



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

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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 (Commerce) 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 (e.g. Energy Design Conference, American Council for Energy Efficient Economy Summer Study).
- 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 2018 include:

- Two Request for Proposals (RFPs) issued.
- One Request for Information (RFI) issued.
- 99 Notice of Intent (NOI) to propose received and reviewed.
- 6 full proposals received and evaluated.
- 41 full proposals received and in process of evaluation.
- 19 previously-funded CARD projects completed.
- Revised NOI reviewing process to more efficiently incorporate feedback from utility representatives.
- Conducted 12 CARD webinars to more effectively disseminate results of CARD projects.
- Improved project tracking and project management policies and procedures.
- Aligned with Office of Grant Managements new policies on inclusiveness and diversity in grantmaking.

Clean Energy Resource Teams (CERTs)

Major accomplishments of the CERTs Partnership in 2018 include:

- Hosted 27 events with 1,948 attendees, connecting with an additional 4,018 community members through 278 meetings, presentations and other outreach activities across the state;
- Saved or offset 49.6 billion BTUs over the past year as a result of CERTs efforts; and
- Funded 39 community-based clean energy seed grants projects. The savings from these projects will be reported in 2019.

Sustainable Buildings 2030 (SB2030)

Major accomplishments of the SB 2030 initiative in 2018 include:

- 166 buildings designed to the SB 2030 Energy Standard are predicted to save approximately 923 million kBtus/year;
- To date, 92% of all building projects enrolled in the SB 2030 program have documented designs that met or exceeded the SB 2030 Energy Standard,
- Buildings designed to the SB 2030 Energy Standard are predicted to save approximately \$14.8 million per year, assuming an average cost of \$16.03 per mmBtu;
- Buildings designed to the SB 2030 Energy Standard anticipate cumulative avoided carbon emissions of 114,000 tons of CO₂e annually.
- 130 completed SB 2030 projects are estimated to have saved 1,817 million kBtu, a reduction of 236,000 tons of CO₂e and a savings of \$29.1 million to-date.

Statutory Reference

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 Statute, 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 (Commerce). Approximately \$2.6 million is available annually for the program. The grant funds benefit 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 2018 are summarized in Table 1.

Table 1 CARD program metrics

Description of Metric	Since Start of Program	For Calendar Year 2018
Successful CARD grant funding cycles	10	1
Request for Proposals (RFP) issued by Department	22	2
Request for Information (RFI) issued by Department	2	1
Notice of Intent (NOI) to Propose submitted by Responders and reviewed by Department staff	419	99
Full proposals submitted by Responders and evaluated by Department staff	469	47
R&D projects funded through the CARD grant program	119	pending
Pending CARD grants (currently in negotiation or awaiting final approval)	Not applicable	pending
Completed CARD grant projects	91	19

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 useful and timely information to enhance energy efficiency program designs within their CIP portfolios.

Through 2018, the CARD program funded or has pending projects totaling about \$28.5 million. These projects received (or will receive) an additional \$7.3 million in matching funds.

Table 2 Summary of CARD program funding to date

Project Type	Number	% of Total Projects	Dollars Awarded ¹	% of Awarded Dollars	Estimated Match ²
Projects awarded through RFP process (includes completed and ongoing projects)	107	82.9%	\$24,398,578	85.4%	\$6,753,483
Projects anticipated as result of pending RFP evaluations (Approximate)	10	7.8%	\$2,000,000	7.0%	unknown
Projects awarded outside of RFP process (completed only, as there are currently no ongoing projects)	12	9.3%	\$2,156,132	7.6%	\$496,605
All CARD Projects	129		\$28,554,710		\$7,250,088

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

- CIP priorities;
- Proposal’s content, scope of work and work plan;

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 have 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.

- 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 below list completed and ongoing CARD projects respectively that were funded through this RFP process, including details on each project.

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 & 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 & 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 enabling MN utilities to design, implement, administer, & report on CIPs.	\$1,500,000	\$511,250
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 & 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 & Environment	Saving Energy by Reducing Duct Leakage in Large Commercial & Institutional Buildings	\$380,155	\$189,045
2012	Center for Energy & 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 & 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 & Environment	Heat Pump Water Heaters: Savings Potential in Minnesota	\$25,941	\$17,294
2012	Center for Energy & 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 & Environment	Improving Effectiveness of Commercial Energy Recovery Ventilation Systems	\$379,478	\$100,101
2013	Center for Energy & 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 & 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 & 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 & 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 & Environment	Evaluation of New Domestic Hot Water System Controls in Hospitality and Commercial Buildings	\$200,599	\$42,235
2014	Center for Energy & Environment	Small Embedded Data Center Program Pilots	\$272,829	\$71,490
2014	Illume Advising, Inc.	Behavioral Programs Literature Review & Benchmarking Study, and Workshops	\$122,620	\$16,125
2014	Center for Energy & 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 & 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
2016-17	GDS Associates, Inc.	Electric Utility Infrastructure Potential Study	\$277,965	\$0
	Totals:	72 completed projects	\$19,864,108	\$5,969,702

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
2015	GDS Associates, Inc.	Whole-Farm Energy Management Valuation	\$203,415	\$59,844
2016-17	Center for Energy & Environment	Natural Gas & Electric Potential Study	\$1,348,686	\$69,265
2016-17	Center for Energy & Environment	Natural Gas & Electric Potential Study	\$1,656,252	\$86,439
2018	Center for Energy & Environment	Pay-For-Performance: A Development Tool to Incentivize Ongoing Building Performance	\$49,334	\$8,706
2018	Michaels Energy, Inc.	Stakeholder views on the emerging intersection of electrification, efficiency & decarbonization	\$44,462	\$8,283
2018	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
2018	Gas Technology Institute	Demonstration of packaged central condensing tankless water heating systems in multifamily buildings	\$334,667	\$20,555
2018	University of Minnesota	Driving Wastewater Treatment Energy Efficiency through a Cohort Training Model	\$50,000	\$7,980
2018	Center for Energy & Environment	Cooling Loads: The diversity of potential residential cooling solutions and a best practices guide	\$49,946	\$8,814

2018	Evergreen Economics, Inc.	Future Emerging Technologies: Leveraging Public Research for Application in Minnesota	\$49,680	\$20,360
2018	Center for Energy & Environment	Field Study of Stand-alone Dehumidification and Efficiency Opportunities in MN Single Family Homes	\$257,780	\$41,843
2018	Seventhwave, Inc.	Field and market assessment of heat pump clothes dryers	\$376,598	\$45,620
2018	Seventhwave, Inc.	Field study of Tier 2 advanced power strips	\$105,978	\$7,703
2018	Center for Energy & Environment	Expanded Scope Commercial Boiler Tune Ups	\$250,960	\$38,605
2018	Center for Energy & Environment	The Operation and Control of Lighting, Plug Loads, and other Power over Ethernet (PoE) Technologies Using Network Switches in Small Commercial and Institutional Buildings	\$104,975	\$389,901
2018	Seventhwave, Inc.	MN Residential Energy Baseline & Market Characterization Study	\$299,390	\$18,527
2018	Seventhwave, Inc.	MN Commercial Energy Baseline & Market Characterization Study	\$319,863	\$17,850
	Totals:	20 Ongoing projects	\$4,534,470	\$783,781

In addition to the completed and ongoing projects funded through the RFP process (as listed in the previous two tables) at the end 2018 there are two RFPs that have received proposals which are currently in the evaluation process. Pending evaluation results, an anticipated eight to 12 additional new projects are expected to be funded for a total of approximately \$2 million.

Occasionally, Commerce will fund a CARD project outside of the competitive RFP process, in cases where a project requires a sole source provider, or when Commerce has the opportunity to leverage CARD funds for a project already underway or being funded from multiple sources. To date, 12 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).

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 2018, this process was continued.

Starting in 2012 and continuing into 2018, 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 2018, efforts in this direction focused on aligning policies and procedures with new requirements and recommendations from the Department of Administration related to inclusiveness and diversity in the grantmaking process. Additional improvements were also made to standardize internal procedures for project management of CARD grant projects.

In 2013, a Notice of Intent (NOI) to propose procedure was added to the process for responding to general topic RFPs. This process allows Commerce 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, Commerce 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, Commerce further refined this process to make it more efficient and accessible to utilities.

Starting in 2014, Commerce improved the accessibility of grant proposals and evaluation files by making them available electronically on the Commerce 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 2018, 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 2018. In addition, CARD results continue to be presented at local, regional and national conferences with very positive feedback.

Starting in 2016 and continuing in 2018, Commerce 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. Commerce 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, Commerce standardized CARD webinars to give them a consistent look and add an introduction by Commerce 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.

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 conservation, energy efficiency and renewable energy technologies and practices for their homes, businesses and local institutions. CERTs works to impartially meet stakeholders where they are, convert learning into doing and provide inclusive access to clean energy.

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

- Governmental units: CERTs has engaged hundreds of government entities through GreenStep Cities, Cities Charging Ahead, Solar Possible and outreach for the Local Energy Efficiency Program.
- Utilities: This past year CERTs conducted eight business blitzes to scale-up utilization of utility rebates and audit services.
- Small businesses: CERTs supports counties in adopting Property Assessed Clean Energy (PACE) and small businesses in utilizing PACE for efficiency projects.
- Agricultural producers: In November, CERTs hosted an efficiency and solar event for hog farmers (mncerts.org/swine) in Fairmont, connecting participants with information on energy audits from Great River Energy and potential funding through PACE, tax incentives and the Rural Energy for America Program (REAP).
- Underserved communities: CERTs coordinated an effort with North Shore Area Partners, Co-op Light and Power and Minnesota Power to conduct LED bulb direct installs into homes of low-income and disabled elderly residents in Silver Bay.

Program Outcomes

To integrate its work around the state, CERTs aligns its programming and documents its success within three major categories: learn, connect and act. Highlights from the past year in each of these categories include:

- Learn describes the variety of work CERTs does to help Minnesotans understand their clean energy options, utilize decision tools to determine what action make most sense, identify project models and see the range of projects underway around the state:

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.

- The MN Energy Stories newsletter is a digest for those looking for news, projects examples and opportunities. The list grew to 14,300 subscribers this year, with 850 new people coming from the Solar Video Contest (contests.mncerts.org).
 - Solar resources and tools were the most frequently accessed, with over 27,000 views and over 15% of overall website traffic, with major use of CERTs solar (mncerts.org/solar), community solar (mncerts.org/solargardens), subscriber collaborative (mncerts.org/collaborative), SolSmart (mncerts.org/solar/solsmart), Solar Possible (mncerts.org/solarpossible), and Renewable Energy for Greater Minnesota (mncerts.org/greatrenewables) pages.
 - Two other popular resources on the CERTs website this year have been the MN Clean Energy Jobs Board with over 10,000 views (mncerts.org/jobs) and a page on Property-Assessed Clean Energy, or PACE, with 2,500 views (mncerts.org/pace).
 - CERTs published 70 blog posts in the last year, with a great deal of interest shown for two series, one featuring women leading Minnesota energy industry (mncerts.org/women-in-energy) and another featuring successful CERTs Seed Grant case studies (mncerts.org/blog-series/seed-grants). Other top posts for organic search traffic include saving water and energy with faucet aerators (4,700 views), how wind energy works (1,400 views), and farmers with their own solar installations (900 views).
 - CERTs continues to engage the public about LED lighting with the classic 2-page educational Right Light Guide, the online Right Light App (rightlightapp.org) that can be accessed from any device, the Right Light Guide for tube lights, and CERTs' holiday lighting resources. There were 4,700 views of these efficient lighting education and tools with 1,500 new users of the Right Light App.
- Connect frames the work CERTs does via events, conferences, presentations, workshops and tours to create learning and networking opportunities that catalyze action. In 2018, CERTs hosted 27 events with 1,948 attendees. CERTs connected with an additional 4,018 community members through 278 meetings, presentations and other outreach activities across the state. Following events, summaries are posted to the CERTs Blog. A sample of 2018 events follows:
 - The seventh statewide CERTs Conference was held March 28-29, 2018, in St. Cloud. The event attracted 550 attendees from a variety of sectors for an agenda focused on best practices, case studies, emerging opportunities and intentional networking. Highlights included seven community lighting talks and breakout sessions on utility efficiency programming models, strategies for reducing low-income energy burden, energy storage and EVs. (mncerts.org/blog/looking-back-successful-2018-certs-conference).
 - The Power of Minnesota events utilize a new documentary called *The Power of Minnesota* (powerofmn.com) that features stories of Minnesotans across the state who are building and participating in the clean energy economy. It was the catalyst for events in Canby (mncerts.org/canby), Lindstrom (mncerts.org/chisago), Bemidji (mncerts.org/bemidji) and Fargo-Moorhead (mncerts.org/f-m). These forums served as opportunities to highlight local speakers and action, for community conversations about clean energy, and to understand the associated job, economic and community benefits.

- A forum focused on energy efficiency and energy benchmarking (mncerts.org/msusaves) highlighted Minnesota State University Mankato’s tremendous efficiency successes and spurred discussions about how other governmental units can follow Mankato State University’s lead.
- Act describes the hands-on assistance that CERTs provides to spur Minnesotans to take clean energy action. Table 5 details actions that resulted in energy savings or offsets in 2018, including audiences served, a description of the effort and the actual BTUs saved or offset. Overall, CERTs programming saved or offset 49.6 billion BTUs, or enough to power 1.4 million LED light bulbs annually. 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	Saving Watts and Drops – Minnesota Energy Resources (MER) Water Conservation Kits: Distributed approximately 4,000 business reply cards in 56 communities, resulting in 353 kits to customers. Arranged 16 community-hosted kit distributions, resulting in 1,562 kits to customers. In total, savings of 82,940 therms and \$53,300 annually.	8,294,000,000
Utilities, Governmental Units, Underserved Communities	Savings Watts and Drops – Other utility and community efforts: With CERTs’ direct assistance, Falcon Heights Environment Commission distributed 379 LED bulbs; Melrose Public Utilities distributed 708 bulbs to low-income, senior housing and weatherization agency; Austin Utilities and Owatonna Public Utilities distributed 240 faucet aerators; Westbrook Walnut Grove YES! Team distributed 100 LED bulbs in collaboration with Westbrook Public Utilities; CERTs on behalf of North Shore Area Partners (NSAP) installed 233 LED bulbs in senior single-family homes in Silver Bay in collaboration with Co-op Light and Power; and CERTs and NSAP also referred 14 senior single-family homes in Silver Bay to Minnesota Power for free energy assessments with installation of LED bulbs and water saving devices. Savings of 73,952 kWh, 1,810 therms, and \$12,526 annually.	433,324,173
Utilities, Underserved Communities	MER – Multi-Family Building Direct Install Program: CERTs referred 44 properties, of which 14 moved forward in 8 communities (Albert Lea, Chisholm, Cloquet, Detroit Lakes, Eveleth, Grand Rapids, International Falls, Rosemount) in the program, serving 440 units or households. Half of the properties were low-income housing. MER partnered with Minnesota Power for dual savings for the properties (gas and electric). Savings of 14,350 therms, 89,047 kWh, and \$19,900 annually.	1,738,828,364

⁴ Calculations include conversions as follows: 3,412 BTUs per kWh, 100,000 BTUs per therm

<p>Utilities, Small Business</p>	<p>Otter Tail Power (OTP) Commercial Direct Install Business Blitzes: Conducted door-to-door outreach to main street businesses and commercial districts about free energy assessments offered by OTP’s contractor. CERTs visited 143 businesses in Pelican Rapids and Hallock in early 2018, 91 of which received assessments with direct install of LED bulbs, water-saving devices and water heater insulation. Follow-up of businesses from Frazee and Red Lake Falls blitzes in 2017 and Pelican Rapids blitz in spring 2018 showed 13 projects were completed at 12 businesses in these communities. Savings from directly installed energy efficiency measures of 271,669 kWh and \$25,800 annually and from follow-up projects of 213,228 kWh and \$20,200 annually.</p>	<p>1,654,468,564</p>
<p>Utilities, Small Business</p>	<p>Xcel Energy Partners In Energy – Winona Business Blitz: Collaborated with Center for Energy and Environment (CEE) and conducted door-to-door outreach to main street businesses about free energy assessments by MN Chamber of Commerce’s Energy Smart. CERTs visited 100 businesses, 63 of which received assessments. Immediately following CERTs outreach 30 signed up for Energy Smart assessments. Over the course of the summer, another 30 signed up. There were 45 post-audit activities by small and medium sized businesses. Savings of 99,228 kWh, 1,943 therms and estimated \$10,700 annually.</p>	<p>532,865,936</p>
<p>Utilities, Small Business</p>	<p>Implementation from past utility program outreach: Projects continue to move forward from previous CERTs business blitzes and home energy audit promotion. CERTs partnered with CenterPoint Energy to promote their Natural Gas Energy Analysis program to commercial customers by going door-to-door in the cities of Victoria, Shakopee, and Shorewood. CERTs carried out business blitzes for Austin Utilities and People’s Energy Cooperative. CERTs promoted MER Home Energy Audits in 6 communities, two of which coordinated audits with the electric utilities (Freeborn-Mower Cooperative Services in Albert Lea and OTP in Bemidji) for dual-savings for members/customers. Up to one year after these efforts, 9 businesses and 3 additional households have moved forward with energy projects, resulting in savings of 16,947 kWh, 1,419 therms, and \$2,600 annually. Also, one business installed 32 kW solar in Austin, generating 42,048 kWh annually.</p>	<p>343,189,745</p>
<p>Utilities, Governmental Units</p>	<p>OTP Publicly-Owned Power (POP): CERTs did outreach in 24 communities. Leech Lake Band of Ojibwe installed 39.24 kW solar array with OTP’s POP program, generating 51,561 kWh annually. There are also 6-7 communities in an initial stage of exploring the program.</p>	<p>175,926,132</p>

<p>Small Business, Governmental Units, Utilities</p>	<p>Property Assessed Clean Energy (PACE): CERTs engages communities and businesses in PACE programs administered by the Rural Minnesota Energy Board and the St. Paul Port Authority. This engagement resulted in 32 businesses utilizing PACE financing for energy efficiency (e.g., lighting and HVAC) and solar projects. The 11 energy efficiency projects are saving \$468,621 annually.</p>	<p>18,135,753,004</p>
<p>Governmental Units</p>	<p>Governmental clean energy assistance: CERTs guided numerous governmental units on resources for their clean energy projects and 6 cities, 1 county, and 1 school completed projects from CERTs assistance in 2018. Appleton Health Services, a city-owned nursing home, was awarded Energy Savings Partnership funds for an air conditioning project, saving 116,057 kWh and \$11,000 annually. Brooklyn Park utilized their own third-party solar process and CERTs' guidance to install solar on 6 city buildings/properties. Initially joining CERTs' Solar Possible program, Richfield chose to advance on their own with CERTs' guidance and installed solar on 8 city-owned buildings. CERTs created a model RFP for individual cities to utilize third-party financing for solar on their building/properties and helped the cities evaluate proposals from solar installers. Using this assistance from CERTs, Shoreview installed 123 kW at their Maintenance Center and Roseville is installing 205 kW of solar at 3 city-owned buildings/properties. Woodbury went through the third-party RFP process, but ultimately decided to subscribe to community solar gardens to power their Healthy Sports Center. CERTs also assisted Ramsey County Parks with their projects at The Ponds at Battle Creek and their headquarters in Maplewood. The West Central Research and Outreach Center credits the CERTs 2018 Conference for connecting with a wind turbine contractor for replacement blades that got two 10 kW wind turbines operational again. The solar and wind projects are generating 3,915,976 kWh annually.</p>	<p>13,757,296,596</p>
<p>Small Business, Governmental Units, Underserved Communities</p>	<p>Minneapolis Green Cost Share: Metro CERT coordinated the review process for applications by forming a committee of experts to provide the City of Minneapolis a technical review of the projects. Metro CERT did outreach to potential committee members, created a scoring tool, reviewed projects, and is writing case studies about some of the projects. In 2018, 31 energy projects at 30 sites (9 in green zones that target underserved communities) were funded \$1,003,184 from City of Minneapolis, for a total investment of \$12,778,568 with matching funds. As of December 7, 2018, 6 projects (all solar) are finished, generating 643,289 kWh annually.</p>	<p>2,194,902,068</p>

Governmental Units, Small Business	Supporting other programs: CERTs connected Altura Wastewater Pond facility and a business near Austin to Minnesota Technical Assistance Program’s (MnTAP) efficiency assessments. Operational changes at both resulted in savings of 315,100 kWh and \$28,700 annually. CERTs co-hosted the Bemidji Solar United Neighbors (SUN) event to engage residents in a solar bulk-buy, ultimately resulting in 14 homes with solar generating 122,202 kWh annually. CERTs trained 7 Minnesota GreenCorps Energy Conservation Members on behavioral science and assisted one member with employee engagement and workstation efficiency projects at Hennepin County, resulting in 70,529 kWh and \$7,550 annually. Leveraging research on municipal liquor stores performed by Metro CERT’s 2018 GreenCorps member, CERTs routed 31 stores through CEE’s One-Stop Lighting program and one store upgraded lighting.	1,759,704,880
Agriculture, Small Business	USDA Rural Energy for America Program (REAP) and Rural Energy Development Assistance (REDA): Projects continue to move forward from previous CERTs efforts to promote REAP funding for energy efficiency in turkey barns and grocery stores. Two turkey barns and a rural grocery store received REAP funding in 2018, collectively saving 135,627 kWh and \$12,900 annually. Ripple-effects from REAP and REDA resulted in two residential solar systems of 10.6 and 8 kW.	546,150,992
Total CERTs Program Savings		49.6 billion

Ongoing Efforts

2018 Seed Grants

Each of the seven CERT regions announced their seed grant funding in early 2018. Project funding, labor only, was awarded to a range of energy efficiency and clean energy projects. The 39 projects, slated to wrap up in 2019, are described here: mncerts.org/sites/default/files/CERTs2018SeedGrantsAnnouncement.pdf. **Audiences: Gover-mental Units, Utilities, Underserved Communities**

Utility Conservation Improvement Program (CIP) Support

In addition to the utility support described in Table 5, additional business blitzes were conducted for Otter Tail Power in Fertile, Parkers Prairie, Perham and Twin Valley, and for the City of Faribault as part of Xcel Energy's Partners in Energy. Associated energy savings will be accounted for in 2019. CERTs developed a Utility Menu of Services (mncerts.org/sites/default/files/CERTs-Utility-Menu-Services-Overview.pdf) to more clearly define ways in which CERTs can partner with utilities and presented with Minnesota Department of Commerce to more than 40 CIP utility personnel in Bemidji and Owatonna. The Menu has also been shared with Minnkota Power Cooperative's network of eight cooperatives and 10 municipal utilities, Breckenridge Public Utilities, and an email list of approximately 500 utility staff statewide. CERTs held a webinar and met individually with Austin Utilities, Connexus Energy, Crow Wing Power, Federated Rural Electric Association, Kandiyohi Power Coop and Owatonna Public Utility on how PACE can be a nice complement to utility rebates. CERTs is supporting efforts to connect and align utility CIP and Community Action Agency joint work. **Audiences: Utilities, Small Business, Governmental Units, Underserved Communities**

GreenStep Cities and Tribal Nations

CERTs continues to support city and tribal nation-level actions on clean energy best practices through the GreenStep program. The program now has 125 participants spanning from Mahnommen to Winona and Marshall to Grand Marais. CERTs staff provide direct assistance to cities and tribal nations as they pursue energy-related best practices and connect cities with interns, where possible, for assistance in adopting the program, conducting building energy benchmarking and taking action on the program best practices. Hosted a "Low-Cost Strategies for Energy-Efficient Public Buildings" session at the League of Minnesota Cities Annual Conference as well as two events – one in Warren and one in Mankato – focused on building energy benchmarking and harnessing existing programs and financing to get project done. **Audiences: Governmental Units**

Community Solar Gardens (CSG)

CERTs has continued to serve as an educational resource to individual consumers, local governments, utilities and researchers working to understand community solar gardens or start community solar garden projects. In 2018, CERTs assisted 68 unique governmental units (cities, counties, schools and tribal nations) and other community groups and organizations with community solar garden questions. This assistance has ranged from

responding to siting and planning questions to evaluating contract terms, and understanding 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 2018, CERTs continued efforts to support local governments and schools interested in adopting solar for their own facilities. While public facilities can be good locations for solar, government entities cannot take advantage of federal tax credits for solar and, therefore, may choose to work with solar developers to secure third-party financing. Following the release of a model request for proposals (RFP) for third-party solar in late 2017, CERTs began discussion with the Office of Enterprise Sustainability (OES) to jointly initiate a solar procurement effort for state, local government and school facilities. We launched this new effort, “Solar Possible,” in March 2018. This first-in-the-nation approach utilizes a State Master Contract and Site(s)-Specific RFP to jointly procure onsite solar for state agencies, local governments and schools. The collaborative approach aims to reduce barriers to adoption, facilitate shared learning and drive projects to successful completion. This effort is geared toward jurisdictions in Xcel Energy territory and has included 11 state, county, city and school organizations proposing potential sites for onsite solar. **Audiences: Governmental Units**

Connecting Low-Income Communities to Efficiency and Renewable Sources (CLICERS)

CERTs has assisted the Minnesota Department of Commerce with initial data gathering, interviews and a series of stakeholder meetings targeting identification of high-value opportunities to lower the energy burden of low-income households. CLICERS activities have now moved into the implementation phase. CERTs is assisting the Minnesota Department of Commerce with leveraging opportunities for community action agencies, clarifying best practices for low-income customer engagement in community solar gardens and identifying best-use case scenarios for onsite solar. **Audiences: Underserved Communities**

Property Assessed Clean Energy (PACE)

Over the past year, CERTs has partnered with the St. Paul Port Authority (SPPA) to assist counties with education and information as they consider signing the PACE joint powers agreement (JPA). PACE allows commercial entities (including non-profits) 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 2018 including Isanti, Lake, Otter Tail, Steele and Wabasha. In southwest Minnesota, CERTs partner the Southwest Regional Development Commission administers the Rural Minnesota Energy Board PACE program, another opportunity to finance clean energy projects. Staff has featured PACE as an opportunity to local business and local economic development authorities; to several utilities; and to CERTs steering committee members. **Audiences: Governmental Units, Small Businesses, Utilities**

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. CERTs leads the communications-related work for the project. Major work in the last year involved hosting all of the Technical Committee meetings, posting three reports—Interconnection Assessment, Hosting Capacity Analysis and Solar Potential Analysis—doing media outreach around the latter, and supporting other communications needs as necessary. Learn more at mnsolarpathways.org. **Audiences: Utilities**

Cities Charging Ahead

CCA is a cohort program, led by CERTs and the Great Plains Institute, geared toward planning for and expanding EV charging infrastructure across the state. There are 28 participating jurisdictions, including 16 cities in the Metro cohort, five cities in Southeast, three cities and one Tribal Nation in the Northeast, and three other cities in Greater Minnesota (Warren, Morris and Hackensack). Participants are conducting fleet analyses for EVs (through Xcel Energy’s Fleet Carma), planning for future EV infrastructure, pursuing funding for Level 2 charging stations and hosting educational events for their residents to increase EV awareness. **Audiences: Governmental Units, Utilities**

Electric Vehicles: CERTs worked with Rochester Public Utilities and Moorhead Public Service on EV charger planning and connected Dakota Electric with fleet study resources and to Elk River Municipal Utility, an EV fleet leader. CERTs also hosted a utility-to-utility information sharing session on electric vehicles with utility presenters (Otter Tail Power, Beltrami Electric Cooperative, Moorhead Public Service) to facilitate information and resources sharing across utilities serving northwest Minnesota. Nine different utilities participated. Four out of 11 survey respondents are more likely to move forward with a new or revised electric vehicle-related effort as a result of attending. **Audiences: Utilities**

Allocation of Legislative Funding Resources and Leveraged Resources

CERTs has 16 staff who account for 11.5 full time employees (FTE), 8 of whom are paid via legislative allocation. Staffs 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. These funds 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 community energy projects and champion development, and U.S. Department of Agriculture Rural Energy Development Assistance funding to assist farms and rural small businesses with renewable energy assessments.

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 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 *SB 2030* 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 *SB 2030* 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 *SB 2030* 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:

- 2013 Report: 40 projects expected to save \$3.25 million per year (250 million kBtu/year) in energy for operations.
- 2014 Report: 66 projects expected to save \$5.24 million per year (327 million kBtu/year) in energy for operations.
- 2015 Report: 78 projects expected to save \$7.04 million per year (490 million kBtu/year) in energy for operations.
- 2016 Report: 93 projects expected to save \$8.3 million per year (534 million kBtu/year) in energy for operations
- 2017 Report: 126 projects expected to save \$9.8 million per year (634 million kBtu/year) in energy for operations
- 2017 Report: 154 projects expected to save \$12.6 million per year (867 million kBtu/year) in energy for operations; of these the 109 completed SB 2030 projects are estimated to have saved 1,765 million kBtu and \$25.7 million to-date.
- 2018 Report: 166 projects expected to save \$14.8 million per year (923 million kBtu/year) in energy for operations; of these the 130 completed SB 2030 projects are estimated to have saved 1,817 million kBtu and \$29.1 million to-date.

History of Minnesota Sustainable Building 2030

The *Minnesota Sustainable Building 2030 (SB 2030)* 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 (SB 2030)* program requires all state-bonded projects that began schematic design after August 1, 2009, to meet an energy reduction standard 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 *SB 2030* 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 Statute 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 *SB 2030* 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 *SB 2030* 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 *SB 2030* standards can be achieved cost-effectively for the overwhelming majority of building types and situations.

The required level of energy efficiency is adjusted for the small minority of projects that demonstrate that they cannot meet the *SB 2030* standards cost-effectively. This process ensures that the *SB 2030* 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 *SB 2030* 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 more often include onsite

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

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.

State-Bonded Project Cost-Effectiveness Actual Results

From 2009 through December 2018, 160 building projects have been involved in the *SB 2030* process and have reported Energy Standard and Design Energy Consumption values. Of these 160 projects, 109 of the 119 state-required building projects and 43 of 47 volunteer building projects have reported as on track to meet the required *SB 2030* Energy Standard. To date, 92% of all building projects enrolled in the *SB 2030* program have reported meeting or exceeding the *SB 2030* Energy Standard in design. On average, these projects have reported anticipated energy consumption of 34% less than their 2030 Energy Standard.

When compared to buildings that just meet the minimum energy code requirements, the buildings designed to the *SB 2030* Energy Standard are predicted to save approximately 923 million kBtus/year; a reduction in carbon emissions of 114,000 tons of CO₂e; and a savings of \$14.8 million per year, assuming an average cost of \$16.03 per mmBtu.⁶ As new projects are added each year and projects meet the 2015-2020 energy standard, ongoing annual savings to the State and other building owners will increase. Based on submitted anticipated performance, the 130 completed *SB 2030* projects are estimated to have saved 1,817 million kBtu; avoided 236,000 tons of CO₂e; and saved \$29.1 million as of January 1, 2019. The total cost of the program using CIP funds is approximately \$5.37 million through December 2018.

Sample projects recently participating and contributing to this savings, and which were recently recognized as finalists at the [2018 Best of B3 Award Event](#), include:

- Department of Natural Resources Glenwood Area Office Facility: 6,765sf building in Glenwood. Annual savings over code are estimated at 384 mmBtu, \$5,600 and 20 tons of carbon.
- 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.
- 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.

SB 2030 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, the integration of *SB 2030* with the utilities' CIP programs, hosting education classes for designers and building operators, and assisting design teams in the integration of the *SB 2030* Energy Standards into projects.

⁶ The average cost per kBtu from the B3 Benchmarking database is \$0.0160306 for the most recent available estimate (assuming a mix of electricity, gas, and other fuels). For 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. Previously reported data has not been amended to reflect this change.

- **Case Studies Database** - As part of the program, predicted building performance has been documented for 115 SB 2030 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 Database](#), where owners and project teams can market their successes, and design teams can search for strategies that may help them reach the SB 2030 Standards. As operations data is collected for these projects, the case studies database will be updated, allowing the evaluation of their actual performance.
- **Sustainable Building Operations** - It is essential that SB 2030 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 (DCV). 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 has completed EEO manuals for three pilot buildings. CSBR is working with CEE on these pilots.

- **SB 2030 Utility Programs** - As the SB 2030 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 SB 2030 standards. Priority items include.
 - Comprehensive design assistance services.
 - Bonus incentives (per unit of savings) for achieving *SB 2030* standards.
 - Comprehensive whole-building performance program for small buildings.

No utilities have yet provided financial incentives related specifically to achieving the *SB 2030* 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 *SB 2030* 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 designers continue to be delivered. Presentations on the B3 Guidelines and SB 2030 programs have been given to the Minnesota Education

Facility Management conference, the Minnesota Library Association and the Minnesota Chief Engineers Guild. A series of presentations at facilities conferences for the University of Minnesota and Minnesota State Colleges and Universities have also been conducted. A session was held at the November 2018 American Institute of Architects Minnesota State Convention on SB 2030-related B3 Guidelines program updates. In December 2018, two 4-hour in-depth trainings were held on designing efficient moisture-safe building enclosures, which are increasingly needed as the SB 2030 standard shifts. A symposium on Sustainable Buildings 2030 will be held on January 10, 2019, at the Science Museum of Minnesota. Throughout the year, several in-person team meetings were also held with design firms working on projects participating in the program.

SB 2030 Next Steps

All work on the *SB 2030* program completed to-date shows it is cost effective to meet the *SB 2030* target. Of all buildings involved in the program, 92 percent were able to meet the *SB 2030* Energy Standard with little additional cost to the overall projects. Total project costs are \$5.37 million through December 2018.

The 166 buildings designed to the *SB 2030* Energy Standard are predicted to save approximately 923 million kBtus/year, 114,000 tons of CO₂e and \$14.8 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 130 *SB 2030* projects currently in operation are estimated at 1,817 million kBtu, 236,000 tons of avoided carbon and \$29.1 million.

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 *SB 2030* 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 *SB 2030* programs.

Finally, work must continue on the next stages of the *SB 2030* program to support the reduction requirement for new projects, which will increase from 70% to 80% reduction in January 2020. This will require continued research from the project team lead by the Center for Sustainable Building Research at the University of Minnesota.