,676.88	$34,972,030.22	$44,055,707.10	21,675	10,682	10,356	122,595,685	102,948	50,746	49,124	582,545,801
2029	$9,072,882.00	$34,930,470.05	$44,003,352.05	21,668	10,680	10,350	122,571,522	124,468	61,347	59,349	704,330,413
2030	$0.00	$0.00	$0.00	0	0	0	0	124,317	61,267	59,221	703,526,200
2031	$0.00	$0.00	$0.00	0	0	0	0	124,101	61,157	59,040	702,368,931
2032	$0.00	$0.00	$0.00	0	0	0	0	123,386	60,735	58,411	698,477,555
2033	$0.00	$0.00	$0.00	0	0	0	0	122,809	60,384	57,900	695,330,534
2034	$0.00	$0.00	$0.00	0	0	0	0	121,535	59,566	56,844	687,158,206
2035	$0.00	$0.00	$0.00	0	0	0	0	120,238	58,736	55,769	678,866,523
2036	$0.00	$0.00	$0.00	0	0	0	0	117,359	56,331	53,286	659,790,040
2037	$0.00	$0.00	$0.00	0	0	0	0	114,449	53,887	50,774	640,488,029
2038	$0.00	$0.00	$0.00	0	0	0	0	112,014	51,738	48,690	623,796,477
2039	$0.00	$0.00	$0.00	0	0	0	0	96,964	43,854	43,268	529,097,753
2040	$0.00	$0.00	$0.00	0	0	0	0	82,443	36,361	38,371	438,583,478
2041	$0.00	$0.00	$0.00	0	0	0	0	67,604	28,713	33,365	346,171,372
2042	$0.00	$0.00	$0.00	0	0	0	0	50,640	21,432	26,612	250,315,647
2043	$0.00	$0.00	$0.00	0	0	0	0	33,293	13,993	19,761	152,169,633
2044	$0.00	$0.00	$0.00	0	0	0	0	15,163	6,103	12,439	51,891,028
2045	$0.00	$0.00	$0.00	0	0	0	0	10,739	4,434	8,683	36,410,539
2046	$0.00	$0.00	$0.00	0	0	0	0	6,190	2,718	4,820	20,490,213
2047	$0.00	$0.00	$0.00	0	0	0	0	1,636	996	957	4,563,879
2048	$0.00	$0.00	$0.00	0	0	0	0	818	498	478	2,281,557

Summary of Findings

Minnesota Power has a proven track record of successful CIP performance and anticipates continuing this trend into the future, as indicated by the aggressive goals set forth in the 2021-2023 Triennial Plan and assumed in the 2021 IRP baseline forecast. However, the Company acknowledges that the current EE environment is rapidly evolving in ways that will continue to present new challenges. Changing baselines, uncertain economic conditions (whether related to the current pandemic in the near term, or resulting from other, unknown events that may occur over the longer term), and decreased avoided costs will all contribute to Minnesota Power's ability to offer cost-effective, meaningful programs to customers. While Minnesota Power continues to build on the successes of its existing programs and adapting to challenges through unique and innovative program offerings and delivery strategies, achieving this higher level of savings through less cost-effective measures will be more resource intensive. Additionally, long-term EE savings require customers to take specific actions year after year, which introduces uncertainty regarding whether or not these savings will materialize. For these reasons, among others, it is important to take a reasonable approach to long-term EE assumptions to minimize risk and uncertainty. The Company has done so, while also testing what could be achieved by including alternative scenarios in its IRP analysis.

Part 2: Order Point 14, Potential Energy-Efficiency Competitive Bidding Process

In the Order approving Minnesota Power's 2015 Integrated Resource Plan ("2015 Plan"),[1] the Minnesota Public Utilities Commission (or "Commission") required that for its next resource plan, the Company must "investigate the potential for an energy-efficiency competitive-bidding process to supplement its existing conservation improvement program, open to both CIP-exempt and non-CIP-exempt customers, and shall summarize its investigation and findings in its next resource plan." This portion of Appendix B addresses this Commission requirement.

Specifically, Minnesota Power investigated the potential for an energy-efficiency competitive-bidding process to supplement its existing conservation-improvement program by researching best practices and examining how large customers who are exempt from CIP focus on conservation efforts within their operations. The Company's research and analysis, discussed below, indicated that many of the bidding programs available for review had the following characteristics that set the programs up for success: a dedicated funding source, bidding platform, and a process for customer communications. Conversely, the Company was not able to identify specific direction in either Minnesota policy or statutes that provided direction on how the Company might recover costs of a competitive-bidding process from either CIP-exempt or non-CIP exempt customers. The lack of explicit cost recovery authorization presents an important barrier to all potential stakeholders. Additionally, the Company has already demonstrated an outstanding CIP achievement record for non-exempt customers, along with aggressive future goals. For these reasons the Company does not feel that a competitive-bidding process would add value at this time. Nevertheless, the Company summarizes here its investigation and findings.

The first section below provides details on the Company's investigative research that has been completed with respect to energy-efficiency competitive-bidding processes. The second section focuses on energy-efficiency efforts of CIP-exempt customers, along with additional considerations.

Energy-Efficiency Competitive-Bidding Process Research

Minnesota Power identified the following competitive-bidding programs to assess best practices, potential outcomes, and possible barriers to success for any program Minnesota Power might initiate. Each program is discussed in turn, and includes a combination of deregulated, regulated and a statewide efficiency program not run by the individual utilities.

Energize Missouri Industries program, is an initiative of the Missouri Department of Natural Resources ("Missouri DNR"). Between 2010 and 2011, the Missouri DNR provided grants to energy efficiency ("EE") companies that competitively bid for EE incentives through a reverse auction. The overall goal of the online reverse auction was to provide industries and commercial entities with an opportunity to realize measurable energy savings that would result in reduced energy costs and increased market competitiveness. The online reverse auction allowed pre-qualified providers to bid on $3 million in incentives on a $/kWh saved basis for expected EE projects. Available incentive dollars were allocated based on a lowest-price obtained, thus increasing the cost-effectiveness of the program and allowing the Missouri DNR to spread the dollars further. The program was funded by a $3 million grant from the American Recovery and Reinvestment Act of 2009 ("ARRA").

[1] Order Approving Resource Plan with Modifications, Docket No. E015/RP-15-690 (July 18, 2016).

Focus on Energy is a company that partners with Wisconsin utilities on an efficiency bidding program. Bids are submitted through an online auction where business incentive program customers and/or trade allies bid for additional financial incentives above current prescriptive and custom levels. Customers who qualify for the business incentive program include commercial and industrial ("C/I") businesses who average less than 1,000 kW per month. Typical businesses include, but are not limited to, banks, hotels, grocery stores, breweries, food processing, and manufacturing. Customers and trade allies can submit bids, using an online auction platform, which identifies the unit price needed to deliver the estimated kWh or therms savings from the EE project.

The Focus on Energy efficiency auction is a type of reverse auction in which the role of the buyer and seller are reversed. The pre-qualified bidders compete by offering rates on a price per annual kWh or a price per therms reduced basis until no pre-qualified bidder is willing to make a lower bid. During the live auction, pre-qualified bidders will be logged into an online platform and will actively submit bids to compete for the EE incentives. The auctions will start at an established bid ceiling price and pre-qualified bidders will bid down on this price at predefined increments. Pre-qualified bidders will be able to see live results and their position for an auction. At the end of the auction, the bidders with the lowest price per annual kWh or therms reduced bids are considered the winners of the auction and are then tasked with implementing their energy-saving project(s). The winning bidder is provided a financial incentive, which is limited to $200,000 per project and $400,000 per customer per calendar year for all Focus on Energy Incentives. The funding comes from Focus on Energy partnership with 107 utilities throughout Wisconsin. Each participating utility pays in either a portion of their revenue or a set amount by meter. Focus on Energy then uses that funding to provide cost-effective programs that support EE projects.

Bid4Efficiency is a reverse auction program run by American Electric Power Ohio. In the reverse auction program, interested customers (nonresidential customers that use more than 200,000 kWh per year) respond to a request for qualifications ("RFQ"). As part of the pre-qualification process customers or service providers are required to attend training and mock auctions. After customers respond to the RFQ, these large C/I customers are eligible to become prequalified bidders. The bidders then send in bids to an online live auction platform in the form of price per annual kWh or watts reduced for energy-efficiency projects such as process-improvement initiatives or compressed-air systems costing more than $25,000. C/I customers as well as trade allies can bid for planned and unplanned projects. Starting at the bid ceiling price, prequalified bidders compete with one another to determine who can submit the lowest $/kWh saved for their specific project. The bidder with the lowest price per annual kWh (or price per watts reduced) is granted an award from $25,000 to $500,000 to complete their project. Additional details of the reverse auction include: bidders can only win one auction, non-winning bidders are offered a default incentive rate 10-20 percent lower than the lowest winning bid, and winners that achieve 80 percent or more of the total awarded auction incentive amount receive a $0.005 per kWh bonus.

Kansas City Power and Light (now Evergy) historically offered a block bidding program, which featured separate auctions for C/I customers and for trade allies. The auctions consisted of two blocks: one for projects in excess of $100,000 and one for those exceeding $400,000. To participate in the program, potential bidders responded to the request for quotation for the auction and attend a webinar to learn how the auction process would work. If the request for quotation was approved for the customer's project, that customer was then allowed to participate in the online auction. Projects that were eligible to receive the program incentives

were required to save more than 1 million kWh annually and have a minimum payback of at least two years.

Energy-Efficiency Competitive-Bidding for CIP-Exempt Customers

Minnesota Power's CIP-exempt group is comprised of large industrial customers that have identified through a state legislative designation to be considered "exempt" from the conservation program established in Minnesota. CIP exceptions are defined by Minnesota Statutes § 216B.241, subd. 1a(b), which states in part: "The owner of a large customer facility may petition the commissioner to exempt both electric and gas utilities serving the large customer facility from the investment and expenditure requirements [of CIP]" and "[t]he filing must include a discussion of the competitive or economic pressures facing the owner of the facility and the efforts taken by the owner to identify, evaluate, and implement energy conservation and efficiency improvements." Under this statute, customers seeking an exemption are required to file with the commissioner of the Minnesota Department of Commerce and must prove that they are implementing energy conservation and efficiency improvements. They also must show there is no need for additional incentives to manage, complete, and address EE measures. Exempt customers must provide a filing every five years to the commissioner explaining measures that they are already taking to be efficient. However, a large customer facility that is, under an order from the commissioner, exempt from the investment and expenditure requirements as of December 31, 2010, is not required to submit a report to retain its exempt status, except with respect to ownership changes.

There are approximately 14 Minnesota Power customers at the time of this filing that fall under the CIP-exempt classification, most of whom have submitted multiple reports to the Department of Commerce detailing efforts to implement EE and energy conservation strategies. These CIP-exempt customers compete in global markets and in industries that have an advantage because of other nations' favorable tax policies, trade laws, health care costs, environmental compliance or other subsidies. CIP-exempt customers are naturally incentivized to pursue all efficiency improvements to keep their product costs as low as possible, including any and all economically viable efficiency improvements related to energy.