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

Minnesota Department of Commerce

Mission

For more than 150 years, the Minnesota Department of Commerce and its predecessor agencies have served Minnesotans. Our mission is to protect and assist consumers, to ensure a strong, competitive and fair marketplace, and to engage people and communities across the state.

Our Strategic Priorities

- Protect the public interest through consumer protection, consumer education, assistance to consumers, safety, health and financial security, and lowering inequities.
- Serve as a trusted public resource for consumers and businesses by listening and learning from the Minnesotans Commerce services, being effective stewards of public resources, advocating for Minnesota consumers and develop a policy, programmatic, and regulatory environment that meets their needs.
- Reduce economic barriers within Commerce regulatory oversee and reduce disparities within those of all races, ethnicities, religions, economic statuses, gender identities, sexual orientations, (dis)abilities, and zip codes.
- Ensure all, especially historically disadvantaged Minnesotans, are resilient to Minnesota's climate and engaged in advancing efforts to mitigate climate change.
- Ensure a strong, competitive, and fair marketplace for Minnesotans.

Pursuant by Minnesota Statute 3.197: This report cost approximately $1,250 to prepare, including staff.

Copyright

Contents

Executive Summary 5

Conservation Applied Research and Development (CARD) 5

Clean Energy Resource Teams (CERTs) 5

Sustainable Buildings 2030 (SB 2030) 6

Statutory Reference 6

Conservation Applied Research and Development (CARD) 7

Introduction 7

Overview of Projects 8

Ongoing Efforts 16

Clean Energy Resource Teams (CERTs) 18

Introduction 18

Activity Highlights 20

Connecting with Community 20

Advancing Solar Schools 20

Partnering with Tribal Nations 21

Connecting Jurisdictions to Networks and Opportunities 22

Supporting Local Government Projects 22

Supporting Project Implementation with Businesses, Farms and Nonprofits 23

Building on Successful Business and Farm Outreach Strategies 24

Advancing Innovation in Small Business Engagement 24

Integrating Energy Savings by Connecting Food and Energy 25

Exploring Energy Options in Rural Communities 25

Partnering with Utilities to Advance Electric Vehicle Programming and Adoption 26

Sharing Resources for Home Energy Efficiency 26
Developing New Models for Utility Programming with Manufactured Homes 27
Collaborating with Utilities to Demystify Heat Pumps 28
Developing Solar Models for Income Eligible Households 28
Strengthening the Clean Energy Workforce 28
Clean Energy Impacts 30
Allocation of Legislative Funding Resources and Leveraged Resources 33
Sustainable Buildings 2030 (SB 2030) 34
Overview 34
History of Minnesota Sustainable Building 2030 35
Expected Cost-Effectiveness of the Sustainable Building 2030 Program 35
State-Bonded Project Cost Effectiveness Actual Results 36
SB 2030 Program Progress 39
SB 2030 Next Steps 41

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 13 newly published project reports, 15 project webinars, a variety of articles and at regional and national conferences attended by grantees and Commerce staff.
- Use of CARD project results and insights from 12 completed projects to inform policy decisions in Minnesota.
- Use of CARD project results from 12 completed projects to inform CIP Technical Reference Manual (TRM)
- Enhancements to utility CIP offerings and increased energy savings achieved toward utility energy savings goals.

Specific accomplishments of the CARD program for calendar year 2022 include:

- Twelve (12) previously funded CARD projects completed.
- Fifteen (15) CARD project webinars conducted to broadly disseminate results of CARD projects.
- Successfully kept 18 ongoing CARD projects on track.

Clean Energy Resource Teams (CERTs)

Major accomplishments of the CERTs Partnership in 2022 include:

- Hosted 39 events with 1,463 attendees and connected with over 7,500 community members through 400 meetings, presentations, and other outreach activities across the state;
- Saved or generated 111.7 billion BTUs over the past year as a result of CERTs' efforts; and
- Awarded seed grant funding to 74 projects – over twice as many as last round through additional leveraged funds – in communities from Warren to Winona, Morton to Mountain Iron, Long Prairie to Lindstrom.

Sustainable Buildings 2030 (SB 2030)

Major accomplishments of the SB 2030 initiative through 2022 include:

- 244 buildings designed to the SB 2030 Energy Standard are predicted to save approximately 919 million kBtus/year.
- To date, 91% 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 $16.7 million per year assuming an average cost of $18.18 per mmBtu.
- Buildings designed to the SB 2030 Energy Standard anticipate a reduction in carbon emissions of 100,000 tons of CO2e annually.
- Projects have reported anticipated energy consumption of 26% less than their 2030 Energy Standard.
- 178 completed SB 2030 projects are estimated to have saved 4,594 million kBtus, a reduction of 604,000 tons of CO2e and a savings of $83.5 million to-date.[1]

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.

[1] The US Bank Stadium, although having gone through design and construction SB 2030 review and approval, has been removed from our tracking between the 2022 and 2023 reporting years and resulted in a reduction in reported annual and to-date savings metrics between those years. Prior year metrics have not been updated to remove this project.

(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 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 2022 are summarized in Table 1.

Table 1. CARD program metrics

Description of Metric	Since Start of Program	For Calendar Year 2022[a]
Successful CARD grant funding cycles	13	1 [b]
Request for Proposals (RFP) issued by Department	25	1
Request for Information (RFI) issued by Department	2	0
Notice of Intent (NOI) to Propose submitted by Responders and reviewed by Department staff	537	0
Notice of Intent (NOI) to Propose submitted by Responders and pending review by Department staff	92	92
Full proposals submitted by Responders and evaluated by Department staff	513	0
R&D projects funded through the CARD grant program	160	0
Pending CARD grants	0	0
Completed CARD grant projects	125	12

a. Includes activities through December 1, 2022 when this report was compiled.
b. This funding cycle is currently in process and won't close out until mid-2023.

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 2022, the CARD program has funded 160 projects totaling over $34 million. These projects received (or will receive) an additional $7.9 million in matching funds (Table 2). [2]

Table 2. Summary of CARD program funding to date

Project Type	Number	% of Total Projects	Dollars Awarded	% of Awarded Dollars	Estimated Match
RFP Funded Projects awarded through RFP process (includes 125 completed, and 18 ongoing projects)	143	89.4%	$31,795,041	93.4%	$7,487,624
Pending RFP Funding Projects anticipated as result of pending RFP evaluations (Approximations)	0	0%	$0	0%	$0
Non-RFP Funded Projects awarded outside of RFP process (includes 17 completed projects and 1 ongoing project)	18	10.6%	$2,236,447	6.6%	$496,605
All CARD Projects	**161**	**100%**	**$34,031,488**	**100%**	**$7,984,229**

The vast majority of CARD grants are primarily funded through a competitive Request for Proposal (RFP) process. Based on a review of current Conservation Improvement Program (CIP) needs with input from utilities and other stakeholders, Commerce 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;

[2] Award amounts shown in Table 2 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 only 0.4% 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. In addition, matches shown in Table 2 are based on match commitments in initial grant contracts; collected matches often exceed what was committed in the contract. On average, matching funds are approximately 17% 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).

To date CARD grants funded by RFP number 143, representing over $34 million in funding, plus $7.9 million in matching funds (Table 2).

Occasionally Commerce Department will fund a CARD project outside of the competitive RFP process. This is typically in cases where a necessary project/service 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, 18 such projects have been funded by this means, representing just over $2.2 million of total funds (Table 2). These non-RFP grants also represent nearly $500,000 in matching funds.

In summary, RFP funded grants account for 88.8% of all CARD projects awarded and 93.4% of all CARD funding. By comparison, sole source grants or professional/technical contracts only account for 11.2% of funded CARD projects and 6.6% of CARD dollars spent (Table 2, Figure 1).

Figure 1. CARD funding to date from RFPs versus sole source contracts

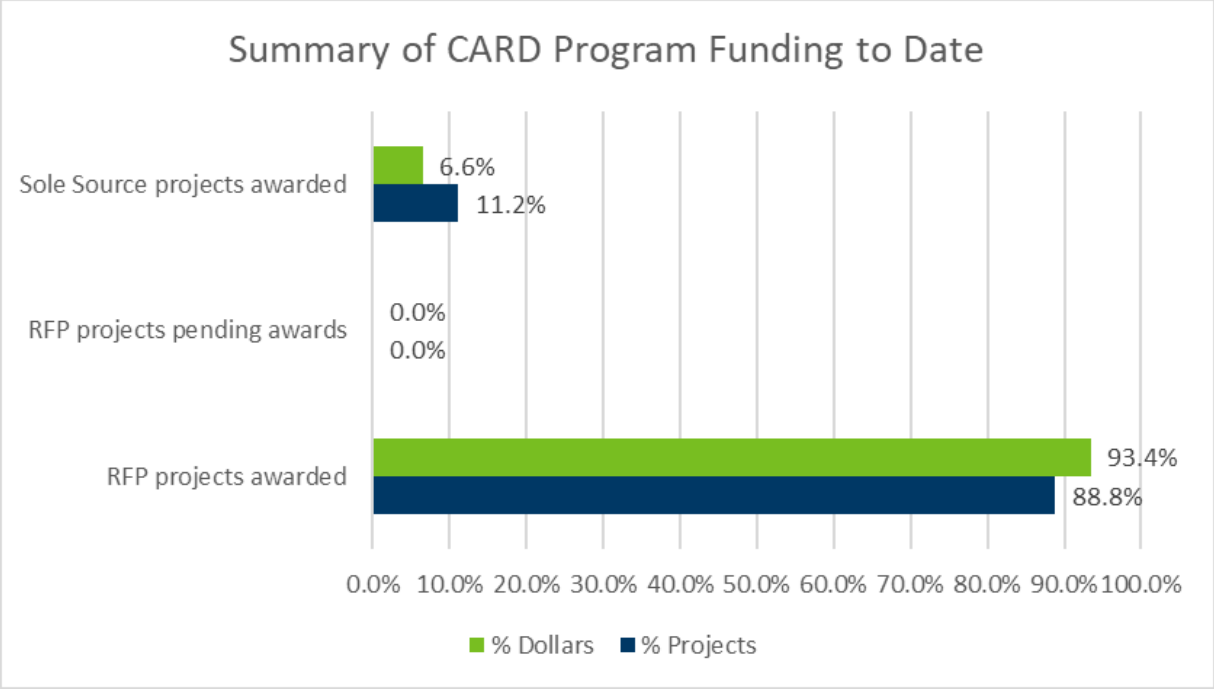


Table 3 lists the 12 CARD projects completed in 2022 that were funded through the RFP process, including details on each project. For projects completed in previous years refer to previous legislative reports

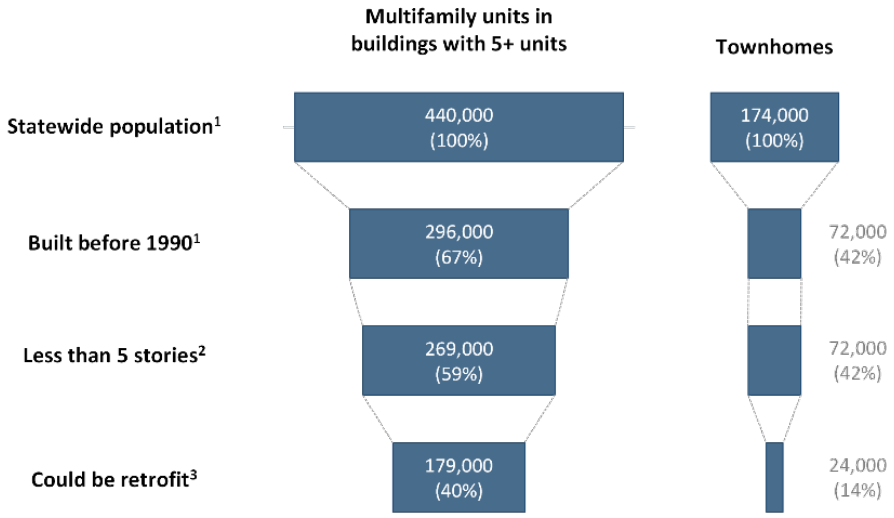
Table 3. CARD projects funded through RFP process completed in 2022

RFP Year	Fund Cycle	Grantee	COMPLETED Project Description	Dollars Awarded	Estimated Match	Year of Completion
2017	8	Gas Technology Institute	Demonstration of packaged central condensing tankless water heating systems in multifamily buildings	$334,667	$20,555	2022
2017	8	Center for Energy and Environment	The Operation and Control of Lighting, Plug Loads, and other Power over Ethernet (PoE) Technologies Using Network Switches	$104,975	$389,901	2022
2018	10	Michaels Energy, Inc.	Energy Efficiency Potential of Nanofluids	$266,837	$89,680	2022
2018	10	Franklin Energy Services, Inc.	Energy Savings Potential of Networked Lighting Control Systems in Small Businesses	$141,631	$8,320	2022
2019	11	Indian Land Tenure Foundation	CIP with Tribal Governments & Tribal Members	$119,911	$8,686	2022
2020	12	Center for Energy and Environment	Heat Pump for ACs: Energy Savings and Modernization of Single-Family Cooling Systems	$153,380	$14,684	2022
2020	12	Citizens Utility Board of Minnesota	Analysis of New or Modified Energy Efficiency Programs to Increase Energy Savings of Underserved Populations	$50,000	$21,574	2022
2020	12	GDS Associates	Field Study to Quantify Energy Efficiency Opportunity in Radio Wave Grain Drying Systems	$0	$0	2022
2020	12	EcoMetric Consulting	HVAC Contractor Decision Research	$209,312	$17,815	2022
2020	12	U of MN - CSBR	Project Overcoat: Investigation of a process for affordable high-performance enclosure upgrades for multifamily buildings	$50,000	$0	2022
2020	12	Center for Energy and Environment	Energy Savings from Residential Zoned Air Distribution Systems	$49,839	$5,538	2022

RFP Year	Fund Cycle	Grantee	COMPLETED Project Description	Dollars Awarded	Estimated Match	Year of Completion
2020	12	Slipstream	Tribal Food Sovereignty: How Minnesota Utility CIP Participation Pathways can Enable Greater Food Security for Minnesota Tribes	$47,180	$2,815	2022
		Totals:	**12 2022 completed projects**	**$1,527,732**	**$579,568**	

Figure 2 is an example result from a recently completed CARD white paper which estimated the market potential for retrofitting Minnesota multifamily housing stock with an Overcoat Panel System that combines a pre-fabricated whole-wall retrofit concept with the "perfect wall" arrangement of cladding, insulation and weather barrier to ensure long-term energy performance and durability at an affordable price. Figure 3 is a diagram which displays the Overcoat System's components and structure.

Figure 2. Estimated Number of Minnesota Housing Units Appropriate for Overcoat Retrofit (from final white paper prepared by the Center for Sustainable Building Research)



1. Source: 2015-2019 Census American Community Survey
2. Source: 2013 Minnesota Multifamily Rental Characterization Study
3. Based on visual review of Rental Characterization Study sample properties

Figure 3. Overcoat Panel Diagram (from final white paper prepared by the Center for Sustainable Building Research)

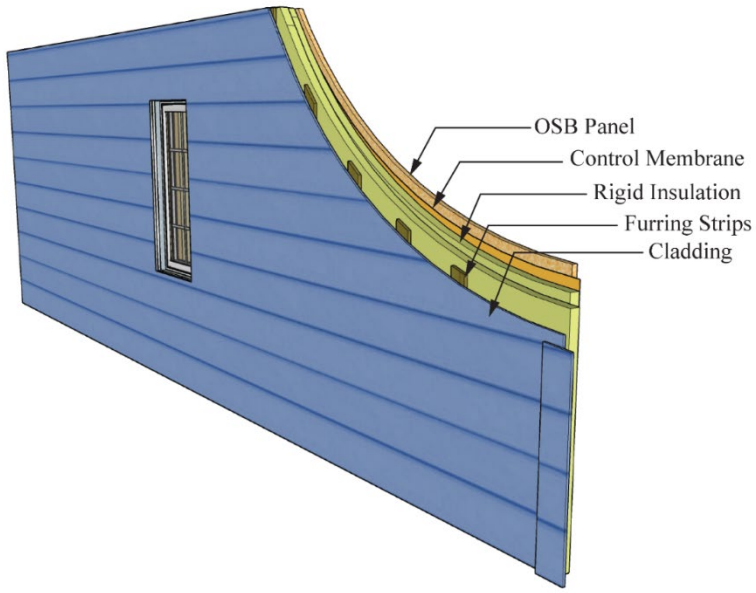


Table 4 lists the 18 CARD projects funded through the RFP process that are currently ongoing, including details on each project.

Table 4. Ongoing 18 projects funded through RFP process (as of December 2022)

RFP Year	Fund Cycle	Grantee	ONGOING Project Description	Dollars Awarded	Estimated Match
2018	10	LHB, Inc.	Field study of phase change material (PCM) use for passive thermal regulation	$321,631	$13,507
2018	10	Center for Energy and Environment	Optimized Installations of Air Source Heat Pumps for Single Family Homes	$360,707	$52,007
2018	10	Center for Energy and Environment	Ductless cold climate heat pumps for multifamily applications	$343,940	$41,354
2020	12	Slipstream	Refrigeration Thermal Storage for Energy Efficiency	$266,650	$16,272
2020	12	U of MN – Center for Sustainable Building Research	The Market for Passive House Multifamily Projects in Minnesota	$255,580	$33,747
2020	12	Center for Energy and Environment	How Smart Do Intelligent Buildings Need to Be?	$202,737	$11,585

RFP Year	Fund Cycle	Grantee	ONGOING Project Description	Dollars Awarded	Estimated Match
2020	12	Cadmus Group	Measuring the Equivalent Full Load Heating and Cooling Hours for Residential HVAC Equipment in Minnesota	$111,270	$4,060
2020	12	Center for Energy and Environment	Advanced Controls for Residential HVAC Fan	$288,659	$23,983
2020	12	Slipstream	Cold-Climate Variable Refrigerant Flow Demonstration and Market Research	$378,957	$44,864
2020	12	Slipstream	Equity, Empowerment, and Energy Reduction through Community Engagement and Behavioral Interventions	$449,885	$24,010
2020	12	Center for Energy and Environment	Air-to-Water Heat Pumps: The cold climate solution for high-efficiency cooling, space heating, and water heating	$330,048	$26,772
2020	12	Michaels Energy	A Field Study of Ground Source Technology in Retrofit Applications in Urban (space constrained) Commercial Buildings	$295,894	$28,920
2020	12	Great Plains Institute	Electric Utility Energy Conservation Program Participation Rates and Barriers to Participation among Latinx-owned Businesses across Minnesota	$50,000	$8,390
2020	12	ThermoLift Inc.	Installation/use of patented thermal compression heat pump (TCHP) a refrigerant-free cold-climate natural-gas heating, cooling, and hot water system	$100,000	$74,125

RFP Year	Fund Cycle	Grantee	ONGOING Project Description	Dollars Awarded	Estimated Match
2020	12	Cadmus Group	Measuring the Savings from Smart Thermostats Installed in Minnesota Homes	$120,180	$4,060
2020	12	Center for Energy and Environment	Optimizing the New Generation of Grocery Refrigeration Equipment	$392,393	$22,674
2020	12	Slipstream	Field Demonstration of ASHRAE Guideline 36-2018 High-Performance Sequences of Operation for HVAC Systems	$364,710	$30,225
2020	12	Center for Energy and Environment	Overcoming the Market Barriers for RTU Retrofit Enhancements	$175,521	$18,447
		Totals:	**18 Ongoing projects**	**$4,808,762**	**$479,002**

Figure 3 and Figure 4 are examples of the types of equipment being installed as part of two cold-climate air-source heat pump CARD studies that are currently ongoing. These innovative heat pumps are designed to provide air conditioning and most of the heating for a single-family home or a multifamily unit.

Figure 4. Ducted Whole House Cold-Climate Air-Source Heat Pump, which Includes an Outdoor Condenser unit (left) that is connected to an Evaporator Coil installed in the Ductwork of the Forced-Air Furnace Inside the Home (right) (Photos courtesy of the Center for Energy and Environment).

Figure 5. Ductless Cold-Climate Air-Source Heat Pump, which Includes an Outdoor Condenser Unit (left) and an Indoor Evaporator Unit or Head (right). (Photos courtesy of the Center for Energy and Environment)

Ongoing Efforts

Each year, the Commerce Department solicits input from utilities and other stakeholders to inform CIP needs and help develop appropriate topics for the RFPs. In 2022, this process was continued. In 2021 and continuing into 2022, Commerce gathered feedback on the previous statewide demand-side management potential study, completed in 2018, in order to assist with planning for a possible updated study.

Starting in 2012 and continuing into 2022, Commerce 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 2020, efforts in this direction focused on the implementation of a new grant interface website (GIW) that was first introduced in 2019. The interface has improved the application process for potential grantees and provided more consistent tracking and oversight of grantee applications for Commerce.

The process was tested in late 2019 and early 2020 with a CARD specific-topic RFP that was relatively straightforward. Given the successful results from that test, in 2020 the GIW was first utilized for a much more complicated multi-topic general CARD RFP. This effort was also successful and involved a major re-envisioning of the CARD RFP process to interconnect with and conform to the GIW. In 2022, Commerce moved to a newer grant tracking platform that offered more flexibility and options for tracking contracts after grants were awarded. The CARD RFP that was issued in August of 2022 was the first RFP to use this new platform.

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 and 2019, Commerce further refined this process to make it more efficient and accessible to utilities. In 2020, the process was further updated and successfully incorporated into the GIW platform. The utility participation process is currently in being incorporated into the new grant tracking platform that Commerce adopted in 2022.

Starting in 2014, Commerce improved public accessibility of grant proposals and evaluation files by making them available electronically on Commerce website through the Commerce Actions and Regulatory Document Search tool.[3] Previously, viewing these files required an appointment and in-person viewing of a hard copy of evaluation documents. In 2020, some minor improvements were made to the process of accessing these files.

[3] https://www.cards.commerce.state.mn.us/CARDS/

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 2020. In addition, CARD results continue to be presented at local, regional and national conferences with very positive feedback.

Starting in 2016 and continuing through 2022, 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 energy 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: regular articles for distribution through the CIP contact list, CIP Notifications and other publications; publicizing final CARD reports more broadly; holding webinars on CARD results and making the webinars available for on-demand viewing at a later date. In addition, Commerce 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.

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. In 2020, feedback on classifications was collected from CARD stakeholders. 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. All of these efforts have improved the quality of CARD project proposals and CARD project results.

From the years 2020 through 2022 brought significant challenges to CARD project management due to the COVID-19 pandemic. More specifically, building lockdowns due to the pandemic affected the ability to freely access buildings and also substantially changed operation of and energy use in buildings. Many projects had delays in recruiting appropriate research sites, installing new technologies at identified sites, and collecting data at research sites where monitoring of new technologies was in progress. In addition, changes in the way all building types (residential, multifamily, schools, commercial) are being utilized has changed energy usage compared to pre-pandemic operation, making the analysis of technologies being assessed more complicated. Despite these challenges, 12 projects were successfully completed in 2022 and 18 ongoing projects from were kept on track (albeit many with adjusted timelines for completion). These efforts were accomplished through the collective flexibility and diligence of Department project managers and grantees.

Clean Energy Resource Teams (CERTs)

Introduction

The Clean Energy Resource Teams (CERTs) is a statewide partnership[4] 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 shift some transportation and heating applications to electric through electric vehicles and air source heat pumps. Through stories and decision tools, educational forums, programming cohorts, one-on-one assistance, and seed grants, CERTs catalyzes clean energy projects.

CERTs tailors its assistance to five (5) key audiences: government units, utilities, small businesses, agricultural producers, and underserved communities. This targeted approach ensures that CERTs' programming meets the different needs and interests of these varied communities. For example, CERTs developed an application readiness checklist to support and coach schools as they began the Solar for Schools grant application process. Tailored approaches also generate opportunities to connect across audiences toward shared goals, as with CERTs' manufactured home park work, which connects a segment of often underserved households with local utilities for mutual benefit.

Key metrics from CERTs' 2022 activities include:

- Empowering 124,854 individuals, who accessed stories, clean energy guides, job opportunities, and events on the CERTs website 230,512 times. CERTs' online tools and guides[5], some of which now offer multiple language options, are central to providing people with the step-by-step guidance they need to move forward with projects. The Clean Energy Job Board, CERTs' most popular resource, hosted 269 postings. CERTs' latest guide, published in September, provides timely information and resources to help Minnesotans learn more about Inflation Reduction Act incentives.[6]
- Hosting a total of 39 events, both in-person and online, with a total of 1,463 attendees. A highlight was a series of events with the University of Minnesota Extension: Beat the Chill, Beat the Heat, and Winter is Coming. CERTs also connected with over 7,500 additional community members through 400 meetings, presentations, and other engagement activities. Through these forums, CERTs builds relationships within and among networks and provides learning opportunities to spark action.

---

[4] 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.

[5] https://on.mncerts.org/tools

[6] https://on.mncerts.org/IRA

- Reaching nearly 13,000 people through the MN Energy Stories email newsletter, through which CERTs shared the 63 unique clean energy stories and news posts it published this year[7] and extending that reach to broader audiences through over 50 local media stories that featured CERTs' programs and partnerships. For example, CERTs' work with manufactured housing received an Environmental Initiative Award in 2022 and was featured nationally by Yale's Climate Connections, on the Weather Channel, and through the Energy News Network.[8]
- Awarding $330,000 in seed grant funding to 74 projects across Minnesota more than doubling the number of projects funded in the 2020 seed grant round (35 projects)[9]. This expansion of seed grants was made possible with additional support from the Minnesota State Energy Office's funds from the U.S. Department of Energy and from the Morgan Family Foundation, both of which prioritized seed grants for underserved communities.
- Engaging 88 Regional Steering Committee members from across the entire state through CERTs' seven (7) regions.[10] Relationships are central to all of CERTs' clean energy work; steering committee members inform programming, serve as key connectors in and to their communities, and drive the seed grant process, from priority setting to reviewing and awarding funds.
- Saving or offsetting 111.7 billion BTUs, or enough to power the average use of a 13-watt LED light bulb (75-watt equivalent) in every one of Minnesota's 2.2 million households. CERTs provides hands-on assistance to spur Minnesotans to move forward on clean energy action. Table 5 details actions that resulted in energy savings or offsets in 2022.

[7] https://on.mncerts.org/stories

[8] https://on.mncerts.org/Carolyn

[9] https://on.mncerts.org/SeedGrants2022

[10] https://on.mncerts.org/about

Activity Highlights

Connecting with Community

CERTs' regional steering committees continued to provide key cross-sectoral connections to communities throughout Minnesota. Members shared ideas and feedback during regular regional meetings and online statewide lunch-and-learns on topics such as Ecolibrium 3's Resilience Hub seed grant project[11], energy and environment planning for small cities, transmission planning, the Inflation Reduction Act, home electrification, and manufactured home park outreach. Members also collaborated with CERTs staff on a range of events and initiatives, such as the Lakes Area Electric Vehicles Event and the income-qualified solar pilot project described further below.

In 2022, CERTs connected with Minnesotans at community events across the state, sharing resources, answering questions, and learning about community members' energy concerns, which in turn continue to inform CERTs' programming. CERTs tabled at events including FarmFest, Columbia Heights Art & Info Fair, Cass Lake Days, ReCharge St. Cloud, Fond du Lac Iskigamizige-Giizis Pow Wow, Back to Basics Spring Fair in Pine River, and Duluth Harvest Fest, as well as numerous Earth Day events and National Drive Electric Week events. CERTs also helped staff on the Department of Commerce's energy display in the State Fair EcoExperience building, including arranging for community partners to speak on various topics and an equipment distributor to provide an air source heat pump display.

Advancing Solar Schools

In 2022, CERTs sprang into outreach mode for the Minnesota Solar for Schools program, supporting students, teachers, and school administrators as they worked to harness the benefits of solar energy. The initial application period ran throughout January of 2022; CERTs reached out to every Minnesota school district, had meaningful engagement with 31 school districts, and presented to dozens of school officials, teachers, students, and community organizations. CERTs worked with Morris Area Schools, St. Paul Public Schools, Moose Lake Community School, and Apple Valley-Eagan-Rosemount Schools to issue requests for proposals using the CERTs model request for proposals (RFP). Of note, Moose Lake Community Schools is the first of two districts that installed 40 kW of solar using Solar for Schools funding (see row A in Table 5 for energy generated; the other district was Marshall Public Schools). With the launch of Phase II, CERTs provided technical assistance to Bemidji State, Minnesota West, Anoka-Hennepin, and the University of Minnesota-Crookston (not eligible but considering their solar options).

School support efforts extended beyond outreach and one-on-one support to also reach students, promote youth leadership, and integrate solar into student learning. For example, CERTs helped recruit Rosemount

[11] https://on.mncerts.org/Eco3ResHub

students to showcase their successful endeavors - and leadership - at the Minnesota State Fair. CERTs and several partners collaborated with MIGIZI as they engaged nine youth to make solar videos to promote both solar installations and solar career potential to their high school peers. For classroom learning, a Northwest CERT seed grant is supporting Ojibwe solar curriculum development for the Red Lake Charter School to ensure that all students have culturally relevant learning opportunities.

Behind the scenes, CERTs worked with the Department of Administration to revamp the solar master contract, a tool that can be used by State agencies, local jurisdictions, and higher education institutions to procure solar; there are now eight well qualified Minnesota-based solar installers/developers included in this contract. Finally, CERTs engaged with utilities and utility-related associations to ensure that schools proceed on their solar projects with accurate incentive information, rate escalation estimates, and acceptable contracts.

Partnering with Tribal Nations

CERTs has supported Indigenous manufacturing and job creation in partnership with Anishinaabe-run 8th Fire Solar in Osage. 8th Fire Solar manufactures solar thermal panels that can help heat homes and businesses. While 8th Fire Solar also does installation of their solar thermal systems, they aim to equip other Native communities with the skills to perform installations on their own properties. CERTs has initiated and supported job-training cohorts with the Lower Sioux Indian Community and Leech Lake Band of Ojibwe, with discussions underway to expand training to Mille Lacs Band of Ojibwe and Red Lake Band of Chippewa members. CERTs also uses existing media connections to spread the word about 8th Fire's efforts to train more communities, as well as to inform people about solar thermal panels, an often under-recognized solar technology.[12]

CERTs expanded on its partnership with the Lower Sioux Indian Community by coordinating a community heating feasibility study in partnership with Lower Sioux Housing Department, the Center for Urban and Regional Affairs, and the University of Minnesota Regional Sustainable Development Partnerships. Lower Sioux Indian Community's 160 households currently use propane as their primary fuel source to heat their homes. To help the families and households reduce the financial burden of utility bills, Lower Sioux Indian Community is interested in assessing two options for the future: first, to connect each individual home to an existing natural gas line, and second, to upgrade the homes' heating and cooling systems by installing cold climate air source heat pumps (ccASHPs). Analysis is still underway. Home Energy Squad visits to nine homes offered a sampling of community-specific data on the homes, as well as an opportunity for energy efficiency implementation (see row B in Table 5 for energy saved).

Over the summer of 2022, CERTs staff reached out to the eleven tribal nations that share the same geography as Minnesota to assess their interest in co-developing an EV Smart Program for Native Nations. Many discussions and conversations ensued, with strong interest from many tribal nations to participate. This relationship

[12] https://sahanjournal.com/climate-environment/solar-heating-8th-fire

deepening serves as the building block for partnership development to create a framework - designed specifically to work for tribal nations - that will begin in earnest in 2023.

In addition to these projects, CERTs is working with White Earth, Grand Portage, Leech Lake, Lower Sioux, Mille Lacs and Fond du Lac Nations to support additional energy efficiency, renewable energy, and electric vehicle projects through CERT seed grants.

Connecting Jurisdictions to Networks and Opportunities

CERTs, along with our partners at the Great Plains Institute (GPI), continue to convene the Community Energy Network – a network of 60+ cities, a county, and a regional development commission to learn about and discuss clean energy opportunities. Highlights from this year's convenings included a presentation from the City of Duluth about their Climate Action Plan followed by a discussion about how other communities could replicate this approach as well as several sessions focused on how communities can capture Infrastructure Investment and Jobs Act funds resources

Additionally, CERTs provides assistance and support to the 140+ GreenStep cities and tribal nations as they work to implement clean energy-related best practices. This past year, CERTs hosted a workshop around a sample Community Solar Request for Proposals that cities could use to enable equity-focused community solar gardens for local residents. CERTs also hosted a GreenStep workshop on Community Solar Subscriptions & Green Power Purchasing Programs to educate cities about these options. Similarly, CERTs hosted a forum with the City of Plymouth, Xcel Energy, and Carbon Solutions Group to highlight the Plymouth Community-Wide EV Charging Initiative. This initiative allowed Plymouth to install 115 public EV charging stations and expand EVs in their city fleet; six additional suburban communities are now moving forward with similar community-wide EV charging infrastructure.

Learnings from GreenStep also led to the creation of the Small and Mighty Cities Cohort for cities with populations less than 4,000. In partnership with Region 5 Development Commission, CERTs hosted four cohort sessions around topics identified as priorities by participating cities, including efficiency and solar for city facilities, EVs, housing, and funding opportunities. As relevant funding opportunities arose in the months following the cohort, these were shared with the cities.

Supporting Local Government Projects

CERTs continued to provide direct support to local jurisdictions to advance local projects. One clear highlight from 2022 was collaborating with the City of Bemidji to procure a 25kW solar array for the city's Tourist Information Center. The city utilized the CERTs model RFP, had CERTs distribute the RFP on their behalf to potential solar installers, and had CERTs participate with a team of residents to score the four proposals. A local company was selected for the project, helping keep jobs and money in the community.

CERTs also provided guidance to the cities of Coon Rapids and Edina on energy performance contracts and renewable energy procurement. Coon Rapids is exploring major energy efficiency upgrades and entering into a power purchase agreement for solar. CERTs and Coon Rapids will continue this partnership in the year ahead.

Supporting Project Implementation with Businesses, Farms and Nonprofits

CERTs continued to work directly with counties throughout the state to advance Property Assessed Clean Energy (PACE), a key clean energy financing tool with programs administered by the St. Paul Port Authority and the Rural Minnesota Energy Board. This year, three additional counties – Cass, Douglas, and Lyon – enabled PACE, bringing the total number of counties with PACE to 72.[13] In connection with CERTs' work, PACE programs financed solar for three rural businesses, energy efficiency in four new construction projects (hotel and apartments), and energy efficiency for two existing businesses. (See row C in Table 5 for total energy saved and total energy generated.)

CERTs is now in the fourth round of its Renewable Energy for Greater MN program (REGM-4), with funding from USDA Rural Development. CERTs staff work with farmers and rural small businesses to identify clean energy opportunities and resources (USDA funding, PACE, and utility programs). Thus far, 13 farms or small businesses have taken steps toward project implementation, with five solar projects installed as part of REGM-4. In addition, five more projects (four solar and one wind) were installed as a result of CERTs' assistance during the previous round (REGM-3). (See row D in Table 5 for total energy generated.)

Four additional projects were completed from CERTs direct technical assistance to nonprofits and businesses, including solar on two churches in Minneapolis and Hopkins, solar on a brewery in Blaine, and air source heat pumps for a grocer in McGregor (see row E in Table 5 for total energy saved). CERTs continues to partner with and refer organizations to service providers, such as the University of Minnesota's Minnesota Technical Assistance Program (MnTAP). As a result of recent referrals, four organizations took action (see row F in Table 5 for total energy saved).

Metro CERT continued to work with the City of Minneapolis to convene a panel of subject matter experts to review and recommend project applications for the Minneapolis Green Cost Share program, which cost-matches small businesses' and organizations' investments in solar, energy efficiency, and air pollution reduction projects. Metro CERT also does storytelling to share project case studies and program impact.[14] Metro CERT provided additional direct assistance to the Stop & Shop in Minneapolis, resulting in 50 kW solar and lighting projects (see row E in Table 5 for energy generated and saved).

Numerous nonprofit organizations around the state received CERTs seed grants. Results from many of these projects will be available in 2023, but some were completed in 2022. For example, the project at Bam'idizowigamig Creator's Place in Pine Point enabled a more energy efficient building for the organization's training and support for entrepreneurs and people released from incarceration.[15] In St. Charles, the Hometown Resource Center (a thrift shop and food shelf) was able to replace their aged and unreliable HVAC system with

[13] https://on.mncerts.org/PACE

[14] https://on.mncerts.org/GreenCostShare2021

[15] https://on.mncerts.org/CreatorsPlace

one that is new and more efficient.[16] (See row G in Table 5 for total energy saved and total energy generated for current seed grants, as well as row H for ripple effects from 2020 seed grants.)

Building on Successful Business and Farm Outreach Strategies

CERTs collaborated with Otter Tail Power Company to connect with 37 small business accounts through a business blitz (direct outreach on utility programs in an individual community). During the 23 assessments conducted, many businesses installed free, energy-saving measures like LED bulbs, water-saving devices, and water heater insulation. CERTs also teamed up with the Cook County Local Energy Project to assist ten small businesses in the Grand Marais area. (See row I in Table 5 for total energy saved.)

Over the course of the year, CERTs presented at in-person or online business and farm events in each of the seven CERTs regions. One such event took place in Stearns County. To strengthen local understanding of on-farm solar, CERTs co-hosted this well-attended farm solar event in partnership with the Minnesota Farmers Union and the Minnesota Dairy Initiative. The event brought together local government, utility, and university panelists with expertise on various aspects of solar: funding, zoning, interconnection, and integration into farm operations, including agrivoltaics (the co-location of solar and agriculture on the same plot of land).

Advancing Innovation in Small Business Engagement

Metro CERT (through CERTs partner Great Plains Institute) is collaborating on an innovative project entitled Advancing Solar for Underserved Small Businesses: New Engagement Practices for Energy and Economic Security. It is one of just eight projects nationwide selected by the U.S. Department of Energy to participate in the Solar Energy Innovation Network. Led by the Lake Street Council, project partners also include peer business support organizations and energy planning organizations, with additional in-kind support from the City of Minneapolis, City of Saint Paul, and Xcel Energy. The project team is experimenting with creative, promising ideas to use solar power in underserved businesses, seeking to create a blueprint for other communities pursuing novel ways of adopting and benefiting from solar energy.

CERTs and partners also completed community-based research for the Conservation Applied Research and Development grant-funded Latinx-owned businesses' use of electric utility programs. Research involved gaining the perspectives of electric utilities, support organizations, and Latinx-owned businesses via interviews and surveys and reviewing existing resources on energy efficiency for Latinx-owned businesses. Key recommendations for improving program participation by Latinx-owned businesses include program targeting and translation, partnerships with support organizations, hiring electric utility staff representative of community demographics, exploring ways to streamline processes and reduce upfront costs, and collecting data to allow assessment of participation rates.

[16] https://on.mncerts.org/HometownRC

Integrating Energy Savings by Connecting Food and Energy

Food storage and energy go hand-in-hand, which means that any business or service provider that sells or distributes food probably has an energy efficiency - and energy saving - opportunity. For years CERTs has worked to support rural grocery energy efficiency efforts. This past year, Northwest CERT awarded a seed grant to Aaron's Grocery in Fertile to help advance cooler and lighting upgrades. Members of the Northwest CERT Steering Committee emphasized how a local grocery store can be the heart of a community and key to healthy food access. CERTs continued outreach this past year about the Good Food Access Fund, Property Assessed Clean Energy, Rural Energy for America Program funding, and utility rebates to help pay for these energy efficiency improvements at rural grocery stores - even bringing on additional staff capacity to help provide direct technical assistance to stores to navigate the energy audit and upgrade process.

Beyond rural grocery, CERTs is in the midst of developing new strategies to engage both food shelves and food shelf patrons. Southeast CERT funded a seed grant with Channel One Food Bank in Rochester to invest in energy efficiency upgrades and thereby reserve general operating funds for the food bank's mission to end hunger in their region. Channel One aims to also leverage their efforts to demonstrate the viability of energy efficiency upgrades to other nonprofits, especially their network of 200 partnering food shelves and local food security programs. This project has inspired a series of additional collaborations, including one with Neighbors United Food Shelf Project in Granite Falls, still in development, that will engage patrons in addition to considering energy efficiency in the facility itself.

Exploring Energy Options in Rural Communities

Transmission and wind energy-to-green ammonia are both topics of great relevance across Greater Minnesota, as they speak to economic development potential. This past year, Southwest CERT staff, who also work with the Rural Minnesota Energy Board, dove into transmission constraints and the impact that curtailment is having on the region and the pace of building out renewables. Commissioners from Southwest Minnesota briefed Steering Committee members across the state on challenges that are emerging and on the need to expand transmission to facilitate additional renewable energy development.

CERTs staff also worked closely with the Agricultural Utilization Research Institute to finalize an opportunity assessment on the potential for wind energy-to-green ammonia.[17]

Key findings from the analysis include:

- Distributed wind (and solar) facilities could be used to produce green ammonia - fertilizer - locally while perhaps utilizing renewable energy resources that might otherwise be curtailed.
- A rise in use of urea speaks to the potential value of colocation of green ammonia facilities with ethanol production facilities.

[17] https://on.mncerts.org/WindGreenAmmonia

- Operationally, green ammonia production is cost-competitive with methane-based ammonia production and could reduce farmer exposure to fertilizer price fluctuations that result from natural gas price increases. New hydrogen incentives included in the Inflation Reduction Act have the potential to make these projects even more cost competitive.
- Because hydrogen and ammonia can be used for many purposes beyond fertilizer, commercializing a system for fertilizer (a known market and technology) could begin to scale deployment, enabling future applications for energy storage, transport, and use across the state and region.

Partnering with Utilities to Advance Electric Vehicle Programming and Adoption

CERT staff field questions every day from individuals and organizations interested in EVs and charging infrastructure. CERTs has hosted a series of events to respond to this growing interest over the past year, and utilities have been essential partners in all aspects of this work, especially across Greater Minnesota. For example, in August, with support from a CERTs Seed Grant, South Central Electric Association, Nobles Cooperative Electric, Federated Rural Electric, and Brown County Rural Electric Association hosted an EV Ride and Drive in Windom with opportunities to check out six different vehicles, including both the Ford F-150 Lightning and a Rivian truck. The event was well attended, with over 90 participants signing up for test drives. In October, CERTs supported the Prairie Woods Chapter of the Izaak Walton League, West Central Climate Action, and Detroit Lakes Public Utilities with hosting a Lakes Area EV Event. This EV Ride and Drive event was a hit, with over 100 attendees and every single test drive slot filled.

CERTs co-hosted a peer-to-peer utility meeting on electric vehicles along with the Minnesota Municipal Utilities Association, Minnesota Rural Electric Association, and Great River Energy. The session focused on the EV charging landscape and auto dealership engagement and included a utility panel featuring Wright-Hennepin Electric Cooperative, East Central Energy, and Elk River Municipal Utility sharing their own experiences and expertise on these topics.

Sharing Resources for Home Energy Efficiency

In alignment with its Under 5% Energy Burden Campaign and building on its existing content, CERTs increased accessibility through translation of its home energy guides[18], which are now available in English, Spanish, Somali, Hmong and S'gaw Karen. CERTs also customized the Spanish language guides for Willmar Municipal Utility to print and distribute at a welcoming and resource sharing event. In addition, CERTs collaborated with UMN Extension's Family Development Center to deliver the content at three (3) statewide webinars – Beat the Chill; Beat the Heat; and Winter is Coming – reaching over 200 attendees through the series. The energy saving presentation content has also been shared as customizable slide decks that can be used by other organizations interested in sharing reliable home energy information with their audiences.

[18] https://on.mncerts.org/HomeEnergyGuide

CERTs seed grants in multiple regions of the state are also improving access to home energy efficiency resources. For example, It Takes a Community to Strengthen Energy Efficiency is a project in which Growing Up Healthy and the Healthy Community Initiative have been working to create a replicable model that uses a meeting-in-a-box concept to conduct neighborhood-led energy efficiency events, starting with two Faribault manufactured home communities. In another example – Energy Justice Pueblitos – Unidos MN has been partnering with the Citizens Utility Board of Minnesota on home energy train-the-trainer workshops, establishing a cohort of community experts in Minneapolis, St. Cloud, and Worthington. Outcomes of these projects and others will be available in 2023.

During April (Earth Month) and October (Energy Month), CERTs communications campaigns featured extensive social media content related to home energy. Additional home energy stories explored how efficiency can be incorporated into the lives of everyday Minnesotans: "A journey into home energy efficiency with John Suzukida"[19] and "Things I learned about heat pumps: a homeowner's perspective"[20]. The heat pump story attracted so many readers and prompted so many follow-up questions, CERTs has now developed an air source heat pump advice column called "Ask Alexis".

Developing New Models for Utility Programming with Manufactured Homes

Again throughout 2022, CERTs partnered with utilities to advance an intensive outreach approach for making manufactured homes more energy efficient. "Energy blitzes" are one-day events that bring together a variety of partners to offer energy-saving items and additional efficiency opportunities to manufactured home communities. Through seed grant projects and other community collaborations, CERTs organized blitzes in Eagle Lake, Hermantown, Mora, Rochester, and Rosemount. All events engaged local utilities (BENCO Electric Cooperative, CenterPoint Energy via Home Energy Squad, Minnesota Energy Resources, Minnesota Power, Mora Municipal Utility, Southern Minnesota Municipal Power Agency, and Xcel Energy), and many also included community action programs. Overall, CERTs and partners visited 344 households, shared information on energy saving tips and programs, and distributed over 2,900 energy efficiency items (see row J in Table 5 for energy saved).

This fall, CERTs formalized this community-centered approach to engage local champions in advancing energy efficiency with manufactured home park residents into a Steps for Success guide on how to conduct an energy blitz. CERTs hosted a peer-to-peer utility learning session on the new guide with thirteen (13) utilities and followed with an additional 20+ utilities who wanted to learn more about the approach. In 2023, CERTs hopes this guide will be a pathway for more cooperative and municipal utilities to partner with CERTs on utilizing this approach. Minnesota Energy Resources has already integrated this programming into their triennial

[19] https://on.mncerts.org/Journey

[20] https://on.mncerts.org/Learned

conservation improvement program plan, and CERTs is working with Xcel Energy as they actively pursue programming specific to manufactured homes.

Collaborating with Utilities to Demystify Heat Pumps

With increased focus on beneficial electrification, issuance of the Energy Conservation and Optimization (ECO) Act technical guidance in March 2022, and anticipated tax credits and rebates from the Inflation Reduction Act, more and more people are hearing about, and curious about, air source heat pumps (ASHPs). Heat pumps use electricity to both heat and cool, and the heating provided is up to three times more efficient than forced air and electric resistance heating systems. CERTs has been working alongside the Minnesota Air Source Heat Pump Collaborative and has created a variety of materials to ensure that households with questions about heat pumps are getting good answers.

In May, CERTs presented its consumer-facing resources at a Great River Energy-hosted Utility ASHP Summit for their member cooperatives. Since the summit, the CERTs ASHP guide was updated, and utilities (Federated Rural Electric, PKM Cooperative, New Ulm Public Utilities, City of Staples, East Central Energy, Runestone Electric Association, and Meeker Cooperative) began co-branding the guide for use with their own customers/members. Four utilities were instrumental in reviewing and providing critical feedback for revising the guide (Great River Energy, Minnesota Power, Otter Tail Power, and Southern Minnesota Municipal Power Agency).

Developing Solar Models for Income Eligible Households

Throughout 2022, CERTs and its partners at the Minnesota Department of Commerce, Detroit Lakes Municipal Utility, MAHUBE-OTWA Community Action Agency, and Humphrey School of Public Affairs have been working to scope, research, and understand potential models to increase income eligible household access to community solar. Specifically, the project seeks to develop replicable community solar model(s) that integrate cooperative and municipal utility partners and the existing Low Income Home Energy Assistance Program (LIHEAP) administrators, process, and eligibility, in ways that reduce energy burden for income eligible households. CERTs has facilitated this project, working with the team to dig into detailed questions ranging from how this model could affect income eligible households month-by-month to how this effort could be cost-effectively scaled by utilities to serve both qualifying households and their broader customer base. The team is on the verge of installing its first small-scale pilot to work through all of the processes and procedures required of both the local community action agency and the local utility.

Strengthening the Clean Energy Workforce

Throughout 2022, CERTs continued to advance efforts around clean energy workforce development, such as through the aforementioned support of 8th Fire's solar thermal panel installation training with Lower Sioux Indian Community and Leech Lake Band of Ojibwe, as well as another seed grant project currently underway: Community Grassroots Solutions' Clean Energy Careers for St. Cloud's Somali Community.

Another important component of CERTs' workforce programming was the development of a new AmeriCorps program in collaboration with Serve Minnesota/AMPACT's Climate Impact Corps. CERTs/RSDP developed the

Sustainability Project Coordinator position and successfully recruited members to serve in five of the seven CERTs regions. These members are collaborating with CERTs and RSDP staff on efforts with food shelves, rural grocers, manufactured homes and multifamily housing, and electric vehicles. This effort is being piloted during the 2022-23 program year, with the possibility of expanding it to other community-based host organizations in future years.

Beyond those specific programs, CERTs continues to play an important connecting role in the workforce space, including through its perennially popular job board, careers page, and a newly developed careers handout for use at in-person events. Participation in workforce and mentoring events enabled CERTs to reach over 350 people. CERTs also shared timely training, internship, and scholarship opportunities through its communications, and two key workforce stories published by CERTs are "MN BIPOC leaders in clean energy cultivate UMN Morris students' passion", which focused on the UMN Morris's Intercultural Sustainability Leaders (ISLe) program[21] and "Solar camp attracts future installers, not bears" which highlighted a pilot program to train electrical construction students in solar installation at Minnesota State's campus in Canby[22]. CERTs continues to connect with MnSCU staff on workforce development opportunities.

[21] https://on.mncerts.org/ISLe

[22] https://on.mncerts.org/SolarCampMnSCU

Clean Energy Impacts

Table 5 details efforts with energy savings or energy generated in 2022[23] as a result of CERTs work, including a row identifier, a description of the effort, and the BTUs saved or generated. Cost savings in Table 5 reflect savings from energy efficiency projects only and amount to nearly $1.7 million annually for all efforts.

Table 5. CERTs Impacts Summary

ID	Effort Description	BTUs[24]
A	**Solar Schools:** Moose Lake Community Schools installed a 40 kW array, generating 52,560 kWh annually.	**179,334,720 Generated**
B	**Community-based Residential Energy Efficiency:** Connected 9 income-qualified homes with Home Energy Squad (HES) visits in Lower Sioux Indian Community, saving at least 15,232 kWh, 182 gallons propane, and $2,100 annually (data for 8 homes). Catalyzed an additional 5 HES visits in St. Paul, saving approximately 5,000 kWh, 425 therms, and $1,000 annually. Distributed 53 water and energy saving kits from Minnesota Energy Resources (MER) at the North Branch Home and Garden Show, saving 2,608 therms and $2,200 annually. Connected CEE with 6 buildings for MER Multifamily Energy Savings Program; 2 income-qualified buildings in Rochester and Spring Grove with 67 units total received visits and services, collectively saving 14,683 kWh, 1,760 therms, and $3,300 annually.	**615,082,980 Saved**
C	**Property Assessed Clean Energy (PACE) Financing:** Engaged communities and businesses in PACE programs, which resulted in 3 solar projects and 6 energy efficiency projects being financed by PACE. The energy efficiency projects include upgrades to lighting, HVAC, and sometimes insulation, and are collectively saving $661,000 annually.	**43,109,579,742 Saved** **389,334,720 Generated**

[23] Due to the timing of this report, data herein covers activities spanning November 1, 2021 – October 31, 2022.

[24] Calculations include conversions as follows: 3,412 BTUs per kWh; 100,000 BTUs per therm; 114,000 BTUs per gallon gasoline; 91,500 BTUs per gallon propane.

D	**Renewable Energy for Greater MN:** Worked with farmers and rural small businesses to identify energy efficiency opportunities, prioritize renewable energy options, and connect to resources for project implementation. From assistance provided between July 2019 and June 2021, an additional 5 projects have been completed (4 solar, 1 wind). From assistance provided between July 2021 and October 2022, 5 solar projects have been completed. Collectively, these 10 projects are producing 709,018 kWh annually.	**2,419,169,416 Generated**
E	**Direct Business and Organization Assistance:** Assisted with 91 kW solar at University Lutheran Church of Hope in Minneapolis, 85 kW solar at Gethsemane Lutheran Church in Hopkins, and 40 kW solar at Invictus Brewing in Blaine, collectively generating 283,834 kWh annually. Assisted Ukura's Grocery in McGregor with 2 air source heat pumps, saving 1,100 gallons propane and $1,900 annually. Assisted Stop & Shop in Minneapolis with 50 kW solar and lighting projects, generating 65,700 kWh, saving 32,672 kWh and $2,300 annually.	**212,126,864 Saved** **1,192,575,888 Generated**
F	**Minnesota Technical Assistance Program:** Referred 4 clients for technical assistance or a site visit that resulted in implementation of energy efficiency projects, saving 1,977,000 kWh and $120,000 annually. Also encouraged cities to participate in the Wastewater Treatment Plant Energy Efficiency Cohort Training Program; wastewater plant operators from Brainerd, Elk River, Faribault, and Mankato participated. Two plants implemented measures based on the training, saving 473,100 kWh and $40,300 annually.	**8,359,741,200 Saved**
G	**2022 CERTs Seed Grants:** Of the 74 projects funded, 22 projects have been completed thus far. These projects leveraged $680,000 from other sources and involved or reached over 12,700 Minnesotans. Eleven projects had a clean energy installation focus (as opposed to education, outreach, or research only): 2 projects with manufactured home parks (savings included in row J), 7 energy efficiency projects (saving 66,564 kWh, 688 therms, and $8,400 annually), and 2 solar projects (generating 4,216 kWh annually).	**295,916,368 Saved** **14,384,992 Generated**
H	**2020 CERTs Seed Grants Ripple Effects:** Of the 35 projects funded via 2020 seed grants, at least 3 continued with additional projects for which the ground was laid during the CERTs seed grant: a lighting upgrade followed a lighting study while air source heat pumps in a 6-plex followed weatherization, the two projects saving a combined 54,530 kWh and $6,000	**186,056,360 Saved** **48,419,692 Generated**

	annually; a residential solar installation followed training for local installers in Cook County, generating 14,191 kWh annually.	
I	**Business Blitzes:** Assisted 10 businesses in Grand Marais and Cook County; 2 completed energy efficiency projects, saving 16,000 kWh, 4,560 gallons propane, and $9,400 annually. Scheduled 23 assessments in McIntosh for Otter Tail Power (OTP) Commercial Direct Install Program, which included installation of energy-saving items, resulting in annual savings of 45,899 kWh and $4,100. Businesses and organizations in Battle Lake, Brooks, Cass Lake, Clearbrook, Gonvick, Gully, McIntosh, Miltona, and Ottertail that received OTP assessments and in Long Prairie and Hackensack that received Minnesota Power assessments in 2021 have since completed 25 projects, with annual savings of 619,945 kWh and $56,000.	**2,743,691,728 Saved**
J	**Manufactured Home Parks:** Distributed 2,912 energy saving items (light bulbs, showerheads, faucet aerators, and do-it-yourself weatherization kits) and catalyzed 13 home energy assessments with 7 partnering utilities and 4 organizations at 344 units across 5 manufactured home parks. In total, savings of 22,560 kWh, 13,930 therms, and $14,500 annually.	**1,469,974,720 Saved**
K	**Solar for Vouchers:** As a result of the technical assistance that property managers received in this pilot, 3 solar projects (31 kW, 57.15 kW, and 11 kW) were installed on multifamily buildings, generating 130,283 kWh annually.	**444,525,596 Generated**
L	**Solar Works:** In the year following two Solar Works! events with more than 100 attendees in St. Louis Park, 46 residential solar projects totaling 428.87 kW were installed, generating 563,535 kWh.	**1,922,781,420 Generated**
M	**Guaranteed Energy Savings Program (GESP):** CERTs connected Winona State University to the GESP and provided many other resources in 2017. In 2022, the numerous project elements were completed, including 10 solar systems generating 1,694,845 kWh annually and 20,000 light fixture upgrades, HVAC controls, and other energy efficiency projects saving 4,975,121 kWh, 225,809 therms, and $685,000 annually.	**39,556,012,852 Saved** **5,782,811,140 Generated**
N	**Electric Vehicles (EVs) and EV Charging Infrastructure:** Implementation of projects continued from two CERTs cohorts that took place in 2020-2021:	**2,729,401,680 Net Saved**

	Cities Charging Ahead 2.0 and Powering Ahead with Vehicle Electrification (with municipal utilities). Eden Prairie, Edina, Hackensack, Hutchinson, Lake City, Minnetonka, Rochester, Shakopee, and St. Louis Park installed 14 dual-head Level 2 charging stations and 3 DC fast chargers (all publicly-available), and added 12 electric fleet vehicles, resulting in 33,291 gallons of gasoline avoided, 312,360 kWh used for charging, and $81,500 net annual savings.	
	Total CERTs Program Savings	**111.7 billion**

Allocation of Legislative Funding Resources and Leveraged Resources

CERTs has 15 staff members who account for 11 full time employees (FTE), all of whom are paid in part via this legislative allocation. Staff are based across CERTs' four (4) partner organizations and across all seven (7) regions. This past fall, CERTs secured additional support from AmeriCorps to host new Project Sustainability Coordinators adding capacity in the Central, Metro, Northeast, Northwest, and Southeast regions. Given the people- and relationship-focused nature of CERTs' work, staff members are essential 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. For this year's seed grant round, CERTs leveraged an additional $190,000 from the Morgan Family Foundation and the Minnesota Department of Commerce's State Energy Office funds from the U.S. Department of Energy to fund additional projects focused on underserved communities.

Beyond the legislatively appropriated dollars, CERTs continues to leverage additional support for its work. Funding and related programmatic efforts include U.S. Department of Agriculture Rural Energy Development Assistance funding to assist farms and rural small businesses with renewable energy assessments, McKnight Foundation funding to spur support of solar school efforts and storytelling, Carolyn Foundation funding to advance work with manufactured housing residents, support from the Justice 40 Accelerator to support partnerships and projects with Tribal Nations, and several contracts for services for specific projects and efforts.

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

Sustainable Buildings 2030 (SB 2030)

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:

Table 6. SB 2030 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
2021	197	1,067	17.5	4,581	75.0
2022	217	1,083	20.0	5,140	94.9
2023**	244	919	16.7	4,594	83.5

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

**The US Bank Stadium, although having gone through design and construction SB 2030 review and approval, has been removed from our tracking between the 2022 and 2023 reporting years and resulted in a reduction in reported annual and to-date savings metrics between those years. Prior year metrics have not been updated to remove this project.

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 (5) 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 moved 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 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 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 2009[25], 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. 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. Through 2019, a 15-year simple payback period was also used as a measure of cost-effectiveness after an in-depth evaluation of societal, participant, and utility costs and using methodology consistent with Conservation Improvement Program (CIP) calculations.

The measure was developed as a metric to be used by design teams and by the SB 2030 Review Team when evaluating cost-effectiveness because implementing CIP-style calculations for individual strategies is not a viable approach. During the last half of 2019, the cost-effectiveness evaluation was updated and concluded that a payback period of 12 years is an appropriate cost-effective boundary for measures under the SB 2030 program, using the analysis method outlined above for updated utility factors. The SB 2030 Project Team anticipates moving to a regular update of the cost-effectiveness evaluation, coordinated with triannual CIP filing schedule.

Projects that demonstrate that they cannot meet the SB 2030 standards cost-effectively using on-site measures (efficiency and renewable energy) are permitted to provide sufficient carbon-neutral renewable energy through off-site development or procurement of renewable energy sufficient to meet the SB 2030 Target. Projects may access these methods only after a project team demonstrates that appropriate energy saving design options and energy efficiency upgrades were investigated to achieve the SB 2030 performance level and shown that on-site only options to meet the SB 2030 Standard are not cost-effective for the particular project. An appropriate on-site Energy Standard is then set by evaluating the set of all cost-effective measures for that project.

This path is anticipated to more often 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 December 2021, 244 building projects have been involved in the SB 2030 process and have reported Energy Standard and Design Energy Consumption values. Of these 244 projects, 158 of the 170 state-required building projects and 64 of 74 volunteer building projects have reported as on track to meet the required SB 2030 Energy Standard. To date, 91% of all buildings project enrolled in the SB 2030 program have reported meeting or exceeded the SB 2030 Energy Standard in design. On average, these projects have reported

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

anticipated energy consumption of 26% less than their 2030 Energy Standard.

When compared to buildings that just met the minimum energy code requirements, the buildings designed to the SB 2030 Energy Standard are predicted to save approximately 919 million kBtu/year, a reduction in Carbon emissions of 100,000 tons of CO2e, and a savings of $17.0 million per year assuming an average cost of $18.18 per mmBtu.[26] As new projects are added each year and projects meet the 2020-2025 energy standard, ongoing annual savings to the State and other building owners will increase. Based on submitted anticipated performance the 178 completed SB 2030 projects are estimated to have saved 4,594 million kBtu, avoided 604,000 tons of CO2e and saved $83.5 million as of January 1, 2023.[27] The total cost of the program using CIP funds is approximately $7.2 million through September 2022.

Example projects recently participating and contributing to this savings, and which were recognized as finalists at the 2021 Best of B3 Award Event[28] include the following:

[26] The average cost per kBtu from the B3 Benchmarking database is $0.018378139 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.

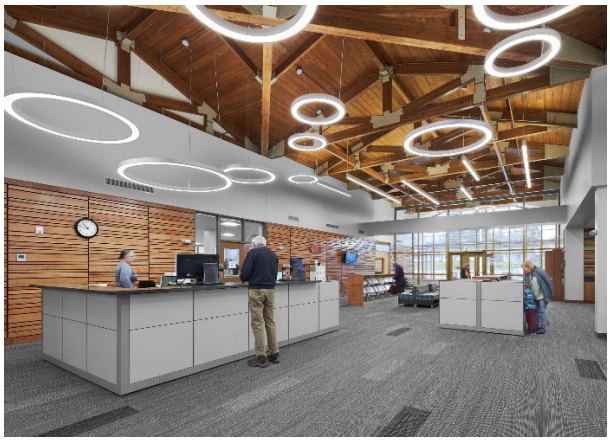
[27] The US Bank Stadium, although having gone through design and construction SB 2030 review and approval, has been removed from our tracking between the 2022 and 2023 reporting years and resulted in a reduction in reported annual and to-date savings metrics between those years. Prior year metrics have not been updated to remove this project.

[28] http://www.b3mn.org/best-of-b3/

Figure 5*(left)* & 6*(right).* Richard M. Schulze Family Foundation Saint Paul Opportunity Center and Dorothy Day Residence: 163,797 square foot (sf) building in Saint Paul. Annual savings over code are estimated at 7,043 mmBtu, $130,023 and 1,036 tons of carbon.

Figure 7*(left)* & 8*(right).* Bell Museum: 91,990 sf building in Saint Paul. Annual savings over code are estimated at 1,605 mmBtu, $29,663 and 258 tons of carbon.

Figure 9*(left)* & 10*(right).* Fergus Falls Public Library: 25,600 sf building in Fergus Falls. Annual savings over code are estimated at 1,234 mmBtu, $22,779 and 65 tons of carbon.



SB 2030 Program Progress

Ongoing efforts are focused on the continual improvement of the tool that will be used to establish customized Energy Standards and development of the administration of the program. Additional efforts include the creation of a case study database, the development of a sustainable building operations system, and 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. Below are listed details of these program components.

- Case Studies Database—as part of the program, predicted building performance has been documented for 179 SB 2030 projects. Reported metrics may 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[29], 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 update, 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

[29] http://casestudies.b3mn.org/

operators to perform this function by completing occasional routine checks on large energy consuming equipment in the building. This web-based application is used to create a custom Energy Efficient Operations (EEO) Protocol. 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.

Eight tasks are currently supported in the online tool with ready-made templates. Two methods have been developed to check on correct operation of heat recovery devices, and one for demand controlled ventilation (DCV). We also support the creation of custom tasks for system types that are not directly supported by a ready-made template.

To enable the creation of a robust EEO Protocol, and for sustained efficient operation of mechanical systems, it is critical that the design and commissioning process produce robust documentation about system parameters and correct system operation. We are in the process of performing a detailed investigation focused on system documentation available to building operators in SB 2030 buildings. This will help inform future development of program requirements to ensure that building owners have the information they need to correctly operate their building systems.

- 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 are listed below.

  A) Comprehensive design assistance services.

  B) Bonus incentives (per unit of savings) for achieving SB 2030 standards.

  C) 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. A training on the B3 Daylighting guidelines was developed and delivered in April, with updates on the Small Sites in B3 Guidelines presented in May. A two-part workshop on the B3 Embodied Carbon requirements was given in June. Presentations were developed and delivered for the annual

Wastewater and Collections conference and the Minnesota Energy Expo. Work on integrating resilience into sustainability programs was shared at the ACEEE Summer Study in August. Symposia on Sustainable Buildings 2030 were held on February 3, and on October 13, 2022—both in partnership with Science Museum of Minnesota. Presentations on the B3 Guidelines and SB 2030 programs were given at the AIA Minnesota Conference in November as a panel session outlining considerations relevant for small buildings. Many of these presentations were recorded are available online at the B3 Guidelines Training[30]. Throughout the year many individual team meetings were held with design firms working on projects participating in the program; both to outline program requirements and work through project-specific issues as they arise.

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. Ninety one percent (91%) of all buildings involved in the program were able to meet the SB 2030 Energy Standard with little additional cost to the overall projects. Total project costs are $7.2 million through September 2022.

The 244 buildings designed to the SB 2030 Energy Standard are predicted to save approximately 919 million kBtu/year, 100,000 tons of CO2e and a savings of $16.7 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 178 SB 2030 projects currently in operation are estimated at 4,594 million kBtu, 604,000 tons of avoided carbon at a cost savings of $83.5 million.[31]

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 SB 2030 designs. 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.

Future areas of consideration in the SB 2030 Program development include the consideration of time-of-day CO2 emissions factors, which could allow the SB 2030 Program to encourage strategies that decrease energy use when the grid is the most fossil fuel dependent and could be used by design teams to accurately adjust the carbon intensity relative to the efficiency strategies that they select.

[30] https://www.b3mn.org/guidelines/training-and-education/

[31] The US Bank Stadium, although having gone through design and construction SB 2030 review and approval, has been removed from our tracking between the 2022 and 2023 reporting years and resulted in a reduction in reported annual and to-date savings metrics between those years. Prior year metrics have not been updated to remove this project.

Work continues the next stages of the SB 2030 program to support the reduction requirement for new projects, which increased from a 70% to 80% reduction in January of 2020 and is slated to increase to a 90% reduction in 2025. Program updates as part of this transition included an expansion of renewable resources available for project teams to consider, elimination of a reduced standard for renovation projects, implementation of a parallel carbon and energy standard, improving carbon emissions factors for electric utilities, and expanding the cost-effectiveness test to include a hierarchy of renewable energy generation options. 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 SB 2030 Standard while ensuring that the robust program goals are maintained.