



Conservation Applied Research and Development (CARD), Clean Energy Resource Teams (CERTs), and Sustainable Buildings 2030 (SB2030)

January 15, 2020

Prepared by
Minnesota Department of Commerce, Division of Energy Resources

Pursuant to Minnesota Statute § 216B.241 Subdivision 1e

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Executive Summary

Funding for the Conservation Applied Research and Development program (CARD), Clean Energy Resource Teams (CERTs), and Sustainable Buildings 2030 (SB2030) has been established through Minnesota Statute § 216B.241 in the Conservation Improvement Program (CIP). These funds originate from utility assessments that provide resources to the Department of Commerce (the Department) and other legislatively named entities to support achievement of Minnesota's statewide energy policy goals. Each of these programs is uniquely positioned to help continuously achieve energy efficiency and renewable energy project implementation throughout the state. The following report details the activities of each of these programs.

Conservation Applied Research and Development (CARD)

Major accomplishments of the CARD program overall include:

- Dissemination of CARD grant results to utilities and other stakeholders through project reports, newsletter articles, webinars, and at regional and national conferences.
- Enhancements to utility CIP offerings and energy savings achieved toward the 1.5% goal.
- Use of CARD project results and insights to inform policy decisions in Minnesota.

Specific accomplishments of the CARD program for calendar year 2019 include:

- One Request for Proposals (RFP) issued, with two more under development.
- 3 full proposals received and evaluated.
- 6 previously funded CARD projects completed.
- 13 new research projects added to the portfolio.
- 5 CARD webinars and one public forum were conducted to more effectively and broadly disseminate results of CARD projects.
- A new grant interface webpage to improve grant application and tracking process was launched.

Clean Energy Resource Teams (CERTs)

Major accomplishments of the CERTs Partnership in 2019 include:

- 32 events were hosted with 2,703 attendees.
- An additional 7,509 community members were connected with through 315 meetings, presentations, and other outreach activities across the state.
- 48.4 billion BTUs were saved or offset over the past year as a result of CERTs' efforts.
- Funding was wrapped up for the forty-two 2018 community-based clean energy seed grants projects.
- A new request for proposals (RFP) for 2020 projects was launched. Sixty applications were received with thirty-five proposed projects awarded.

Sustainable Buildings 2030 (SB2030)

Major accomplishments of the SB2030 initiative through 2019 include:

- 185 buildings designed to the SB2030 Energy Standard are predicted to save approximately 1.023 billion kBtus/year.
- To date, 88% of all building projects enrolled in the SB2030 program have documented designs that met or exceeded the SB2030 Energy Standard.
- Buildings designed to the SB2030 Energy Standard are predicted to save approximately \$15.7 million per year assuming an average cost of \$15.35 per mmBtu.
- Buildings designed to the SB2030 Energy Standard anticipate a reduction in carbon emissions of 116,000 tons of CO₂e annually.
- 138 completed SB 2030 projects are estimated to have saved 2,893 million kBtus, a reduction of 372,000 tons of CO₂e and a savings of \$44.4 million to-date.

Statutory Reference

Listed below is the statutory reference establishing funding sources for each of the programs as well as the legislative reporting requirements. The following report details the activities and performance of each of these programs:

Pursuant to Minnesota Statutes, section 216B.241, Subdivision 1e.

(a) The commissioner may, by order, approve and make grants for applied research and development projects of general applicability that identify new technologies or strategies to maximize energy savings, improve the effectiveness of energy conservation programs, or document the carbon dioxide reductions from energy conservation programs. When approving projects, the commissioner shall consider proposals and comments from utilities and other interested parties. The commissioner may assess up to \$3,600,000 annually for the purposes of this subdivision. The assessments must be deposited in the state treasury and credited to the energy and conservation account created under subdivision 2a. An assessment made under this subdivision is not subject to the cap on assessments provided by section 216B.62, or any other law.

(b) The commissioner, as part of the assessment authorized under paragraph (a), shall annually assess and grant up to \$500,000 for the purpose of subdivision 9.

(c) The commissioner, as part of the assessment authorized under paragraph (a), each state fiscal year shall assess \$500,000 for a grant to the partnership created by section 216C.385, subdivision 2. The grant must be used to exercise the powers and perform the duties specified in section 216C.385, subdivision 3.

(d) By February 15 annually, the commissioner shall report to the chairs and ranking minority members of the committees of the legislature with primary jurisdiction over energy policy and energy finance on the assessments made under this subdivision for the previous calendar year and the use of the assessment. The report must clearly describe the activities supported by the assessment and the parties that engaged in those activities.

Conservation Applied Research and Development (CARD)

Prepared By Minnesota Department of Commerce, Division of Energy Resources.

Introduction

The Conservation Applied Research and Development (CARD) grant program is administered by the Department of Commerce, Division of Energy Resources (the Department). Approximately \$2.6 million is available annually for the program. The grant funds benefit the State of Minnesota and Minnesota ratepayers through the Conservation Improvement Programs (CIPs) that utilities operate.

Significant CARD program metrics since its start in 2008 and for calendar year 2019 are summarized in Table 1.

Table 1 CARD program metrics

Description of Metric	Since Start of Program	For Calendar Year 2019 ^a
Successful CARD grant funding cycles	11	1
Request for Proposals (RFP) issued by Department	22	1
Request for Information (RFI) issued by Department	2	0
Notice of Intent (NOI) to Propose submitted by Responders and reviewed by Department staff	419	0
Full proposals submitted by Responders and evaluated by Department staff	466	3
R&D projects funded through the CARD grant program	134	13
Pending CARD grants	--	--
Completed CARD grant projects	96	6

a. Includes activities through December 15, 2019 when this report was compiled.

Overview of Projects

CARD projects quantify the savings, cost-effectiveness and field performance of advanced technologies; characterize market potential of products or technologies within the state; study and characterize hard-to-reach market sectors; investigate and pilot innovative program strategies; and review and analyze relevant policy issues. Completed CARD projects provide utilities with informative and timely information to enhance energy efficiency program designs within their CIP portfolios.

Through 2019, the CARD program funded projects totaling about \$29.6 million. These projects received (or will receive) an additional \$7.5 million in matching funds (Table 2).

Table 2 Summary of CARD program funding to date

Project Type	Number	% of Total Projects	Dollars Awarded¹	% of Awarded Dollars	Estimated Match²
<u>RFP Funded</u> Projects awarded through RFP process (includes completed, and ongoing projects)	120	89.6%	\$27,332,935	92.5%	\$7,044,378
<u>Pending RFP Funding</u> Projects anticipated as result of pending RFP evaluations (Approximations)	0	0%	\$00	0%	\$00
<u>Non-RFP Funded</u> Projects awarded outside of RFP process (includes completed as there are currently no ongoing projects)	14	10.4%	\$2,224,788	7.5%	\$496,605
All CARD Projects	134	100%	\$29,557,723	100%	\$7,540,983

As shown in Table 2, the vast majority of CARD grants are funded through a competitive Request for Proposals (RFP) process (almost 90% of all projects and over 92% of funding). Based on a review of current Conservation Improvement Program (CIP) needs with input from utilities and other stakeholders, the Department issues an RFP, and reviews and evaluates each submitted proposal based on specific criteria including:

- CIP priorities;
- Proposal’s content, scope of work and work plan;
- Responder’s qualifications, skills and experience;
- Anticipated impacts of the project outcomes; and
- Project budget (which often includes matching funds from the responder).

Table 3 and Table 4 list completed and ongoing CARD projects respectively that were funded to date through this RFP process, including details on each project.

¹ Award amounts shown in tables are based on initial awards and does not include additional amounts that might be added through amendments. To date additional funds added through amendments has totaled less than 0.5% of initial awards. Amounts shown in the table also do not reflect funds left unspent after the close of contracts. To date, unspent money returned to the CARD fund has been about 2% of initially awarded funds.

² Matches shown in the tables are based on match commitments in contracts; collected matches often exceed what was committed in the contract. On average, matching funds are approximately 18% **higher** than initially estimated.

Table 3 Completed CARD Projects Funded through RFP Process

RFP Cycle	Grantee	Project Description	Dollars Awarded	Estimated Match
2008	Owatonna Public Utilities	Home Energy Reports Pilot Program	\$123,260	\$531,272
2008	Center for Energy and Environment	Actual Savings and Performance of Natural Gas Instantaneous Water Heaters	\$160,495	\$281,905
2008	U of MN - Sponsored Projects Admin. Grants & Contracts	Quantification of Changes in Residential/Multifamily Building Codes and Standards for Assessing Energy Conservation and Efficiency Impacts in a Cold Climate	\$90,606	\$15,912
2008	Great River Energy	Home Energy Reports Pilot	\$165,000	\$424,300
2008	Energy Center of Wisconsin	Plugging into Savings - Taming Home Electricity Use	\$285,700	\$60,000
2008	U of MN - Sponsored Projects Admin. Grants & Contracts	Researching Energy Conservation Potential for Minnesota Business and Industry	\$203,177	\$0
2008	Eugene A. Scales & Associates, Inc.	Quantification of Indirect Program Impacts (Re-Direct Program)	\$91,170	\$9,000
2008	Franklin Energy Services LLC (Glacier Consulting Group)	Research to Inform Design of Residential Energy Use Behavior Change Pilot	\$47,305	\$0
2008	Navigant Consulting (Summit Blue Consulting)	Demand Side Management (DSM) Potential Study	\$354,250	\$0
2009-10	Northwind Sailing, Inc.	Angry Trout Cafe Kitchen Exhaust HR	\$22,450	\$8,650
2009-10	Center for Energy and Environment	Capturing Energy Savings from Large Building Envelope Leakage Reduction	\$395,240	\$316,760
2009-10	Class5 (Energy Efficiency Programs, Inc.)	Energy Efficiency in the Workplace (health care facilities).	\$395,444	\$5,000
2009-10	Franklin Energy Services, LLC	Emerging Energy Efficiency Financing Mechanisms - provide analysis of emerging energy eff financing models and assess the applicability and attractiveness to MN	\$46,284	\$0
2009-10	Franklin Energy Services, LLC	Energy Management Teams - Coordinator Resource Pilot Study	\$340,464	\$76,284
2009-10	Franklin Energy Services, LLC	Utility Infrastructure Improvements for Energy Efficiency: Best Practices Study	\$27,864	\$0
2009-10	Energy Platforms, LLC	Energy Savings Platform (ESP) Creation of a standards-based Info Technology platform	\$1,500,000	\$511,250

RFP Cycle	Grantee	Project Description	Dollars Awarded	Estimated Match
		enabling MN utilities to design, implement, administer, & report on CIPs.		
2009-10	Franklin Energy Services, LLC	ASHP Efficiency Gains from Low Ambient Temperature Operation using Supplemental Electric Heating	\$55,792	\$0
2009-10	U of MN (Bioproducts & Biosystems Engineering)	Residential GSHP Study. Monitor and analyze the performance of installed residential GSHP in MN.	\$780,816	\$89,738
2009-10	Neighborhood Recycling Corp., (The Green Institute)	Develop an energy efficiency program model for small businesses based on low cost operations and maintenance conservation measures.	\$227,124	\$32,300
2011	Energy Center of Wisconsin	Field Test of Drainwater Heat Recovery in Commercial Buildings	\$138,294	\$5,000
2011	CLASS 5, Inc.	CLASS 5 Community (City-Wide)	\$162,226	\$146,000
2011	Center for Energy and Environment	Advanced Rooftop HVAC Unit Controls Pilot	\$408,108	\$417,865
2011	Energy Center of Wisconsin	Automatic Daylighting Control Commissioning in the Midwest	\$206,172	\$10,500
2011	Minnesota Project, The	LEDs: Energy Savings and Replicability in MN Livestock Facilities	\$185,130	\$75,000
2011	Franklin Energy Services, LLC	Technical Review of the Minnesota Deemed Savings Database	\$146,880	\$0
2011	Franklin Energy Services, LLC	The Energy Efficiency Potential in Minnesota's Multi-family Sector	\$599,056	\$0
2011	Energy Management Solutions, Inc.	Street Lighting	\$49,000	\$0
2011	Michaels Energy	Convenience Store Energy Efficiency	\$52,000	\$76,000
2011	Franklin Energy Services, LLC	Single Recommendation Strategy Study	\$11,380	\$0
2011	Minnesota Municipal Utilities Association	Smart Grid Technologies Installation & Assessment	\$283,825	\$283,825
2011	Energy Management Solutions, Inc.	Variable Refrigerant Technology in Cold Weather Climates	\$65,925	\$0
2011	Michaels Energy	Energy Savings from Demand Response and Load Management	\$100,000	\$0
2011	Bright Power	Multi-family Energy Benchmarking with EnergyScoreCards	\$398,164	\$330,776
2012	Center for Energy and Environment	Saving Energy by Reducing Duct Leakage in Large Commercial & Institutional Buildings	\$380,155	\$189,045

RFP Cycle	Grantee	Project Description	Dollars Awarded	Estimated Match
2012	Center for Energy and Environment	Window Retrofit Technologies for Increased Energy Efficiency without Replacement	\$47,224	\$28,458
2012	U of MN - MnTAP	Researching Energy Conservation Potential at Minnesota Data Centers	\$46,781	\$0
2012	Weidt Group, The	Integrating Benchmarking and the Green Button Initiative into Utility CIP to Capture Greater Energy Savings	\$50,000	\$10,000
2012	Center for Energy and Environment	Condensing Boiler Optimization	\$209,232	\$105,488
2012	U of MN - MnTAP	Motivating Manufacturing Energy Efficiency: E2 Assessments and GreenLean(SM) Training with Directed Implementation Assistance	\$177,488	\$150,000
2012	Minnesota Project, The	Dairy Cooperative Partnerships for Improved Efficiency Program Adoption	\$210,232	\$5,557
2012	Center for Energy and Environment	Heat Pump Water Heaters: Savings Potential in Minnesota	\$25,941	\$17,294
2012	Center for Energy and Environment	Reducing the Energy Cost of Effective Ventilation in Multi-Unit Buildings	\$148,348	\$83,232
2012	Gas Technology Institute	Advanced Heat Recovery System Field Deployment	\$743,603	\$19,000
2012	Michaels Energy	Cost-Effective Recommissioning of Restaurants	\$276,410	\$12,600
2012	University of Illinois at Chicago, Energy Resources Center	Increasing CHP Opportunities to Aid Minnesota's Energy Savings Goal: Analyzing Net Metering Rules and Standby Rates	\$23,040	\$7,680
2013	FVB Energy Inc.	Combined Heat and Power (CHP) Policy Review and Potential	\$199,976	\$0
2013	Seventhwave, Inc.	Improving installation & maintenance practices for Minnesota residential furnaces, air conditioners & heat pumps	\$437,950	\$52,175
2013	Seventhwave, Inc.	Commissioning of demand control ventilation systems in cold climates	\$265,000	\$7,500
2013	Gas Technology Institute	Field Study of High Efficiency Heating & Cooling Mixed-air Rooftop Units (RTUs)	\$236,382	\$66,275
2013	Seventhwave, Inc.	Energy savings from institutional tuning in Minnesota	\$200,000	\$17,580
2013	Franklin Energy Services	Field Test of Large Battery Charging Technologies	\$67,512	\$10,210
2013	Center for Energy and Environment	Improving Effectiveness of Commercial Energy Recovery Ventilation Systems	\$379,478	\$100,101

RFP Cycle	Grantee	Project Description	Dollars Awarded	Estimated Match
2013	Center for Energy and Environment	Demonstrating the Effectiveness of an Aerosol Sealant to Reduce Multi-Unit Dwelling Envelope Air Leakage	\$280,996	\$74,549
2013	Michaels Energy	Mainstreaming Motel Optimization	\$335,024	\$14,850
2013	Seventhwave, Inc.	Research-based design of a residential high user program	\$297,956	\$28,000
2013	Sustainable Engineering Group	The Energy Conservation Potential of Displacement Ventilation Technology in Minnesota Climate Conditions	\$90,170	\$0
2013	Outsourced Innovation	Improving Energy Efficiency and Crop Production in Controlled Environment	\$126,970	\$14,368
2013	Weidt Group	Net Energy Optimizer for Commercial New Construction	\$50,000	\$193,050
2013	Center for Energy and Environment	Optimized Operation of Indoor Public Pool Facilities	\$240,000	\$60,000
2013	Energy Center of Wisconsin	CIP: Stakeholder Meetings' Facilitator for Energy Savings Goal Study	\$59,978	\$0
2013	Strategen Consulting	CIP: White Paper Analysis of Utility-Managed, On-Site Energy Storage in Minnesota	\$99,781	\$0
2013	Meister Consultants Group	CIP: Value of Solar Thermal Study RFP	\$75,000	\$0
2013	U of MN (The Minnesota Project)	Maximizing Rural Electric Cooperative Farm Energy Efficiency Programming	\$74,993	\$5,195
2014	Burr Energy (Microgrid Institute)	Engagement Survey for CHP in MN	\$13,393	\$0
2014	Burr Energy (Microgrid Institute)	CHP Facilitator for Stakeholder Engagement	\$28,947	\$0
2014	Center for Energy and Environment	Pilot Study of a Furnace Retrofit Device for High Efficiency Residential Heating and Humidification	\$401,201	\$93,373
2014	Gas Technology Institute	Advanced Commercial Clothes Dryer Technologies Field Test	\$193,756	\$14,500
2014	Center for Energy and Environment	Field Assessment of Cold-Climate Air Source Heat Pumps	\$201,445	\$103,155
2014	Seventhwave, Inc.	Commercial Roof-top Unit Characterization and Performance	\$419,714	\$35,104
2014	Center for Energy and Environment	Evaluation of New Domestic Hot Water System Controls in Hospitality and Commercial Buildings	\$200,599	\$42,235
2014	Center for Energy and Environment	Small Embedded Data Center Program Pilots	\$272,829	\$71,490

RFP Cycle	Grantee	Project Description	Dollars Awarded	Estimated Match
2014	Illume Advising, Inc.	Behavioral Programs Literature Review & Benchmarking Study, and Workshops	\$122,620	\$16,125
2014	Center for Energy and Environment (86778 NEC)	Quality Installation and Retrocommissioning of High Efficiency Condensing Boilers	\$220,250	\$48,600
2014	Seventhwave, Inc.	Assessments of Plug-Load Control Devices in Commercial Buildings	\$299,000	\$35,750
2014	Cadmus Group, Inc., The	Economic Impact Analysis of the Conservation Improvement Program	\$120,012	\$3,820
2014	Michaels Energy, Inc.	Continuous Commissioning for Small Outpatient Medical Clinics	\$220,296	\$33,700
2014	Center for Energy and Environment	Commercial Energy Code Compliance Pilot	\$354,525	\$45,200
2014	APPRISE, Inc.	Statewide Policy Analysis and Evaluation of Low-Income Programs in Minnesota Utility CIP Portfolios	\$245,096	\$23,760
2014	Seventhwave, Inc.	Minnesota Manufactured Homes Characterization and Performance	\$346,208	\$27,200
2015	GDS Associates, Inc.	Identify & recommend prescriptive EUI measures for inclusion in TRM	\$110,470	\$0
2015	Franklin Energy Services, LLC	T12 Socket Penetration Study	\$81,585	\$53,305
2015	Seventhwave, Inc.	Enhancing New Construction Programs with Performance-based Procurement and Design	\$314,904	\$73,390
2015	Seventhwave, Inc.	Characterizing Opportunities for Small Commercial Energy Programs	\$437,589	\$24,860
2015	Illume Advising, LLC	Statewide Commercial Behavior Segmentation and Potential Study	\$448,022	\$14,578
2015	Gas Technology Institute	Field Study of An Intelligent, Networked, Retrofittable Water Heat Controller	\$281,852	\$20,000
2015	University of Minnesota	Industrial Compressed Air Demand Reduction through Air Tool Replacement	\$68,889	\$3,150
2015	GDS Associates, Inc.	Direct Cooling Retrofit for Server Racks	\$158,987	\$231,103
2015	GDS Associates, Inc.	Dairy Farm Precise Ventilation Control Electric Savings	\$36,867	\$56,153
2015	GDS Associates, Inc.	Whole-Farm Energy Management Valuation	\$203,415	\$59,844
2016	GDS Associates, Inc.	Electric Utility Infrastructure Potential Study	\$277,965	\$0
2016	Center for Energy and Environment	Natural Gas & Electric Potential Study	\$1,656,252	\$86,439

RFP Cycle	Grantee	Project Description	Dollars Awarded	Estimated Match
2017	Synapse Energy Economics, Inc.	Updating the energy efficiency cost-effectiveness framework in Minnesota	\$49,860	\$0
2017	Michaels Energy, Inc.	Stakeholder views on the emerging intersection of electrification, efficiency & decarbonization	\$44,462	\$8,283
2017	American Council for an Energy-Efficient Economy (ACEEE)	Prepaid electricity plans as energy efficiency programs in Minnesota: Potential savings and concerns.	\$49,998	\$2,751
2017	University of Minnesota	Driving Wastewater Treatment Energy Efficiency through a Cohort Training Model	\$50,000	\$7,980
2017	Seventhwave, Inc.	Field study of Tier 2 advanced power strips	\$105,978	\$7,703
	Totals:	96 completed projects	\$21,974,213	\$6,142,702

Table 4 Ongoing CARD Projects Funded through RFP Process

RFP Cycle	Grantee	Project Description	Dollars Awarded	Estimated Match
2014	Franklin Energy Services, LLC	MN Technical Reference Manual Update for 2017-2019	\$331,172	\$0
2017	Center for Energy and Environment	Pay-For-Performance: A Development Tool to Incentivize Ongoing Building Performance	\$49,334	\$8,706
2017	Gas Technology Institute	Demonstration of packaged central condensing tankless water heating systems in multifamily buildings	\$334,667	\$20,555
2017	Center for Energy and Environment	Cooling Loads: The diversity of potential residential cooling solutions and a best practices guide	\$49,946	\$8,814
2017	Evergreen Economics, Inc.	Future Emerging Technologies: Leveraging Public Research for Application in Minnesota	\$49,680	\$20,360
2017	Center for Energy and Environment	Field Study of Stand-alone Dehumidification and Efficiency Opportunities in MN Single Family Homes	\$257,780	\$41,843
2017	Slipstream, Inc.	Field and market assessment of heat pump clothes dryers	\$376,598	\$45,620
2017	Center for Energy and Environment	Expanded Scope Commercial Boiler Tune Ups	\$250,960	\$38,605
2017	Center for Energy and Environment	The Operation and Control of Lighting, Plug Loads, and other Power over Ethernet (PoE)	\$104,975	\$389,901

RFP Cycle	Grantee	Project Description	Dollars Awarded	Estimated Match
		Technologies Using Network Switches in Small Commercial and Institutional Buildings		
2017	Seventhwave, Inc.	MN Residential Energy Baseline & Market Characterization Study	\$299,390	\$18,527
2017	Seventhwave, Inc.	MN Commercial Energy Baseline & Market Characterization Study	\$319,863	\$17,850
2018	Michaels Energy, Inc.	Energy Efficiency Potential of Nanofluids	\$266,837	\$89,680
2018	Cadmus Group, Inc., The	Understanding the Market Barriers & Opportunities for Cold Climate Air Source Heat Pumps in Residential Households	\$206,077	\$0
2018	Slipstream, Inc.	Market potential for saving energy and CO2 with load shifting measures	\$170,134	\$14,348
2018	2050 Partners, Inc.	Minnesota Codes and Standards Program: Concept to Realization Roadmap	\$343,212	\$6,646
2018	Franklin Energy Services, Inc.	Energy Savings Potential of Networked Lighting Control Systems in Small Businesses	\$141,631	\$8,320
2018	Slipstream, Inc.	Light level characterization in Minnesota commercial buildings	\$169,488	\$8,476
2018	Center for Energy and Environment	Revealing the Market for Strategic High Performance Envelope Retrofits	\$120,170	\$21,206
2018	LHB, Inc.	Field study of phase change material (PCM) use for passive thermal regulation	\$321,631	\$13,507
2018	University of Minnesota - MnTAP	Market Study to Determine the Energy Efficiency Opportunity Potential at Minnesota Drinking Water Utilities	\$70,000	\$7,845
2018	Center for Energy and Environment	Optimized Installations of Air Source Heat Pumps for Single Family Homes	\$360,707	\$52,007
2018	Center for Energy and Environment	Ductless cold climate heat pumps for multifamily applications	\$343,940	\$41,354
2018	Center for Energy and Environment	Commercial and Industrial Refrigeration Market Assessment	\$226,850	\$21,366
2018	Cadmus Group, Inc., The	Economic Impact of CIP	\$193,680	\$6,140
	Totals:	24 Ongoing projects	\$5,358,722	\$901,676

In addition to the completed and ongoing projects funded through the RFP process (as listed in the previous two tables) at the end 2019 there are two RFPs in development, with \$2.2 million in additional funding anticipated.

Occasionally the Department will fund a CARD project outside of the competitive RFP process, in cases where a project requires a sole source provider, or when the Department has the opportunity to leverage CARD funds for a project already underway or being funded from multiple sources. To date fourteen such projects have been funded by this means, representing about \$2.2 million of total funds awarded through CARD since the program's start in 2008 (Table 2). These non-RFP grants also represent nearly \$500,000 in matching funds.

Ongoing Efforts

Each year, the Department solicits input from utilities and other stakeholders to inform CIP needs and help develop appropriate topics for the RFPs. In 2019, this process was continued.

Starting in 2012 and continuing into 2019, the Department has been reviewing current policies and practice for CARD grant contract negotiation and project management in an effort to improve the quality and consistency of CARD project reporting and monitoring and to produce deliverables that are more accessible to utilities and other stakeholders. In 2019, efforts in this direction focused on rolling out a new grant interface website to improve the application process for potential grantees and provide more consistent tracking and oversight of grantees for the Department. That rollout was started in September of 2019 with the first CARD RFP to use this process expected to be posted in late November 2019.

In 2013 a Notice of Intent (NOI) to propose procedure was added to the process for responding to general topic RFPs. This process allows the Department to review project ideas and recommend only certain projects to proceed to full proposal. Both potential grantees and utilities appreciated this improvement as it improved the efficiency of the evaluation process and allowed respondents to focus on proposals more likely to be successful.

In 2017, the Department further improved the NOI process by inviting utility representatives to participate in it. This initiative was well-received and resulted in a more robust process, as well as recommendations for projects more in line with utility goals and needs. In 2018 and 2019, the Department further refined this process to make it more efficient and accessible to utilities.

Starting in 2014, the Department improved the accessibility of grant proposals and evaluation files by making them available electronically on the Department website through the [Commerce Actions and Regulatory Document Search tool](https://www.cards.commerce.state.mn.us/CARDS/) (<https://www.cards.commerce.state.mn.us/CARDS/>). Previously, viewing these files required an appointment and in-person viewing of a hard copy of evaluation documents. In 2019, some minor improvements were made to the process of accessing these files.

In 2015 an updated CARD website was rolled out which includes a search tool for CARD projects allowing users to quickly obtain a list of past and ongoing CARD grants, search, or sort by market sectors or targeted technology, obtain more details on specific projects of interest and link to available final reports. The website underwent additional updates and improvements in 2019. In addition, CARD results continue to be presented at local, regional and national conferences with very positive feedback.

Starting in 2016 and continuing in 2019, the Department improved stakeholder and public understanding of the CARD Grant Program's purpose and the role it plays in helping to achieve the State's 1.5% savings goal. The Department sought ongoing input from stakeholders regarding research needs, worked more collaboratively

with utilities on ongoing CARD projects and encouraged grantees to seek more utility input and collaboration. Dissemination of CARD grant results have become more systematic, including writing regular articles for the CIP Newsletter and other publications, publicizing final CARD reports more broadly, holding webinars on CARD results and making the webinars available for download later. In addition, the Department standardized CARD webinars to give them a consistent look and add an introduction by Department staff, which has raised the profile of the CARD program and received positive feedback from stakeholders. All of these efforts have improved the quality of CARD project proposals and CARD project results. In 2019, a project was begun to build a database of CARD projects that classifies projects according to the results. Classification categories include market sector, technology type, research approach, as well as notes on applicability in CIP and next steps for effective application in CIP. This classification project is ongoing but once complete is expected to provide utilities with another tool for assessing CARD project results and applicability in their portfolios.

Clean Energy Resource Teams (CERTs)

Prepared by the Clean Energy Resources Teams partnership.

Overview

The Clean Energy Resource Teams—or CERTs—is a statewide partnership³ with a shared mission to connect individuals and their communities to the resources they need to identify and implement community-based clean energy projects. CERTs empowers communities and their members to adopt energy efficiency and renewable energy for their homes, businesses and local institutions, and increasingly to electrify select end-uses through electric vehicles and air source heat pumps. CERTs works to impartially meet stakeholders where they are, convert learning into doing, and provide inclusive access to clean energy.

From hands on assistance to educational forums and seed grants, CERTs' work is place- and people-based. Overall, CERTs works with five primary audiences. Brief examples include:

- Governmental units: CERTs engaged hundreds of cities, counties, schools, and tribal nations to help them advance their own energy efficiency and renewable energy projects through GreenStep Cities, Cities Charging Ahead, Solar Possible, and through on-the-ground engagement with local staff and officials.
- Utilities: CERTs conducted 9 business blitzes to scale-up utilization of utility rebates and audit services and collaborated with utilities to carry out 11 separate Saving Watts and Drops efforts to achieve Conservation Improvement Program savings.
- Small businesses: CERTs supported small businesses in utilizing PACE and utility rebates and programs for efficiency projects, connected businesses to service providers like the Retiree Environmental Technical Assistance Program (RETAP) for assessments, and collaborated with

³ The CERTs partnership joins the Minnesota State Energy Office, part of the Minnesota Department of Commerce, Division of Energy Resources; the University of Minnesota Extension Regional Sustainable Development Partnerships; the Southwest Regional Development Commission; and the Great Plains Institute.

community-led organizations like the Lake Street Business Council to advance local business clean energy actions.

- Agricultural producers: CERTs continued to conduct free virtual and onsite solar site assessments for farmers (and small businesses), partnered with Minnesota Farmers Union on a number of events, and provided direct technical assistance to farmers seeking information about leasing some of their land for solar.
- Underserved communities: CERTs leveraged its Saving Watts and Drops programming to coordinate energy saving efforts in multi-family housing, with manufactured home communities, and LED distribution at Food Shelves. CERTs continued to work with tribal nations on energy education events, solar development, and energy-efficient housing.

Program Outcomes

To integrate CERTs' work around the state, CERTs aligns its programming and documents its success within three major categories: learn, connect and act. *Learn* describes the variety of work CERTs does to help Minnesotans understand their clean energy options, utilize decision tools to determine how best to move forward, and see project models and examples that they can adapt and replicate. *Connect* frames the work CERTs does via events, conferences, presentations, workshops, and tours to create learning and network building opportunities that catalyze action. *Act* describes the hands-on assistance that CERTs provides to spur Minnesotans to take clean energy action. Highlights from 2019, by category, include:

- **Learn:** CERTs launched a new website, revamped and developed an array of new tools and guides, and published 75 stories and news posts in 2019. A sample of 2019 resources follows:
 - The most accessed resource on the CERTs website in 2019 was the new Clean Energy Job Board. Between job opportunities curated by CERTs staff and those added directly by hiring organizations, there were 200 jobs featured (mncerts.org/job-board).
 - CERTs Tools and Guides (mncerts.org/tools-guides) were overhauled this year on the new website launched in March of 2019. The most popular guides—in order—were about:
 - Community Solar Gardens (mncerts.org/solargardens)
 - PACE Financing (mncerts.org/pace)
 - Efficient Lighting (mncerts.org/lighting)
 - Simple Steps to Solar (mncerts.org/simple-steps-solar)
 - Choosing an Electric Vehicle (mncerts.org/evs)
 - In 2019, CERTs researched, developed, tested, and launched a new guide to air source heat pumps for residents. The guide—which lives online, has a downloadable companion guide, and is being customized for Minnesota utilities—explains the technology, setup options, performance levels, and next steps for installation (mncerts.org/ashp).
 - The MN Energy Stories newsletter is a digest for those looking for news, projects examples, and opportunities. With the new website, stories and news have taken an even more central and dynamic role in the resources provided by CERTs (mncerts.org/stories). CERTs published 75 stories and news posts in the last year. Some of the most read posts have included:
 - Community solar for homeless Veterans in Duluth (mncerts.org/e3csg)
 - Electric vehicles for metro cities (mncerts.org/muniev)

- Solar in South Saint Paul Schools (mncerts.org/sspsolar)
 - Thermal imaging with drones in Warren (mncerts.org/warrendrones)
 - A solar-powered veterinarian in Two Harbors (mncerts.org/vetsolar)
 - Features on ice dam prevention (mncerts.org/icedams), EV opportunities (mncerts.org/evnews), and solar brightfields (mncerts.org/brightfields)
- **Connect:** In 2019, CERTs hosted 32 events with 2,703 attendees. CERTs connected with an additional 7,509 community members through 315 meetings, presentations and other outreach activities across the state. A sample of 2019 events follows:
 - Regional events spotlighted a range of technologies, deployment models, and case studies. An electric vehicle (EV) forum in Moorhead (mncerts.org/fmev) focused on identifying opportunities for key players to expand EV use in the Northwest region. An event in St. Charles highlighted an innovative solar model called the Butter Solar Portfolio (mncerts.org/buttersolar) and the mix of partners, including the St. Charles Municipal Utility and Organic Valley, that came together to make it possible. The Metro CERT Annual Event (mncerts.org/metro2019) was an opportunity to highlight a range of community energy efforts including efficiency and solar in Maplewood; equity-focused efficiency and solar programming in Minneapolis; and EV projects in Woodbury, Edina and Bloomington.
 - *The Power of Minnesota* documentary (powerofmn.com) features stories of Minnesotans across the state who are building and participating in the clean energy economy. In 2019, CERTs hosted or supported community events in Winona (mncerts.org/winona), Mountain Iron, Mankato (mncerts.org/mankato), Warren, New London, Crookston, and Fergus Falls (mncerts.org/fergus). Beyond screening the documentary, these events served as opportunities to highlight local speakers and projects and for community conversations about clean energy associated job, economic, and community benefits. More events and new video stories are coming soon for this project.
 - In partnership with the Minnesota Department of Commerce, CERTs created and staffed a Growing Clean Energy exhibit in the Eco Experience building at the 2019 Minnesota State Fair using content from *The Power of Minnesota*. The exhibit attracted many visitors and received media attention from FOX 9 and KARE 11 (mncerts.org/statefair2019).
 - CERTs partnered with the Minnesota Solar Energy Industries Association (MnSEIA) to run our 4th annual Solar Video Contest aimed at engaging youth and people of all ages across Minnesota with fun and educational short videos about solar. There were more entries and votes than ever before, as well as an award presentation on stage at the MnSEIA conference (contests.mncerts.org).
 - **Act:** Overall, CERTs programming saved or offset 48.4 billion BTUs, or enough to power 1.4 million LED light bulbs annually. Table 5 details actions that resulted in energy savings or offsets in 2019, including audiences served, a description of the effort and the actual BTUs saved or offset. Cost savings in Table 5 reflect savings from energy efficiency projects only.

Table 5 CERTs Programming Summary

Audience	Program Description	BTUs Saved/Offset ⁴
Utilities, Underserved Communities	<p>Saving Watts and Drops: Coordinated 11 separate efforts to distribute more than 6,000 energy saving items like light bulbs, showerheads, and faucet aerators. Partnering utilities included: Brainerd Public Utilities, CenterPoint Energy, Kandiyohi Co-op, Lake Region Electric Co-op, Minnesota Energy Resources, Minnesota Power, New Ulm Public Utilities, Otter Tail Power, Todd-Wadena Electric Co-op, and Xcel Energy. Communities and activities included: Bemidji, Fond du Lac Tribal Nation, Glencoe water department, St. Paul subsidized housing, Wadena, New London-Spicer Schools YES! team fundraiser, King Turkey Day, Dodge County Fair, manufactured home parks in Brainerd, and apartments (some low-income) in New Ulm. In total, savings of 333,234 kWh, 36,066 therms, and \$62,900 annually.</p>	4,743,594,408
Utilities, Small Business	<p>Otter Tail Power (OTP) Business Blitzes: Conducted door-to-door outreach to main street businesses and commercial districts to support OTP’s Commercial Direct Install program, which includes free assessment, free installation of energy saving items, and recommendations for future projects. CERTs visited 301 businesses in Morris and Crookston in 2019, 153 of which received assessments with direct install of LED bulbs, water-saving devices, and water heater insulation. Follow-up of businesses from Hallock, Fertile, Twin Valley, Perham, and Parkers Prairie blitzes in late 2018 and Morris and Crookston in 2019 showed 30 businesses completed projects in these communities. Savings from directly installed energy efficiency measures of 413,373 kWh and \$37,200 annually and from follow-up projects of 386,483 kWh and \$34,800 annually.</p>	2,729,108,672
Utilities, Small Business	<p>Xcel Energy Partners In Energy Business Blitzes: Collaborated with Center for Energy and Environment (CEE) and conducted door-to-door outreach to main street businesses in Faribault in late 2018 and in Mahtomedi/Willernie and Rosemount in 2019. CERTs promoted free energy assessments by Minnesota Chamber of Commerce’s Energy Smart and Xcel Energy’s One-Stop programs on lighting, refrigeration, and rooftop units. CERTs visited 231 businesses and there were 41 post-audit activities by small and medium sized businesses, resulting in savings of 693,696 kWh, 194 therms, and estimated \$62,500 annually.</p>	2,386,290,752

⁴ Calculations include conversions as follows: 3,412 BTUs per kWh; 100,000 BTUs per therm; 91,333 BTUs per gallon propane; 114,000 BTUs per gallon gasoline

Audience	Program Description	BTUs Saved/Offset ⁴
Utilities, Underserved Communities	Minnesota Energy Resources and Minnesota Power Home and Business Energy Audits: Promoted their joint home and business energy assessment blitz in April 2019 in Cloquet and Scanlon. CERTs created a public service announcement that was aired on area radio stations. Assessments were conducted for 117 businesses and 124 households, saving them \$17,200 annually. Direct install savings totaled 128,878 kWh and 1,474 therms and gas measures following the audits was 1,247 therms.	711,831,736
Utilities, Underserved Communities	Minnesota Energy Resources (MER) and Minnesota Power Multi-Family Building Direct Install Program: Referred 22 properties, of which 7 moved forward in 6 communities (Albert Lea, Glenville, North Branch, Jackson, Cannon Falls, Hinckley) serving 176 units or households. Two of the 7 properties were low-income housing. MER partnered with Minnesota Power for gas and electric savings for the properties. Savings of 6,120 therms, 17,625 kWh, and \$19,900 annually.	672,136,500
Utilities	Lake Crystal Business Blitz: Visited 38 businesses and promoted utility rebate programs and PACE financing. Two businesses did projects for total savings of 65,665 kWh and \$8,500 annually.	224,048,980
Governmental Units	Community Solar Garden (CSG) assistance: Presented to City of Hastings in April 2019 about their community solar garden options and pathways forward for evaluating options; by October, the City signed contracts for two CSG subscriptions for 2,683,887 kWh annually.	9,157,422,444
Governmental Units	Solar Possible: Partnered with the Great Plains Institute and the Minnesota Department of Administration, Office of Enterprise Sustainability on a first-in-the-nation approach of utilizing a State Master Contract and Site(s) Specific RFP for state agencies, local governments, and schools in Xcel Energy electric territory to jointly procure on-site solar. Collaborative solar purchasing can reduce administrative costs, support peer learning, enable timely action, and reduce costs through bulk pricing. The following governmental units ultimately participated: 453 kW system for Hennepin County, three systems for Edina Public Schools (406, 30 and 3 kW), 453 kW system for South St. Paul Public Schools, and five systems for the State of Minnesota (75, 88, 94, 184, and 198 kW); totaling 2,551,332 kWh produced annually.	8,705,144,784
Governmental Units	SolSmart: From 2017 to 2018, CERTs and the Great Plains Institute supported Stearns County, Chisago County, Pine City, and the cities of Austin, Hutchinson, Grand Rapids, St. Francis, and Rochester with advancement toward designation through SolSmart, a national program	678,759,396

Audience	Program Description	BTUs Saved/Offset ⁴
	that provides free technical assistance with best practices and ordinances for solar energy development. In the year following their designations, Austin had 2 systems installed totaling 49 kW and Rochester had 14 systems installed totaling 102 kW, resulting in 198,933 kWh production annually.	
Small Business, Governmental Units, Utilities	Property Assessed Clean Energy (PACE): Engaged communities and businesses in PACE programs administered by the Rural Minnesota Energy Board and the St. Paul Port Authority. This engagement resulted in 15 businesses utilizing PACE for solar projects and 9 utilizing PACE financing for energy efficiency (e.g., lighting and HVAC). The energy efficiency projects are saving \$115,800 annually.	7,263,674,760
Governmental Units, Utilities, Underserved, Small Business, Agriculture	2018 CERTs Seed Grants: CERTs funded 42 projects across the state for a total of \$140,000 dollars. These projects leveraged \$3,920,607 from other sources and involved or reached nearly 76,600 Minnesotans. Thirty-three projects had a focus on implementation of clean energy (rather than a focus on research or education), including 24 energy efficiency projects (saving 525,968 kWh, 10,548 therms, 2,931 gallons propane, and \$67,200 annually), 8 renewable energy projects (generating 415,467 kWh annually), and 1 EV project (2,477 gallons gasoline and \$6,700 annually). Significant savings come from six weatherization-focused projects with Bi-County Community Action, Bois Forte, Ecolibrium3, Mille Lacs Band of Ojibwe, United Community Action Partnership, and in the Winona area. Significant clean energy generation comes from a residential solar group buy in the Metro.	4,817,051,243
Governmental Units	Seed Grant Ripple Effects: The seed grant final report asked whether the seed grant project spurred other projects, ideas, or next steps. The City of North Mankato’s city council directed staff to find other energy saving and renewable energy options after seeing the savings of the lighting upgrade funded by the CERTs seed grant. As a result, the City now has two solar garden subscriptions for 1,089,100 kWh.	3,716,009,200
Governmental Units, Small Business	Supporting other programs: Promoted AGRI Milk Cooler Grants to dozens of schools and the following each received \$1,500 for new milk coolers: Aspen Academy Public School, Career Pathways Charter, Forest Lake Area Schools (3 grants), Global Academy Charter, and Wabasso Public School, for a total estimated savings of 29,120 kWh and \$2,600 annually. Assisted the Minnesota Green Corps member serving Mille Lacs County on lighting upgrades to County Jail and Justice Center, resulting in savings of 8,147 kWh and \$750 annually. Promoted Xcel Energy’s One-Stop Lighting program in Murray County, resulting in 12	1,485,564,328

Audience	Program Description	BTUs Saved/Offset ⁴
	<p>businesses receiving assessments and 2 implementing lighting upgrades for a total of 17,246 kWh and \$1,500 savings annually. Referred six businesses or organizations to Minnesota Technical Assistance Program's (MnTAP) and those that took action are realizing an aggregated savings of 250,000 kWh and \$28,700 annually. Guided CEE with business blitz methods for outreach in the Sartell / Sauk Rapids area for their non-wires alternative pilot project with Xcel Energy. CEE's team visited 401 businesses, signed 35 up for audits, and guided 12 through to completed lighting retrofit, with a total savings of 130,881 kWh and \$11,800.</p>	
Agriculture, Small Business	<p>USDA Rural Energy Development Assistance: From June 2017 to July 2019, CERTs worked with farmers and rural small businesses to identify energy efficiency opportunities, prioritize renewable energy options, and connect them to resources (USDA REAP funding, PACE, etc.) to move forward on project implementation. CERTs provided 29 free onsite and virtual solar site assessments and 5 projects are completed to-date, collectively producing 169,396 kWh annually.</p>	577,979,152
Governmental Units, Utilities	<p>Cities Charging Ahead: Coordinated a year-long cohort with 28 participating communities. Cities learned about incorporating electric vehicles (EVs) in their fleets, hosting publicly-available EV charging infrastructure, and encouraging EVs with private development. The six cities (Bloomington, Burnsville, Eagan, Elk River, Morris and Woodbury) that purchased 6 EVs and leased 4 EVs are saving 2,553 gallons gasoline and \$6,900 annually. Three of these 10 EVs are powered by renewable energy, associated with the generation of 24,960 kWh annually.</p>	376,205,520
Total CERTs Program Savings		48.2 billion

Ongoing Efforts

- 2019 RFP for 2020 Seed Grants:** In August 2019, CERTs launched its seed grant request for proposals for the 2020 community-based clean energy seed grant projects. Each of the seven CERTs regions has \$20,000 for local clean energy projects. Steering Committee members in each region determine seed grant priorities and then review and award funding. A total of 60 projects requested \$317,775 in funding; 35 projects have been awarded a total of \$140,000 in funding for labor only expenses. The official announcement of awards will be released in January 2020. **Audiences: Governmental Units, Small Business, Agriculture, Utilities, Underserved Communities**
- Utility Support:** In addition to the utility support described in Table 5, additional business blitzes were conducted for Minnesota Municipal Power Agency's (MMPA) cities of Arlington, Brownton, and

Winthrop and associated energy savings will be accounted for in 2020. CERTs shared its Utility Menu of Services (mncerts.org/utilities) to 14 municipal utilities (Arlington, Brainerd, Brownton, East Grand Forks, Fairfax, Hibbing, Lake Crystal, Madelia, New Ulm, Owatonna, Pierz, Rochester, Winthrop, Willmar); 15 cooperative utilities (Beltrami, BENCO, Connexus, Dakota, East Central, Freeborn-Mower, Kandiyohi, Meeker, MiEnergy, Mille Lacs, Nobles, North Star, People’s, Steele-Waseca, Todd-Wadena); 2 investor owned utilities ((IOUs); Minnesota Power, Greater Minnesota Gas); and Minnesota Municipal Utilities Association (MMUA) and MMPA to more clearly communicate ways in which CERTs can partner with utilities. CERTs shared how PACE can complement utility rebates with a number of utilities (listed in full below). CERTs hosted a utility-to-utility conference call on manufactured housing energy efficiency. CERTs created a guide on home heating and cooling with air source heat pumps with detailed review and design input by Great River Energy, Minnesota Power, Minnkota, Missouri River Energy Services, and Otter Tail Power (mncerts.org/ashp). Minnesota Power and Otter Tail Power have branded the guide for use with their customers. On electric vehicles (EVs), CERTs hosted an in-person utility-to-utility sharing session with nine SW electric utilities (Federated Rural Electric, Sioux Valley Energy, Missouri River Energy Services, Nobles Cooperative Electric, South Central Electric Association, New Ulm Public Utilities, Renville-Sibley Cooperative Power Association, Brown County Rural Electrical Association, City of Windom). Metro CERT presented on Cities Charging Ahead and EVs at the MMUA’s summer conference. CERTs co-hosted a booth at Farm Fest with 10 electric cooperatives, including EVs on display by South Central Electric Cooperative, Nobles Electric Cooperative, and Agralite Electric Cooperative.

Audiences: Utilities, Small Business, Governmental Units, Underserved Communities, Agriculture

- **Minneapolis Green Cost Share:** Metro CERT conducts the technical review process for Green Cost Share projects for the City of Minneapolis by assembling a committee of experts, creating a scoring tool, reviewing project applications, and summarizing the review for City staff. Metro CERT also promotes the request for proposals and writes some project case studies. In 2019, 80 projects were funded more than \$1.3 million from City of Minneapolis, for a total investment over \$10 million with matching funds. Projects completed in 2019 include 48 energy efficiency projects, 26 solar projects, and 6 solar bulk buy projects with 127 participating sites. These projects are located at 53 commercial properties and 21 multifamily properties, with the remaining located at nearly all residential properties as part of the solar bulk buy projects. Thirty-three of the 80 projects are in Green Zones that target underserved communities. ***Audiences: Small Business, Governmental Units, Underserved Communities***
- **GreenStep Cities and Tribal Nations:** CERTs continues to support the 130+ GreenStep city and tribal nation participants with clean energy best practice actions. Direct support this past year included action on energy efficiency, benchmarking, solar, and EVs. CERTs co-hosted two GreenStep workshops this past year, one on Green Building Case Studies and another on Cities Charging Ahead: Tools and Resources for EV Readiness. CERTs also hosted a Solar in Your City session at the League of Minnesota Cities Annual Conference with speakers from Brooklyn Park, Duluth, La Crescent, and Red Wing. ***Audiences: Governmental Units***
- **Community Solar Gardens:** CERTs continued to serve as an educational resource to individual consumers, local governments, and utilities working to understand community solar gardens or start community solar garden projects. In 2019, CERTs assisted 71 unique governmental units (cities, counties, schools, and tribal nations), utilities, and other community groups and organizations with

community solar garden questions. This assistance has ranged from responding to siting and planning questions to developing specific consumer education pieces geared toward low-income household audiences regarding the potential for subscription-related savings. CERTs also counseled jurisdictions on their range of solar options beyond participating in solar gardens. **Audiences: Governmental Units, Utilities, Agriculture, Underserved Communities**

- **Onsite Solar for Jurisdictions:** In 2019, CERTs continued efforts to support local governments' and schools' interest in adopting solar for their own facilities through a variety of efforts including Solar Possible, a joint solar procurement effort for jurisdictions in Xcel Energy territory with the Office of Enterprise Sustainability and Great Plains Institute (savings referenced in Table XX). The Solar Possible initiative won two awards for its unique cohort approach; one from the U.S. Department of Energy's Solar in Your Community Challenge program and a second from the University of Minnesota's Humphrey School of Public Affairs and the Bush Foundation's State Government Innovation Award. In addition, CERTs hosted an on-site solar workshop with representatives from both the National Renewable Energy Lab and the U.S. Environmental Protection Agency, published a suite of tools to assist jurisdictions with the solar procurement process (mncerts.org/public-solar-procurement), and hosted a webinar to guide jurisdictions through using these tools. **Audiences: Governmental Units**
- **Connecting Low-Income Communities to Efficiency and Renewable Sources (CLICERS):** CERTs continues to assist the Minnesota Department of Commerce with CLICERS implementation activities geared toward lowering the energy burden of low-income households. Together, CERTs and the Minnesota Department of Commerce have supported opportunities for community action agencies to advance solar, identified best practices for low-income customer engagement in community solar gardens, and pursued onsite solar projects with underserved communities. **Audiences: Underserved Communities**
- **Property Assessed Clean Energy (PACE):** Over the past year, CERTs partnered with the St. Paul Port Authority to assist counties with education and information as they consider signing the PACE joint powers agreement (JPA). PACE allows building owners to finance energy efficiency and renewable energy projects and then repay them as a separate line item on their property taxes. Five counties signed the JPA in 2019, including Clay, Kanabec, Norman, Todd, and Wadena. In southwest Minnesota, CERT partner the Southwest Regional Development Commission administers the Rural Minnesota Energy Board PACE program, another opportunity to finance clean energy projects. Staff featured PACE as an opportunity to manufacturing groups, chambers of commerce and local economic development authorities; to numerous utilities (8 municipal utilities (Brainerd, Delano, Lake Crystal, New Ulm, Pierz, Princeton, Shakopee, Willmar); 4 cooperative utilities (East Central, Kandiyohi, Mille Lacs, Todd-Wadena); 3 IOUs (Minnesota Energy Resources, Minnesota Power, Otter Tail Power); and MMPA); and to RETAP consultants. A 2019 legislative change to the PACE statute enabled PACE to be used for new construction. Several new construction projects were funded with more in the works for 2020. **Audiences: Governmental Units, Small Businesses, Utilities, Agriculture**
- **MN Solar Pathways:** CERTs is one of five partners (led by the Minnesota Department of Commerce) working on the Minnesota Solar Pathways project. This effort is funded by the U.S. Department of Energy and aims to find least-risk, best-value strategies for Minnesota to achieve its solar energy goals (mnsolarpathways.org). CERTs leads the communications-related work for the project, and our greatest

success this year has come from the publishing and reception of the Solar Potential Analysis (SPA) that was covered extensively in the media and began national conversations about curtailment and overbuilding as positive strategies for getting to high penetrations of renewable energy (mnsolarpathways.org/spa). **Audiences: Utilities**

- **Cities Charging Ahead:** This year-long cohort program that worked together across Minnesota to explore electric vehicle (EV) readiness was led by the Great Plains Institute and CERTs. There were 28 participating jurisdictions in four regional cohorts: 16 cities in the Metro cohort (Bloomington, Burnsville, Coon Rapids, Eagan, Edina, Elk River, Falcon Heights, Fridley, Hastings, Inver Grove Heights, Maplewood, Marine on St. Croix, Richfield, St. Louis Park, White Bear Lake, Woodbury), 5 in Southeast (Albert Lea, Faribault, Red Wing, Rochester, Winona), 4 in Northeast (Duluth, Fond du Lac Tribal Nation, Grand Marais, Virginia), and an additional 3 in greater Minnesota (Warren, Morris, Hackensack). Participating communities received technical assistance focused on three primary actions: a) adding EVs to fleets, b) installing publicly-available EV charging stations, and/or c) guiding private development through incentives or ordinances. Beyond those jurisdictions that added EVs to their fleets (see metrics in Table XX), seven additional jurisdictions (Coon Rapids, Falcon Heights, Faribault, Fridley, Hastings, Inver Grove Heights, Maplewood) conducted fleet analyses for EVs through Xcel’s FleetCarma partnership. In 2019, five cities (Burnsville, Eagan, Elk River, Red Wing, Morris) installed 10 level 2 EV chargers and 2 DC fast chargers (5 of these 12 chargers are powered by renewable energy) with more planned for 2020. Two cities (St. Louis Park and Rochester) updated local ordinances to require EV charging with new development, and several cities incorporated EV readiness components into their comprehensive plan. Additionally, a number of participants hosted educational “ride and drives” for their residents to increase EV awareness. The CERT-hosted “EV-olution” event in March brought participants and other key actors together to highlight project successes and release a suite of resources developed through the cohort program to assist others in their EV efforts. These tools are publicly-available on the Drive Electric website (driveelectricmn.org/). **Audiences: Governmental Units, Utilities**
- **Solar Siting:** CERTs advanced several siting related efforts through SolSmart technical assistance and through on-going programming about solar siting in relation to agricultural lands and community character. SolSmart is a national designation program that provides technical assistance with best practices and ordinances for solar energy development. The Great Plains Institute coordinated a Midwest cohort of communities advancing toward designation in SolSmart. As part of that effort, CERTs worked one-on-one with communities in Greater Minnesota. Carlton County, Clay County, Crystal Bay Township, and the cities of Bemidji, Dawson, La Crescent, Mountain Iron, Warren, and Winona all achieved designation. In addition, CERTs worked with partners to host a number of discussions about solar siting practices and approaches that can maximize shared benefits in relation to agricultural lands and community character. CERTs assisted the Minnesota Association of Townships with solar siting resources and provided direct support to the counties of Blue Earth, Chippewa, Cottonwood, McLeod, Murray, Nobles, Renville, and Winona with siting questions. **Audiences: Governmental Units**

Allocation of Legislative Funding Resources and Leveraged Resources

CERTs has 16 staff who account for 11.5 full time employees (FTE), all of whom are paid in part via this legislative allocation. Staff are based across CERTs' four partner organizations and across all seven regions. Given the nature of CERTs work, staff are critical to carrying out CERTs clean energy work across the state and thus represent the largest share of CERTs spending followed by seed grants. Seed grants catalyze local projects, connect communities to clean energy efforts and attract other dollars to further clean energy around the state.

Beyond the legislatively appropriated dollars, CERTs continues to leverage additional support for its work. Funding and related programmatic efforts include U.S. Department of Energy Solar Energy Technologies Office funding to advance solar, McKnight Foundation funding to spur local government clean energy projects along with clean energy champion development, Carolyn Foundation funding to develop and test a cohort model to implement clean energy, U.S. Department of Agriculture Rural Energy Development Assistance funding to assist farms and rural small businesses with renewable energy assessments, and several contracts for services for discrete efforts.

These leveraged dollars reflect the value of the CARD investment in CERTs and how those core dollars have spurred and accelerated additional programming through complementary investments.

Sustainable Buildings 2030 (SB2030)

Prepared by the Center for Sustainable Buildings Research (CSBR).

Overview

The Minnesota Department of Commerce submits this report pursuant to Minnesota Statutes 216B.241, subd. 9 (f) on the cost-effectiveness and progress of implementing the SB2030 performance standards and shall make recommendations on the need to continue the program.

In 2013, the reporting requirements were changed to require an annual report to the legislature every January. The 2010 report concluded that SB2030 would be cost-effective when meeting the targets for projects during the first phase of the program (between 2010 and 2015).

In the 2013 report, this conclusion was verified with data from the first 40 projects in the program designed to the SB2030 Energy Standard. As data has come in from projects in the last few years, the following savings have been reported; this trend continues for the subsequent phase of the project.

Table 6 SB2030 Estimated Cost Savings

Report year	Number of reporting projects	Estimated energy savings per year, mmBtu	Estimated cost savings per year, million \$	Estimated energy savings to-date, mmBtu*	Estimated cost savings to-date, million \$*
2013	40	250	3.25	--	--
2014	66	327	5.24	--	--
2015	78	490	7.04	--	--
2016	93	534	8.3	--	--
2017	126	634	9.8	--	--
2018	154	867	12.6	1,765	25.7
2019	166	923	14.8	1,817	29.1
2020	185	1,023	15.7	2,893	44.4

*Note that savings to-date were not estimated prior to the 2018 report.

History of Minnesota Sustainable Building 2030

The Minnesota Sustainable Building 2030 (SB2030) standards were enacted in 2008 and designated the Center for Sustainable Research (CSBR) at the University of Minnesota as the lead to develop a Minnesota program reflecting the goals of the national Architecture 2030 program.

Architecture 2030 establishes the goal of achieving net-zero energy use in buildings by 2030 and outlines specific incremental performance targets in order to meet this goal. Every five years, total carbon output due to energy use in buildings is to be reduced by an additional 10% compared to the average energy use of existing buildings in 2003. Reflecting this national program, the Minnesota Sustainable Building 2030 program requires all state-bonded projects that began schematic design after August 1, 2009 to meet an energy reduction of 60% compared to the average building. Starting in 2015, projects have begun to meet the 70% reduction standard. In 2020 this target moves to 80% better than a baseline building.

The SB2030 legislation requires CSBR, in cooperation with Commerce, to “establish cost-effective energy-efficiency performance standards for new and substantially reconstructed commercial, industrial, and institutional buildings that can significantly reduce carbon dioxide emissions by lowering energy use in new and substantially reconstructed buildings.” All program elements are to be based on scientific or real world experience in building energy conservation, and all buildings are to be scientifically benchmarked and real reduction in energy consumption measured.

The energy standards for all types of buildings are to be comprehensive, reliable, and equitable and provide procedures for the ongoing monitoring of energy use in buildings that have adopted the performance standards.

Minnesota Statutes 216B.241 also requires that utilities develop and implement programs that help building owners achieve the energy savings goals through design assistance, incentives, and verification.

Finally, continuing education and training programs for Minnesota designers, engineers, and building operators are fundamental to the initiation of the *SB2030* standards and the law made education and training a primary goal.

Expected Cost-Effectiveness of the Sustainable Building 2030 Program

The significant improvements in building performance required by the *SB2030* energy performance standards must be achieved in a cost-effective manner. Projects and activities are generally considered cost-effective if the project or activity results in a net benefit to the consumer or society. In the case of utility-administered conservation programs, benefits are based on the energy savings over the assumed lifetime of a particular measure.

In 2009⁵, the Center for Energy and the Environment (CEE) performed a preliminary cost-effectiveness analysis on a set of 115 buildings in the region. This initial review shows that the energy performance level required by the *SB2030* standards can be achieved cost-effectively for the overwhelming majority of building types and situations. This analysis has been updated in 2019 to reflect changes in utility pricing and will inform further implementation of cost-effectiveness for projects in the program.

The required level of energy efficiency is adjusted for the small minority of projects that demonstrate that they cannot meet the *SB2030* standards cost-effectively. This process ensures that the *SB2030* standards do not mandate energy efficiency upgrades that are not cost-effective for state-bonded projects. Such adjustments are granted after a project team demonstrates that appropriate energy saving design options were investigated in an effort to achieve the *SB2030* performance level and shown that these design options are not cost-effective for the particular project. An appropriate cost-effective Energy Standard is then set by evaluating the set of all cost-effective measures for that project. Moving forward, this path is anticipated to increasingly include on-site renewable generation as the cost-effectiveness of this strategy is improving. To ensure this cost-effectiveness is also present for projects where energy modeling may place a significant burden, smaller projects and those with limited mechanical upgrades are afforded a path to compliance through comprehensive prescriptive efficiency requirements. Wastewater treatment facilities are also provided a pathway to document energy efficiency measures pursued and anticipated performance metrics.

State-Bonded Project Cost Effectiveness Actual Results

From 2009 through November 2019, 185 building projects have been involved in the *SB2030* process and have reported Energy Standard and Design Energy Consumption values. Of these 185 projects, 114 of the 129 state-required building projects and 48 of 56 volunteer building projects have reported as on track to meet the required

⁵ This document is available online through the Minnesota Legislative Reference Library at <http://www.leg.state.mn.us/docs/2009/mandated/090892.pdf>

SB2030 Energy Standard. To date, 88% of all building projects enrolled in the *SB2030* program have reported to meet or exceed the *SB2030* Energy Standard in design. On average, these projects have reported to anticipate energy consumption of 32% less than their *SB2030* Energy Standard.

When compared to buildings that just met the minimum energy code requirements, the buildings designed to the *SB2030* Energy Standard are predicted to save approximately 1.023 billion kBtus/year, a reduction in carbon emissions of 116,000 tons of CO₂e, and a savings of \$15.7 million per year assuming an average cost of \$15.35 per mmBtu⁶. As new projects are added each year and projects meet the *SB2030* energy standards, ongoing annual savings to the State and other building owners will increase. Based on submitted anticipated performance the 138 completed *SB2030* projects are estimated to have saved 2,893 million kBtu, avoided 372,000 tons of CO₂e and saved \$44.4 million as of January 1, 2019. The total cost of the program using CIP funds is approximately \$5.85 million through December 2019.

Example projects recently participating and contributing to this savings, and which were recognized as finalists at the 2018 Best of B3 Award Event⁷ include:



Figure 1(left) & 2(right) Department of Natural Resources Glenwood Area Office Facility: 6,765 square foot (sf) building in Glenwood. Annual savings over code are estimated at 384 mmBtu, \$5,600 and 20 tons of carbon.

⁶ The average cost per kBtu from the B3 Benchmarking database is \$0.01535 for the most recent available estimate (assuming a mix of electricity, gas, and other fuels). Beginning in the 2019 report the data used to estimate program savings was improved from prior years – restricting the evaluation to only Minnesota buildings in the B3 Benchmarking program and eliminating outliers that skewed this rate. Earlier reports have not been amended to reflect this change.

⁷ These projects are the same that were listed in the 2019 report as the program is anticipating moving to a biannual celebration and did not hold an awards ceremony in 2019. The website for the Best of B3 Award event is <http://www.b3mn.org/best-of-b3/>.



Figure 3(left) & 4(right) City of Mankato Transit Facility: 43,651 sf building in Mankato. Annual savings over code are estimated at 3,099 mmBtu, \$49,000 and 311 tons of carbon.



Figure 5(left) & 6(right) CHS Field: 80,349 sf building in Saint Paul. Annual savings over code are estimated at 603 mmBtu, \$9,660 and 60 tons of carbon.

SB2030 Program Progress

Initial efforts have focused on the development of the tool that will be used to establish customized Energy Standards and development of the administration of the program. Ongoing efforts include the creation of a case study database, the development of a sustainable building operations system, integration of SB2030 with the utilities' CIP programs, hosting education classes for designers and building operators, and assisting design teams in the integration of the SB2030 Energy Standards into projects.

- **Case Studies Database** - As part of the program, predicted building performance has been documented for 132 SB2030 projects. Reported metrics include predicted energy use, carbon emissions and construction costs, along with several water, waste, and indoor environmental quality metrics. These case studies, which are in various stages of the design process or operation, are displayed online on the B3

Case Studies Database⁸, where owners and project teams can market their successes, and design teams can search for strategies that may help them reach the SB2030 Standards. As operations data is collected for these projects the case studies database will update, allowing the evaluation of their actual performance.

- **Sustainable Building Operations** - It is essential that SB2030 designed buildings are operated at the energy standards that they were designed to achieve. To do this, building operators need methods to ensure that each significant energy consuming device is using only as much energy as needed to perform its intended function. A web-based application has been developed to enable building operators to perform this function by completing occasional routine checks on large energy consuming equipment in the building. This application performs four critical functions:
 - Enables users to create a customized set of tasks for a particular building,
 - Notifies building operators when tasks are due to be completed,
 - Supplies detailed instructions on how to perform the task, and tracks completion and status of tasks for a building, and
 - Notifies facilities managers when tasks uncover malfunctioning systems.

There are now 38 buildings populating the online tool. Eight tasks are currently supported in the online tool. Two methods have been developed to check on correct operation of heat recovery devices, and one for demand controlled ventilation. The DCV module is undergoing refinement to make it more broadly applicable to numerous operation schemes that have been discovered during pilot projects. The Center for Energy and Environment (CEE) has completed energy efficient operations manuals for three pilot buildings. CSBR is working with CEE on these pilots.

- **SB2030 Utility Programs** - As the SB2030 energy performance standard has been implemented, the project team has worked cooperatively with utilities to develop and/or modify CIP programs to encourage new buildings to meet the SB2030 standards. Priority items are listed below.
 - A) Comprehensive design assistance services.
 - B) Bonus incentives (per unit of savings) for achieving *SB2030* standards.
 - C) Comprehensive whole-building performance program for small buildings.

No utilities have yet provided financial incentives related specifically to achieving the SB2030 Energy Standard. New construction programs do provide incentives based on energy savings for performance over and above the energy code, as well as no-cost services for projects committing to a high level of savings, including reporting of the SB2030 Energy Standard, and B3 Guidelines tracking tool entry of data and submittals which has assisted in streamlining submissions and program compliance verification.

- **Sustainable Building 2030 Education** – Educational programs for the designers continue to be delivered.

⁸ The website for the B3 Case Studies Database is <http://casestudies.b3mn.org/>.

Presentations on the B3 Guidelines and SB2030 programs have been given to the Minnesota Chief Engineers Guild and at the AIA Minnesota Conference. Presentations to both the Minnesota and the Rochester chapters of ASHRAE on the SB2030 process have also been delivered. In October of 2019 a 14-hour in-depth training was held on designing and evaluating efficient moisture safe building enclosures, which are increasingly needed as the SB2030 standard shifts. A symposium on Sustainable Buildings 2030 will be held on January 16, 2020 at the Science Museum of Minnesota. Throughout the year many in-person team meetings were also held with design firms working on projects participating in the program, both to outline program requirements and to work through project-specific issues as they arise.

SB2030 Next Steps

All work on the SB2030 program completed to-date shows it is cost effective to meet the SB2030 target. Eighty eight percent of all buildings involved in the program were able to meet the SB2030 Energy Standard with little additional cost to the overall projects. Total project costs are \$5.85 million through December 2019.

The 185 buildings designed to the SB2030 Energy Standard are predicted to save approximately 1.023 billion kBtus/year, 116,000 tons of CO₂e and \$15.7 million per year. When new projects are added each year the annual savings to the State and other building owners will continue to grow. Savings from the 138 SB2030 projects currently in operation are estimated at 2,893 million kBtu, 372,000 tons of avoided carbon at a cost savings of \$44.4 million.

The Sustainable Building 2030 Standards program should continue. The program has demonstrated the value of establishing customized performance targets early in the design process, which permits projects flexibility in how to best achieve those targets. The savings to-date reflect the significant energy, cost and carbon reductions achieved by the program. More educational opportunities are needed for architects and engineers to facilitate more SB2030 designs. The building operator training program has been developed and is being applied to pilot projects. Two of the three largest electric investor owned utilities have developed comprehensive design assistance services, but not all utilities have fully integrated SB2030 programs.

Work continues on the next stages of the SB2030 program to support the reduction requirement for new projects, which will increase from 70% to 80% reduction in January of 2020. Program updates as part of this transition are proposed and being reviewed. Example proposed program updates under review include an elimination of a reduced standard for renovation projects, implementation of a parallel carbon and energy standard, and improving carbon emissions factors for electric utilities. This and other program development efforts will require continued research from the project team led by the Center for Sustainable Building Research at the University of Minnesota to ensure that projects are able to comply in a cost-effective manner with the SB2030 Standard, while ensuring that the robust program goals are maintained.