

Researching Affordable Housing Issues

EnergyScoreCards Minnesota Phase II 2019



ENERGYSCORECARDS MINNESOTA PHASE II

The results of this pilot are derived from energy and water benchmarking in 31 subsidized, multifamily, affordable housing buildings.

Prepared by:

Katherine Teiken, Minnesota Housing
Ashly McFarlane, Center for Energy and Environment

Acknowledgements

This project was undertaken by the Minnesota Housing Finance Agency.

The authors gratefully acknowledge the time commitment from the owners and property managers that participated in this project. They include:

Catholic Charities of St. Paul and Minneapolis
Hayes Gibson
Hope Community
Jeremiah Program
Model Cities
Nath Management
Nationwide Housing
Olmsted County HRA
RS Eden
Twin Cities Housing Development Corporation
YWCA St. Paul

Additional thanks to staff from Minnesota Housing, Center for Energy and Environment, and Bright Power. The authors would like to especially thank the following people who contributed to the success of this project:

Ashley Oliver, Minnesota Housing
John Patterson, Minnesota Housing
Dan May, Center for Energy and Environment
Carl Nelson, Center for Energy and Environment
Rebecca Olson, Center for Energy and Environment
Mark Opdahl, Center for Energy and Environment
Erik Ennen, Center for Energy and Environment
Jon Braman, Bright Power
Megan Rosa, Bright Power
Crystal Sun, Bright Power

Disclaimer

The views and opinions expressed in this report are those of the authors and do not reflect the policy or position of any other individual or entity. No other individual or entity noted in this report assumes any liability for the information presented and no such individual or entity makes any express or implied representation or warranty relating to the information provided.

Abstract

EnergyScoreCards Minnesota Phase II (Phase II) was designed to study the impacts of energy and water benchmarking paired with more supportive technical and financial assistance in 31 subsidized, multifamily, affordable housing buildings. Phase II was funded by the Minnesota Housing Finance Agency (Minnesota Housing) and builds off of previous work done by the Minnesota Department of Commerce Conservation Applied Research and Development funded EnergyScoreCards Minnesota pilot.

The research was conducted from 2016 through 2018, and the Phase II design provided two years of benchmarking service along with a variety of technical assistance including, but not limited to, quarterly check-in calls, building assessments, and one-on-one troubleshooting. Help navigating utility incentive programs and financing programs was also provided.

This report includes a detailed account of the pilot design and methodology, as well as the quantitative statistical analysis and qualitative findings.

Table of Contents

Abstract.....	2
Table of Contents.....	3
Table of Tables.....	7
Table of Figures.....	7
List of Acronyms.....	8
Executive Summary.....	9
Primary Results.....	9
Other Results.....	9
Introduction.....	11
Problem Definition.....	11
Purpose of EnergyScoreCards Minnesota Phase II.....	11
Background.....	13
Context.....	13
Multifamily Energy and Water Management.....	13
Energy and Water Benchmarking for Multifamily Buildings.....	14
The Benefits of Benchmarking.....	14
Benchmarking Services and Software.....	15
Previous Research.....	15
Minnesota Multifamily Rental Characterization Study (Center of Wisconsin and Franklin Energy LLC, 2013).....	15
Occupant Health Benefits of Residential Energy Efficiency (E4The Future, 2016).....	16
Low-income Conservation Improvement Program Evaluation (APPRISE Incorporated, 2017).....	17
Minnesota Energy Efficiency Potential Study (Center for Energy and Environment, Optimal Energy and Seventhwave, 2018).....	17
Gaps in Research Intended to be Filled by Phase II.....	18
The Original EnergyScoreCards Minnesota (Bright Power. Minnesota Green Communities, Center for Sustainable Building Research, Minnesota Housing Finance Agency, MN Center for Energy and Environment, 2015).....	18
EnergyScoreCards Minnesota Phase II.....	18
Methodology.....	20
Overall Phase II Design.....	20

ENERGYSCORECARDS MINNESOTA PHASE II

Recruitment 21

Comprehensive Support 21

 Software Tool 21

 Technical Assistance 22

 Financial Assistance 23

Data 24

 Public Data 24

 Data Collection 24

 Data Integrity 25

 Data Analysis 25

Results 27

 Quantitative Findings 27

 Participation in Utility Incentive Programs 27

 Energy and Water Conservation Actions Taken 27

 Cost of Energy and Water Conservation Actions 29

 Energy and Water Savings 30

 Cost Effectiveness 35

 Qualitative Findings 37

 Benchmarking 37

 Technical Assistance 38

 Utility Incentive Programs 39

 Energy Projects 39

 Project Reimbursement by Minnesota Housing 40

Discussion and Recommendations 41

 Comparing the Original EnergyScoreCards Minnesota Pilot and EnergyScoreCards Minnesota Phase II
 41

 Energy and Water Conservation Actions Taken 41

 Energy and Water Savings 41

 Other Considerations 42

 Comparing the Phase II Results to the Phase II Key Objectives 42

 Primary Objectives 42

 Secondary Objectives 43

ENERGYSCORECARDS MINNESOTA PHASE II

Bringing the Phase II to Scale	43
Scenario 1.....	44
Scenario 2.....	45
Discussion.....	45
Overall Recommendations for Future Programs and Policies	47
Future Research	48
Works Cited.....	49
Appendix A: Communication with Phase II Participants.....	51
Participation Agreement.....	52
Timeline.....	56
Opportunity Analysis.....	60
Quarterly Check-In Call Agenda and Communication	62
Review of MFBE Report	64
Version 1- Building Meets Minimum Threshold:	64
Version 2- Building Does Not Meet Minimum Threshold:.....	67
Project Reimbursement Application	70
Project Reimbursement Application Acknowledgement.....	75
Project Reimbursement Application Approval	76
Final Building Report.....	77
Appendix B: Tools for EnergyScoreCards Minnesota.....	82
Benchmarking Tool	82
Technical Assistance	89
Sample Technical Documents Provided.....	90
Bid Review.....	90
Boiler Outdoor Reset	92
Appendix C: Full Qualitative Results	94
Online Survey	94
In-Person Interviews	99
Final interview with Organization 1	101
Final Interview with Organization 2	106
Final Interview with Organization 3	111
Final Interview with Organization 4	116

ENERGYSCORECARDS MINNESOTA PHASE II

Final Interview with Organization 5 122

Final Interview with Organization 6 128

Final Interview with Organization 9 133

Final Interview with Organization 10 137

Final Interview with Organization 11 145

Appendix D: Additional Quantitative Analysis and Results 152

 Energy and Water Savings 152

 Multi-Family Building Efficiency Program Payback Summary 158

 Energy and Water Savings Actions Completed 165

Table of Tables

Table 1: Buildings with complete, partial, or no data available for 2018.	25
Table 2: Average Payback Summary for buildings participating in the MFBE Program	27
Table 3: Site owner /property manager energy use index (EUI) savings. A positive value indicates a savings.....	30
Table 4: Site owner/property manager water intensity savings. A positive value indicates a savings.	31
Table 5: Site owner/property manager cost savings per building per year for master-metered buildings. A positive value indicates a savings. Values shown below have not been normalized by building square footage.....	32
Table 6: Average cost savings per unit per year for master-metered buildings.....	32
Table 7: Site owner/property manager cost savings per building per year for non-master-metered buildings with central space heat and domestic hot water. A positive value indicates a savings. Values shown below have not been normalized by building square footage.....	33
Table 8: Average cost savings per unit per year for master-metered buildings.....	35
Table 9: Site owner/property manager cost savings per building per year for non-master-metered buildings with central domestic hot water and tenant paid space heat. A positive value indicates a savings. Values shown below have not been normalized by building square footage.	35
Table 10: Average cost savings per unit per year for master-metered buildings.....	35
Table 11: Comparing potential scenarios to bring Phase II to scale	46
Table 12: Utility savings per square foot per year. A positive value indicates an energy savings.....	154
Table 13. Utility savings per building per year and percent savings.....	156
Table 14: Cost savings per building and per unit per year.....	157
Table 15: MFBE Program Payback Summary	158
Table 16: Energy and Water Savings Actions.....	165

Table of Figures

Figure 1: Projects completed per quarter of Phase II	29
Figure 2: Final EnergyScoreCards grades at the end of the original pilot versus the end of Phase II.	30
Figure 3: Site owner/property manager energy use index change for master-metered buildings.....	31
Figure 4: Site owner/property manager energy use index change for non-master-metered buildings where the owner/property manager pays for the heat.	33

List of Acronyms

BTU – British Thermal Unit
CARD – Conservation Applied Research and Development
CDD – Cooling Degree Day
CEE – Center for Energy and Environment
CIP - Conservation Improvement Program
COU – Cooperatively Owned Utility
CSBR – Center for Sustainable Building Research
DHW – Domestic Hot Water
EE – Energy Efficiency
EDA – Energy Design Assistance
EUI – Energy Use Index
HDD – Heating Degree Day
HRS – Hours
HUD – U.S. Department of Housing and Urban Development
kBTU – Kilo British Thermal Units
IOU – Investor Owned Utility
LED – Light Emitting Diode
MFBE – Multi-Family Building Efficiency
MRY – Most Recent Year
SQFT – Square Footage
TBD – To Be Determined

Executive Summary

EnergyScoreCards Minnesota Phase II (Phase II) is part of Minnesota Housing's ongoing effort to enhance and refine its sustainability policies. To date, Minnesota Housing has focused on green standards for new construction and rehabilitation projects. Minnesota Housing used Phase II to build on the foundation of the original EnergyScoreCards Minnesota pilot and current internal sustainability initiatives by focusing on asset management and improving the energy and water efficiency of the agency's existing portfolio of buildings through retrofits. In Phase II, utility benchmarking data was collected and used in combination with in-depth technical assistance provided to owners and property managers in order to help implement energy and water efficiency projects at 31 subsidized, multifamily, affordable housing buildings.

Primary Results

One primary objective of Phase II was to reduce utility costs in participating buildings. Overall, 74 percent of participating buildings implemented energy and water savings projects, although almost 50 percent of the conservation projects were completed in the final year of Phase II, with the majority of completions taking place in the last six months. It is likely that the full impact of on-site energy and water usage was unable to be measured prior to the end of Phase II, and the cost-savings that were seen represent a conservative measurement of potential costs. Despite the fact that the majority of projects were completed in the last six months, 55 percent of buildings saw improvement in their overall EnergyScoreCards grades by the end of Phase II and 63 percent of participating buildings saw a decrease in utility spending. In Phase II, The total cost savings based on the most recent 12 months of utility consumption was approximately \$50,840 per year, or about \$37 per unit, and 3 percent of baseline utility costs.

The impacts on energy and water usage varied by meter type. Master-metered buildings achieved a 5 percent reduction in site energy usage after the end of Phase II. Master-metered buildings also saw an average water usage reduction of 3.5 percent. The average master-metered building saw a total cost savings of \$3,190. Non-master-metered buildings with central space heat and domestic hot water (DHW) showed an increase in site energy and water usage but the average non-master-metered building with central heat and hot water still saw a cost savings of \$587. Non-master-metered buildings with only central DHW only showed a minor decrease in Energy Use Index (EUI) and an increase in water usage. The average non-master-metered building with only central hot water saw a cost savings of \$1,649.

Another primary objective of Phase II was to compare utility savings with the cost of monitoring and targeting the buildings and financing the retrofits. The full cost for Minnesota Housing to implement Phase II was \$143,780. Comparing the full cost of Phase II to the ongoing conservative cost savings, the payback period for Minnesota Housing is two years and 10 months.

Other Results

One secondary objective of Phase II was to assess the interest of multifamily owners/property managers in investing in more efficient energy initiatives. By the end of Phase II, 74 percent of participating buildings had implemented an energy or water conservation project. A total of 95 projects were completed during Phase II. Of the eight participants that implemented projects, only one participant stated affirmatively that they would have proceeded with the projects even had they not participated in Phase II. Conversely, five participants specifically called out the fact that these projects would not have taken place at all or would not have taken place as quickly if they had not participated in Phase II.

ENERGYSCORECARDS MINNESOTA PHASE II

Another objective of Phase II was to assess the compatibility of utility incentive programs, especially Xcel Energy and CenterPoint Energy's MFBE Program (Xcel Energy and CenterPoint Energy, 2019)¹ with Minnesota Housing funding processes. In the original EnergyScoreCards Minnesota pilot, 19 percent of buildings participated in utility incentive programs. In Phase II, 52 percent of buildings participated in electric and natural gas utility incentive programs, showing a significant increase in participation in utility conservation improvement programs. In Phase II, 16 buildings participated in the MFBE program but only five had an energy-saving threshold high enough to fully participate in the program. The remaining eleven buildings instead qualified for traditional utility rebates. Two buildings were able to pair the MFBE program with Minnesota Housing's energy rebate requirements; however, new construction and substantial rehabilitation projects may still benefit more from other utility incentive programs, such as Energy Design Assistance.

The final objective of Phase II was to assess the usefulness of using utility benchmarking to improve energy and water management and provide useful information for future Minnesota Housing benchmarking policy. Most owners and property managers that participated in Phase II liked the data and information that was presented in the benchmarking tool, but they did not use the tool on their own. Instead they relied on check-in calls with Phase II staff to review the data.

Lastly, there were a few key qualitative findings that were not part of the primary or secondary objectives for undertaking Phase II. First, Phase II participants listed having one point of contact helpful when facilitating the implementation of energy and water saving projects as what they liked most about Phase II. Second, Phase II participants listed a lack of technical resources and staff capacity at the participant level and a lack of financial resources as the biggest barriers preventing building owners/property managers from implementing energy and water saving projects.

¹ <https://www.multifamilyenergysolutions.com/>

Introduction

Problem Definition

Owners and property managers of subsidized, multifamily, affordable housing buildings find it difficult to implement energy and water saving projects. The lack of staff capacity to monitor utility usage, along with a lack of resources, both technical and financial, often makes it difficult to plan and implement projects.

Purpose of EnergyScoreCards Minnesota Phase II

EnergyScoreCards Minnesota Phase II (Phase II) is part of Minnesota Housing's ongoing effort to enhance and refine its sustainability policies. To date, Minnesota Housing has focused on green standards for new construction and rehabilitation projects. Minnesota Housing used Phase II to build on the foundation of the original EnergyScoreCards Minnesota pilot and current internal sustainability initiatives by focusing on asset management and improving the energy and water efficiency of the agency's existing portfolio of buildings through retrofits.

Minnesota Housing saw the opportunity to continue with the EnergyScoreCards service for 31 buildings in the organization's portfolio that showed high energy and water consumption in the original pilot. In addition, Minnesota Housing and participants that were interviewed from the original pilot believed that additional incentives beyond access to the EnergyScoreCards benchmarking tool may be needed in order for owners and property managers of these buildings to take action. This subsequent Phase II gave Minnesota Housing the opportunity to focus more intentionally on leveraging benchmarking, the process of identifying how much energy a building uses, in order to identify and implement targeted energy and water investments in subsidized, multifamily, affordable housing buildings. This effort served as a test case to help Minnesota Housing determine whether to bring this approach to scale and use it with a greater number of buildings in the agency's portfolio.

Phase II's key objectives were to:

- Reduce utility costs in targeted buildings. In Minnesota, many owners/property managers pay heating and water bills, while tenants pay in-unit electric bills. Lower in-unit electric bills will provide a direct benefit to tenants, while lower heating and water bills for the owner/property manager will provide an indirect benefit to tenants by lowering building operating costs, which may help the financial position of the building and decrease the need for future rent increases.
- Compare utility savings with the cost of monitoring and targeting the buildings and financing the retrofits. Assess whether providing access to EnergyScoreCards paired with energy audits, retrofit recommendations, and financing provides a positive return on investment.

Other secondary objectives included:

- Assess the interest of multifamily owners/property managers in investing in more efficient energy initiatives and determine the incentives, payback periods, and other information needed beyond benchmarking to entice them to take action.
- Assess the usefulness of using utility benchmarking to improve energy and water management. The 2015 Enterprise Green Communities Criteria (Enterprise Community Partners, 2019)²

² <https://www.enterprisecommunity.org/solutions-and-innovation/green-communities>

included a requirement for benchmarking; however, the Minnesota Overlay to Green Communities (Minnesota Housing, 2019)³ removed this requirement. The results from Phase II may be used to inform future benchmarking policy.

- Assess the compatibility of utility incentive programs, especially Xcel Energy and CenterPoint Energy’s Multi-Family Building Efficiency Program (Xcel Energy and CenterPoint Energy, 2019)⁴ with Minnesota Housing funding processes. Beginning in 2015, Minnesota Housing’s funding applications required developers to include an Energy Rebate Analysis. The Multi-Family Building Efficiency Program and other utility incentive programs are avenues for developers to analyze their rebate potential.

³ <http://www.mnhousing.gov/sites/multifamily/buildingstandards>

⁴ <https://www.multifamilyenergysolutions.com/>

Background

EnergyScoreCards Minnesota Phase II (Phase II) is part of Minnesota Housing's ongoing effort to enhance and refine its sustainability policies. To date, Minnesota Housing has focused on green standards for new construction and rehabilitation projects. Minnesota Housing used Phase II to build on the foundation of the original EnergyScoreCards Minnesota pilot and current internal sustainability initiatives by focusing on asset management and improving the energy and water efficiency of the agency's existing portfolio of buildings through retrofits.

Context

The following information provides context for this report and was derived from the American Community Survey (United States Census Bureau, 2017)⁵:

- Minnesota has 2,153,100 housing units.
- 615,981 housing units are rented.
- 398,692 housing units are rented by lower-income households (incomes below \$50,000).
- Of the state's 268,758 renter households who are burdened by their housing costs (including utilities), 251,097 are lower income.
- Of the state's 615,981 rental units, 353,077 are in multifamily buildings with five or more units.
- 176,224 of the state's rental units were built before 1960.

Multifamily Energy and Water Management

Typically, multifamily owners/property managers are responsible for paying monthly utility bills for the common areas of the building. For buildings with tenant paid utilities, the owners/property managers are also responsible for paying any residual utility costs while the unit is unoccupied. In addition to owner/property manager distributions and returns as a driver for reducing utility costs, the United States Department of Housing and Urban Development (HUD) also requires owners/property managers of HUD-assisted or HUD-funded buildings to conduct a utility analysis as part of the rent adjustment process. This can occur any time during the year, but most often occurs when a new budget and rent levels are proposed. During the budget process, owners/property managers will usually conduct a look back of three years, and this review helps identify trends as well as unusual increases or areas to address in regard to energy consumption/water usage.

If owners/property managers determine that energy or water efficiency improvements are needed, they develop a timeline for improvements and a budget that accounts for the expenses, given the resources available, including operating cash, reserve funds, and utility incentives or rebates. The timeline and estimates are shared with the agency asset manager for discussion. If the plan is approved, the improvement expense would be included in the annual budget as a capital expenditure for large scale property-wide improvements, or absorbed into the operating budget for smaller scale turnover expenses (such as low flow toilets, showers, faucets or light emitting diode (LED) lighting on turns). Implementing improvements property-wide makes the cost benefit analysis more meaningful, and the property will likely benefit from greater savings, but the implementations are not always possible given tight cash flow or, if the property is not owner-managed, a lack of owner approvals for improvements.

⁵ <https://www.census.gov/programs-surveys/acs/>

Once improvements have owner approval, owners/property managers will contact the person or institution, such as Minnesota Housing, managing the building's property reserve accounts. When Minnesota Housing asset managers receive these types of requests, agency staff generally requires three bids for large scale capital improvements along with review by one of the agency architects (e.g. installation of solar panels, energy efficient window replacement, HVAC replacement and upgrades). Once the source of all funds is finalized, and the work is underway, the owners/property managers will submit a draw from reserves to pay for the expense (to the extent funds are available). If funds are insufficient to cover the expense, the owners/property managers would be encouraged to negotiate with Minnesota Housing, utility companies, or other possible funding sources to cover the costs.

Energy and Water Benchmarking for Multifamily Buildings

Multifamily buildings may have several different meter configurations based on the age and type of building.

Natural gas and electric usage for the entire building, including common areas and individual units, may be master metered and paid for entirely by the owner or property manager. Alternatively, either or both natural gas and electric usage may be individually metered. In this case, the owner or property manager would only pay for the common area utilities, with tenants responsible for paying in-unit usage. Multifamily benchmarking platforms will typically indicate the meter configuration.

Water usage is typically metered at the whole-building level, although some buildings separate water meters based on irrigation and household water usage. Some owners/property managers are beginning to opt into sub-metering for water usage in order to determine usage levels from different units or areas of the building. This can be helpful for leak detection.

Historically, multifamily benchmarking has focused on only those meters that the owner or property manager is responsible for paying. In order for an owner or property manager to monitor whole building energy usage in situations in which tenants are responsible for paying in-unit utilities, owners or property managers must provide signed releases from each tenant to the utility. Alternatively, some utilities offer aggregated whole building energy usage information. In this case, an owner or property manager can view the overall energy usage of the building but cannot view individual tenant usage.

The Benefits of Benchmarking

Benchmarking platforms allow owners or property managers to track energy and/or water usage. This can be helpful to property managers who want to make recommendations about potential energy or water improvements to property owners. Benchmarking platforms also allow for the monitoring of energy and/or water usage post-implementation in order to ensure the efficiency project is performing as expected.

Across Minnesota and nationally, cities and states are beginning to require large commercial and multifamily buildings to track and disclose energy usage both at the aggregated building level and also at the per unit level. Requiring benchmarking and disclosure helps to make energy and/or water usage more transparent. This allows tenants to know prior to leasing what additional costs they may face when paying for utilities. It also allows local governments, utilities and other stakeholders to understand where the biggest opportunities are to target assistance and investment. For example, the City of Minneapolis has recently implemented an energy disclosure ordinance (City of Minneapolis, 2019).⁶

⁶ <http://buildingdisclosure-mpls.mncee.org/>

Benchmarking Services and Software

There are several benchmarking platforms commonly used by multifamily owners and property managers.

EnergyScoreCards (Bright Power, 2019)⁷ is a paid online service by Bright Power that offers owners and property managers information on their energy and water consumption, compares usage with similar buildings, and provides a letter grade (A B, C or D) based on that comparison. The benchmarking service also includes training and an assigned energy analyst who helps guide owners and property managers in learning about their buildings' energy and water consumption as well as conservation.

WegoWise (WegoWise, 2019)⁸ is a paid online service that allows building owners and property managers to import utility data in order to benchmark and analyze energy and water usage and costs.

ENERGY STAR Portfolio Manager (Environmental Protection Agency, 2019)⁹ is a free online tool that building owners and property managers can use to measure and track energy and water consumption. Many state and local programs and policies that require benchmarking require the use of the ENERGY STAR Portfolio Manager tool.

B3 Benchmarking (Minnesota Department of Commerce, 2019)¹⁰ is an online benchmarking platform required to be used by buildings in Minnesota that receive public funding.

Previous Research

Minnesota Multifamily Rental Characterization Study (Center of Wisconsin and Franklin Energy LLC, 2013)¹¹

In 2013, Franklin Energy completed a Conservation Applied Research and Development (CARD) funded study to characterize energy usage in Minnesota's multifamily housing.

This study found that a typical multifamily building is heated with a natural gas boiler system, has common area lighting that operates continuously, and has a common area laundry facility. In individual units, refrigeration is the single biggest in-unit electrical use, and cooling is generated through individual wall or window AC units. In-unit lighting is used for, on average, three hours per day.

For a typical multifamily building, the owner or property manager is responsible for the natural gas bill, which includes building heat and domestic hot water (DHW). The owner or property manager is also responsible for electric bills for common area electric consumption and the water bill for the entire building. These costs average about \$745 annually per unit. Tenants are typically responsible for electric bills for in-unit lights and appliances. The costs average about \$360 per year per individual unit.

⁷ <https://www.brightpower.com/performance-analysis-ongoing-support/>

⁸ <https://www.wegowise.com/>

⁹ <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager>

¹⁰ <https://mn.b3benchmarking.com/>

¹¹

<https://www.cards.commerce.state.mn.us/CARDS/security/search.do?method=showPop&documentId=%7b15E1DC52-AEA9-4562-B622-45FBD3713F4F%7d&documentTitle=67915&documentType=6>

This study further outlines:

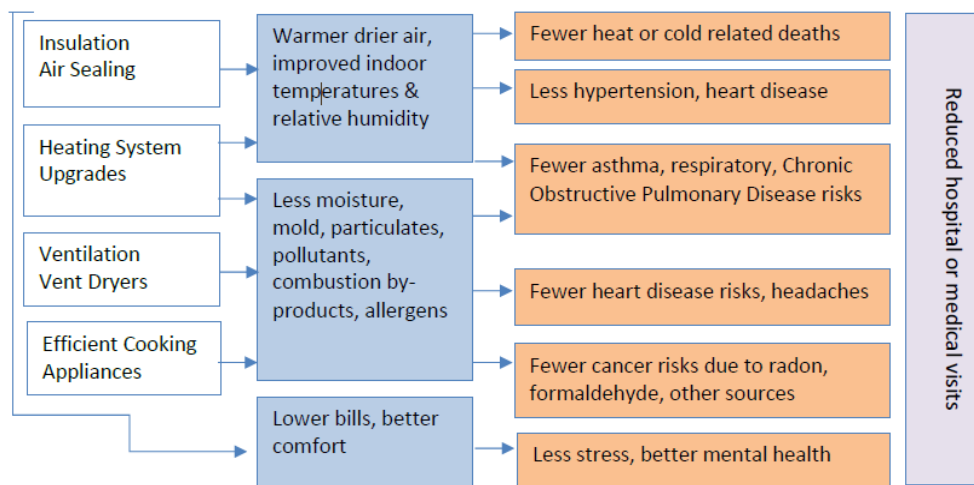
- *The Minnesota multifamily building sector offers a significant opportunity for energy efficiency programs with nearly 22 percent of the state’s housing units in multi-unit buildings.*
- *The multifamily sector has typically been hard to reach for energy efficiency programs. There are a variety of challenges that may stifle investment in energy efficiency, including the lack of awareness of efficiency benefits, limited capital to invest in new technologies, and conflicting priorities for a building owner or manager’s time and energy. In addition, an oft-cited challenge of the multifamily sector is the split incentive to invest between the owners of the buildings and the tenants; the person who pays for the energy efficiency investment may not be the person who reaps the benefit of the energy savings.*
- *Overall, our analysis suggests that for multifamily buildings with gas heat, about 70 percent of the potential energy and water savings would accrue to building owners and 30 percent would accrue to tenants, with the latter mainly in the form of reduced bills for in-unit lighting and appliances.*

Occupant Health Benefits of Residential Energy Efficiency (E4The Future, 2016)¹²

In 2016, E4theFuture completed a study on the occupant health benefits of residential energy efficiency.

This study notes:

- *Experts estimate that 40% of diagnosed asthma is associated with home exposures (e.g., moisture, temperature variations, pests), some of which can be improved through energy efficiency (EE) and related ventilation.*
- *Residential EE programs typically improve the building envelope and heating systems, creating warmer and more comfortable homes. The pathways by which home energy upgrades can also help to improve indoor environmental conditions and occupant health, as seen below:*



¹² <https://e4thefuture.org/wp-content/uploads/2016/11/Occupant-Health-Benefits-Residential-EE.pdf>

Low-income Conservation Improvement Program Evaluation (APPRISE Incorporated, 2017)¹³

In 2017, APPRISE Incorporated completed a CARD funded study to help stakeholders understand the low-income Conservation Improvement Program (CIP) with the goal of identifying pathways to increase the effectiveness of the program.

Their study found:

- *About 36 percent of low-income households live in multifamily buildings with 5 or more units. But, less than 5 percent of natural gas [Investor Owned Utility] (IOU) funds were spent on those types of housing units. These statistics suggest that the current policies and procedures have not encouraged enough investment in low-income multifamily buildings.*
- *Electric IOUs spent about 72 percent of their funds on comprehensive single family programs and 28 percent on other types of programs.*
- *One important finding was that no [Cooperatively Owned Utility] (COU) reported delivering multifamily services as part of their low-income or residential program portfolios. Our in-depth interviews with the COU program managers found that some have multifamily buildings in their service territory but are unsure how to work with them on participation in either low-income CIP or residential programs.*

Minnesota Energy Efficiency Potential Study (Center for Energy and Environment, Optimal Energy and Seventhwave, 2018)¹⁴

In 2018, Center for Energy and Environment (CEE) completed a CARD funded study to estimate the energy efficiency potential in Minnesota from 2020-2029. The study estimates that low-income households in five+ unit multifamily dwellings have the potential to achieve cost-effective, first-year savings of 1.3 percent of annual electric usage and 1.3 percent of natural gas utility usage through the utility CIP. These estimates are based on CIP potential scenario planning. The study defined “low-income” as households with income at or below 200 percent of the Federal Poverty Guidelines.

The study also noted the following:

- *Space heating measures dominate the low-income savings potential for both electricity and natural gas.*
- *Low-income households are also more likely to heat their home with expensive fuels such as electricity.*
- *Owners of multifamily rental buildings where the tenant pays the bills (as is almost always the case for electrically heated multifamily) are particularly hard to address with CIP programs because of the split incentive.*

¹³ <http://mn.gov/commerce-stat/pdfs/card-low-income-cip-evaluation.pdf>

¹⁴ <http://mn.gov/commerce-stat/pdfs/mn-energy-efficiency-potential-study.pdf>

Gaps in Research Intended to be Filled by Phase II

The Original EnergyScoreCards Minnesota (Bright Power, Minnesota Green Communities, Center for Sustainable Building Research, Minnesota Housing Finance Agency, MN Center for Energy and Environment, 2015)¹⁵

In 2012, Minnesota Housing became a partner in the original EnergyScoreCards Minnesota pilot, which studied the impact of energy and water benchmarking in 500+ multifamily buildings in Minnesota. One hundred and twenty nine of these buildings are in Minnesota Housing's portfolio. Other partners in the original pilot were Bright Power, Inc., Minnesota Green Communities, the Center for Sustainable Building Research (CSBR) at the University of Minnesota, and CEE. The original pilot was funded through grants from the Xcel Energy Emerging Technologies Grant Program, the Department of Commerce's CARD Program, and Minnesota Housing (part of the Corridors of Opportunity funding from HUD).

The original pilot was designed as a two-year pilot with a treatment group that received two years of free access to the EnergyScoreCards service and a control group that had its energy and water consumption tracked but did not have access to the service until after the two-year pilot was completed. This allowed for a comparison of outcomes between the two groups.

The final report found that:

- *The program demonstrated that benchmarking is feasible as a large scale strategy in Minnesota multifamily buildings for owner-paid utilities. Results of a statistical comparison found significant savings of 5% energy savings and 30% water savings in master-metered buildings receiving the service for two years in comparison to the control group.*
- *The value of savings produced in master-metered buildings during the pilot (\$269,380) is 2.15 times the cost of providing the service to the master-metered buildings (\$125,435). Because a large portion of costs were one-time (for program design and launch) and savings only began in the second year, the cost-effectiveness of long-term program would improve over time, assuming savings persist or deepen each year. For instance, in a hypothetical 10 year program targeting master-metered buildings, cumulative savings would be \$7.79 for every \$1 spent assuming savings start in the second year and continue each of the remaining years at the same level.*

EnergyScoreCards Minnesota Phase II

Of the 129 Minnesota Housing buildings in the original EnergyScoreCards Minnesota pilot, 33 buildings (2,177 units) had high energy usage at the end of the original pilot resulting in overall C or D energy grade in the online tool. Prior to beginning Phase II EnergyScoreCards Minnesota, Minnesota Housing conducted in-person and phone interviews with the 13 owners or property managers that represented these 33 buildings. The purpose of these conversations was to understand from the original pilot participants the challenges of implementing energy and water saving projects in their buildings. A common theme from these conversations was the difficulty owners and property managers had pinpointing the underlying issues that were causing poor building performance and understanding what potential solutions were available to address them.

¹⁵ <http://mn.gov/commerce-stat/pdfs/bright2016-mfbenchmark-final.pdf>

ENERGYSCORECARDS MINNESOTA PHASE II

Many of the owners and property managers stated in these conversations that they did not utilize the EnergyScoreCards benchmarking tool or associated resources such as guides, webinars and newsletters to their fullest potential in the original pilot. Issues that were brought up from the original pilot include:

- A lack of understanding about if and how their buildings compared to other buildings in the EnergyScoreCards tool
- A lack of support to pinpoint the underlying issues that were causing poor scores in EnergyScoreCards and the associated improvement actions that should be taken
- A lack of funding to implement energy-saving projects

Because of these conversations, Minnesota Housing planned EnergyScoreCards Minnesota Phase II to pair the existing EnergyScoreCards benchmarking tool with even more in depth, one-on-one, personalized technical assistance by Bright Power and CEE. Phase II also provided more information to help participants determine financing options, including accessing grants through Minnesota Housing.

Methodology

Overall Phase II Design

Of the 129 buildings from the original pilot, 31 buildings, comprised of 11 owners/property managers, were interested in participating in Phase II. The invitation to participate was given to buildings from the original pilot that were part of Minnesota Housing's portfolio and that were scoring a C or D grade at the end of the original pilot. Not all of the owners/property managers of the original low-scoring buildings were interested in participating in Phase II, so Minnesota Housing allowed interested owners/property managers with low-scoring buildings to submit other higher-scoring buildings from their portfolio that had also been part of the original pilot.

Phase II EnergyScoreCards Minnesota provided owners/property managers free access to an additional two years of the EnergyScoreCards benchmarking platform. A Bright Power energy analyst worked directly with building owners and property managers to provide online access to EnergyScoreCards, introductory trainings and ongoing support on data maintenance, and help finding energy and water saving opportunities. The web-based platform also provided:

- Automatic retrieval and collection of owner/property manager paid utility accounts
- Energy management tools including: Property ScoreCard, Account Analysis, Portfolio reports, Energy Events, and Alerts
- Calculation of weather and space adjusted metrics and comparison to other multifamily buildings

To help facilitate the identification and implementation of energy and water projects, Minnesota Housing paired the EnergyScoreCards offering with services from CEE, which the owner or property manager could access for free. CEE's role was to provide advice and analysis and to work closely with building owners/property managers to implement recommended energy and water improvements. Specific CEE tasks included:

- Troubleshooting high utility bills, unbalanced heating, and other energy issues
- Performing high-level assessments to identify high impact efficiency projects
- Evaluating water efficiency opportunities
- Responding to ad-hoc maintenance and energy questions
- Evaluating the utility recommendations for reasonableness
- Estimating energy savings, cost savings, and applicable rebates for ad-hoc projects
- Providing project implementation and technical assistance, including bid guidance and quality assurance checks

Minnesota Housing also encouraged Phase II participants to make use of utility incentive programs, including but not limited to the Xcel Energy and CenterPoint Energy's Multi-Family Building Efficiency (MFBE) Program. This program provided free walk-through energy audits, free direct install services of

LED lighting and water saving aerators and showerheads. It also included comprehensive whole building retrofit recommendations and applicable rebates.

Recruitment

Minnesota Housing mailed Participation Agreements to the owners and property managers representing buildings in the original pilot that had overall EnergyScoreCards grades of C or D.

The Participation Agreement outlined what the owners/property managers would receive in return for participating:

- Two years of continued, free benchmarking of owner/property manager paid utilities through Bright Power's online EnergyScoreCards platform
- Free consulting services and technical assistance from CEE
- Assistance navigating Minnesota Housing loan and grant opportunities

In turn, owners/property managers agreed to allow Minnesota Housing and CEE access to their historical and current energy and water usage consumption data. Owners/property managers also agreed to work with Minnesota Housing and CEE to evaluate possible energy and water saving strategies.

As a follow-up to the Participation Agreement, a timeline was sent to all potential Phase II participants. This timeline outlined the Phase II structure and steps alongside the estimated time investment needed by the owner/property manager.

Owners/property managers were allowed to request that any building that had participated in the original EnergyScoreCards Minnesota pilot be allowed to participate in Phase II. Buildings with an overall energy grade of C or D were given priority. Some owners/property managers indicated that they were interested in having buildings with better scores participate in order to compare and contrast similar buildings in their portfolio that had lower scores. In all, 11 owners/property managers were interested in participating, for a total of 31 buildings. Twenty-nine buildings were located in the greater Twin Cities metro area. Two buildings were located in Greater Minnesota.

Refer to Appendix A for Participation Agreement examples and follow-up information.

Comprehensive Support

Software Tool

Upon enrollment in Phase II EnergyScoreCards Minnesota, Bright Power sent Phase II participants a spreadsheet, which contained information on each of their buildings such as address, square footage, number of units, number of bedrooms, number of stories, meter configuration, fuel type, etc. Phase II participants were asked to verify the information and make corrections as needed.

Phase II participants were also asked to provide online access to utility billing information. Online utility billing access allowed Bright Power to pull usage and consumption data directly into the EnergyScoreCards tool. If participants were unable or unwilling to provide access to utility bills via online access, they were asked to provide monthly PDFs of each bill.

After building and utility information was updated in EnergyScoreCards, Phase II participants were given a 90-minute user tutorial that reintroduced them to the capabilities of the EnergyScoreCards online tool.

This was necessary in part due to the length of time between Phase II and the original EnergyScoreCards Minnesota pilot and also due to staff turnover and reassignments within various owner/property management groups.

After the initial tutorial, Phase II participants were asked to meet with Minnesota Housing, Bright Power, and CEE staff quarterly in order to review the most recent energy and water usage and spending data and to discuss potential energy and water saving opportunities. These meetings took place online and were facilitated by Bright Power using Join Me and Zoom web-meeting technology.

Refer to Appendix B for additional information on the tools available through the EnergyScoreCards benchmarking platform.

Technical Assistance

After the building and utility data in the EnergyScoreCards platform was set up, each Phase II participant received an opportunity analysis. The purpose of the analysis was to inform the participant about overall electric, natural gas and water usage within each of their buildings. The document also recommended high priority, energy-saving opportunities within each building. These opportunities were determined by reviewing specific EnergyScoreCards grades for cooling, electric baseload, heating, natural gas baseload and water usage. Data was also analyzed to determine if usage was increasing compared to historical data. For those areas where the building was considered to be performing poorly, specific solutions were provided, such as upgrading lighting to LEDs and installing lighting controls. Refer to Appendix A for an example opportunity analysis.

Each Phase II participant was provided information regarding how to participate in their applicable utility incentive program. Minnesota Housing and CEE staff assisted Phase II participants in filling out the MFBE Program application, including helping them provide documentation that verified the building's low-income status for the utility. The MFBE Program began with an initial walk-through audit of the building with the owner/property manager to evaluate current building systems and energy-saving opportunities. Subsequently, the owner/property manager received free direct installs of LED lighting, faucet aerators and showerheads in both common areas and resident units. After completing the direct-install, the utility provided the owner/property manager with a report that documented the energy projects that had the potential to result in savings along with the potential rebates that might be available to support these investments. The MFBE Program has a tiered incentive structure based on the percentage of achievable energy savings, with verified low-income buildings receiving a double incentive, covering up to 80 percent of the cost. If Phase II participants could not meet the lowest tier of whole building energy savings required by the program, the utility recommended traditional prescriptive rebates instead.

Upon receiving the final report and recommendations from the MFBE Program, Phase II participants were asked to share the report with Minnesota Housing and CEE. Minnesota Housing and CEE then reviewed the report in order to help provide additional information and support regarding energy-saving goals, rebates and next steps. For example, when a building did not reach the minimum energy-saving threshold to receive rebates through the MFBE Program, Minnesota Housing and CEE provided additional information on how to access the recommended prescriptive rebates for the highest priority opportunities. The third-party review also provided additional information on how completing the recommendations may benefit current EnergyScoreCards grades and utility usage. Refer to Appendix A for an example review of the MFBE Program.

CEE also provided other technical assistance for buildings as needed. This technical assistance included providing written education and cost information, meeting one-on-one via telephone or in person to troubleshoot energy issues, estimating energy savings associated with projects not included in the MFBE Program, providing walk-through energy assessments to buildings not participating in the MFBE Program, and providing project bid reviews and analysis. Refer to Appendix B for a list of the type of technical assistance provided in Phase II.

After the end of Phase II, all participants received a report documenting their buildings' energy usage throughout Phase II. This included providing the final overall grades for each building and a comparison of weather normalized usage and spending trends by fuel from 2016 to the most recent year. Weather normalized calculations are a method to take into account variations in weather patterns from year to year that may impact utility consumption. This report also provided a comparison of non-weather normalized usage data from January 2016 through December 2018. Refer to Appendix A for an example final report.

Financial Assistance

In Phase II, Minnesota Housing and CEE also helped building owners/property managers to navigate financial assistance opportunities. For example, in addition to utility incentives, some buildings were also eligible to apply for funding through Minneapolis' Green Business Cost Share Program (Minneapolis Health Department, 2019)¹⁶. The Green Business Cost Share Program provides matching dollars for approved efficiency and renewable projects.

Building owners/property managers were also provided assistance navigating funding through Minnesota Housing's Consolidated RFP (Minnesota Housing, 2019)¹⁷ or Minnesota Housing's Publicly Owned Housing Program (Minnesota Housing, 2019)¹⁸. Phase II Participants were informed in advance that participating in Phase II would have no impact on whether a project was or was not funded through Minnesota Housing's traditional funding processes. While some buildings did apply for and received funding through the Consolidated RFP, many buildings did not have a project scope that was sufficient to move forward through either of these funding processes.

Instead, Minnesota Housing made available a small number of grants to which Phase II participants could apply. Along with being a participant in Phase II, grant applicants must have completed the entire set-up process for Phase II, which included having provided updated utility information to Bright Power, participating in the initial EnergyScoreCards tutorial and reviewing the initial utility data with Bright Power, CEE and Minnesota Housing. These grants were structured as a reimbursement, with participants required to pay any upfront costs for projects after which they would be reimbursed for expenses. Phase II participants could apply for grant funds for either energy or water efficiency projects. Reimbursement would be provided for approved projects that were completed by December 31, 2018.

The grant application deadline was September 1, 2017. Sixteen out of the 31 participating buildings applied for grant funding. The grant application requested information on the proposed project, how the project was expected to save the building energy/water, and information on why the project was a priority to complete. The application also requested information on which fuel would be affected,

¹⁶ <http://www.minneapolismn.gov/environment/WCMS1P-105418>

¹⁷ <http://www.mnhousing.gov/sites/multifamily/gettingstarted>

¹⁸

<http://www.mnhousing.gov/wcs/Satellite?cid=1403296151009&pagename=External%2FPage%2FFEXTStandardLayout>

whether the project would help the owner/tenant/both, estimated cost of the project, and source of financing for the remainder of the project.

Grant awards were announced in November 2017. Out of the 16 applications, 13 buildings were approved for reimbursement for energy or water savings projects. Minnesota Housing budgeted a total of \$50,000, and for ease of administration, decided to allow a flat reimbursement request of \$3,845 per building. Ultimately, 10 buildings were able to complete projects and request reimbursement by the end of Phase II. Note that many of the buildings that did not apply for grant reimbursement still completed energy or water projects, which will be discussed later in this report.

Refer to Appendix A for example documents related to project reimbursement available through Minnesota Housing.

Data

Public Data

The Government Data Practices Act presumes that all government data is public unless a state or federal law states otherwise. Several Phase II participants, however, expressed concern about certain types of data being shared, including, but not limited to, energy and water usage and spending information for specific buildings. Therefore, certain types of data have been redacted for the purpose of this report. The public has a right to request the full non-redacted public data contained in this report and may make a request by mail, fax or email. Visit Minnesota Housing's website (Minnesota Housing, 2019)¹⁹ for additional information on public data requests.

Data Collection

The type of data that was collected during Phase II included:

- Building information (e.g., address, square footage, number of units, number of bedrooms, number of stories, meter configuration, fuel type)
- Owner/property manager paid utility data
- Utility reports that were issued after participation in the Multi-Family Building Efficiency Program
- Information on energy and water saving projects that were undertaken, including cost and energy-saving estimates
- Feedback on participants' experience in Phase II

Building information was collected via Excel spreadsheets. Quantitative utility usage and spending data was collected automatically through the EnergyScoreCards tool. MFBE reports were voluntarily provided by Phase II participants. Information on energy and water savings projects was collected via an online survey in which nine of the 11 participants responded. Follow-up information was collected via in-person interviews at the end of Phase II; nine out of the 11 participants participated in the final in-person interview.

Refer to Appendix C for full online survey results and transcripts of the final in-person interviews.

¹⁹ <http://www.mnhousing.gov/sites/np/datarequests>

Data Integrity

Minnesota Housing, CEE and Bright Power reviewed existing building information in the EnergyScoreCards platform with the owner or property manager at the beginning of Phase II. In some cases, building information such as square footage, number of units, or number of stories that was collected in the original pilot was deemed to be incorrect. In such cases, the information was corrected as it was found.

On a quarterly basis, Minnesota Housing, CEE and Bright power reviewed energy and water usage along with spending information for each building. At the end Phase II, the data was reviewed again. Any missing or incorrect utility data was flagged, and the building owner/property manager was asked to provide copies of utility bills in order to verify and correct.

Prior to calculating energy and cost savings, the data was reviewed to check for outliers that may have indicated a data entry error. Data points that appeared to be errors were omitted from the analysis. For example, if the electricity usage for one month was 100x an average month's usage, the data was omitted.

Data Analysis

CEE staff analyzed owner/property manager paid utility usage and spending data using statistical analysis. When the utility data was found to correlate with weather data, CEE used heating degree days (HDD), cooling degree days (CDD), and regression analysis to calculate weather normalized savings.

The correlations of coefficient and regression p-values were calculated for each building's natural gas and electric data. Natural gas use per square foot and electric use per square foot were treated as dependent variables, with HDD and CDD as independent variables. If a valid regression model could be found, the utility data was weather normalized before energy savings were calculated. A regression model was considered valid if it met the following criteria:

- The coefficient of determination (r-squared) was greater than 0.5
- The p-value for each independent variable was less than 0.05
- The absolute calculated energy savings was greater than the standard deviation of the utility data in the model year

Electricity data was weather normalized for 13 buildings before the savings were calculated. Natural gas was weather normalized for 18 buildings. Water usage was not weather normalized. In order to compare the buildings, the water savings was calculated by using a water index or ratio of water usage to number of bedrooms.

For this analysis, 2015 was treated as the baseline period. Data through the end of Phase II, December 2018 was not available for all of the buildings (refer to Table 1). If data through December 2018 was not available for a building, the most recent 12 months of data was used instead.

Table 1: Buildings with complete, partial, or no data available for 2018.

	Electric	Natural Gas	Water
Buildings with data through December 2018	26	26	27
Buildings with partial 2018 data	4	4	0
Buildings with no data for 2018 and omitted from analysis	1	1	4

Change in Fuel and Water Usage Index

If a valid regression model could be found, the following steps were taken to calculate the change in EUI: (1) Divide natural gas and electric by the building square footage; (2) Model the 2015 natural gas and electric use at 2018 conditions (or most recent 12 months); (3) Subtract the 2018 actual natural gas/electric (or most recent 12 months) from the 2015 modeled electric/natural gas.

If a valid regression model could not be found, the savings were calculated using the following steps: (1) Divide natural gas and electric by the building square footage; (2) Subtract the 2018 actual natural gas/electric (or most recent 12 months) from the 2015 modeled electric/natural gas.

Per Building Usage and Cost Savings

In Phase II, average electric and natural gas savings per building was calculated by averaging the weather normalized change in electric and natural gas use. The cost savings was calculated using the average utility rate for the final 12 months of Phase II. The 2018 average utility rate was multiplied by the building electric, gas and water savings to estimate the total savings.

This calculation differs from the original pilot. In the original pilot, the electric and gas savings were derived by applying the average fuel savings per square foot to the total square footage of the original pilot participants. Water savings was calculated by applying the average water savings per bedroom to the total number of bedrooms in the original pilot participant buildings. Costs savings were calculated using average utility rates of the original pilot participants. Using this approach in the original pilot gave each building equal impact on the average, no matter the building size.

The buildings with higher square footage and more units that participated in Phase II achieved a higher cost savings than the smaller buildings. To ensure that the cost savings for larger buildings were captured when evaluating the cost effectiveness, the per square footage averages were not used when calculating cost savings per building as was done in the original pilot. Instead the weather normalized change in energy and water usage per building was multiplied by the average 2018 utility rate to determine the change in utility cost for each building. Then the total change in utility cost was summed across all the participants.

Results

The following section describes the primary findings from the quantitative and qualitative analysis undertaken in EnergyScoreCards Minnesota Phase II.

Quantitative Findings

Participation in Utility Incentive Programs

EnergyScoreCards Minnesota Phase II encouraged participating building owners/property managers to utilize utility incentive programs. Twenty-nine of the Phase II participants were eligible for Xcel Energy and CenterPoint Energy's MFBE Program. Sixteen of those buildings applied for and received assessments and direct install services. Of those 16, eight buildings completed other projects beyond the direct install services that were specifically recommended in the assessments.

Of the 16 buildings that participated in the MFBE Program, only five had a whole building, energy-saving threshold high enough (at least 15 percent) to qualify for the program. The other eleven buildings instead qualified for a mixture of prescriptive and custom rebates.

Table 2 shows the average payback summary from the 16 buildings that participated in the MFBE Program that would have occurred had all 16 buildings completed all of the cost effective projects that were recommended by the MFBE Program. Not all of the projects that were recommended by the utility were completed by the end of Phase II.

Table 2: Average Payback Summary for buildings participating in the MFBE Program

	Annual cost saved	Annual MMBTUs Saved	Estimated project cost	Simple payback (years)	% Equivalent MMBTU reduced
Average	\$4,549	296.4	\$28,154	7.3	14.48%

A full list of recommended cost effective projects and a payback summary can be found in Appendix D.

Energy and Water Conservation Actions Taken

Minnesota Housing and CEE pulled data on the number of conservation actions that were completed over the course of Phase II. This information was taken directly from four sources: (1) Conversations with participants during quarterly check-in calls; (2) Assessment reports, which included information on direct install projects through the MFBE Program; (3) An online survey about project implementation that was administered by CEE; (4) A final in-person interview conducted by Minnesota Housing and CEE that provided a chance to ask Phase II participants follow-up information related to the online survey.

These data sources show that 23 buildings, owned/managed by eight Phase II participants, implemented energy and water conservation projects over the course of Phase II. This is 74 percent of total participating buildings and 73 percent of participating owners/property managers. Forty percent of buildings with full, owner/property manager paid utilities completed projects. Eighty-eight percent of buildings where the owner/property manager paid for heat and domestic hot water and the tenant paid for in-unit electric completed projects. One hundred percent of the buildings where the owner/property manager paid for hot water and the tenant paid for in-unit electric and in-unit heat completed projects.

ENERGYSCORECARDS MINNESOTA PHASE II

Participants completed approximately 95 projects during Phase II. Those projects along with the number of buildings (in parentheses) that implemented them are noted below.

Heating, Ventilation, and Air-Conditioning

- AC covers in units (3)
- Air source heat pumps (mini-splits) (1)
- Boiler stack dampers (2)
- Boiler tune-up (3)
- Controls on cooling system (1)
- Cooling and air handling unit upgrade (1)
- High efficiency bath fans (1)
- High efficiency boilers (2)
- High efficiency furnace and air handler (1)
- High efficiency motor on rooftop air handling unit (1)
- High efficiency pumps (1)
- Install a 3-way valve on boiler system (1)
- Install limit switches on the furnaces (1)
- Insulated boiler pipes (2)
- Insulated ducts (1)
- Pump variable frequency drive (1)
- Reduce garage temperature (1)
- Replace boiler expansion tank (1)
- Weather stripping on entry doors (3)

Lighting

- De-lamped lights (1)
- In-unit LED lighting (15)
- Occupancy and/or daylight sensors on lighting (5)
- Replace common area lighting with LEDs (6)
- Replace exterior lighting with LEDs (11)

Domestic Hot Water and/or Water

- High efficiency domestic hot water heater (3)
- Insulated domestic hot water pipes (1)
- Low flow fixtures in units (16)
- Implemented a toilet leak detection and repair program (5)
- Install water meters (1)
- Irrigation controls (1)
- Low flow toilets (2)

Other Electric

- ENERGY STAR rated refrigerators (1)

Other Natural Gas

- Moisture sensor on snow melt system (1)

Refer to Appendix D for additional information on the energy and water projects that were completed.

Six of the participating buildings had projects that were undertaken in the final three months of Phase II, and almost 50 percent of the projects undertaken were completed in 2018. Figure 1 indicates the number of projects completed each quarter.

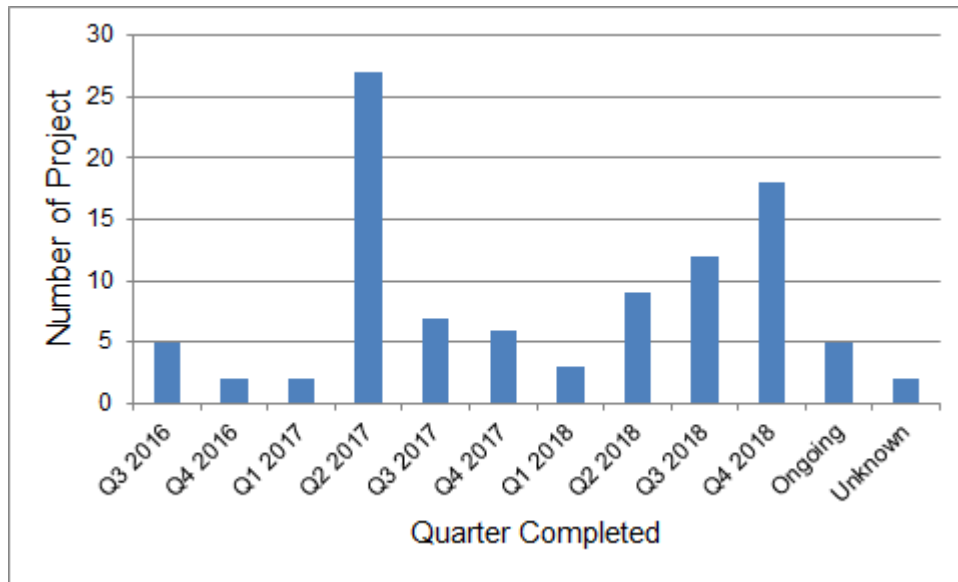


Figure 1: Projects completed per quarter of Phase II

Cost of Energy and Water Conservation Actions

In total, \$160,414 was spent on energy and water efficiency projects by Phase II participants. Minnesota Housing reimbursed \$38,405, leaving the full cost borne by 13 buildings, represented by six owners/property managers, at \$122,009. The remaining 10 buildings and two owners/property managers undertook projects that were either free (e.g. direct installs from the MFBE Program) or had only maintenance projects that were mainly time intensive.

This spending data may be incomplete as it was difficult to ensure that every project and associated cost was documented by the Phase II participant and shared with Minnesota Housing and CEE. Similarly, the full amount of rebates and other funds (e.g. The City of Minneapolis Green Business Cost Share Program) that Phase II participants were able to access is unknown.

The full cost data can be found in Appendix D.

Energy and Water Savings

At the end of EnergyScoreCards Minnesota Phase II, 17 buildings (55 percent) saw improvement in their overall EnergyScoreCards grade. Eleven buildings (35 percent) had their overall EnergyScoreCards grade stay the same. Three buildings (10 percent) saw their overall EnergyScoreCards grade worsen (e.g. change from an A or B grade to a C or D grade). Changes in the overall EnergyScoreCards grade can be found below in Figure 2 .

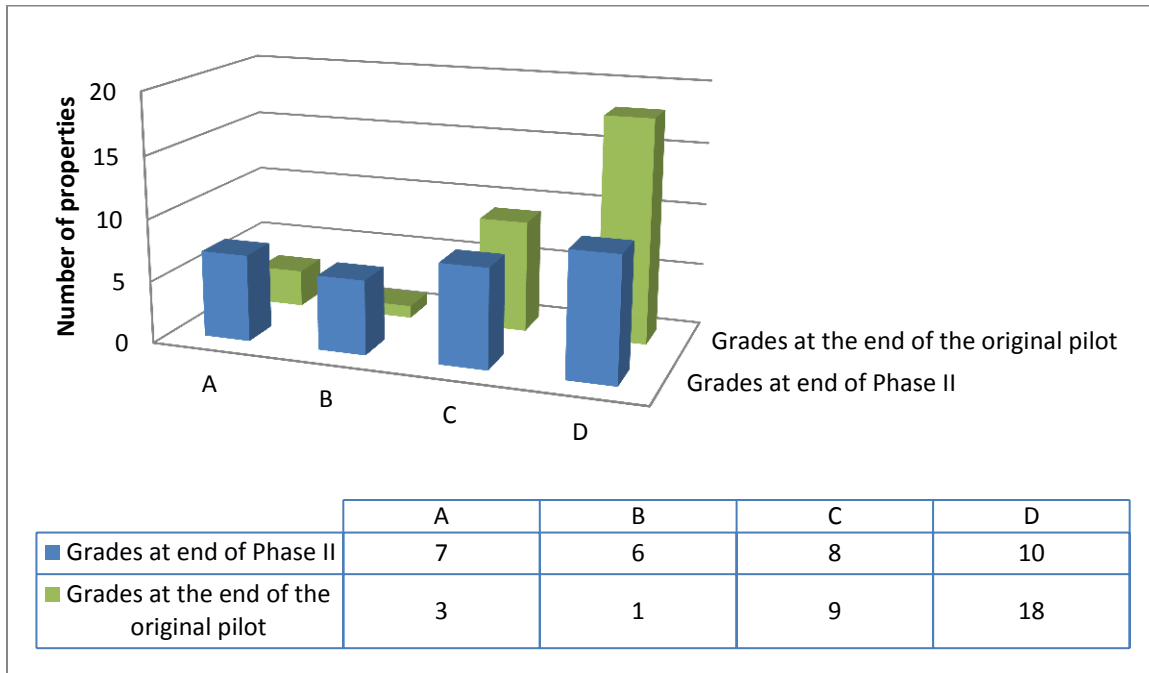


Figure 2: Final EnergyScoreCards grades at the end of the original pilot versus the end of Phase II.

Table 3 and Table 4 below show the comparison of savings observed at buildings between the three main metered configurations: fully master-metered buildings, buildings with master-metered central heat and hot water, and buildings with only master-metered hot water.

Table 3 compares year 2015 to the most recent year (MRY) of utility data. Outliers were excluded from the master-metered EUI electric averages shown below. Outliers were also omitted from the averages shown for the buildings with central heat and hot water.

Table 3: Site owner /property manager energy use index (EUI) savings. A positive value indicates a savings.

Metering configuration	Number of buildings	Buildings with complete or partial natural gas and electric data for 2018	2015 - MRY EUI (kBTU/sqft/yr)	2015 - MRY Electric (kBTU/sqft/yr)	2015 - MRY Natural gas (kBTU/sqft/yr)
Master-metered	10	10	4.8 +/- 13 kBTU	0.5 +/- 2.8 kBTU	2.8 +/- 14 kBTU
Central heat and hot water	17	16	-2.2 +/- 6.8 kBTU	0.3 +/- -1.7 kBTU	-3.0 +/- 7.4 kBTU
Central hot water only	4	4	0.04 +/- 1.1 kBTU	0.7 +/-0.4 kBTU	-0.7 +/- 1.3 kBTU

Table 4: Site owner/property manager water intensity savings. A positive value indicates a savings.

Metering configuration	Number of buildings	Buildings with complete or partial water data for 2018	2015 – MRY Water per bedroom (gal/bed/day)
Master-metered	10	10	2.8 +/- 17 gal
Central heat and hot water	17	13	-5.1 +/- 26 gal
Central hot water only	4	4	-3.4 +/- 17 gal

Master-metered Buildings

Average per Square Foot

Out of the 31 buildings participating in EnergyScoreCards Minnesota Phase II, 10 were master-metered buildings where the owner/property manager pays the utilities for the entire building. Results of the statistical analysis indicated master-metered buildings, where the owner/property manager pays for all utilities in the building, experienced a decrease in their energy use index of 4.8 ± 13 kBtu/sqft/year in the last 12 months of the Phase II relative to 2015, the final year of the original pilot. This equals a 5.1 percent reduction in site energy usage in a typical master-metered building.

Figure 3 below is a graph indicating change in EUI for the master-metered buildings. The middle line indicates the median, and the black dot shows the mean. Fifty percent of the change in EUIs falls within the box. One outlier, defined as a data point more than two standard deviations from the mean, was excluded from the analysis. Excluding one outlier, the solid lines show the minimum and maximum change.

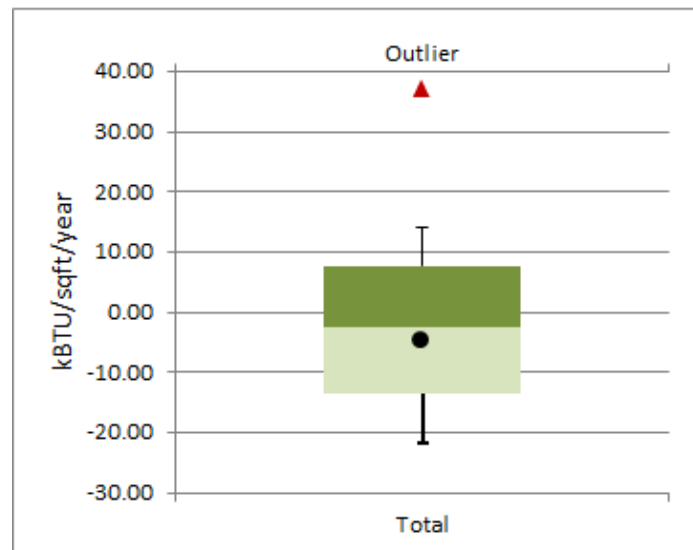


Figure 3: Site owner/property manager energy use index change for master-metered buildings.

Decreases in natural gas use were the main driver for this savings; however, the sign on the change in natural gas and electric use varied across the buildings. This equates to some buildings' natural gas use decreasing while some buildings' gas use increasing.

Master-metered buildings decreased their water usage by 2.8 ± 17 gallons/bedroom/day in Phase II, a 3.5 percent reduction in water for a typical master-metered building.

Building Totals

Looking at the change in utilities for the buildings as a whole and not on a square footage basis, the electric consumption decreased, but natural gas increased. Summing the change in electric, natural gas, and water cost for the 10 master-metered buildings, the master-metered buildings saved approximately \$35,088 as in 2018 compared to what they spent in 2015. The total average cost savings for these buildings was \$3,190.

Table 5: Site owner/property manager cost savings per building per year for master-metered buildings. A positive value indicates a savings. Values shown below have not been normalized by building square footage.

	Average Savings	Minimum	Maximum	Total*
Electric	\$1,160	-\$5,660	\$6,135	\$12,763
Natural Gas	-\$301	-\$9,079	\$4,221	-\$3,312
Water	\$2,331	-\$2,259	\$12,532	\$25,637

*For all buildings with a complete year of data for 2015 and 2018. Values are not normalized by square footage.

Table 6 shows the average cost savings per unit. These values were derived from the cost savings per building, which was then divided by each building's square footage before the average was calculated. Comparing per unit to per building savings, the sign on the electric and natural gas cost savings changes. Table 5 above, indicates larger buildings have a greater impact on the average savings. In Table 6 below, the smaller and larger buildings have relatively equal impact on the savings.

Table 6: Average cost savings per unit per year for master-metered buildings.

	Average Savings	Minimum	Maximum
Electric	-\$5.62	-\$257	\$137
Natural Gas	\$17.17	-\$118	\$119
Water	\$33.22	-\$87	\$237

Non-Master-Metered Buildings: Central Heat and Hot Water

Average per Square Foot

Seventeen buildings had meter configurations where the tenant was responsible for the in-unit electric usage and the owner/property manager was responsible for heating and water heating. In these 17 buildings, one building had a meter configuration where the tenant was responsible for cooling, but in the remaining 16 the owner/property manager paid for cooling.

Excluding one outlier and one building that did not have data for 2018, results of the statistical analysis showed non-master-metered buildings, where the owner/property manager paid for heat, experienced an increase in their energy use index of 2.2 ± 6.8 kBtu/sqft/year in the last 12 months of Phase II relative to 2015, a 3.7 percent increase in site energy usage in a typical building. Similar to the master-metered buildings, however, the change in energy use index varied significantly across the buildings.

Figure 4 below graphs the change in EUI for non-master-metered buildings where the owner/property manager pays for heat. The middle line shows the median and the black dot shows the mean. Fifty percent of the change in EUIs falls within the box. One outlier, defined as a data point more than two standard deviations from the mean, was excluded from the analysis. Excluding one outlier, the solid lines indicate the minimum and maximum change.

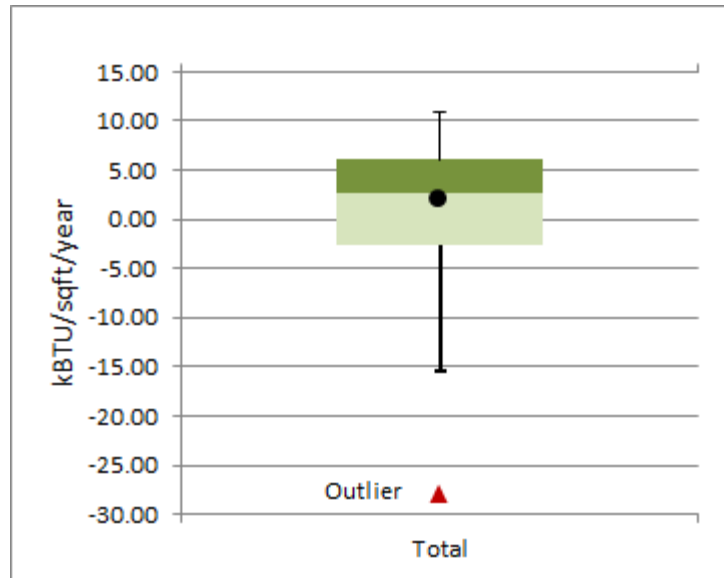


Figure 4: Site owner/property manager energy use index change for non-master-metered buildings where the owner/property manager pays for the heat.

Excluding one outlier, buildings in this category increased their water usage by 5.1 ± 26 gallons/bedroom/day, which is a 6 percent increase in water usage for a typical building in this category.

Building Totals

The combined statistical analysis for these buildings is outlined in Table 7. The sum of the change in utility costs for the buildings indicated that natural gas costs increased over the course of Phase II, but electric and water costs decreased. Summing the change in electric, natural gas, and water cost for the 17 non-master-metered buildings with central heat and hot water, the total cost savings was approximately \$9,155 in 2018 compared to what they spent in 2015. The total average cost savings per building was \$587.

Table 7: Site owner/property manager cost savings per building per year for non-master-metered buildings with central space heat and domestic hot water. A positive value indicates a savings. Values shown below have not been normalized by building square footage.

	Average Savings	Minimum	Maximum	Total*
Electric	\$1,223	-\$10,547	\$15,698	\$19,560
Natural Gas	-\$1,066	-\$7,782	\$2,475	-\$15,996
Water	\$430	-\$7,064	\$8,683	\$5,590

*For all buildings with a complete year of data for 2015 and 2018.

In Table 7 above, larger buildings have a greater impact on average savings.

ENERGYSCORECARDS MINNESOTA PHASE II

Table 8 shows the average cost savings per unit. To get these values, the cost savings per building was divided by each building's square footage before the average was calculated.

Table 8: Average cost savings per unit per year for master-metered buildings.

	Average Savings	Minimum	Maximum
Electric	\$38	-\$124	\$523
Natural Gas	-\$10	-\$132	\$165
Water	\$28	-\$203	\$511

Non-Master-Metered Buildings: Central Hot Water**Average per Square Foot**

The final four of the 31 buildings had a meter configuration where the tenant was responsible for in-unit electric usage and in-unit heating, but the owner/property manager was responsible for water heating. The results of the statistical analysis showed almost no change in energy use index. Electricity generally decreased for the buildings and natural gas increased offsetting the change in electric usage. Buildings in this category increased their water usage by 3.4 ± 17 gallons/bedroom/day, a 4.5 percent increase in water for a typical building in this category.

Building Totals

Summing the change in electric, natural gas, and water cost for the four non-master-metered buildings with central hot water, the total cost savings was approximately \$6,598 in 2018 compared to what they spent in 2015. The total average cost savings per building was \$1,649.

Table 9: Site owner/property manager cost savings per building per year for non-master-metered buildings with central domestic hot water and tenant paid space heat. A positive value indicates a savings. Values shown below have not been normalized by building square footage.

	Average Savings	Minimum	Maximum	Total*
Electric	\$1,472	\$569	\$3,546	\$5,888
Natural Gas	-\$436	-\$1,111	\$131	-\$1,743
Water	\$613	-\$2,340	\$3,273	\$2,453

*For all buildings with a complete year of data for 2015 and 2018.

Table 9 above indicates larger buildings have a greater impact on the average savings. Table 10 shows the average cost savings per unit. To get these values, the cost savings per building was divided by each building's square footage before the average was calculated.

Table 10: Average cost savings per unit per year for master-metered buildings.

	Average Savings	Minimum	Maximum
Electric	\$38	\$25	\$72
Natural Gas	-\$9	-\$23	\$6
Water	\$2	-\$102	\$67

Cost Effectiveness

Not including hours spent doing pre-Phase II planning and set-up in 2016, and hours spent doing post-Phase II evaluation in 2019, Minnesota Housing staff spent approximately 478 hours between January 1, 2017 and December 31, 2018 managing Phase II. CEE staff spent approximately 243 hours providing technical assistance over those two years. Bright Power staff spent approximately 168 hours providing

ENERGYSCORECARDS MINNESOTA PHASE II

benchmarking assistance over those two years. This equates to approximately 854 hours, or 427 hours per year in total assistance for the 31 buildings.

The cost of EnergyScoreCards Minnesota Phase II borne by Minnesota Housing over two years was \$143,780. The cost includes: the contracts with Bright Power and CEE to provide benchmarking and technical assistance to Phase II participants; the cost to Minnesota Housing of grant reimbursement for approved energy and water efficiency projects; the direct and indirect cost of Minnesota Housing staff time spent actively managing Phase II. Additional cost borne by Phase II participants and not reimbursed by Minnesota Housing to implement energy and water savings projects was \$122,009. This cost does not factor in costs such as staff time or indirect costs of the Phase II participants. The total cost for Phase II was \$265,789.

The total ongoing annual cost savings based on the last 12 months of utility consumption was approximately \$50,840 per year or about 3 percent of the 2015 utility costs. Utility data for part of 2018 was available for 30 out of the 31 buildings. Dividing this cost savings by the total units for these 30 buildings indicates an average cost savings per unit of approximately \$37. However, not all of the participants experienced a cost savings. Also, this is a conservative estimate because almost 50 percent of Phase II projects were completed in 2018. As a result, the cost savings may not appear in the metrics calculated here, since the savings was calculated by comparing the 2018 and 2015 utility bills.

Comparing the full cost of Phase II borne by Minnesota Housing to the ongoing conservative cost savings, the payback period for Minnesota Housing is two years and 10 months. If project costs borne by Phase II participants are included, the payback period is five years and two months.

Additional statistical analysis on energy and water savings can be found in Appendix D.

Qualitative Findings

In addition to the quantitative data pulled from the EnergyScoreCards tool and the online survey, each Phase II participant underwent a final interview in order to provide more qualitative data. Nine of the 11 owners and property managers that participated in Phase II agreed to participate in the final interview. Two participants declined to participate.

In the final interview, most participants stated that overall they found EnergyScoreCards Minnesota Phase II to have been helpful in implementing energy and water savings projects. Specifically, when asked an open ended question about what they liked about the Phase II, participants stated:

1. Having a single point of contact with a real person – 7 respondents
2. Having access to grant reimbursement – 5 respondents
3. Having access to benchmarking data – 5 respondents
4. Having additional technical support – 4 respondents

However, the participants stated several major barriers that prevented them from doing more:

1. Lack of staff capacity at the participant level – 7 respondents
2. Lack of financial resources at the participant level to implement projects – 7 respondents
3. Unclear benchmarking data – 7 respondents
4. Lack of clarity surrounding proposed solutions – 6 respondents

Benchmarking

Phase II allowed participants to use EnergyScoreCards to track their energy and water usage and spending.

Five of the owners and property managers that participated in Phase II indicated that they have never used other benchmarking tools prior to participating in Phase II. One participant has used Minnesota's B3 Benchmarking Program and three participants have used Energy Star Portfolio Manager. In all four of these cases, the participants stated that they had not paid much attention to these benchmarking tools after the initial set up. Instead of using benchmarking tools, all owners/property managers stated that they track their utilities using either Excel spreadsheets or financial software.

This inattention to benchmarking tools was also evident during EnergyScoreCards Minnesota Phase II. During the final interview, all but one owner/project manager stated that they either never used the benchmarking tool on their own or only used it once in a while. Most participants relied upon the quarterly check-in calls that were pre-scheduled to review and discuss energy usage.

When asked in the final interview what they liked about the benchmarking portion of Phase II, the participants responded:

- The ability to see the data presented using visual graphs – 5 respondents
- The ability to personalize and specify how the energy data was presented – 3 respondents

ENERGYSCORECARDS MINNESOTA PHASE II

- The ability to be able to use the data in order to tell the story and justify the need for improvements – 3 respondents
- Being able to see accurate data and know if something is going wrong (e.g. a leaking pipe) – 2 respondents
- Working with an expert to help explain the data – 1 respondent

When asked what issues they had with the benchmarking tool or what recommended changes they had, Phase II participants stated:

- The tool was difficult to use – 5 respondents
- They didn't feel that their buildings were being compared to similar buildings – 4 respondents
- It was difficult to interpret the data – 2 respondents

Technical Assistance

In the final interview, owners and property managers that participated in Phase II were asked about their experience with the technical assistance that they received. They found the following types of assistance the most helpful:

- Conducting an in-person building assessment, including the opportunity to discuss potential projects and best practices – 7 respondents
- Participating in regular check-ins:
 - Having a real person to talk to, troubleshoot with and ask questions – 6 respondents
 - Relying on the check-ins to encourage discipline and accountability – 5 respondents

It is interesting to note that although Phase II participants did mention the usefulness of in-person building assessments as it relates to the technical assistance that was provided to them, it was not mentioned as their top benefit when discussing utility programs, which will be explored in more detail below. In general, it appears that there was confusion among Phase II participants about the different types of in-person building assessments and the usefulness of each. Phase II Participants did not seem to distinguish between utilities, private contractors, or third party organizations such as CEE in regard to the assistance each organization provided.

Phase II participants had the following recommendations for what additional types of technical assistance would be helpful:

- Additional, one-on-one assistance to help understand conflicting information, difficult building issues, and support prioritizing and implementing potential projects – 5 respondents
- Having an in-person meeting with multiple owners, property managers, and maintenance staff to share ideas and best practices – 4 respondents
- Case studies and other documents that detail specific practical solutions (e.g. seasonal transition and maintenance planning) – 4 respondents
- Providing more resources for tenant education – 2 respondents

ENERGYSCORECARDS MINNESOTA PHASE II

- Having one online website to pursue a variety of energy and water efficiency programs – 1 respondent

Utility Incentive Programs

EnergyScoreCards Minnesota Phase II encouraged participating buildings to utilize utility incentive programs. Twenty-nine of the buildings were eligible for Xcel Energy and CenterPoint Energy's MFBE Program. Sixteen of those buildings applied and received assessments and direct install services, and eight buildings completed other projects beyond direct installs that were specifically recommended in the utility assessments.

During the final in-person interview, owners and property managers that participated in Phase II specifically referenced past participation in the following utility incentive programs, in addition to the MFBE Program:

- Xcel Energy's Multifamily Buildings Program – 3 respondents
- Xcel Energy and CenterPoint Energy's Home Energy Squad – 2 respondents
- Xcel Energy's Energy Design Assistance – 1 respondent
- General prescriptive rebates – 1 respondent

Overall, Phase II participants indicated the things that they liked about the utility incentive programs included:

- Free direct install programs – 4 respondents
- Energy rebates – 4 respondents
- Energy audits – 1 respondent

However, Phase II participants mentioned that it was confusing to work through the utility incentive process. Four participants found it difficult to navigate and piecemeal together multiple utility programs and specifically found the MFBE process and responsiveness slow and rigid.

The other common theme was dissatisfaction with some direct install components. Four participants stated that the water saving devices specifically were causing more expenses from maintenance calls than the possible savings from the energy and water usage.

Energy Projects

As indicated above, eight of the 11 owners and property managers that participated in Phase II were able to implement energy and/or water saving projects in their buildings. When asked in the final interview about how Phase II participants planned and prioritized projects, project urgency (e.g. what is broken or unsafe) and upfront costs versus potential savings were the top two considerations when choosing a project. Similarly, when participants were asked why energy projects were important for them to pursue, they answered:

- Cost savings and associated impact on operating budget – 4 respondents
- Basic needs of the building in order to function correctly – 4 respondents

Of the eight participants that implemented projects, only one participant stated affirmatively that they would have proceeded with the projects even had they not participated in Phase II. Conversely, five participants specifically called out the fact that these projects would not have taken place at all or would not have taken place as quickly if they had not participated in Phase II.

As indicated above, the time burden to plan and the resources needed to execute were the main barriers that prevented participants from implementing additional projects.

Project Reimbursement by Minnesota Housing

As indicated above, five of the owners and property managers that participated in Phase II received reimbursement from Minnesota Housing in order to implement energy or water saving projects in 10 buildings. In the final, in-person interview, the participants that received project reimbursement stated that they liked two main things:

- The grant reimbursement allowed them to pursue a project that they may not have been able to pursue otherwise – 4 respondents
- The project reimbursement process was easy, fast and flexible – 4 respondents

During the interview, Phase II participants were asked what changes to a potential future grant reimbursement or funding, if any, would they recommend. Their responses were:

- To keep the opportunity for future funding a regular, ongoing, opportunity in order to be able to plan the project – 2 respondents
- To keep the application and disbursement process easy and flexible – 2 respondents

There was not consensus about whether a future funding application opportunity should be available year-round or whether it should only be available once a year. Four Phase II participants felt that having funds available only once a year would provide higher motivation for potential applicants to actually submit applications because it would create a sense of urgency. Conversely, three Phase II participants felt that having future funding available year-round would allow for greater flexibility, especially in an emergency/unplanned replacement situation.

In terms of funding amounts, six participants stated that they would recommend making future funding amounts variable based on the size of the building, expense of the proposed project, and projected energy savings. They cautioned, however, that as applications become more complicated, more assistance would be needed in order to help the owner/property manager accurately submit the application.

One participant specifically asked for the ability to request upfront payments in situations where the property does not have the reserves necessary to cover the cost of the project until a reimbursement is received.

Discussion and Recommendations

Comparing the Original EnergyScoreCards Minnesota Pilot and EnergyScoreCards Minnesota Phase II

When comparing the energy and cost savings between the original EnergyScoreCards Minnesota pilot and Phase II, it is important to note four differences between the studies:

- 1) In the original pilot, the savings was determined by comparing the energy use index of participants to a control group that did not have access to the benchmarking tool. Since Phase II did not have a control group, an alternative method had to be used to estimate the impact.
- 2) Since Phase II did not have a control group, the statistical significance of the savings could not be evaluated.
- 3) The sample size between the original pilot and Phase II was not equal. In the original pilot, the energy and water usage was studied in more than 500 buildings, of which 286 buildings were given access to the benchmarking software. Of the participants that were given access to the benchmarking software, 45 of their buildings were master-metered with valid scorecards. In comparison, 31 buildings participated in Phase II, 10 of which were master-metered buildings with valid scorecards.
- 4) In the original pilot, the cost savings was calculated by multiplying the weather normalized average utility savings per square foot by the total square footage of the participating buildings and an average utility rate. In Phase II, the weather normalized energy and water savings for each building was multiplied by an average utility rate. The resulting cost savings per building was then summed to determine the total cost savings for the participating buildings.

Energy and Water Conservation Actions Taken

The original EnergyScoreCards Minnesota pilot evaluated conservation actions taken relative to participation in electric and gas utility incentive programs. Nineteen percent of treatment group buildings participated in at least one electricity rebate program over the two-year period. For gas programs, there was no statistically significant difference between treatment and control group participation.

In Phase II, 52 percent of buildings participated in electric and natural gas utility incentive programs. Participants were also asked to provide information on conservation actions taken, both rebate eligible actions and actions ineligible for rebates (e.g. implementing a leak detection program). Seventy-four percent of Phase II buildings implemented energy and/or water conservation projects showing a significant increase in participation in conservation projects.

Energy and Water Savings

Master-metered Buildings

In the original EnergyScoreCards Minnesota pilot, participants with master-metered buildings showed a 5 percent reduction in site energy usage on average. Phase II participants with master-metered buildings achieved an additional 5 percent reduction in site energy usage by the end of Phase II, indicating the added resources provided in Phase II may have resulted in a greater savings in master-metered buildings. However, in both the original pilot and Phase II, the change in EUI varied significantly across participants, with some participants actually showing an increase in EUI in both studies.

In terms of water savings, master-metered participants from the original pilot showed a 30 percent reduction in water usage. Despite having approximately 25 percent of projects in Phase II related to water usage, Phase II master-metered participants showed only a 4 percent reduction in water usage at the end of the study.

Non-master-metered Buildings

In the original EnergyScoreCards Minnesota pilot, non-master-metered buildings showed insignificant changes in energy and water usage. Phase II non-master-metered buildings that had central space heat and DHW showed an increase in site energy and water usage. Non-master-metered buildings with central DHW only showed a minor decrease in EUI and an increase in water usage.

The reason for the increase in site energy and water usage is not conclusive. Change in energy use index and water usage varied significantly across buildings. It is possible that an increase in occupancy levels (vacant units being rented or units with single occupancy being rented to families) or changes in occupancy type (a single person who is out of the unit for the majority of the day versus an elderly tenant who is in the unit for a majority of the day) could have affected energy and water usage.

Because direct utility cost savings were not immediately seen, this could indicate that additional incentives or resources outside of those provided in the original EnergyScoreCards Minnesota pilot and Phase II may be needed to encourage additional water efficiency projects in order to decrease consumption in non-master-metered buildings.

Other Considerations

Almost 50 percent of the projects completed during Phase II were completed in the final 12 months. A full year worth of energy and water data is preferred in order to get a greater understanding of energy and water usage that may be affected by seasonal changes. Because of the short period of time between the completion of some projects and the end of Phase II, the effect on the energy and water usage is likely not fully incorporated into the savings potential calculated in the data provided.

Comparing the Phase II Results to the Phase II Key Objectives

Primary Objectives

One primary objective of Phase II was to reduce utility costs in targeted buildings. Overall, 74 percent of participating buildings implemented energy and water savings projects. Sixty three percent of participating buildings saw a corresponding decrease in utility spending. In Phase II, The total cost savings based on the most recent 12 months of utility consumption was approximately \$50,840 per year, or about \$37 per unit, and 3 percent of baseline utility costs. Fifty-five percent of buildings saw improvement in their overall EnergyScoreCards grades by the end of Phase II. Almost 50 percent of the conservation projects were completed in the final year of Phase II, with the majority of completions taking place in the last six months. It is likely that the full impact of on-site energy and water usage was unable to be measured prior to the end of Phase II and the cost-savings that were seen represent a conservative measurement of potential costs.

The impacts on energy and water usage varied by meter type. Master-metered buildings achieved a 5 percent reduction in site energy usage after the end of Phase II. Master-metered buildings also saw an average water usage reduction of 3.5 percent. The average master-metered building saw a total cost savings of \$3,190. Non-master-metered buildings with central space heat and domestic hot water (DHW) showed an increase in site energy and water usage but the average non-master-metered building with central heat and hot water still saw a cost savings of \$587. Non-master-metered buildings with only

central DHW only showed a minor decrease in Energy Use Index (EUI) and an increase in water usage. The average non-master-metered building with only central hot water saw a cost savings of \$1,649.

Another primary objective of Phase II was to compare utility savings with the cost of monitoring and targeting the buildings and financing the retrofits. The full cost for Minnesota Housing to implement Phase II was \$143,780. Comparing the full cost of Phase II to the ongoing conservative cost savings, the payback period for Minnesota Housing is two years and 10 months.

Secondary Objectives

One secondary objective of Phase II was to assess the interest of multifamily owners/property managers in investing in more efficient energy initiatives. By the end of Phase II, 74 percent of participating buildings had implemented an energy or water conservation project. A total of 95 projects were completed during Phase II. Of the eight participants that implemented projects, only one participant stated affirmatively that they would have proceeded with the projects even had they not participated in Phase II. Conversely, five participants specifically called out the fact that these projects would not have taken place at all or would not have taken place as quickly if they had not participated in Phase II.

Another secondary objective of Phase II was to assess the usefulness of using utility benchmarking to improve energy and water management and provide useful information for future Minnesota Housing benchmarking policy. Most owners and property managers that participated in Phase II like the data and information that was presented in the benchmarking tool, but they did not use the tool on their own. Instead they relied on check-in calls with Phase II staff to review the data.

The final objective of Phase II was to assess the compatibility of utility incentive programs, especially Xcel Energy and CenterPoint Energy's MFBE Program (Xcel Energy and CenterPoint Energy, 2019)²⁰ with Minnesota Housing funding processes. In the original EnergyScoreCards Minnesota pilot, 19 percent of buildings participated in utility incentive programs. In Phase II, 52 percent of buildings participated in electric and natural gas utility incentive programs, showing a significant increase in participation in conservation projects. In Phase II, 16 buildings participated in the MFBE program but only five had an energy-saving threshold high enough to fully participate in the program. The remaining 11 buildings instead qualified for traditional utility rebates. Two buildings were able to pair the MFBE program with Minnesota Housing's energy rebate requirements. However, new construction and substantial rehabilitation projects may still benefit more from other programs, such as Energy Design Assistance.

Bringing the Phase II to Scale

There are at least two scenarios that are plausible for bringing Phase II to scale and having Minnesota Housing create a comprehensive benchmarking program that owners and property managers can participate in for free. The free program would include providing support to benchmark owner/property manager paid utility bills; technical assistance, including in-person energy assessments; support accessing utility incentive programs and rebates; and access to financial assistance through Minnesota Housing. Understanding the number of buildings that can be feasibly served in any potential scenario can be done by extrapolating the number of hours spent by Minnesota Housing, CEE and Bright Power serving the Phase II participants.

²⁰ <https://www.multifamilyenergysolutions.com/>

Scenario 1

Costs

In Scenario 1, technical assistance is still provided by an organization such as CEE and benchmarking assistance is provided by an organization such as Bright Power.

Minnesota Housing spent roughly 239 hours per year serving 31 buildings and 11 owners/property managers in Phase II. This equates to roughly eight hours per building. If this hourly rate is expanded to roughly the full-time equivalent of one staff person working 2,000 hours per year, that would equate to a comprehensive benchmarking program that can conservatively support up to 259 buildings.

Minnesota Housing spent roughly \$40 per hour managing Phase II, not including benefits and indirect costs. Extrapolating this information, direct costs including salary and benefits of roughly \$93,600 and indirect costs including overhead of roughly \$116,990 can be assumed. Therefore, the total direct and indirect cost for a full-time staff person managing a 259 building program would be \$210,590 per year.

In Phase II, Minnesota Housing budgeted \$50,000 total for grant reimbursement funding for energy and water efficiency projects. This equates to \$1,612 per building. After reimbursement applications were received, Minnesota Housing allocated \$3,845 per building for the approved buildings. In the end, only 33 percent of buildings requested and received reimbursement grant funds. If Phase II spending is extrapolated for a full program of 259 buildings, Minnesota Housing can expect to spend between \$330,670 on the low end to \$995,855 on the high end for grant reimbursement for energy and water efficiency projects.

Based on the contract cost, CEE spent roughly \$403 per building actively providing technical assistance for buildings that participated in Phase II. This does not include contract costs of pre-planning or post evaluation. If the cost of the active technical assistance from Phase II is extrapolated to a program of 259 buildings, the total cost would be \$104,377.

For Phase II, Bright Power charged \$500 per building and waived a \$200 setup fee. If it is assumed that the buildings participating in a full program have not ever used the EnergyScoreCards service, then it can be assumed that the cost per building will be at least \$700 for the first year. This would equal \$181,300.

Total costs for Scenario 1 would be at least \$826,937 for the first year of the program. It can be assumed that costs would be at least \$1,271,404 for two years of the program because the EnergyScoreCards fee would drop from \$700 to \$500 per property and because the reimbursement amount would be carried through both years of the program. This equates to a cost of \$4,909 per building over the two years of Scenario 1 version of a comprehensive benchmarking program that can support up to 259 buildings.

Benefits

The cost benefit analysis for Scenario 1 would closely resemble that of Phase II. The average cost savings per building for Phase II was \$1,640. Multiplying \$1,640 by 259 buildings, a conservative estimate of the total annual cost savings for Scenario 1 would be \$424,760. If it is assumed that this will be a two-year program, the payback period would be three years.

The benefits of proceeding with Scenario 1 include the ability to work with a greater number of buildings and owners/property managers compared to the number of buildings that could be supported by Scenario 2. Scenario 1 is also benefited by working with established partner organizations that have the ability to focus on providing assistance within their respective specialties (e.g. energy recommendations and benchmarking support) rather than relying on a single staff person that is in a more generalist role.

Scenario 2

Costs

In Scenario 2, a full time staff person at Minnesota Housing would be responsible for providing all benchmarking and technical assistance to program participants. Instead of using the paid EnergyScoreCards web-based platform, the Minnesota Housing staff person would be responsible for helping buildings benchmark through the free EnergyStar Portfolio Manager.

Minnesota Housing spent roughly 239 hours per year serving the 31 buildings and 11 owners/property managers in Phase II. CEE spent 122 hours per year and Bright Power spent 84 hours per year, totaling 445 hours per year. If a full-time staff person from Minnesota Housing takes over the services provided by CEE and Bright Power and creates its own full program, the program would conservatively be able to support roughly 139.

Minnesota Housing spent roughly \$40 per hour managing Phase II, not including benefits and indirect costs. Extrapolating, direct costs including salary and benefits of roughly \$93,600, and indirect costs including overhead of roughly \$116,990 can be assumed. Therefore, the total cost for a full-time staff person managing a 139 building program would be \$210,590. Although the cost for a full time staff person will be the same as Scenario 1, they will not be able to manage as many buildings as in Scenario 1 because they will be taking on some of the responsibilities that would be managed by organizations such as CEE and Bright Power in Scenario 1.

In Phase II, Minnesota Housing budgeted \$50,000 for grant reimbursement funding for energy and water efficiency projects. This equates to \$1,612 per building. After reimbursement applications were received, Minnesota Housing allocated \$3,845 per building for the approved buildings. In the end, only 33 percent of buildings requested and received reimbursement of grant funds. If Phase II spending is extrapolated for a full program of 139 buildings, Minnesota Housing can expect to spend between \$176,870 on the low end to \$534,455 on the high end for grant reimbursement for energy and water efficiency projects.

The total cost for Scenario 2 would be at least \$387,460 for the first year of the program. It can be assumed that costs would be at least \$598,050 for two years because the reimbursement amount would be carried through both years of the program. This equates to a cost of \$4,303 per building over the two years of the program.

Benefits

The cost benefit analysis for Scenario 2 would differ slightly from that of Phase II. The average cost savings per building for Phase II was \$1,640. Extrapolating a program of 139 buildings, a conservative estimate of the total annual cost savings would be \$227,960 annually. If it is assumed that this will be a two-year program, this equals a payback period of two years and seven months.

The benefits of proceeding with Scenario 2 include a lower total program cost and a slightly faster payback period.

Discussion

Other Potential Scenarios and Unknown Costs

There may be other potential scenarios that would be feasible when considering how to bring Phase II to scale. A third scenario could entail continuing to use a paid benchmarking program such as EnergyScoreCards while bringing all technical assistance in-house at Minnesota Housing. Similarly, the

inverse could also be possible, with a fourth scenario that uses a free benchmarking platform such as EnergyStar Portfolio Manager but contracts with an outside organization to provide additional technical assistance.

Table 11: Comparing potential scenarios to bring Phase II to scale

Scenario	Total Cost	Cost per building	Savings	Savings per building	Payback Period	Number of Buildings Served	Benchmarking Service	Technical Assistance
1	\$1,271,404	\$4,909	\$424,760	\$1,640	3 years	259	Outside organization	Outside organization
2	\$598,050	\$4,303	\$227,960	\$1,640	2 years, 7 months	139	Minnesota Housing	Minnesota Housing
3	\$845,545	\$4,945	\$280,440	\$1,640	3 years	171	Outside organization	Minnesota Housing
4	\$817,361	\$4,279	\$313,240	\$1,640	2 years, 7 months	191	Minnesota Housing	Outside organization

If Minnesota Housing decides to move forward with a full program, any contracts with external organizations would be subject to an open bid process. The bid submissions would likely lead to different costs for both the technical assistance contract and the benchmarking contract.

Benchmarking and Technical Assistance

Scenario 1 continues the use of the EnergyScoreCards web-based platform. This paid benchmarking tool adds to the expenses Minnesota Housing would need to cover, but provides additional support for owners/property managers who are tracking their utilities. Scenario 2 uses the EnergyStar Portfolio Manager benchmarking platform. Using a free platform will cut down on program costs but will require additional time and support from Minnesota Housing staff in order to help buildings set up and interpret their utility data.

Both scenarios assume the continued presence of utility incentive programs such as Xcel and CenterPoint's MFBE Program, which includes free energy assessments, free direct installs, and project rebates. In areas where utility incentive programs are less comprehensive, additional time and support from Minnesota Housing may be needed.

In the qualitative findings, a lack of clarity around the benchmarking data, utility incentive processes, and proposed projects were some of the major barriers that prevented Phase II participants from implementing additional energy and water saving projects. Providing additional in-person support and educational resources will likely be necessary in order to have the most effective program results. Continuing to contract with an outside organization that specializes in technical assistance for energy efficiency in multifamily buildings may be beneficial because it offers more specialized knowledge, which in turn could help owners and property managers of affordable multifamily buildings troubleshoot complex issues within their buildings.

Costs Borne by Owners and Property Managers

Neither scenario takes into account costs borne by building owners and property managers, such as staff time and costs to implement energy and water efficiency projects. In the qualitative findings, a lack of staff capacity at the Phase II participant level was another major barrier that prevented Phase II participants from implementing additional energy and water saving projects. This barrier may be an argument for having a smaller program size so that Minnesota Housing staff can spend more time and resources helping each building and owner/property manager.

Both scenarios assume continuing financial assistance through the use of grant funding that reimburses projects after they are completed. In the qualitative findings, a lack of financial resources was cited as one barrier that prevented Phase II participants from implementing additional energy and water saving projects. Minnesota Housing may consider increasing the amount of financial support through grants and incorporating more support to help program participants to access deferred loans or amortizing loans in order to increase the number and size of efficiency projects that are undertaken in a full program.

Both staff capacity and financial costs borne by owners and property managers are not insubstantial and any full program should be structured in such a way as to offset them as much as possible.

Payback Periods and Non-Energy Benefits

Any potential payback period and energy savings for either scenario would be dependent on the ratio of master-metered building versus non-master-metered buildings that were part of a full program. In Phase II, there were two non-master-metered properties for every master-metered building. Master-metered properties saw larger savings, so increasing the number of master-metered buildings would likely decrease the payback period. However, non-master-metered buildings would still likely see non-energy benefits from participating in this program, such as decreasing the energy burden felt by residents and increasing the safety, health and comfort of the building.

Overall Recommendations for Future Programs and Policies

Owners and property managers of subsidized, multifamily, affordable housing buildings struggle to implement energy and water efficiency projects for several reasons. Although owners and property managers recognize the financial benefits to these projects, they are often a lower priority for management, where projects and/or buildings with health and safety issues take priority. Additionally, both organizational staff capacity issues and a lack of financial resources hinder the number and scope of energy and water saving projects that are undertaken. Because of these barriers, any potential program or policy should attempt to make it as easy as possible for owners and property managers to participate.

The majority of Phase II participants responded that having access to in-person, one-on-one assistance was the biggest benefit of participating in Phase II. Most property managers are hired mainly to interface with residents and ensure compliance with rent and income restrictions and other requirements established by the institutions that provided financing for the building. Energy and water efficiency planning may not be a priority, so having access to a single point of contact where they could ask questions throughout the entire planning and implementation process is critical. Having someone hold them accountable and keeping these issues on the forefront of their workload, having resources readily available to ask detailed technical questions about building mechanics and bid comparisons, and having support in navigating complex utility and financing programs were all mentioned as benefits to participating in Phase II. Having access to resources such as tenant education would also be beneficial. Any future program or policy should include these aspects.

Phase II helped 74 percent of participating buildings to implement energy or water savings projects. However, approximately 50 percent of these projects were undertaken in the last 12 months of Phase II, with many begun in the final six months of that 12-month period. Because of the short time period between implementing and writing this report, the full financial cost savings and usage benefits of these projects may not have had ample time to be reflected in the statistical results. Owners and property managers of subsidized, multifamily, affordable housing usually try to plan projects two to five years in advance and have long-term capital improvement plans that list out the expected projects for the

lifetime of the building. Any future program or policy should take into consideration the substantial length of time it takes for owners and property managers to track utilities, participate in utility incentive programs, plan and design projects, seek bids, and secure financing prior to being able to complete a project.

Master-metered buildings were more likely to experience financial benefits of these projects. Beyond the direct impact on operating costs, this savings allows for reinvestment in the building to make other, much needed repairs and may prevent the building owner or property manager from needing to increase rents. However, many projects were also undertaken in tenant units. At buildings where tenants are responsible for paying a portion of their utility bills, some of the financial benefits will likely be reflected on tenant utility statements. This will be beneficial in reducing the energy burden experienced by tenants; however, there is the lack of incentive for owners/property managers to invest in spaces where the owner/property manager will not see the financial benefit. Any future program or policy should help incentivize projects even if the owner or property manager might not be the direct recipient of the benefit.

As indicated in *Occupant Health Benefits of Residential Energy Efficiency (E4The Future, 2016)*²¹, the impact of energy and water efficiency projects could contribute to the overall health, safety and comfort of the building, likely providing a positive impact on indoor air quality. Creating healthier, safer and more comfortable living environments for tenants could decrease the instances of illness, which in turn could decrease the instances of missed school and work. Fewer instances of illness will also reduce medical visits and associated costs. Any future program or policy should take into consideration these indirect benefits that go beyond direct financial benefits.

Future Research

If additional research on this topic is to be undertaken, the following suggestions to the Phase II design could be made that would increase the statistical significance of the results:

- Include a larger data set with a control group similar to the original pilot design
- Monitor building utility usage for at least a full 12 months post-project implementation in order to have a more comprehensive understanding of the project's effect on energy and water usage

Other useful research may include the following topics:

- Study the actual final cost of completed energy efficiency projects compared to costs quoted by utilities and other third parties
- Study if/how the amount of total utility incentives a building is eligible for changes depending on whether the utility was involved in the design stage of the project versus being brought in after project completion
- Compile and share case studies on energy and water efficiency projects and maintenance best practices with owners and property managers in order educate them on the benefits of such projects.

²¹ <https://e4thefuture.org/wp-content/uploads/2016/11/Occupant-Health-Benefits-Residential-EE.pdf>

Works Cited

- APPRISE Incorporated. (2017). *Low Income CIP Evaluation Study*. Princeton. From <http://mn.gov/commerce-stat/pdfs/card-low-income-cip-evaluation.pdf>
- Bright Power. (2019). *EnergyScoreCards*. From Bright Power: <https://www.brightpower.com/performance-analysis-ongoing-support/>
- Bright Power. Minnesota Green Communities, Center for Sustainable Building Research, Minnesota Housing Finance Agency, MN Center for Energy and Environment. (2015). *EnergyScoreCards Minnesota*. New York. From <http://mn.gov/commerce-stat/pdfs/bright2016-mfbenchmark-final.pdf>
- Center for Energy and Environment, Optimal Energy and Seventhwave. (2018). *Minnesota Energy Efficiency Potential Study: 2020–2029*. Minneapolis. From <http://mn.gov/commerce-stat/pdfs/mn-energy-efficiency-potential-study.pdf>
- Center of Wisconsin and Franklin Energy LLC. (2013). *MINNESOTA MULTIFAMILY RENTAL CHARACTERIZATION STUDY*. Madison. From <https://www.cards.commerce.state.mn.us/CARDS/security/search.do?method=showPoup&documentId=%7b15E1DC52-AEA9-4562-B622-45FBD3713F4F%7d&documentTitle=67915&documentType=6>
- City of Minneapolis. (2019). *Minneapolis Passes Energy Disclosure Policies*. From Minneapolis Building Benchmarking Help : <http://buildingdisclosure-mpls.mncee.org/>
- E4The Future. (2016). *Occupant Health Benefits of Residential Energy Efficiency*. From <https://e4thefuture.org/wp-content/uploads/2016/11/Occupant-Health-Benefits-Residential-EE.pdf>
- Enterprise Community Partners. (2019). *Green Communities*. From Enterprise: <https://www.enterprisecommunity.org/solutions-and-innovation/green-communities>
- Environmental Protection Agency. (2019). *Portfolio Manager*. From EnergyStar: <https://www.energystar.gov/buildings/facility-owners-and-managers/existing-buildings/use-portfolio-manager>
- Minneapolis Health Department. (2019). *Green Cost Share*. From City of Minneapolis Environmental Services: <http://www.minneapolismn.gov/environment/WCMS1P-105418>
- Minnesota Department of Commerce. (2019). *B3 Benchmarking*. From B3 Benchmarking: <https://mn.b3benchmarking.com/>
- Minnesota Housing. (2019). *Apply for Funding - Getting Started*. From Minnesota Housing: <http://www.mnhousing.gov/sites/multifamily/gettingstarted>
- Minnesota Housing. (2019). *Building Standards*. From Minnesota Housing: <http://www.mnhousing.gov/sites/multifamily/buildingstandards>
- Minnesota Housing. (2019). *Data Requests*. From Minnesota Housing: <http://www.mnhousing.gov/sites/np/datarequests>

ENERGYSCORECARDS MINNESOTA PHASE II

Minnesota Housing. (2019). *Publicly Owned Housing Program*. From Minnesota Housing:
<http://www.mnhousing.gov/wcs/Satellite?cid=1403296151009&pagename=External%2FPage%2FEXTStandardLayout>

United States Census Bureau. (2017). *2017 5-Year American Community Survey*. From American Community Survey: <https://www.census.gov/programs-surveys/acs/>

WegoWise. (2019). *WegoWise*. From WegoWise: <https://www.wegowise.com/>

Xcel Energy and CenterPoint Energy. (2019). *Multi-Family Building Efficiency Program*. From Multifamily Energy Solutions: <https://www.multifamilyenergysolutions.com/>

Appendix A: Communication with Phase II Participants

While some interaction with Phase II participants was dependent on the needs of each individual building and organization, several types of communication were common across all Phase II participants. These include the initial Participation Agreement, a document explaining next steps, an initial opportunity analysis, a review of the Multi-Family Building Efficiency Report, the request for proposals (RFP) for energy/water saving reimbursement, and the final reports given to each participant. An anonymous example of each document type is included below.

Participation Agreement

[Date]

[Mr. / Ms.][First Name] [Last Name]

[Organization]

[Street]

[City] [State], [Zip]

Re: EnergyScoreCards Minnesota Phase II

Dear [Mr./ Ms.] [Last Name]:

Minnesota Housing is interested in promoting benchmarking services in order to reduce energy and water usage in affordable multifamily housing. Specifically, the Agency is interested in continuing the EnergyScoreCards Minnesota work by addressing efficiency needs within a subset of the properties that participated in the original pilot and were deemed to have the most energy savings potential.

We are contacting you because you participated in the original pilot and have properties eligible to participate in Phase II of the EnergyScoreCards Minnesota pilot. This phase will include 30 properties with a goal to move beyond benchmarking to identify and implement energy and retrofit strategies. This letter provides more information about Phase II and how you can get involved.

What You'll Receive

Two years continued free benchmarking of owner-paid utilities through Bright Power Inc's EnergyScoreCards online platform.

A Bright Power Energy Analyst will work directly with owners/agents to provide access to EnergyScoreCards, provide support on data maintenance and help find energy savings opportunities.

The web-based platform offers:

- Automatic retrieval and collection of owner paid utility accounts
- Energy management tools including: ScoreCards, account analysis, portfolio reports and alerts
- Calculation of weather and space adjusted metrics and their comparison to other multifamily properties within the EnergyScoreCards database

Free consulting services and technical assistance, including help with analysis of benchmarking results, water efficiency projects and other assistance through utility-funded programs supplemented by the Center for Energy and Environment (CEE).

We would expect participants to enroll in available utility programs in order to provide property-specific analyses and access to rebates for potential energy upgrades. Participants may also choose to partake in more detailed analyses through a separate agreement with CEE.

In addition to the utility-specific offerings, CEE may help out with:

- Evaluating the recommended retrofits for reasonableness
- Evaluate water efficiency opportunities
- Provide additional project and technical implementation assistance (if warranted)

Assistance navigating various Minnesota Housing funding processes and energy efficiency requirements.

Sources of financing may include utility company incentives, owner contributions, and loans and grants/incentives from Minnesota Housing. Minnesota Housing's contribution will be negotiated on a case-by-case basis and could include grants, zero-interest deferred loans or amortizing loans.

Owner/Agent Role

In turn, the owner/agent will agree to evaluate benchmarking results for potential energy saving upgrades. If benchmarking data and associated consultation with the Energy Efficiency Fellow indicates a potential for energy or water savings, the owner/agent will work with utility personnel or CEE to evaluate possible strategies. The owner/agent will agree to share any and all applicable benchmarking and energy data from the EnergyScoreCards platform with the Energy Efficiency Fellow and CEE. As part of the evaluation, the owner/agent will make use of any applicable utility incentive programs, including but not limited to, Xcel Energy and CenterPoint Energy's Multifamily Building Efficiency Program or Minnesota Energy Resources Multifamily Energy Savings Program. If the owner/agent decides to move forward with implementing any of the proposed energy saving strategies, it will work with the Energy Efficiency Fellow and other Minnesota Housing staff to evaluate whether Minnesota Housing financing is an appropriate use to complete the retrofits.

The owner/agent must also recognize the following:

- Participation in Phase II of the EnergyScoreCards Minnesota pilot does not guarantee or create an advantage for funding through Minnesota Housing.
- Participation in Phase II of the EnergyScoreCards Minnesota pilot is completely voluntary and the owner/agent may opt out at any time.

How to Participate

If the owner/agent agrees with and is interested in participating in Phase II of the EnergyScoreCards Minnesota pilot, complete and sign the following Participant Agreement and return it to:

Katherine Teiken, Energy Efficiency Fellow
 Minnesota Housing
 400 Sibley Street, Suite 300
 Saint Paul, MN 55101

If you have questions, please contact me at katherine.teiken@state.mn.us or 651.296.7618.

Sincerely,

Katherine Teiken
 Energy Efficiency Fellow

EnergyScoreCards Minnesota Phase II: Participation Agreement

Instructions: Please check all properties that you want to be considered for participation in Phase II of the EnergyScoreCards Minnesota pilot.

Properties must have participated in the original EnergyScoreCards Minnesota pilot in order to take part in Phase II. Based on interest, not all properties are guaranteed to be able to take part in Phase II. Properties with Overall Energy Grades of C or D will be prioritized. All other properties will be placed on a waitlist.

On behalf of _____(name of organization), I submit the following properties for participation in the EnergyScoreCards Minnesota pilot project:

Property Name	Property Address	OLD – New Grade
<input type="checkbox"/> Property Name	Property Address	x
<input type="checkbox"/> Property Name	Property Address	x
<input type="checkbox"/> Property Name	Property Address	x
<input type="checkbox"/> Property Name	Property Address	x

ENERGYSCORECARDS MINNESOTA PHASE II

I hereby authorize Bright Power, Inc. and EnergyScoreCards Minnesota partners to collect historical and current utility consumption and spending information for the submitted properties for the purpose of utility consumption tracking. I understand I will be required to accept the Terms of Use of the EnergyScoreCards website before I can use or access EnergyScoreCards for the submitted properties which shall authorize Bright Power, Inc. to collect all relevant utility data. This data may be retrieved in hard copy or electronic form using account information and online account credentials I provide to Bright Power, Inc. This authorization extends from today until December 31st, 2018. I authorize Bright Power, Inc. to share my utility information with the State of Minnesota and the Center for Energy and Environment (CEE).

I agree to evaluate benchmarking results for potential energy saving upgrades. If benchmarking data and associated consultation with the Energy Efficiency Fellow indicates a potential for energy or water savings, I agree to work with utility personnel or CEE to evaluate possible strategies. I agree to share any and all applicable benchmarking and energy data from the EnergyScoreCards platform with the Energy Efficiency Fellow and CEE. As part of the evaluation, I agree to make use of any applicable utility incentive programs, including but not limited to, Xcel Energy and CenterPoint Energy's Multifamily Building Efficiency Program or Minnesota Energy Resources Multifamily Energy Savings Program. If I decide to move forward with implementing any of the proposed energy saving strategies I will work with the Energy Efficiency Fellow and other Minnesota Housing staff to evaluate whether Minnesota Housing financing is an appropriate use to complete the retrofits. I understand that submitted properties are not guaranteed to be selected for participation.

I understand that properties selected for participation will be expected to engage in various trainings, check-in calls and meetings through the course of the pilot, and to make an effort to use the EnergyScoreCards platform.

I also understand that participation in Phase II of the EnergyScoreCards Minnesota pilot is voluntary and that I may opt out at any time.

Owner/Agent Information	
Organization Name:	
Contact Name:	█
Contact Phone Number:	█
Contact Email:	█
Authorized Signer Printed Name:	█
Authorized Signature:	
Date:	█

Timeline

[Date]

[Mr. / Ms.][First Name] [Last Name]

[Organization]

[Street]

[City] [State], [Zip]

Re: EnergyScoreCards Minnesota Phase II

To Whom It May Concern:

On November 17th, you received an invitation to participate in Phase II of the EnergyScoreCards pilot with Minnesota Housing. We have not yet received a response from you and are following up to provide supplemental information. The attached document provides more detailed information on the pilot phases and the estimated owner time commitment.

This pilot is on a first-come, first-serve basis and space is filling up quickly. If the owner/agent agrees with and is interested in participating in Phase II of the EnergyScoreCards Minnesota pilot, complete and sign the previously provided Participant Agreement and return it to:

Katherine Teiken, Energy Efficiency Fellow
Minnesota Housing
400 Sibley Street, Suite 300
Saint Paul, MN 55101

If you need an additional copy of the Participant Agreement or are uninterested in participating in Phase II of the EnergyScoreCards Minnesota pilot, please contact me at katherine.teiken@state.mn.us or 651.296.7618.

Sincerely,



Katherine Teiken
Energy Efficiency Fellow

EnergyScoreCards Pilot – Phase II	
<p>Purpose: The goal of this pilot is to help Minnesota Housing understand what educational resources, technical assistance, and financial resources are needed to help owners/agents move from accessing building utility data into taking action on remedying any energy efficiency issues.</p>	
Pilot Structure/Next Steps:	Owner/Agent Time Investment:
1. Sign Participation Agreement	
~ The Owner/Agent will review and sign the participation agreement and will send to the Energy Efficiency Fellow.	
~ The Energy Efficiency Fellow will schedule a meeting or conference call to discuss next steps with the owner/agent and to answer any questions.	This meeting will last approximately 30 minutes
2. Set up EnergyScoreCards Account	
~ They Bright Power Energy Analyst will re-activate your EnergyScoreCards account.	
~ The Bright Power Energy Analyst will schedule a time to introduce/refresh the Owner/Agent to the EnergyScoreCards web platform. The Bright Power Energy Analyst will also review existing data with the Owner/Agent to ensure all of the utility accounts from the assigned buildings are operational in the web platform and that the building information is accurate.	This call should include staff from both the owner and property/asset management. This introductory call should last 60 minutes.
~ If any updates need to be made, the Owner/Agent will provide the Bright Power Energy Analyst with any outstanding building information and utility account information.	The set up process with the Bright Power Energy Analyst should be minimal, since all of your buildings are already in their system from the last pilot.
~ Based on utility billing cycles, it may take several weeks for new data to be uploaded into the web platform. After new data is introduced, the Bright Power Energy Analyst will schedule a check-in call with the Owner/Agent, Energy Efficiency Fellow, and Center for Energy and Environment to help interpret the new data.	Depending on the number of buildings the Owner/Agent is benchmarking, this call should take between 30 and 60 minutes.
~ The Bright Power Energy Analyst will schedule ongoing check in calls to help interpret the benchmarking data, in conjunction with the Energy Efficiency Fellow.	~ These ongoing check-in calls will be scheduled quarterly, or as needed. Please budget at least 30 minutes for each check-in call.

3. Review Data and Determine Next Steps	
~ The Energy Efficiency Fellow will schedule periodic check in calls/meetings.	Please budget 30 minutes per quarter for these calls. These calls may be in conjunction with calls with the Bright Power Energy Analyst.
~ The Owner/Agent will review the benchmarking data and discuss next steps with the Energy Efficiency Fellow and Center for Energy and Environment.	
~ Center for Energy and Environment will help to determine for which utility (or other) programs buildings are eligible.	
4. Building Audit	
~ The Owner/Agent will decide whether to proceed with next steps for any buildings.	
~ The Owner/Agent will enroll any agreed-upon buildings into eligible utility (or other) programs. The Owner/Agent will update this "Energy Event" information in the EnergyScoreCards web platform.	Please budget at least 30 minutes to fill out utility program paperwork. Please budget 15 minutes to update each "Energy Event" in the web platform.
~ The Utility program (or other) audit will be conducted in order to diagnose potential building problems. Center for Energy and Environment will be available to help diagnose any water efficiency issues.	For each building that the Owner/Agent decides to have participate in a utility (or other) program, the time needed depends on the size of the building. For Xcel's Multifamily Building Efficiency Program (MBEP), The walkthrough audit generally takes 2 hours and site staff should be available. The direct install portion generally takes 4 hours and site staff should be available. If the building is unable to participate in the MBEP, please budget a similar amount of time to work through other utility programs or with CEE.
~ The Utility (or other auditor) will issue a report with recommendations.	
~ The Owner/Agent will review the report with the Program Administrator, Energy Efficiency Fellow and Center for Energy and Environment.	After the audit is completed, the program administrator will set up a time to review all of the reports/recommendations with the Owner/Agent and the Energy Efficiency Fellow. Please budget 2 hours for that. CEE will also be available to review the recommendations for reasonableness.

5. Project Planning	
~ The Owner/Agent will decide whether or not to move forward with recommended retrofits.	
~ If yes, The Owner/Agent will update this "Energy Event" information in the web platform. The Owner/Agent will also discuss financing options and other next steps with the Energy Efficiency Fellow. This may include small grants or other financing options.	Please budget 15 minutes to update each "Energy Event" in the web platform. Please budget at least 30 minutes to discuss the retrofits and financing options with the Energy Efficiency Fellow and Center for Energy and Environment.
~ If no, the Owner/Agent will meet with the Energy Efficiency Fellow and Center for Energy and Environment to determine what barriers prevented action (time burdensome, financial burdensome, benchmarking data not valuable, utility incentive program not valuable, etc)	Please budget at least 30 minutes to discuss barriers with the Energy Efficiency Fellow and Center for Energy and Environment.
<p>Contacts: The Minnesota Housing Energy Efficiency Fellow will be your main point person, but representatives from Bright Power and CEE will be available as needed, depending on the specific needs of your buildings.</p>	

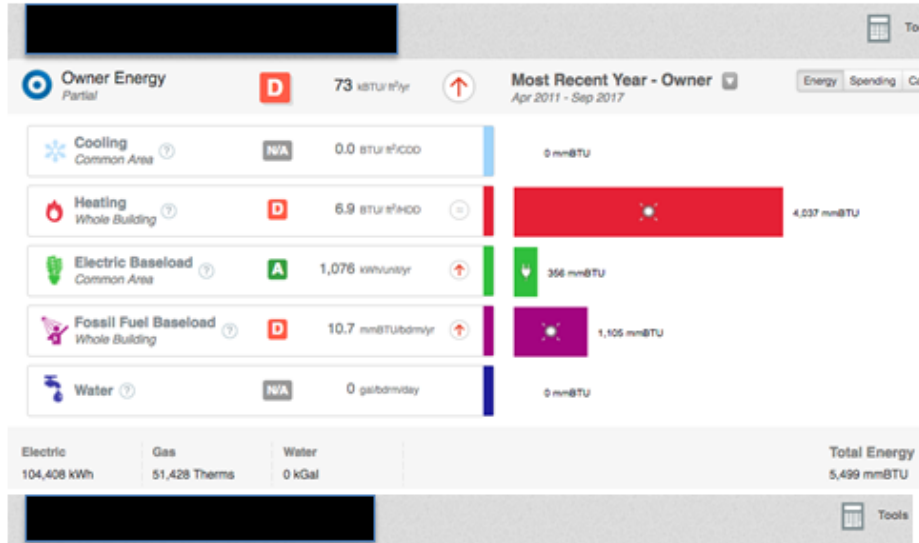
Opportunity Analysis

Energy ScoreCards Phase II

Initial Opportunity Analysis for [REDACTED] - October 2017

[REDACTED]

Quick Facts: 75,710 sq ft, 103 bedrooms



Total Energy	Full Year 2014 - Owner	Most Recent Year - Owner	Difference	Units
Energy	4,849 C	5,499 D	+ 13%	650 mmBTU
Cooling Energy	15 B	0 N/A	-	-15.0 mmBTU
Heating Energy	3,438 C	4,037 D	+ 17%	599 mmBTU
Electric Baseload Energy	351 A	356 A	~	5.00 mmBTU
Fossil Fuel Baseload Energy	1,045 D	1,106 D	+ 6%	61.0 mmBTU

Opportunities

Based on EnergyScoreCards grades, [REDACTED] (overall D) should be considered to be a higher priority than [REDACTED] (overall B) or [REDACTED] (overall A). The biggest opportunity for [REDACTED] is in decreasing the natural gas usage. [REDACTED] is scoring a "D" for both fossil fuel baseload usage and heating. Natural gas usage (combined baseload and heating) has increased 15% since 2014. There may be an opportunity to replace the boiler system, which is original to the building. Due to the boilers also controlling the domestic hot water needs of the building, boiler system replacement would result in both heating and fossil fuel baseload savings.

Next Steps

Step One

The first step for any of the buildings that you are interested in moving forward with is to enroll the building in the FREE [Multi-Family Building Efficiency Program](#). They will perform free direct install services (LED lights, high efficiency showerheads and aerators) in tenant units and common areas. They will also perform a walkthrough audit identifying other energy saving opportunities.

You have already enrolled [REDACTED] for the program. If you decide to enroll the other two buildings, I can help you with the application.

Step Two

For buildings with water saving opportunities, Dan May with Center for Energy and Environment will tour the buildings to analyze the water efficiency opportunities.

Step Three

When you have received the audit report back from the Multi-Family Building Efficiency Program, Dan will provide a 3rd party review of the report in order to help you prioritize recommendations.

Additional Information about the Multi-Family Building Efficiency Program

- Program Website: <http://www.multifamilyenergysolutions.com/>
- 2-page Information Sheet:
<http://www.multifamilyenergysolutions.com/staticfiles/xs/PDF/Marketing/Multi-Family-Cobrand-Multi-Housing-Fact-Sheet.pdf>
- Frequently Asked Questions :
http://www.multifamilyenergysolutions.com/staticfiles/microsites/MultiFamilyEnergy/Files/MN_Business-MultifamilyFAQ.pdf

Quarterly Check-In Call Agenda and Communication

Reply all | Delete | Junk | ...

EnergyScoreCards: [REDACTED]

Teiken, Katherine (MHFA)

Reply all | ...

Thu 9/20/2018, 10:50 AM

[REDACTED] Megan Rosa <mrosa@brightpower.com>

Sent Items

Hi [REDACTED]

Since we were able to update the data, I'm sending over an agenda and some highlights from the building data for our call on Monday. If you do decide that you'd prefer to reschedule the call, please let me know!

Agenda:

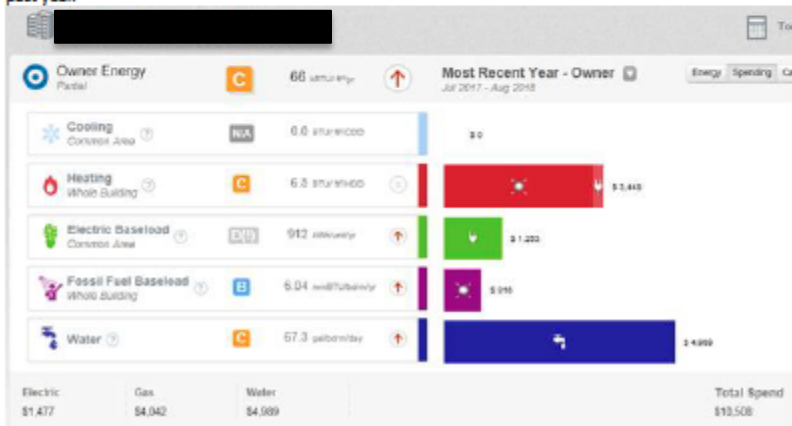
12:00 – 12:05: Gather

12:05 – 12:15: Review building energy data

12:15-12:25: Discuss new/ongoing energy projects

12:25-12:30: Discuss the end of the pilot – Survey and Interview

[REDACTED] is spending roughly \$10,500 annually on utilities. Usage for electric and water have increased over the last year. Natural gas usage has decreased. The increase in usage has cost Families First an extra \$364 on utilities this past year.



ENERGYSCORECARDS MINNESOTA PHASE II

Usage by Fuel	Q3 2017 - Owner	Most Recent Year - Owner	Difference	Units
Energy Usage	623	600	-3%	-18.0 mMBTU
Electric Usage	9,717	10,749	+11%	1,032 kWh
Gas Usage	5,903	5,683	-4%	-220 Therms
Water Usage	413	467	+13%	54.0 KGal



Katherine Teiken
 Energy Efficiency Fellow | Multifamily Division
 Minnesota Housing
 400 Wabasha Street North, Suite 400 | St. Paul, MN 55102
 Direct: 651.296.7610 | Main: 800.657.3647

Housing is the foundation for success. | mnhousing.gov



Review of MFBE Report

The review of the MFBE report varied based on whether the utility found at least 15% whole building energy-saving potential. Samples of both versions are below.

Version 1- Building Meets Minimum Threshold:

July 6th, 2017



Saint Paul, MN 55104

Re: EnergyScoreCards Minnesota Phase II – Review of Multi-Family Building Efficiency Recommendations

Dear [REDACTED]:

Thank you for providing a copy of the report and recommendations you received through the Multi-Family Building Efficiency Program. As part of the services offered through your participation in Phase II of the EnergyScoreCards program, Dan May with the Center for Energy and Environment has provided the following 3rd party review of the report and recommendations.

If you have questions, please contact me at katherine.teiken@state.mn.us or 651.296.7618.

Sincerely,

A handwritten signature in blue ink that reads "Katherine Teiken".

Katherine Teiken
Energy Efficiency Fellow



EnergyScoreCards Minnesota Phase II – Review of Multi-Family Building Efficiency Recommendations

Energy Savings Goals

There is a great opportunity to hit the minimum threshold to obtain incentives from the Multifamily Building Efficiency Program. As stated on the report, the minimum threshold for Tier I is energy savings at the 15% level. With the opportunities that were listed, their respective costs, and the increase in rebate incentive, we recommend that you implement the projects needed to reach the Tier II energy savings threshold of 20%.

The building has already reached 5.3% savings through the direct install. With the boiler upgrade savings of 11.9%, the building is already over the 15% threshold (totaling 17.2% savings, as the report indicates). Based on our last phone call, [REDACTED] already has plans to replace the boiler also plans to replace the water heater. This is already covered by the report, but the following savings are likely to already be completed upon the water heater and boiler installations:

- ECO Measure 0 - Direct Install: 5.3 % savings
- ECO Measure 7 - Boiler Upgrade: 11.9% savings
- ECO Measure 3 - Domestic hot water pipe insulation: 0.6% savings (should be part of work scope in replacing old water heater with new water heater)
- ECO Measure 5 - Boiler pipe insulation: 0.5% savings (should be part of works scope in replacing old boiler with new boiler)
- The upgrades listed above would come to 18.3% building savings.

The lighting upgrades associated with ECO Measures 1 and 4 may be the best upgrades to pursue in order to reach the 20% building savings tier. However, at that point, the only remaining energy savings recommendations that would not be met would be ECO Measures 2 and 6 (weatherstripping the front door and replacing the window AC covers).

Incentives/Rebates

The available incentives/rebates increase substantially if you decide to pursue Tier II- 20% energy savings tier versus Tier I - 15% energy savings. Because of the increased incentives and the limited additional investment needed to meet the higher energy savings tier, we believe that pursuing the 20% energy savings tier is a reachable goal.

In the scenario discussed above, you can meet Tier II - 20% energy savings by completing ECO Measures 0, 1,3,4,5, and 7. If we compare this scenario to only completing measures in the Tier I – 15% scenario, the rebate amount would increase by \$5,062 while the estimated project cost only increases \$3,382.

In the report, an alternative sample Tier/Incentive Scenario for reaching Tier II (20% energy savings threshold) has you completing the ECO measures 0, 1,2,3,4, and 7. If we compare this scenario to only completing measures in the Tier I – 15% scenario, the rebate amount would increase by \$4,800 while the estimated project cost only increases \$3,118.

In both Tier II scenarios, the additional cost of projects associated with completed the additional ECO measures would be more than covered by the increased incentive rebate amount. In fact, you would actually be decreasing the total project cost after rebate if you were to complete all of the recommendations to meet the 20% savings goal.

Effect on EnergyScoreCards grades

Completing the lighting and boiler heating upgrades would help your two worst Energy Scorecards grades: electric baseload and whole building heating. While there are other impacts on heating and electric baseloads scores and usages, lighting and the heating system have two of the largest impacts on these energy usages.

Next Steps

As the Multi-Family Building Efficiency Program report already states, make sure to submit any information regarding proposed work to the Program Implementer, Energy Insight, before moving forward with any work. Also, make sure to inform bidding contractors on the requirements for upgrades. For example, according to the report, the boiler upgrade must be “a higher efficiency, fully modulating, condensing unit with efficiencies in the 93-95% range, with integrated energy management controls that include a 5:1 turndown ratio.” This would hold true for the pipe insulation, and lighting/lighting controls upgrades, and any other upgrades you plan to make.

If you have any additional questions or would like any additional detail, please reach out to Katherine Teiken (Katherine.teiken@state.mn.us) of Minnesota Housing or Dan May (dmay@mncee.org) of Center for Energy and Environment.

Version 2- Building Does Not Meet Minimum Threshold:



400 Wabasha Street North, Suite 400
St. Paul, MN 55102
P: 800.657.3769
F: 651.296.8139 | TTY: 651.297.2361
www.mnhousing.gov

September 26th, 2017

[REDACTED]

**Re: EnergyScoreCards Minnesota Phase II – Review of Multi-Family Building Efficiency
Recommendations for [REDACTED]**

Dear [REDACTED]:

Thank you for providing a copy of the report and recommendations you received through the Multi-Family Building Efficiency Program. As part of the services offered through your participation in Phase II of the EnergyScoreCards program, Dan May with the Center for Energy and Environment has provided the following 3rd party review of the report and recommendations.

If you have questions, please contact me at katherine.teiken@state.mn.us or 651.296.7610.

Sincerely,

A handwritten signature in blue ink that reads 'Katherine Teiken'.

Katherine Teiken
Energy Efficiency Fellow



EnergyScoreCards Minnesota Phase II – Review of Multi-Family Building Efficiency Recommendations

Energy Savings Goals

As stated on page 10 of the report, the minimum threshold for Tier I is energy savings at the 15% level. Based on the opportunities outlined in the report, [REDACTED] does not have a savings potential that will meet the minimum requirements of at least 15% energy savings for the program. As a result, the incentives offered through the Multi-Family Building Efficiency Program will not be available. However, there is still the potential that individual recommendations could qualify for custom or prescriptive rebates.

Rebates

Unfortunately, [REDACTED] does not qualify for rebates through the MFBE Program. However, we highly encourage you to move forward with the recommendations and pursue custom or prescriptive rebates.

LED Lighting: We encourage you to pursue LED lighting upgrades. Existing standard efficiency lighting can be replaced with higher efficiency LED bulbs and fixtures. Along with upgrading the lighting, consider installing efficiency lighting controls.

HVAC: We encourage you to pursue the HVAC opportunities. These opportunities include a Boiler tune-up, insulating heating pipes, and installing exhaust fan controls. Boiler tuneups are especially important if not completed within the last two years, and can help increase efficiency and act as preventative maintenance measure. As noted on the report, the cost effectiveness of the exhaust fan controls is relatively low in comparison to other upgrades, so this should be completed after all of the other recommended measures are complete.

Lighting rebates can be accessed through the One-Stop Efficiency Shop (<https://www.mncee.org/services/commercial-programs/one-stop-efficiency-shop®-lighting-retrofits/>). One-Stop Efficiency Shop is a program where a lighting auditor does a walkthrough of the building, and determines potential lighting upgrades and rebate amounts. The walkthrough would be completed in the common spaces and office areas, and not in the apartment units. The total lighting rebate can be up to 60% of project cost depending on estimated energy savings.

The building could also obtain prescriptive lighting rebates, if not participating in the One-Stop program. The One-Stop lighting auditor can help you determine which rebate program would work best for the property. Based on what other projects [REDACTED] would like to pursue, other rebates are available from Xcel Energy, which is the natural gas and electric utility provider for the building. Prescriptive rebates from Xcel Energy can be found here: https://www.xcelenergy.com/programs_and_rebates/business_programs_and_rebates/equipment_rebates



Effect on EnergyScoreCards grades

Completing the lighting and boiler heating upgrades would help two of your poor Energy Scorecards grades: electric baseload and whole building heating. While there are other impacts on heating and electric baseloads scores and usages, lighting and the heating system have two of the largest impacts on these energy usages.

Next Steps

Although you do not qualify for the incentives through the MFBE program, there are still rebates available that will make these projects cost effective for you. If you would like to complete all of the recommended lighting and lighting controls upgrades, we recommend you work through the One Stop Efficiency Shop program referenced above.

If you would like to only pursue one or two efficiency installations, most lighting contractors should be able to provide you with the documentation necessary to pursue individual rebates.

If you have any additional questions or would like any additional detail, please reach out to Katherine Teiken (Katherine.teiken@state.mn.us) of Minnesota Housing or Dan May (dmay@mncee.org) of Center for Energy and Environment.

Project Reimbursement Application

Deadline: Friday, September 1, 2017 at 5 p.m.

Minnesota Housing is now accepting grant funding applications for Phase II of the EnergyScoreCards Minnesota Pilot Program. The program's goal is to increase the energy and water efficiency for buildings participating in Phase II of the EnergyScoreCards Minnesota pilot. Grant funding will be available to offset the partial costs of these projects.

The available grant funding totals no more than \$50,000. All funded grant applications will receive the same distribution amount. Grant awards are expected to range between \$1300 and \$5000 per building, depending on the number of funded applications. Grant awards may not exceed the projected project cost for each building.

Eligible Applicants

Only owners/agents of buildings participating in Phase II of the EnergyScoreCards Minnesota Pilot Program are eligible to apply for and receive grant funding to implement energy or water efficiency projects. Applicants may apply for funding for each building that is participating in Phase II of the EnergyScoreCards Minnesota pilot. A list of eligible buildings will be provided upon request.

Applicants must have completed the entire set-up process for the Phase II EnergyScoreCards Minnesota Pilot Program for each building that is requesting funding. Set-up includes providing to Minnesota Housing staff updated information for all buildings, participating in an introductory webinar of the EnergyScoreCards web-platform, and participating in an initial data review with BrightPower and Center for Energy and Environment staff. A list of buildings that have completed the set-up process is available upon request.

Eligible Uses

Eligible uses of grant funds include:

- Energy efficiency projects for participating buildings
 - This may include, but is not limited to: lighting upgrades, replacement of the HVAC system, etc.
- Water efficiency projects for participating buildings
 - This may include, but is not limited to: toilet replacement, showerhead replacement, etc.

In order to be awarded funding, energy or water efficiency projects may not be started prior to grant award announcements. All energy or water efficiency projects must be completed by the pilot completion date of December 31, 2018. No funds will be disbursed to projects that do not meet this timeline.

Review Criteria

Proposals will be evaluated for each individual building that is requesting funding, based on the following scoring criteria:

Category	Maximum Score
Applicant is a participant in the Phase II EnergyScoreCards pilot	10
Phase II EnergyScoreCards pilot set-up process is complete	10
Applicant has proposed a project that is likely to save water or energy within the building	10
Total (out of 30 possible points)	

Minnesota Housing staff and staff from the Center for Energy and Environment will review applications to determine selections and funding recommendations. Recommendations will be approved by Minnesota Housing staff.

All proposed energy or water efficiency project information must be finalized and submitted to Minnesota Housing for final approval prior to grant disbursement.

Application Timeline

Applications are due September 1, 2017 at 5:00 p.m.

Funding awards will be announced no later than December 31, 2017. Please note that funding awards may be announced sooner, at the discretion of Minnesota Housing staff.

Application Checklist

- Grant Funding Application

Submission Instructions

Provide application materials to Katherine Teiken, Energy Efficiency Fellow no later than 5 p.m. on Friday, September 1, 2017. Late or incomplete submissions will not be accepted. Submit all application materials electronically to Katherine Teiken, Energy Efficiency Fellow at katherine.teiken@state.mn.us. Please include EnergyScoreCards RFP Application Materials in the subject line.

Questions?

For more information, contact: Katherine Teiken, Energy Efficiency Fellow at katherine.teiken@state.mn.us or 651.296.7610.

Deadline: Friday, September 1, 2017 at 5 p.m.

Applicant Information	
Organization Name	██████████
Contact Person	██████████
Contact Title	██████████
Address	██████████
City, State, Zip Code	██████████
Telephone Number	██████████
Email Address	██████████

Submission Information

Submit all application materials electronically to Katherine Teiken, Energy Efficiency Fellow, at katherine.teiken@state.mn.us. Please include EnergyScoreCards RFP Application Materials in the subject line.

Funding Request

Please indicate the number of eligible buildings for which you are applying for grant funding:

██████████

Energy Efficiency or Water Efficiency Projects

Instructions: For each building for which you are applying for grant funding, please provide the following information. For any information that is not known at this time, please provide a best estimate. If awarded funds, all information must be updated and submitted to Minnesota Housing for final approval prior to grant disbursement.

Building One:

1. Building Name: ██████████
2. Building Address: ██████████
3. Is this building a participant in the Phase II EnergyScoreCards Pilot Program (check one)
 - Yes
 - No
 - Unknown

ENERGYSCORECARDS MINNESOTA PHASE II

4. Has this building completed the set-up process for the Phase II EnergyScoreCards Pilot Program?

NOTE: Set-up includes providing updated information for all buildings to Minnesota Housing staff, participating in an introductory webinar of the EnergyScoreCards web-platform, and participating in an initial data review with BrightPower and Center for Energy and Environment staff. (check one)

- Yes
 No
 Unknown

5. With as much detail as possible, please describe your proposed energy or water efficiency project. Please include information about how this project will help your building save energy. Please also include information about why this project is a priority to complete within this building. Note that changes to proposed projects will be allowed, but they must be submitted in writing and approved by Minnesota Housing prior to making changes.

6. Please indicate for which fuel your project is expected to decrease usage (check all that apply):

- Electricity
 Natural Gas
 Water
 Unknown

7. Please indicate whether your energy or water efficiency project is expected to help the owner/tenant/both save energy or water? (check one):

- Owner Only
 Tenant Only
 Both
 Unknown

8. Please provide an estimated cost for your energy or water efficiency project: _____

9. Please indicate the source of financing that will be used to finance the remainder of the project (e.g., operating budget/reserves, Low-Income Housing Tax Credits, PACE financing):

10. Please indicate the estimated energy or cost savings and anticipated payback period for this project: _____

11. Are you participating in a utility rebate/incentive program? (y/n) _____

a. If yes, please indicate the utility program: _____

b. If known, please indicate the estimated rebate amount for your energy or water efficiency project: _____

12. Eligible projects must be completed after the funding award announcement but prior to the pilot completion date of December 31, 2018. Please provide an estimated date for project completion: _____

Signatures

I certify and acknowledge, on my behalf and/or the applicant, that:

1. The statements and information contained in this application, based upon reasonable inquiry and belief, are true, accurate and complete.
2. I have been duly authorized and have full authority to execute this application on behalf of the applicant.
3. The applicant will promptly notify Minnesota Housing in writing of a change of any fact or circumstance represented in this application, or in any other document furnished in connection with this application, which is reasonably likely to have a material effect on the information contained in this application.

Authorized Signature

Printed Name

Title

Date

Project Reimbursement Application Acknowledgement



400 Wabasha Street North, Suite 400
St. Paul, MN 55102
P: 800.657.3769
F: 651.296.8139 | TTY: 651.297.2361
www.mnhousing.gov

September, 19th 2017



Minneapolis, MN 55404

Dear [REDACTED],

Thank you for applying for a grant through the Phase II EnergyScoreCards pilot program. This letter is to confirm that we have received all the necessary application materials for [REDACTED]. Evaluation and scoring of the applications is still in progress. We expect to be able to notify applicants of the results by the end of October.

Although not required in order to receive the referenced grant, we ask that you kindly share the following items when you receive them:

- Multi-Family Building Efficiency Report for [REDACTED]
- Multi-Family Building Efficiency Report for [REDACTED]

If you are planning to pursue rebates through the Multi-Family Building Efficiency Program, please remember that you must complete all measures indicated in the report in order to receive the rebate from the utility. If you do not plan to pursue rebates through the Multi-Family Building Efficiency Program, you are still eligible to pursue individual rebates through the traditional prescriptive or custom rebate process. Dan May with Center for Energy and Environment and myself can help you determine which path is best for you.

Sincerely,

A handwritten signature in blue ink that reads 'Katherine Teiken'.

Katherine Teiken
Energy Efficiency Fellow
Katherine.teiken@state.mn.us | 651.296.7610

Project Reimbursement Application Approval



400 Wabasha Street North, Suite 400
St. Paul, MN 55102
P: 800.657.3769
F: 651.296.8139 | TTY: 651.297.2361
www.mnhousing.gov

November 16, 2017



Minneapolis, MN 55404

Dear [REDACTED]

I am pleased to inform you that your proposal for the Phase II EnergyScoreCards Minnesota Pilot Program was approved for funding. It was one of 13 applications selected, and all funded buildings are receiving an equal award amount of \$3,845. Your proposal will be awarded a total of \$11,535; funding is available for each of the following projects:

- Perform a boiler Tune-up
- Install Snow Melt Moisture Controls
- Install a Chiller Condenser Fan VFD
- Install LED lighting in common areas and in exterior areas
- Install LED lighting in common areas and in exterior areas
- Install LED lighting in exterior areas

If at any time your proposed energy or water efficiency project changes from what was presented in the application, please immediately notify Minnesota Housing in writing by sending an email to Katherine Teiken. As a reminder, all projects must be completed after the grant contract has been executed but no later than December 31, 2018. No funds will be disbursed to projects that do not meet this timeline.

Minnesota Housing will require invoices that indicate the project completion date and total project cost. Funding reimbursement cannot exceed the total award amount of \$3,845 per building. Additional information on the funding reimbursement process will be forthcoming.

Minnesota Housing will follow up with a formal grant agreement, which will require your review and signature to execute, along with the submission of any necessary documentation. We expect to send these out within 30 days of the date indicated on this letter. If there are any changes to this anticipated timeline, you will be notified.

If you have any questions about the award or contract process, please feel free to contact Katherine Teiken at katherine.teiken@state.mn.us or 651.296.7610

Sincerely,

Wesley J. Butler
Assistant Commissioner, Multifamily

Final Building Report



400 Wabasha Street North, Suite 400
St. Paul, MN 55102
P: 800.657.3769
F: 651.296.8139 | TTY: 651.297.2361
www.mnhousing.gov

December 3rd, 2018



Saint Paul, MN 55102

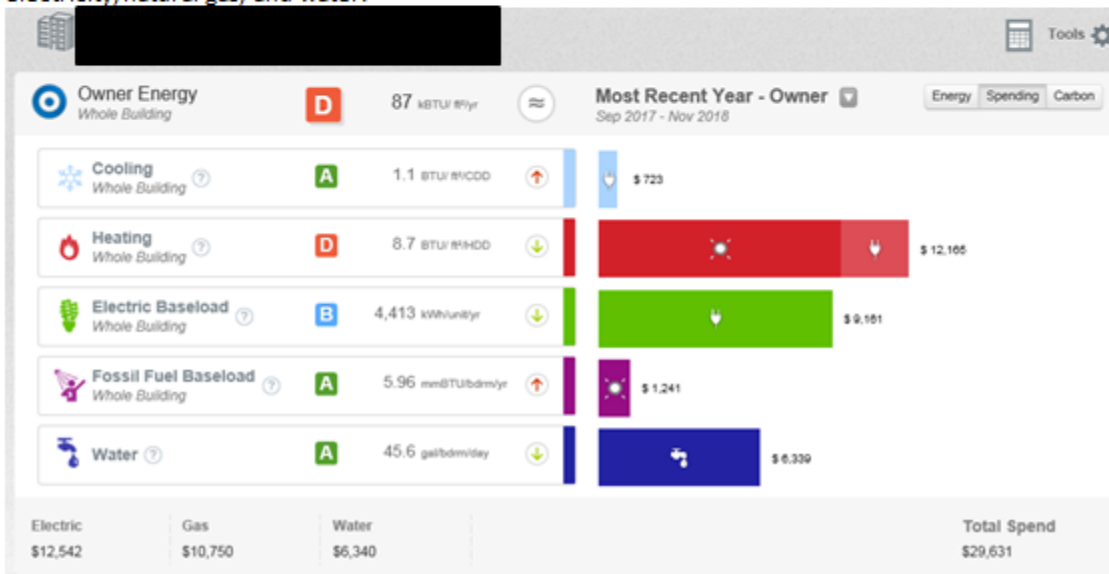
RE: EnergyScoreCards Minnesota – Final report for [REDACTED]

Dear [REDACTED],

Please find below the final report for [REDACTED].

Overall Usage:

[REDACTED] is currently scoring a "D" overall and is spending \$29,631 annually on electricity, natural gas, and water.



ENERGYSCORECARDS MINNESOTA PHASE II

Usage and Spending by Fuel:

Comparing weather normalized data from 2016 to 2018, electric usage has increased 7%. Water and natural gas usage have both decreased.

Usage By Fuel	Full Year 2016 - Owner	Most Recent Year - Owner	Difference		Units
Energy Usage	2,339	2,228	↓ -5%	-111	mmBTU
Electric Usage	101,926	108,729	↑ 7%	6,803	kWh
Gas Usage	19,917	18,572	↓ -7%	-1,345	Therms
Water Usage	826	600	↓ -27%	-226	kGal

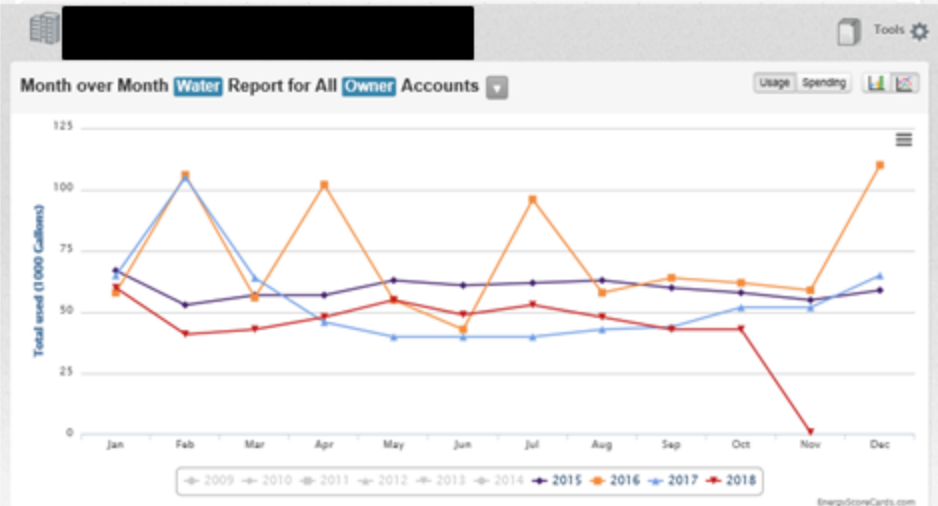
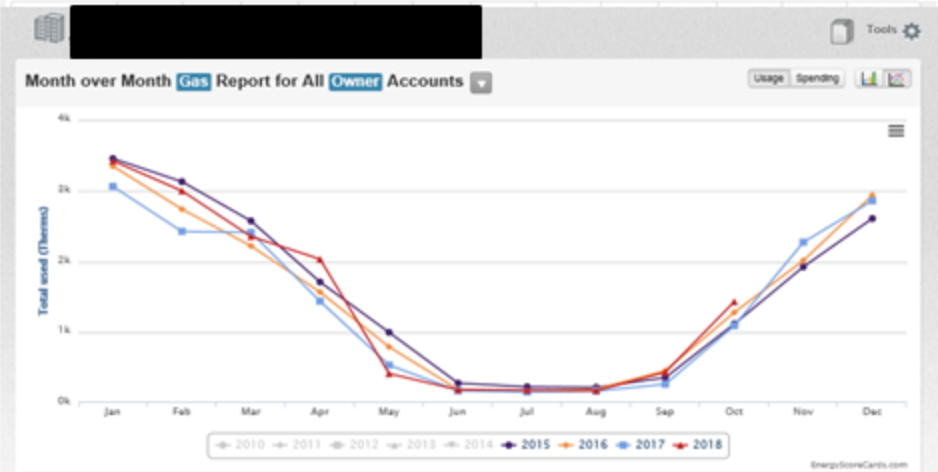
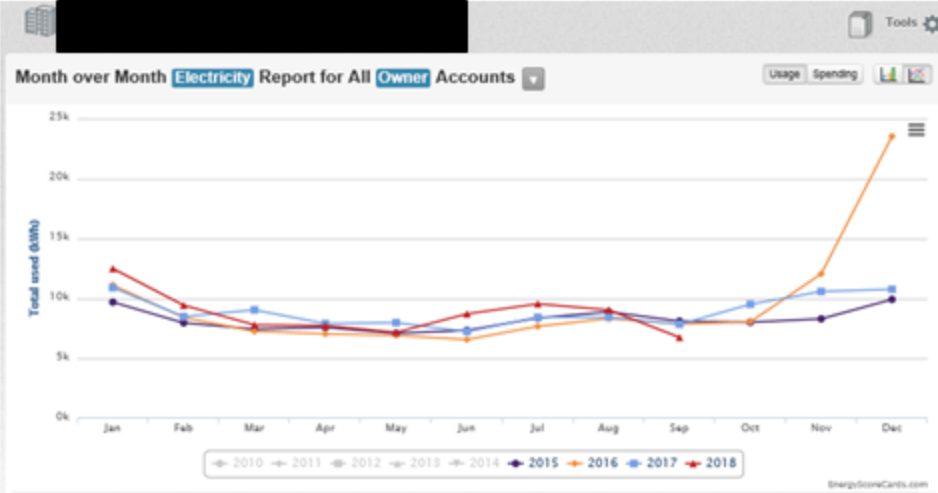
In 2018, you've saved \$376 compared to 2016.

Spend By Fuel	Full Year 2016 - Owner	Most Recent Year - Owner	Difference		Units
Energy Spend	\$23,712	\$23,292	~	(\$420)	
Electric Spend	\$11,300	\$12,542	↑ 11%	\$1,242	
Gas Spend	\$12,412	\$10,750	↓ -13%	(\$1,662)	
Water Spend	\$6,296	\$6,340	~	\$44.00	

ENERGYSCORECARDS MINNESOTA PHASE II

Comparing 2015 – 2018 data:

The raw (not weather normalized data from 2015 – 2018) is below:



ENERGYSCORECARDS MINNESOTA PHASE II

Project Performance:

According to our records, [REDACTED] has completed two energy and water savings projects. These projects are exceeding our projections and are showing real energy and water savings.



ENERGYSCORECARDS MINNESOTA PHASE II

Conclusion:

██████ has project reimbursement of \$3,845 available for work that is completed on or prior to December 31, 2018. ██████ may request reimbursement for the installation of LED lighting, occupancy or daylight harvesting sensors, pipe insulation, or a high efficiency boiler. Reimbursement requests must be received by December 31, 2018. Please reference the signed grant agreement for additional details.

Your access to the online EnergyScoreCards webplatform is available through December 31, 2018. If you have any questions, concerns, or suggestions please do not hesitate to reach out to me. A final report documenting the findings from the two-year pilot will be completed in the spring of 2019.

Sincerely,

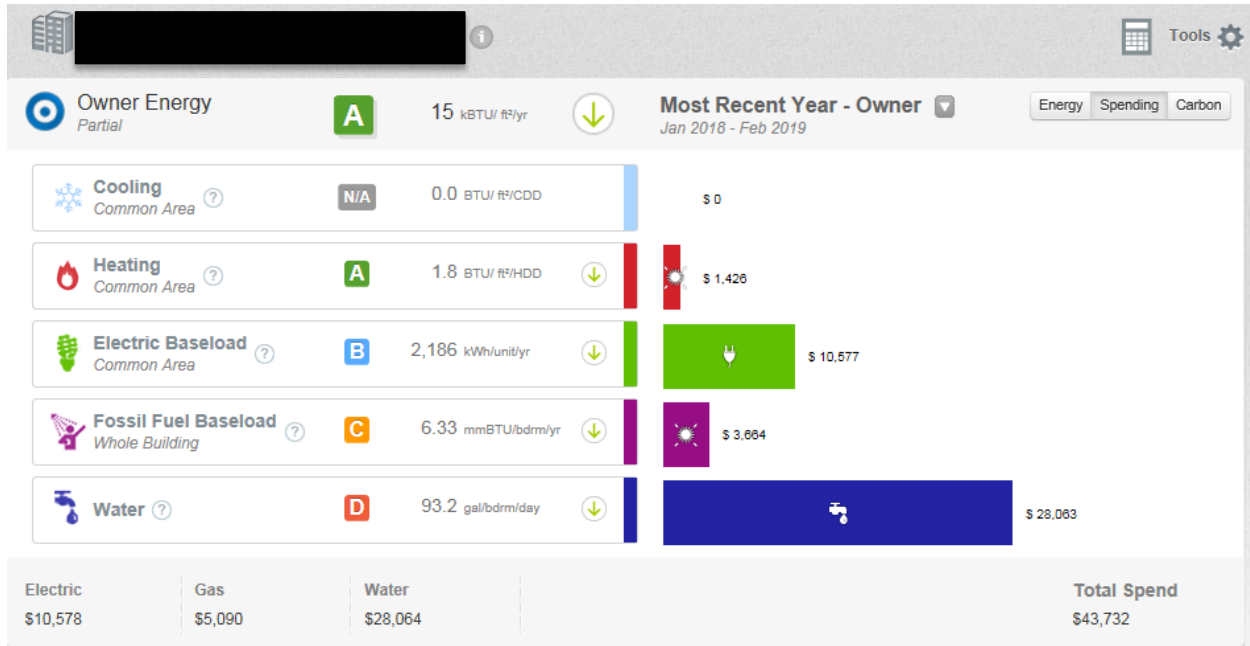
A handwritten signature in blue ink, appearing to read "Katherine Teiken". The signature is fluid and cursive, with a long horizontal stroke at the end.

Katherine Teiken
Energy Efficiency Fellow

Appendix B: Tools for EnergyScoreCards Minnesota

Benchmarking Tool





The online EnergyScoreCards platform was used throughout the pilot to track participants' energy and water usage. The following graphs and data are samples of this platform:







Indices	Full Year 2016 - Owner	Most Recent Year - Owner	Difference	Units
Energy Index	15 A	15 A	~ 0.00	kBTU/ft ² /yr
Cooling Index	3.7 D	0.0 N/A	- -3.70	BTU/ft ² /CDD
Heating Index	2.7 A	1.8 A	↓ -33% -0.90	BTU/ft ² /HDD
Electric Baseload Index	1,276 A	2,186 B	↑ 71% 910	kWh/unit/yr
Fossil Fuel Baseload Index	6.3 C	6.3 C	~ 0.00	mmBTU/bdrm/yr
Water Index	97.3 D	93.2 D	↓ -4% -4.10	gal/bdrm/day


ENERGYSCORECARDS MINNESOTA PHASE II

 [REDACTED]   Tools

Usage By Fuel	Full Year 2016 - Owner	Most Recent Year - Owner	Difference		Units
 Energy Usage	986	983	~	-3.00	mmBTU
 Electric Usage	116,267	89,606	↓ -23%	-26,661	kWh
 Gas Usage	5,892	6,768	↑ 15%	876	Therms
 Water Usage	2,733	2,620	↓ -4%	-113	kGal

 [REDACTED]  

Spend By Fuel	Full Year 2016 - Owner	Most Recent Year - Owner	Difference	
 Energy Spend	\$18,347	\$15,668	↓ -15%	(\$2,679)
 Electric Spend	\$14,127	\$10,578	↓ -25%	(\$3,549)
 Gas Spend	\$4,219	\$5,090	↑ 21%	\$871
 Water Spend	\$27,255	\$28,064	↑ 3%	\$809


[REDACTED]
1

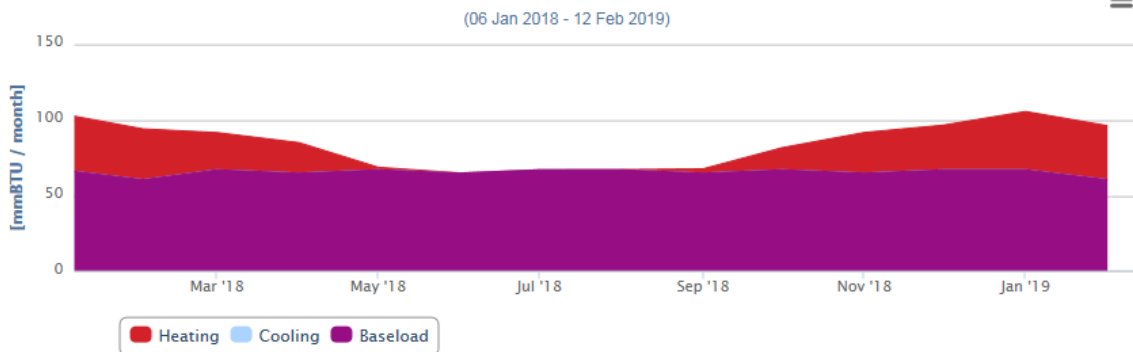
Tools

Usage and Fuel Summary

Export



	Most Recent Year - Owner	Heating	Cooling	Baseload	Usage	Rate	Spending	# of Accounts
▶ Electricity (kWh)		0.00	0.00	89,606	89,606	\$0.1180	\$10,578	1
▶ Gas (therms)		1,896	0.00	4,872	6,768	\$0.7521	\$5,090	1
Total Energy (mmBTU)		190	0.00	793	983	\$15.95	\$15,668	2
▶ Water (kGallons)		0.00	0.00	2,620	2,620	\$10.71	\$28,064	1
Total Utilities							\$43,732	3

Most Recent Year - Owner - Total Utilities




















EnergyScoreCards.com

ENERGYSCORECARDS MINNESOTA PHASE II

Tools 

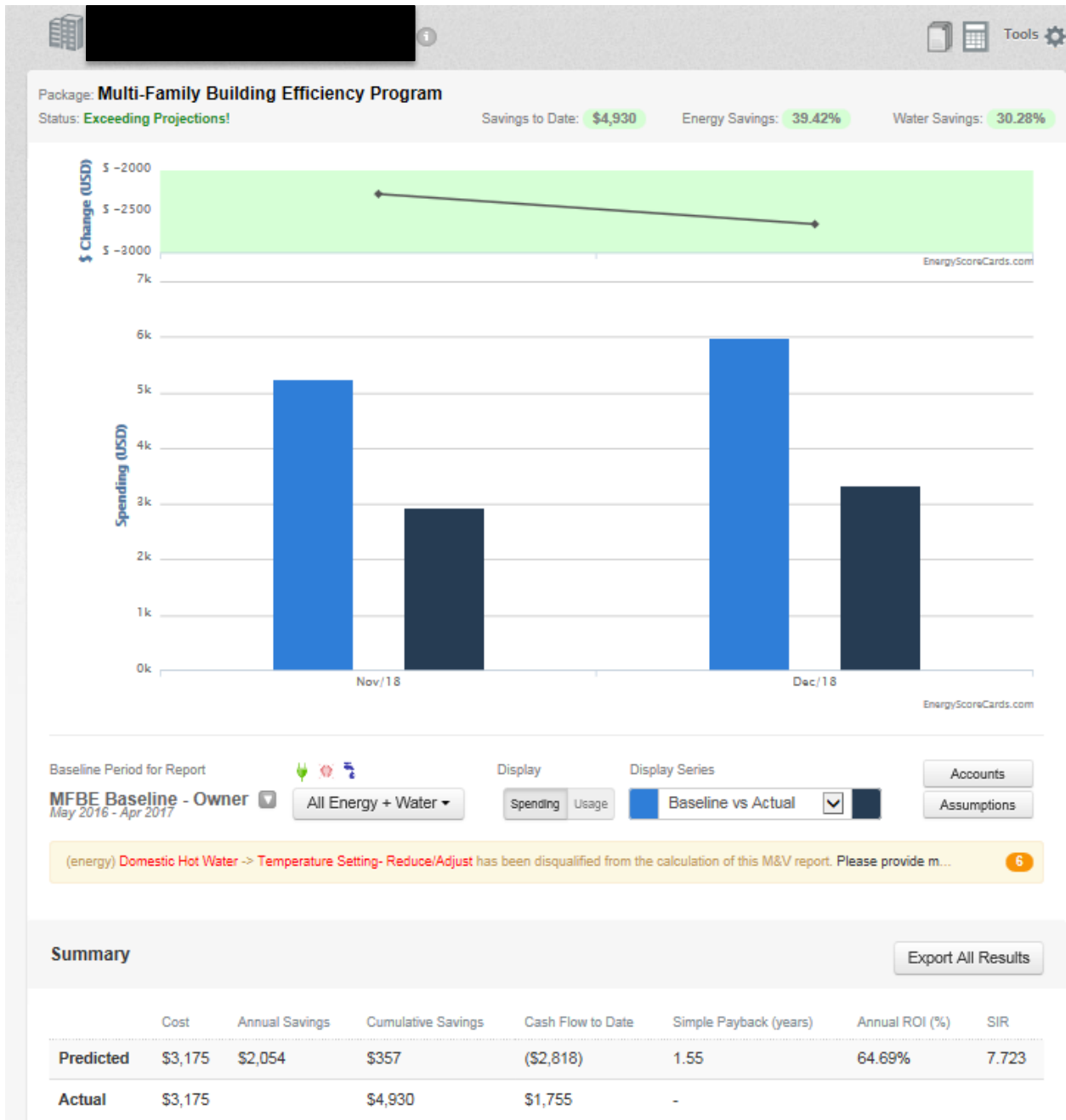
Energy Events / Multi-Family Building Efficiency Program
Compare Scorecards
Measurement and Verification Report

Package Name	Multi-Family Building Efficiency Program		Net Package Cost	\$23,260
Date of Report/Proposal	10/11/2018		Net Package SIR	N/A
Report/Proposal Prepared by			Predicted Annual Savings	\$4,527
Implemented	4 out of 7 Events		Predicted Simple Payback	5.14 years

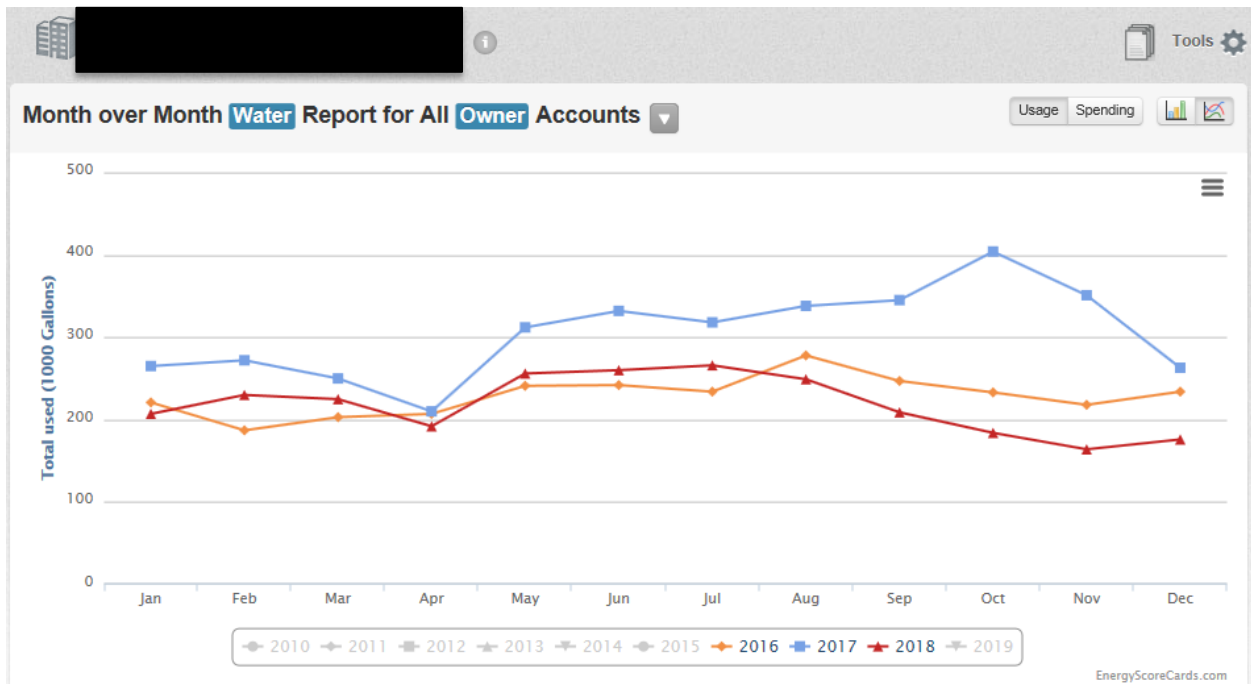
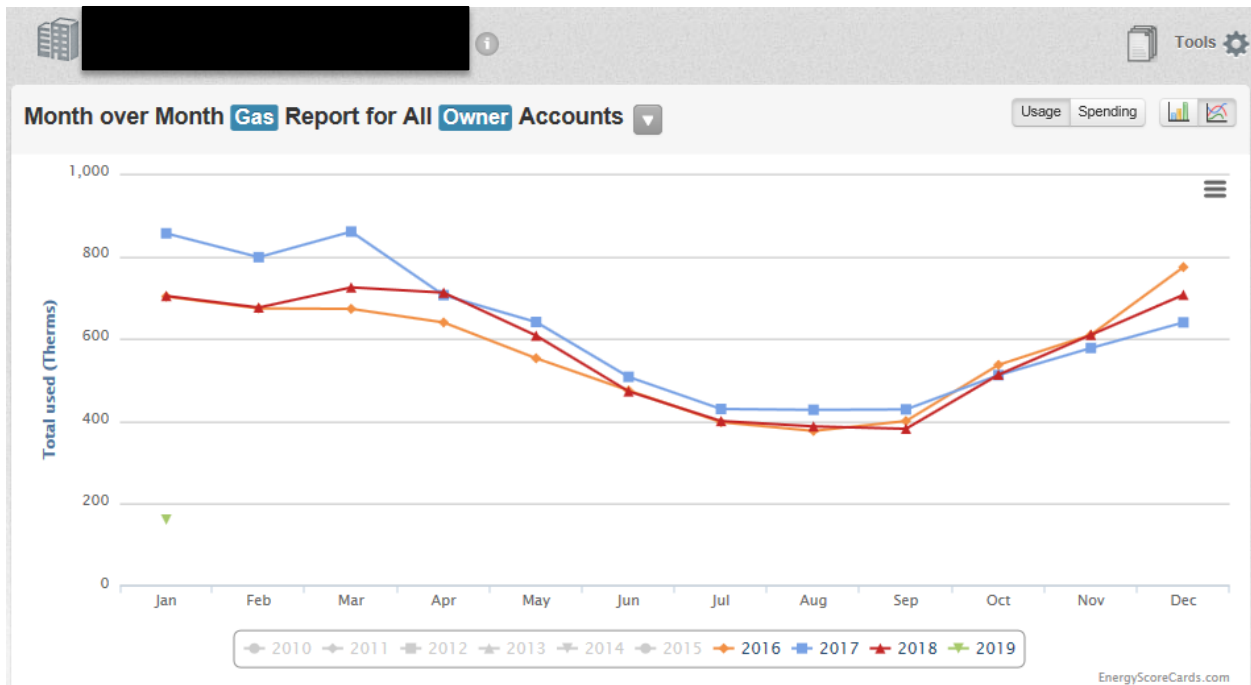
Category	Event	Description	Implementation Start Date	Implementation End Date	Predicted Cost, \$	Predicted Annual Savings, \$	
Lighting	In-Unit Lighting-	In unit LED installatio	03/01/2017	07/20/2017	0	657	 
Water	Low-Flow Faucet	Installed 39 aerators	03/01/2017	07/20/2017	0	656	 
Domestic Hot Water	Temperature Set	Reduce water heater			0	59.00	 
Lighting	Lighting Controls	Lighting Controls			13,230	2,984	 
Lighting	Building Lighting	Efficient lighting upgr	04/12/2018	04/12/2018	3,175	85.00	 
Appliances	ENERGY STAR F	Energy Star Refriger			2,940	86.00	 
Heating	Boiler/Furnace- I	Replace Furnace anc	10/11/2018	10/11/2018	3,915	0	 

Add Event
Save
Delete Package

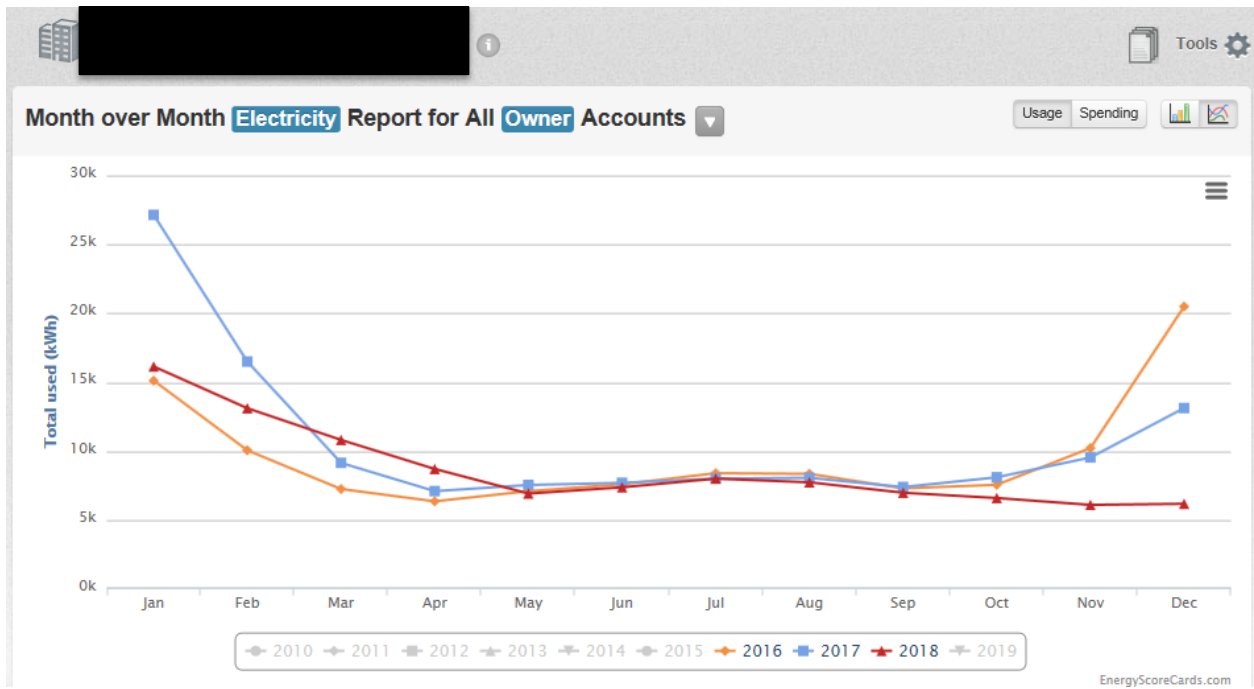
ENERGYSCORECARDS MINNESOTA PHASE II



ENERGYSCORECARDS MINNESOTA PHASE II



ENERGYSCORECARDS MINNESOTA PHASE II



Technical Assistance

EnergyScoreCards Minnesota Phase II provided technical assistance for pilot participants. These include:

Technical Assistance Provided
Met in-person to review utility bills, identify causes for high bills, and to review MFBE recommendations.
Helped the building identify causes for high the utility bills.
Estimated savings associated with replacing the chiller pump and whether rebates are available for the project through the MFBE program. Provided information regarding prescriptive rebates that the building could apply for to help cover the cost of the pump.
Reviewed lighting bids and provided feedback, noting cheaper options for replacing the lighting and how the project impacts future involvement in the MFBE program. Also provided information on the rebates available through the Xcel OneStop lighting program.
Provided cost information for daylight sensors, sample recommissioning studies done through Xcel and CenterPoint, and information on building recommissioning services offered through CEE.
Identified causes of utility spikes and high bills in general.
Provided information on boiler reset controls, how to adjust them, and optimal settings.
Provided information on how glycol affects the efficiency of a boiler via email.
Reviewed boiler stack temperatures to determine whether the system was operating inefficiently. Summarized findings in email and over the phone for the property owner.
Reviewed a boiler and water heater bid and provided feedback on the bid.
Looked into why the electric usage was higher in spring and provided more information on how lighting, AC, electric heating, ventilation, and appliances affect common area electric use.
Met with a property owner and maintenance staff to discuss general boiler maintenance and the benefits of installing 3-way valves.
Troubleshooted issues with hallways overheating.
Performed a walkthrough of a building and identified high impact energy-saving projects. Evaluated ventilation, lighting, and HVAC systems. Provided a summary of the findings by email, including an estimate of the energy savings associated with changing common area lighting from fluorescent to LED.

Sample Technical Documents Provided

Bid Review



Memo

To: [REDACTED]
From: Tim Ellingson
CC: Carl Nelson, Kelley Brim, Katherine Teiken,
Date: December 29, 2017
Re: [REDACTED]

Greetings [REDACTED]

Thank you for your time on the phone on 12/21/17 to discuss the boiler bids for [REDACTED]. The following brief memo highlights a few key general observations as well as bid-specific points from CEE's review of provided materials. Please note that this document is intended to serve as a collaborative resource and does not favor any bid or path at this time.

Specifically, CEE recommends leveraging the utility program lead for further program and incentive related considerations. Energy Insight Inc's 11/2/17 e-mail to [REDACTED] staff included three options which align with CEE's feedback, and subsequent clarification should come from Energy Insight as to what the program or utility deems a cost-effective boiler ECO.

General CEE Observations:

- The three bids vary significantly in boundary/scope/approach.
 - An Owner-provided, goal-focused bid specification is suggested where respondents are required to accommodate or address Owner-specified known existing conditions (ie air in system, pumping issues, etc) as part of a bid.
- For this application, it is possible that condensing-capable boilers may not represent the most cost-effective option as compared to non-condensing boilers given existing seasonal operational hours and zones served by perimeter radiation.
 - If the boilers do not receive low enough return water temperatures, efficiency gains of condensing technology will not be achieved.
 - Existing zone temperature control vitality as well as furniture placement will impact the effectiveness of a retrofit.
 - If the boiler ECO is removed, it significantly lowers the potential savings and incentive tier composition, possibly inhibiting program eligibility.
- Since both existing boilers function, there may be cost-effective potential in replacing one unit with a condensing capable boiler, leaving the other unit in place. This option's cost would have to be balanced against cost of flue requirements as well as the existing domestic hot water heater.

Bid 1: Northland Mechanical Contractors

- \$65,900 Base, \$21,575 Add Alt 1, \$14,500 Add Alt 2, \$97,975 If all selected
- Described Scope:
 - Base: Remove/dispose old boilers, provide/install two new condensing boilers, install new flues, boiler control(s), and route condensing drains
 - Add Alt 1: Provide air separator, expansion tank, air eliminator, secondary pumps.
 - Add Alt 2: Provide condensing water heater

CEE Bid-Specific Feedback:

- This bid is the most thorough in acknowledging existing issues on site pertaining to air in the system and potential pumping issues (ie inadequate capacity) beyond the discrete scope of boiler replacement.
- The contractor has indicated pursuit of the base bid [alone] will not address root cause issues/symptoms noted on site, indicating substantial cost to address base bid and add alt options.

Bid 2: Ryan Plumbing and Heating

- \$33,650 Base, \$13,780 Add Alt 1
- Described Scope:
 - Base: Remove/dispose old boilers, provide/install unknown boiler quantity, new pumps, venting, and accessory wiring.
 - Add Alt: Provide tankless water heater with supplemental storage tank.

CEE Bid-Specific Feedback:

- Note that the PDF bid scan is cut off on left margin and is also hand-written making it difficult to confirm robust detail.
- Proposed boiler quantity is unclear. Boiler output capacity of the referenced GB142 variant is unspecified and could be undersized by output and quantity. Sub-model codes (24/30/45/60) exist to differentiate capacity.
- Informational note: Boiler and domestic hot water heater both appear to be tankless selections, but domestic hot water does leverage a storage tank.
- No mention of pumping or air issues mentioned in Bid 1.

Bid 3: H₂C

- \$53,496 Base, No Add alt.
- Described Scope:
 - Base: Remove/dispose old boilers, provide/install two new condensing boilers of differing capacity. Scope includes installing an indirect Armtrol tank water heater.

CEE Bid-Specific Feedback:

- Specified indirect water heater relies on condensing boiler(s) for hot water and is likely to complicate boiler control. CEE suggests keeping hydronic boilers and domestic hot water heating systems separate to simplify boiler control and promote ability to leverage condensing capabilities when possible.
- Per manufacturer literature, the specified indirect water heater quantity (Qty 1) is insufficient to meet the domestic hot water needs of an 18 unit apartment facility.
- No mention of pumping or air issues mentioned in Bid 1.

Boiler Outdoor Reset

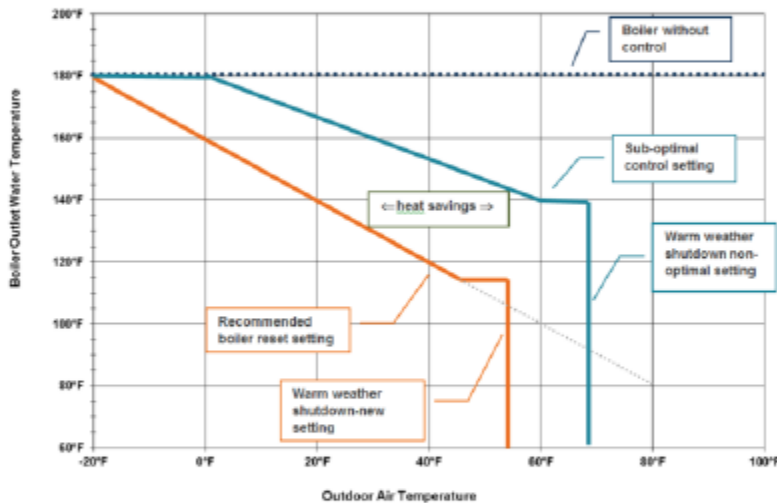
Boiler Outdoor Reset Overview

Summary

A boiler outdoor reset control coordinates boiler water temperature with outdoor temperature: the warmer the outside temperature is, the less the boiler heats the water in the heating system. A boiler cutout control (A.K.A warm weather shutdown or WWSD) shuts off the boilers automatically when the outdoor temperature is warm enough to provide adequate indoor temperatures. Many boiler reset and warm weather shutdown settings can be adjusted lower to achieve more energy savings. This not only saves energy, but can improve building comfort and reduce boiler wear and tear. Most multifamily buildings have some form of boiler reset control/warm weather shutdown controls, whether built into the boiler, or as a separate controller.

Boiler Reset Control Settings Example

Appendix: Boiler Reset/Cutout Control energy savings



Above is an example of some boiler reset control settings. This is an example from a boiler reset control adjustment that CEE completed. This specific building was running a bit on the warm side, so we changed the boiler water temperature settings to be cooler in general, especially during warmer temperatures. As you can see, with both the original, and the adjusted settings, the boiler water temperature maxes out at 180 degrees. This is a typical setting for buildings when they see cold winter temperatures. With most boiler reset controls, you can adjust the high boiler water temperature, the low boiler water temperature, and also the outside temperatures that correspond with these boiler water temperatures. The warm weather shutdown (WWSD) is also shown on both of these boiler settings. Buildings have something called a balance point temperature, where the building is not in need of heat if the outside temperature reaches a certain temperature. Many multifamily buildings do not need to be heated if outside temperatures are between 50-65 degrees F. The orange line setting shows a warm weather shutdown setting of 55 degrees F. The boiler(s) will shut down if the outside temperature is above 55 degrees F, and automatically turn back down when the outside temperature dips below 55 degrees F. The dotted top line shows a boiler without a reset control, where the temperature is constant regardless of what the outdoor temperatures is. It is important to note that condensing (high efficiency) boilers like to see lower water temperatures than non-condensing (standard efficiency) boilers.

Zone-Specific Issues Checklist

Zone-specific problems must be identified and corrected before fine-tuning the boiler control settings in response to a tenant complaint or observed over/under heating. Below is a list of common zone-specific problems that should be checked when there is a problem. Make sure to observe the building for open windows, during both the coldest months and fall/spring.

Thermostat is inaccurate (check against thermometer), is improperly located (next to heater or window), or doesn't provide proper signal (check for proper on-off of 24 volt output to zone valve as thermostat is adjusted above and below the current temperature).

Zone valve isn't operating or doesn't close tightly. Feel pipe temperature in the zone compared to the main line temperature to see if hot water is circulated when it should and shouldn't be. Manually opening and closing the valve a few times often corrects problems with the valves being temporarily stuck open or closed. If a valve still doesn't respond properly to the thermostat, it may need to be replaced. (Note: Feel the pipe temperature at least one foot from the connection to the main line. Allow time for the pipe and radiators to warm or cool after hot water circulation is changed.) This can be completed for the whole building during a routine maintenance check once the heat is turned on, or on a case by case basis upon resident comfort complaints.

Radiator blockage by dust, curtains or furniture will reduce the heat output.

Unrealistic resident expectations of apartment temperatures above 75°F may not be met. Similarly, it may not be possible to keep an apartment below 70°F because of heat coming from surrounding apartments. Measure and document apartment temperature with a thermometer when responding to heating complaints to address this potential issue with a resident.

Appendix C: Full Qualitative Results

Online Survey

At the end of EnergyScoreCards Minnesota Phase II, participants were asked to respond to an online survey describing the energy- and water-saving projects that they had undertaken. Nine of the 11 organizations responded to the survey, and all anonymous results from that survey are below. Note that the projects listed below do not represent the full breadth of projects undertaken during Phase II; some organizations declined to participate in the online survey and some organizations neglected to list every project that had been undertaken. These additional projects were captured through in-person and phone conversations with participants.

ENERGYSCORECARDS MINNESOTA PHASE II

Organization	Have you implemented or do you plan to implement any energy or water saving projects between January 1, 2017 and December 31, 2018?	Please describe the project(s). If there are multiple projects identify them as projects 1, 2, 3, etc., and include property name or address in the project descriptions.	When was each project completed? For each project, specify the project number and completion date.	What was the total cost of the project(s)? For each project, specify the project number and completion date.	Were you able to access any other sources of funding to offset the project costs?	Please list the project number, the rebate amount, the source of the additional funding, and the approximate date that it was received.	Is there any additional information that you would like to share with us at this time?
Organization 1	No				No		The timing of this pilot was incredibly difficult for us; it coincided with opening two new buildings and retrofitting the use of another in addition to normal operating and some significant staffing issues. There was not enough capacity to add projects to the team.

ENERGYSCORECARDS MINNESOTA PHASE II

<p>Organization 2</p>	<p>Yes</p>	<p>Project #1 We installed limit switches on the furnaces Installed special water meters to alert us to over water usage Projects #1, #2, #3, & #4 Inspected and repaired all toilets and plumbing issues if found Reduced lighting in hallways, lounges and underground parking or put in motion detectors without affecting safety and security</p>	<p>Project #1 in summer process in 2017 Project #1, #2, #3 & #4 were completed in 2017 but are done on a regular basis and during unit annual inspections as a preventative</p>	<p>Most of these were done over routine maintenance and was more time than cost. As for Project #1, we no longer have this property and do not have these records.</p>	<p>Yes</p>	<p>This would be for project #1 and we no longer have these records</p>	<p>It was very helpful to have the information available as we have initiated a few energy saving plans and changes in all of our properties and will continue to use what we have learned.</p>
<p>Organization 3</p>	<p>Yes</p>	<p>1) Completed a several projects as recommended by an MBFE energy audit. 2) Installed LED exterior lighting and partially paid for a new EF furnace 3) replace community room lights and one exterior light with LED</p>	<p>1) June 2018 2) October 2018 3) November 2018</p>	<p>1) \$30,000 2) \$6,800 3) \$3,800</p>	<p>Yes</p>	<p>Yes. For project 1. \$15k from MBFE, \$6K from the City of Minneapolis Green Cost Share</p>	<p>It was helpful having time built into the calendar to review energy use.</p>

ENERGYSCORECARDS MINNESOTA PHASE II

Organization 4	Yes	1) Direct install new LED bulbs & low-flow aerators at both buildings 2) New boilers & water heaters in Building 12 installed high-efficiency boilers in 4th floor boiler room to replace two older ones that were out of circulation.	1) Direct-install lighting and aerator replacements in both buildings completed 7/5/2017 & 5/24/2017, respectively. 2) Boilers installed 8/10/18 and water heaters installed 8/3/18.	1) Direct-install paid for as it was part of the coordinated energy program with MHFA 2) Boilers & water heaters were \$60,000 after parts & labor.	Yes	Project #2 (boilers) qualify for CenterPoint energy rebate, but has not yet been processed	No.
Organization 5	Yes	Installed new boilers and water heaters - LED lighting in common areas and units -Low flow toilets and faucets - Weather stripping on main entry doors -AC chill stoppers installed in all units -Mini Split installed in Community Room/Office - New Roof - Pipe Insulation in boiler room	Project was officially completed in September 2018. Majority of scope of work completed by end of January 2018.	\$53,106.41	Yes	Xcel Energy and CenterPoint Energy Multi-Family Building Efficiency program delivered a rebate amount of \$42,485.12 . Received in September 2018	
Organization 6	Yes	looking at a boiler replacement at one property and some LED lighting at another	12/31/2018	boiler \$100,000 LED \$2500	Yes	still in process	No
Organization 8	No				No		

ENERGYSCORECARDS MINNESOTA PHASE II

<p>Organization 10</p>	<p>Yes</p>	<p>1) water saving aerators installed 2) exterior LED lighting installed 3) retrofitting all covers for AC sleeves to make them more airtight in winter 4) replacing weather stripping on exterior doors 5) boiler stack dampers installed</p> <p>1) water saving aerators installed 2) exterior LED lighting installed 3) changing out all toilets to 1.28 gal per flush models</p>	<p>All above completed between June 2017 and December 2018</p>	<p>1) no cost - completed through multifamily program 2) \$3,500 3) T&M = \$1,000 4) \$100 5) \$800</p> <p>1) no cost - completed through multifamily program 2) \$3,500 3) \$2,500</p>	<p>Yes</p>	<p>Grants from MMHFA for each property totaled \$3,845 and \$7,690. In addition, the multifamily program determined that one building at was eligible for reimbursement of 50% of the costs incurred.</p>	<p>While the program was very good about identifying common suggestions for heating and electric savings, resources and information on the water usage were not as robust. It was also difficult to get definitive answers on the use of glycol in the boiler systems, and determining why there was such a large discrepancy in heating costs between two almost identical buildings. (Turned out to be most likely caused by a faulty gas meter).</p>
<p>Organization 11</p>	<p>Yes</p>	<p>Water saving devices installed in all units. LED bulbs and fixtures installed in all units, and most common areas. Motion sensor lighting installed in laundry area.</p>	<p>18-Jun</p>	<p>Not known</p>	<p>Yes</p>		

In-Person Interviews

The following questions were asked of pilot participants in an in-person interview at the end of the pilot:

Benchmarking

- How was your experience benchmarking your properties' energy and water usage?
- Have you used other benchmarking services such as WegoWise or EnergyStar Portfolio Manager?
 - If yes, which program did you prefer and why?

Technical Assistance

- How was your experience having access to technical assistance through Center for Energy and Environment? This assistance may include help troubleshooting problems during the quarterly check-in calls or via email or in-person at a property.

Energy Projects

- *If the interviewee indicated that they implemented projects on the online survey:*
 - Would you have implemented projects without going through the pilot?
 - What is the impact of these projects on the property? Have your utility bills decreased?
 - Will implementing these projects benefit the renters? If yes, please explain.
 - Why/How did you pick the energy-saving projects that you picked?
- *If the interviewee indicated that they had not implemented projects on the online survey:*
 - What prevented you from implementing an energy-saving project during the pilot period?

Project Reimbursement

- *If the interviewee indicated that they implemented projects on the online survey:*
 - Why did/didn't you apply for the project reimbursement available through Minnesota Housing?
 - How was your overall experience with the project reimbursement process?

Utility Rebates

- Did your property(ies) participate in the Xcel/CenterPoint Multi-Family Building Efficiency Program? If yes, please answer the following questions:

ENERGYSCORECARDS MINNESOTA PHASE II

- How was your experience working with the Xcel/CenterPoint Multi-Family Building Efficiency Program?
- How did this experience compare to working through other utility incentive processes (e.g., Home Energy Squad, Energy Design Assistance (EDA) process, other utility programs)?

Overall Pilot/Policy

- What about the pilot was the most helpful? Why?
- If this pilot were to be continued/expanded, what changes would you recommend?
- Do you have any thoughts/recommendations on Minnesota Housing's benchmarking, energy rebate, or overall sustainability policies?
- Would you pay for these services? (e.g., Technical Assistance, benchmarking)

The full transcripts from the final interviews are included below. Please note that Organization 7 and Organization 8 declined to participate in a final in-person interview.

Final interview with Organization 1

INTRODUCTION

Katherine Teiken: Tell me about how the pilot went for you. How was your experience with it?

Interviewee: I feel like the pilot didn't go for me, because of the timing of it. I saw opportunities but didn't have the capacity to take advantages of them. It was very interesting to see a data tool being used and think about how we might try to find internal capacity to do data tracking moving forward. Right now we track in Excel spreadsheets, but to have something that does more plug and play graphing and tracking over time, versus having to run a report is interesting. But again it is finding that human capital. It also went very fast. I was brand new when the pilot started and we were just going to open a building. It was really fast, not enough time to take advantage of the full program.

BENCHMARKING

Katherine Teiken: Have you used other benchmarking tools before?

Interviewee: No, I haven't used other benchmarking tools. There is a B3 tool, but I haven't had time to log into that. Our B3 contact has changed, but I might be interested in adding more buildings to that.

Katherine Teiken: Of the EnergyScoreCards tool, you mentioned that you liked some of the graphs. Was there a specific graph or data point that was helpful for you?

Interviewee: The year-to-year was really helpful. Seeing change from previous years was nice too. It was easier to understand, and that is the biggest thing for me. IT wasn't a lot of data to sort through in order to see trends like an Excel spreadsheet. IT was just you were up 5% or down 5% or whatever the change was.

Katherine Teiken: Was there anything about the tool that you didn't like?

Interviewee: No, there was nothing that I noticed that I didn't like. Sometimes there was a lot of clicking, but if I used it more it might have been easier to find the path I was supposed to be on. It was really simple. That is a win especially as I am trying to tell the story to other people.

Katherine Teiken: We had check-ins 4 times a year to look at the data. How were those check-ins? Was that the right number per year?

Interviewee: It is the right number. If I had a person that was doing something, a more frequent check-in about something specific might have been helpful. But for my purposes it was great.

Ashly McFarlane: Did you go into the tool in between the quarterly meetings?

Interviewee: At the beginning I was in there once a quarter in between. Then I lost time.

TECHNICAL ASSISTANCE

Katherine Teiken: One of the things that we heard from the end of the first pilot was that the tool was interested and helpful to know how buildings were performing. The downfall of the tool is that it didn't give specific guidance about what projects to implement. One of the things we tried to do to provide support there was encourage people to get an energy audit and then also have an on-demand resource from CEE to be available to answer questions and follow up on things that came out of the quarterly meetings. Were you able to take advantage of that or have any feedback?

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee: I tried at the very end to take advantage of that. I already knew about CEE and had worked with them at other jobs. I'm not sure that I took more or less advantage than I would have anyway because I already knew about its existence. Parallel to this we had been contacted by solar folks. If there is a Phase III, it might be interesting to have some solar information available. The other program that I really liked that happened parallel, because of the B3 and our work with the Weidt Group, I got to go to an energy forum last summer. That was very energizing. Other ways to connect people and think about energy would be good resources.

Katherine Teiken: As an aside, Xcel just came out with their low-income solar rewards program. Starting next year, they will have really good incentives for low income individuals or those serving them who want to put on-site solar on their roofs. There will be upfront and ongoing production incentives. The goal is to pay for about $\frac{2}{3}$ the cost of solar.

Interviewee: Our two new buildings are PV ready. Most of our other sites have a logical path for running all the infrastructure.

Ashly McFarlane: You mentioned time was a limiting factor. If you had an intern or someone hired, how would you want them to help you out?

Interviewee: From an energy perspective, it would be doing energy audits at buildings and following up on the information and see what are options are. A project management position could also work with our development department if there are grants available, work with funding sources, manage capital budget and work on what our long term plans are. We are in the middle of getting architects, engineers, MEP look at three of our buildings to work on 20 year capital planning. If we can tie energy pieces into that, that would be good.

Katherine Teiken: In terms of getting more resources, what is the best way for you? Conferences, phone calls, in-person resources? What is easiest or the most helpful for you?

Interviewee: Having links to websites with energy grants and funding sources was helpful. If there was a one-stop shop that you can click through for if you were looking for solar, building automation that you could use on your own time. But then having an actual person, so if you got stuck, got lost, have a question, want to follow up, that there be a body to talk to about how do I interpret this, do I qualify for this, why can't I find something. A combination. One of the things I liked about doing the energy network and the conferences is hearing ideas. I am a big fan of plagiarizing. If people have figured out a way to do things so that I don't have to recreate it, that's great. And it's energizing to hear ideas and see what others are doing.

ENERGY PROJECTS

Katherine Teiken: You weren't able to implement energy savings projects in these specific buildings. What were the barriers that prevented that?

Interviewee: Having a person. I struggle to spend our capital budget each year because there isn't enough human capacity.

Ashly McFarlane: Can you reallocate capital budget?

Interviewee: There is a contract project manager who our has used for 20 years and who does some of our building rep for big construction projects. They have worked on a lot of small projects over the last few years but have indicated that they are going to retire when our new building opens. There will be

ENERGYSCORECARDS MINNESOTA PHASE II

some amount of money from that we can reallocate. I also had a manager leave the department that gave an opportunity to look at how we are structured and try to think about that more strategically. I had some of that work happening, but I was waiting but I am hoping to take advantage of that departure and consulting dollars and combine it into another body. The downside is that we will be at break even with body count. This operating structure worked well for me at my last job, because you get people doing what they are good at rather than fill in gaps. Theoretically we should come out ahead, but I worry about it still being the same body count.

PROJECT REIMBURSEMENT

Katherine Teiken: Notably, you didn't say that it was a lack of money that was the biggest barrier. One of the things that we did as part of this pilot was to have the small grants available for building owners that were struggling and needed a bit of extra help to make a project viable. For this pilot, everyone got a flat amount of funding, almost \$4000 to do a project in their building. Do you think that grants are something that you would want to take advantage of in the future? In terms of planning for that, is there something beneficial to know that there will be a 10% match? Or would you rather it be on a case by case basis depending on the project? How can I give you money that is the best way for you?

Interviewee: I would lean toward the case by case. If there were other funding sources available, Xcel and MHFA, I would be more likely to try to combine funding sources. I am spoiled because there is a strong development and fundraising department who are skilled at writing grant applications and finding creative funding sources. Having it be case by case would give us more opportunity to get bigger opportunities.

Katherine Teiken: So instead of every project be able to get 10%, allow some projects to get more, but fewer projects get funded.

Interviewee: Yes.

UTILITY REBATES

Katherine Teiken: I know you didn't take advantage of the MFBE program., have you had experience with that program in other properties?

Interviewee: No

Katherine Teiken: There is also the home energy squad and energy design assistance. Have you had experience with either of those?

Interviewee: Yes. We used the EDA downtown. My experience with EDA was fantastic. It was cool. The Weidt group comes in and you sit in a room and watch the numbers change as you make decisions about the different equipment. It just has a real coolness factor. Having people who can speak in lay terms about what that means from an operating term. For us, because of things like smoking in the building and how tenants use the building and shared kitchens and bathrooms, being able to sit with folks who say well, this might be more efficient, but then able to talk about what that means for the staff who are working there and from a tenant experience is really helpful to all be in a room at once and be able to do that. It's fantastic.

Ashly McFarlane: Not participating in the MFBE program, was that just a time issue?

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee: Yes. This was a really weird intersection of timing because we had a huge campus being built. If the campus project didn't exist, there probably would have been more capacity to take on the energy stuff. But all of our resources are being thrown at the new buildings.

OVERALL

Katherine Teiken: If there is one thing you liked about the pilot, what would you say it would be?

Interviewee: Having all of the information available. Because it was a pilot, I knew about the MFBE program, the tool online. There was also a guilt factor. Oh, they are going to call me next week and I haven't done anything. There is incentive to try to keep working on things. This is needed. Having the resources fed, you don't have to look or do anything, they just magically appear in your inbox.

Katherine Teiken: Is there a recommended change?

Interviewee: If I were queen of the universe, it would be super cool to have a group of interns who could do project management. This would help create bodies and benefit the interns.

Katherine Teiken: Minnesota Housing has interns. Conceivably we could get an intern to do something like this. Generally our interns are either a semester or 3 months in the summer. Is that enough time, if it's not a yearlong position?

Interviewee: Sure. It would probably have to be one single project. You would probably have to pick a thing that the person was going to work on. But I feel like you could accomplish a project. Especially in a semester, but even in a summer. Some of the energy audit pieces. They might not be able to bring it to a close, but they could probably get it kicked off and help through the selection process. Help find funding. And organize it at the front end.

Ashly McFarlane: Selection process, you mean picking a contractor or a project?

Interviewee: Picking a project. Let's say the energy audit says that your top three are building automation, LEDS, and water aerators. That person could say here is the executive summary showing what we are going to save, here are the incentives I found, and here is my recommendation. And then be able to do a bid process or whatever project management is needed to get it going. I think even in the summer it would be accomplishable, if they were dedicated to it.

Katherine Teiken: Do you have any thoughts overall about Minnesota Housing?

Interviewee: We're a big customer but there hasn't been anything notable. The biggest piece for me is if the pilot could have been pushed back two years, so we were starting it now, would have been a lot more fun and there would have been a chance we could participate more.

Katherine Teiken: Do you think the benchmarking, technical assistance, would you be willing to pay for?

Interviewee: Possibly on the benchmarking. Our property management team just went to YARDI. One of my questions for them was about energy tracking and I think Portfolio Manager is free. If I didn't have to pay for it, I wouldn't. That's the easiest thing to talk about paying for because you can affect change with it. If it is measured, you can change it.

Ashly McFarlane: Do you think the best benefit from benchmarking is being able to compare all properties or is it looking at each specific property year over year to see if there is a spike?

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee: I do both. The spreadsheet has data from 2013. We have it broken down to each property and then by housing unit and then by type of square footage. We have a mix of office, drop in center, shelter, single room occupancy, and efficiency units. None of those are individually metered, all on the building meters. There is some submetering in the types of spaces, so I am able to get closer on the per bed number and compare that by building.

Katherine Teiken: When you are making decisions about what projects you're going to do, how do you decide what you're going to work on?

Interviewee: Right now, we are break - fix. So, it's safety, comfort, program effectiveness, and energy is taking a backseat. I'm really hoping to get to where it is weighing all of those, including energy. If we can get these human capacity, we'll be able to get to that point.

Katherine Teiken: To close out, is there anything left you'd like to see?

Interviewee: No.

Final Interview with Organization 2

INTRODUCTION

Katherine Teiken: I'd love an honest assessment from the owner/manager point of view about what worked and what didn't work. How was this two year experience for you?

Interviewee: The only one this made a big difference on was one building. We found out that the water bills were way off. It gave us an option to know it was a problem, do digging, and even after that it is still a problem. A little better. We went beyond working with you but also hiring someone to come into the building and help us find where the issues were. This building is newer and is a green building. IT has a strange heating system and it is harder to tell if it is correct or not. One building we know is way off the charts but we know that is because the system they have was short suited because they ran out of money in construction. It helps the owners know we're not the only ones making these comments. They can see the reports you have and show them here's the property and how much better we can do. But they don't want to spend the money. That's the problem. Getting the owners to spend the money. If there are incentives in the future for them, maybe we could get them to do something. Managing and seeing day to day operations, we can see it is a problem but getting them to do something is another thing. They just see big bucks going out the door right now. How is this going to affect them in the long run? Will it be worth it?

Katherine Teiken: Are you looking for a certain payback?

Interviewee: Less than 10. 5 would be the max. That is a lot of money to come up with, especially for the smaller non-profit owners. They're not looking to be in debt forever. They're doing the best they can to keep housing for the residents and sometimes that means skipping things that we don't want them to skip. It's understandable, they don't have a lot of money, everything goes into the property. I really think financial incentives would be the big thing. A five year payoff at the max would probably be a good scale.

Katherine Teiken: What is the most helpful type of incentive? 10% max? Tiered system based on more savings = more money?

Interviewee: Rebates. Options of lower cost contractors/construction. Grants and low interest loans to give them more incentive to do something. Upfront payment instead of reimbursement. On an owners term, the less that comes out of their pocket, the better. They also like the idea that in 5 years, the property will be better. At this property we had a rent reduction due to utility allowances. PHA allowances more than doubled. We're now losing money because we are down about 28 dollars a unit. At a property this size, 46 units, we barely make ends meet as it is. Big incentives or rebates are what they need. Bigger properties have bigger funds to do stuff. That building is old and has a lot of needs. We have done some stuff there, but I don't know if it is enough to make a difference. That would be more of an incentive there because they would see a faster payback. The cost may be more but they have money and they can do it.

BENCHMARKING

Katherine Teiken: How was your experience using EnergyScoreCards

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee: It is okay. I don't refer to it a lot. The owners use it more than I do. I look at it when we have our meetings and we talk about it. Otherwise, not in between meetings. I don't pay much attention to it. The owners like it.

Katherine Teiken: Is there a certain graph or type of information that was more helpful?

Interviewee: To get the manager or maintenance people to look at it - You can see how the graphs are going, but there isn't any alarm when something is going wrong with your systems. We hooked up with an energy person for one building, they have a system/alarm that sends them an email when there is an issue going on this month with your water, check this or this or this. That was really helpful to get the maintenance guys going in the right direction and catching it before it was a big deal. A lot of times we see the water bill going up and it doesn't go up huge all at once, it goes up and you don't tend to pay attention at a day to day basis until all of the sudden you're going whoa, wait a minute. When you could have prevented this a long time ago. Something to that extent would be great. A way to put metering in or something saying your usage is way above normal. Monthly is fine. That is better than noticing 6 months down the road that your bill is going up, and instead of thinking it is seasonal, you're going wait a minute, there is something wrong here. You don't know if something happened for one month and it is no big deal and it will correct itself in a month or two and doesn't. You tend to go, oh, my bill was that last month and you get sidetracked.

Katherine Teiken: Have you ever used WegoWise or energy star portfolio manager.

Interviewee: We used portfolio manager. But I haven't paid much attention to it. As the regional manager, I have way too many other things to look at.

TECHNICAL ASSISTANCE

Katherine Teiken: What kind of technical assistance would be helpful for you?

Interviewee: You did that with us. That was really helpful. If we are seeing errors or things going on with these reports, having a meeting with the owners, instead of just us sitting there saying there is an issue and we need to do something. Or them coming to use saying what are you going to do it? To have a meeting and get more details on where we can go, what we can do, what we should look at. With the water bill at one building, no one could tell us what the issue is. We know our water bill is high, but what is the issue? Even this energy guy, he can say your water is going up. But where is it going up? Where is it coming from? What can we do to look at other than looking at everyone toilets. There has to be something. It hasn't been solved yet. We looked at every toilet and fixed every toilet. It's still high. What is the next step? We had the irrigation system looked at. Do we have an underground pipe that is broken? How can we figure out what to do from here? That is the biggest thing. Doing these things lets us know we are off in some areas. If we are off, what do we need to do, where do we check? We are getting the reports and they are great and a lot of information. But what do we do with it?

Katherine Teiken: In-person troubleshooting is more helpful?

Interviewee: Even just a phone call to say, here is where we can start. We do what we can and we look into it. But if you fix every toilet and you can't find a leak, what do we do? Do we need to go to the utility and figure out if the billing is wrong or if there is something wrong with the meter? Or if there is actually a leak somewhere? Or sometimes we have an electrical issue that we have to figure out. So far our maintenance person has been able to track them down, but not everyone has a good maintenance person. It is helpful to have something to push us.

ENERGYSCORECARDS MINNESOTA PHASE II

Katherine Teiken: How were the quarterly check-in calls?

Interviewee: It doesn't hurt to check-in, but quarterly might not be necessary unless there is an issue. When we talked, there wasn't a lot going on. Unless there is an issue somewhere. Maybe more as needed. With one building, maybe that would have been a little more. Some buildings, they can only do what I can do, and the owner isn't going to do anything, there isn't much sense in doing much further. If I keep getting the reports I can show them, or if the owner requests a meeting we can do something extra with that.

Ashly McFarlane: With the benchmarking data, you talked about if you see a bill spike that motivates you. Is there anything else?

Interviewee: Comparing other properties is a motivation. You get an idea that this property which is similar to this one, their electric bill is way down, why? With digging, you could tell us that we pay more of the bills, or they have air conditioning in the common areas and we don't. Something that would help us understand that a bit more. With this property, there is more here, but why is it so low? Information on comparables.

Ashly McFarlane: There is a need for when a bill spikes or something goes wrong at a property. If you already have a property you know could be more efficient, what is most helpful for you to figure out what projects to implement?

Interviewee: If you had a list of contractors for certain things we could work with. Not that you're recommending. But with one building, their system isn't up to par. Their system is so unique, an HVAC company had to go to school to learn to take care of the system. Help finding contractors or qualified contractors. We can look for contractors and every one of them will come back with something different that needs to be done. If you're not an HVAC person, you're looking at those going who is right and who is wrong? There needs to be help to figure out all that. Why talk the owners into spending money if what they're going to do isn't going to work.

ENERGY PROJECTS

Katherine Teiken: How do you prioritize projects?

Interviewee: What is going to save the property the most money and be most cost effective in the long run and the cost up front. We have a budget every year of certain dollar amounts. We have capital funds that we use every year that we have a certain dollar amount. We look at that. How is it going to affect the property. One budget per property that is all approved by the owners. We put it together and put in suggestions of what needs to be done. The owner goes in and approves or not approves and we plan it accordingly. There are emergencies along the way that change what you hoped you could do.

Katherine Teiken: What are the biggest benefits?

Interviewee: Cost savings are the biggest benefit. We are really budget oriented. That is what the owners want and what we go by.

Katherine Teiken: Do you ever get tenant feedback?

Interviewee: Whenever we make changes, it is usually for the positive. In two buildings, our hallways use to be so bright. We took out some of the lights there and that made a difference and cut our bill down. We put in timers and things too. The residents are good with it. A lot of them will make comments. The

ENERGYSCORECARDS MINNESOTA PHASE II

only ones they don't like are the toilets that don't flush very well and the showerheads. Those have been the only ones we have had issues with. The maintenance guys don't like the low flush toilets. I think they need to go to the power assist. But in they are afraid that it will do something to the plumbing because the plumbing is so old. Dealing with maintenance guys is another thing.

Katherine Teiken: Was budget the biggest thing preventing projects from taking place?

Interviewee: In one building, the owners were looking at the possibility of selling so they didn't want to put any money into it. It sounds like they are going to keep it and do a renovation of the building. We were put on hold for that reason. There was no reason to put money into if they weren't keeping it. At one building we had a hard time convincing the owners to spend the money - \$42,000 to update the system. That is a lot of money. The reserves aren't that big. Another building, it's the funds. We don't need to do a lot, but it's the money. We have some in reserves but not much. It is a newer property and hasn't built up the reserves yet. Another building, we do stuff there. We did a lot of lighting there because of high bills. I also have independent managers. Another building we don't manage anymore, but we did a lot there. We went in and put stops on the furnaces so they can't turn the heat up above a certain point and they can't turn the air conditioner down beyond a certain point. This saved a lot of money. The water and sewer. We did a lot of trying to figure out where the leaks were. That was their biggest problem. We researched but there wasn't a whole lot. It is what it is. We do have a lot of families with little kids and that makes a big difference. One building is mostly seniors. Another is all adults. That is how it is in all the properties.

PROJECT REIMBURSEMENT

Katherine Teiken: Do you have a sense about whether it makes a difference for grants to be available all year or only once a year?

Interviewee: I think you might get more applications if you only have grants available once a year. You get them more motivated to get it in on time. On a rolling basis, they just say, oh we'll get to it. And who knows if it ever happens. That works for me. You have deadlines and you know you have to meet them. And you know this one is sitting here that you can get to anytime. I need to do this now. When you are busy, the more you can push someone into something, the more motivated they are to do it. I work better with time limits.

UTILITY REBATES

Katherine Teiken: Did your buildings participate in any utility programs?

Interviewee: We had them out to look at our lights. They put in the wrong lights here, but we couldn't manage the upfront costs right away. That is something we need to look at in the future. We did look at cost savings but it wasn't enough for the owners to do it right away. It was expensive.

Katherine Teiken: Did any programs have the free direct install?

Interviewee: No. One building looked at it. We paid for the stuff but it was installed for free. The seniors didn't like the toilets.

Katherine Teiken: What is most useful for the utilities? Rebates, audits? What makes you consider a program?

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee: All of it. The rebates are good. Also finding out and getting involved and knowing what you are in comparison to other buildings. You can do budget comparisons, but if you don't know more details on what that property has versus you. Unless you hire someone to do it for you, this is nice.

Ashly McFarlane: Have you looked at the EDA?

Interviewee: Not yet. They are just starting it, but I will recommend it. One building needs a major overhaul. They have issues with cast iron sewer venting pipes that are collapsing. We've been lucky there haven't been any air quality issues. 1 million dollars just to fix that. We have been repairing them as we find them. We just rewired the whole building 10 years ago because the circuit breakers weren't up to code and were melting. We were lucky that we could afford it. Now they don't have as much funds because some of the HUD loan was paid off, but now we have a new mortgage. It is no longer as financially positive.

Ashly McFarlane: Where do you get information on programs?

Interviewee: Contractors, property management meetings, talking to other managers. Word gets around.

OVERALL

Katherine Teiken: What was the most helpful thing of the pilot?

Interviewee: Having something to compare. To know what we are looking at as far as errors, mistakes or problems we've got. Having someone to talk to about it. Knowing that there are options out there.

Katherine Teiken: What changes would you recommend?

Interviewee: More detail on the reports. Having someone available to talk and that can come with a contractor to say that makes sense or doesn't make sense. Someone to guide us in the right direction.

Katherine Teiken: Any other thoughts on Minnesota Housing?

Interviewee: No. They're picky. But that's good. That's what we like.

Katherine Teiken: Would you pay for these services: Benchmarking, technical assistance.

Interviewee: Depends upon what all it includes.

Final Interview with Organization 3

INTRODUCTION

Katherine Teiken: Today, I want to give you an update on where the pilot is at and how we are wrapping everything up. And then to hear from you about how the pilot worked for you. We'll start by asking: How was your experience in this pilot?

Interviewee: It was really positive. It was really nice to have you guys there to remind me to make energy efficiency a priority - to have those quarterly check-ins. It was nice to have someone else as a resource as I was moving through the MFBE program. It was nice to be able to ask you guys questions. We were trying to pair different rebate programs together and it was a confusing process. If you guys didn't know the answer you were really good at helping us find someone who did. And when you guys reached out, we got better responses because you're who you are. The money made a big difference. Especially at the one building because it is a small enough building that the \$4000 went really far. We did a project that will save us a few hundred dollars a month. We didn't realize what we were spending on lights that we were keeping on all the time for security reasons. Without this project, we wouldn't have caught that, we wouldn't have been able to change it. So yea, it was really good.

BENCHMARKING

Katherine Teiken: Talking about the benchmarking tool, what did you think of the online EnergyScoreCards tool?

Interviewee: Honestly, I didn't use it on my own as much as I should have. I think it is because every time we went through it, I forgot how to use it. I forgot it was there.

Katherine Teiken: You didn't log-in between our calls?

Interviewee: No. I took the highlights that you uncovered in the meeting, and working with that information and not really doing any homework on my own. It was nice to have someone to explain it. Because, for example, the D didn't necessarily mean a D, because the building was being judged against other buildings that were dissimilar. Having additional context was helpful.

Katherine Teiken: Was there a specific graph or type of data or information that was the most helpful for you?

Interviewee: No. Because I didn't use it on my own. I can't remember.

Katherine Teiken: Have you used any other benchmarking platforms?

Interviewee: We signed up for one through the city to get the rebate dollars and I have never used it.

Ashly McFarlane: Outside of this tool, do you have a process for keeping track of utility bills?

Interviewee: No. I should. Aeon might do it behind the scenes and not tell us about it. CommonBond uses WegoWise. It's been something we've left to our property managers. We haven't made a habit of having conversations about it.

TECHNICAL ASSISTANCE

ENERGYSCORECARDS MINNESOTA PHASE II

Katherine Teiken: Do you have any recommendations for what kind of technical assistance would be better for you?

Interviewee: The energy audit was really helpful. Especially in this building because the system is so complicated and there is so much turnover in the maintenance staff. We didn't know where all the energy vampires are. The audit helped us understand how complicated the system is. We realized things were running all the time and it was just as simple as turning them off or changing their schedule, we were able to save a lot of money. So, I think the physical audit made a big difference. And without this program, I don't know that we would have had the discipline to go through and do the other buildings in the MFBE program because of staff capacity.

Ashly McFarlane: With the audit that you got, do you save the report in a central place?

Interviewee: We have it here. We've shared it with our property managers. I've personally shared it with new maintenance staff. It's only because I've participated in this program that I thought of the importance of sharing it.

Katherine Teiken: When you are looking to have help from someone, what works best for you?

Interviewee: The audit was really helpful and that was a really good use of time. The check-ins on the phone were really great because they were really efficient, just a half hour, and a reminder that I'm involved in the program.

ENERGY PROJECTS

Katherine Teiken: You implemented a lot of projects. Were these projects you were already planning?

Interviewee: Some of them no. Others yes, because it was part of the rehab and we would have done them eventually. But it wouldn't have been on my radar. I wouldn't have paid attention to what kind of light bulbs we had at the other properties.

Katherine Teiken: When you are looking at projects, how do you prioritize?

Interviewee: I ask property management. The lighting projects were easy. What is broken? What would offer us the greatest security benefit if we were to replace it. We had a break in behind one building, so we were able to improve the parking lot lighting. That came at the request of some residents, so that was a great double benefit. And we had some broken security lights over there that we would have had to replace anyway that we could use energy efficient dollars for. At one building, we followed a lot of the recommendations of the audit. We also did things that our property manager recommended as helpful.

Katherine Teiken: What impacts have you seen from these projects?

Interviewee: In terms of the lighting, we've gotten good feedback from the tenants. We improved the lighting in the hallways and the exterior. It looks better. They can see better. The changes we made to the ventilation schedule, we thought tenants might complain and might notice that the building is stuffier or smells are lingering. But we haven't had any complaints. A lot of the changes that tenants would notice would be lighting oriented. And they're happy. And some of the ones we thought they might not appreciate, they were scheduled a certain way because we thought tenants wanted it that way. And we were surprised they didn't notice.

ENERGYSCORECARDS MINNESOTA PHASE II

Katherine Teiken: What is the biggest barrier for you to do more energy projects?

Interviewee: Time and money. If there were more money available, people would put more time into it. One building was a big time hole, but because we were able to get 75% paid for through MHFA, Minneapolis, and MFBE, it was totally worth it.

PROJECT REIMBURSEMENT

Katherine Teiken: How was the reimbursement process for you?

Interviewee: So easy. You were the easiest ones to work with. And you turned the rebates around the fastest. The other ones take 6-8 weeks after we do all the due diligence and after we get approval to do the project. The city was pretty easy too. They're just matching things that are already rebate eligible. So it's easy for them to make the call.

Katherine Teiken: What works for you as an owner (in terms of how the project reimbursement is structured)?

Interviewee: It would be nice to be able to plan for additional funds from the state where we could make incremental energy improvements. We all have the time for that. I also like that you were a little more flexible. There were some things you were willing to cover that the city or the MFBE were too rigid to cover, even though we could make a case that it would be energy efficient. That was really helpful. The MFBE program, you're only in the position to do that every so often, where you have the time and the building has the funds to be able to front all of the money. The city's program is nice. It's a nice supplement but I wouldn't actively pursue an energy efficiency project just because I know I have the city's match. If I already had to do something, I would make an energy efficient choice because I knew I could get the city's match. With you guys, with the additional funds, you could actually plan to do things that you might not otherwise do.

Katherine Teiken: Is it more helpful for you to have an annual grant application deadline or be on a rolling basis?

Interviewee: You could put it in your capital plan for the year. Also, you guys were pretty flexible. If you could apply for a project and then if you realize you need to spend the money differently, if you had some kind of process for doing that, or if that were allowed. I also think that once a year might help you. But it depends on what your intent is. The rolling would allow you that when you have to make an improvement, you could do it and incentivize people to do it in an energy efficient way. The other way encourages you to think about energy efficiency improvements and plan all the time.

UTILITY REBATES

Katherine Teiken: Talk to me about your experience with the MFBE program.

Interviewee: It was pretty rigid. I would absolutely do it again. The auditors went wrong and they didn't understand we had an energy management system. That might be something I would ask them to ask in the intake process. And then send the auditors here knowing to factor that in. We were given some recommendations that were silly. We had to go back and tell them and then they changed the recommendations. But that process was slow. We had to propose an alternative, they had to take it to their engineers, and then the engineers had to get back to us. It was a very long process. We ran up to the deadline and there were a couple of projects, through this back and forth, it took us time to land on other projects. Then we got to the deadline and it was too late to do those other projects. They were

pretty rigid about the deadline. But a lot of the delay, if you look back at my records, was on them. We were pretty on top of it. They said we had already gotten one extension, so we couldn't extend further.

Katherine Teiken: Have you worked with the HomeEnergySquad or EDA?

Interviewee: We worked with the home energy squad on the single family and duplexes that we were rehabbing. They were awesome. They did some really easy concrete things. Lightbulbs, weather stripping, thermostats and gave us some good easy recommendations to include in our rehab plan. It was more straightforward than MFBE. It was one and done. We're going to do it once and here are our recommendations and here are the rebates you were eligible for. The financial benefits aren't as good. We're going to assume most of the cost for the properties. The rebate value isn't all that strong. The MFBE program was worth the hassle because of how much we were given.

Katherine Teiken: MFBE is only for 5 units or more and apartment style buildings. Townhomes and 1-4 units is for HomeEnergySquad. Do you like the delineation?

Interviewee: I think they would have to tailor the MFBE program to smaller units. I wonder if those buildings are too simple and you wouldn't be able to find enough to do. Or if you could pool 10 small properties together.

Ashly McFarlane: Do you have any properties where it is a mix of building sizes?

Interviewee: Yes. 15 unit building and a bunch of duplexes and single-family homes. Another, which is a 25 unit building and then a couple duplexes and single family. We did both programs there for the rehab. Also MFBE and townhomes did home energy squad.

OVERALL

Katherine Teiken: If you had to pick one thing that you really liked about the pilot, what would it be?

Interviewee: Having a connection to a staff person like you is a really good resource. And I liked being part of a cohort. It was nice having the discipline to connect to you on a regular basis. It kept me disciplined.

Katherine Teiken: On the flip side, what changes would you recommend?

Interviewee: In terms of funding, I would do different dollar amounts for different sized properties. The \$4000 made a big difference at the 25 unit building. The impact was lighter at our bigger buildings.

Katherine Teiken: You've gone through a lot of MHFA programs. Do you have any comments or feedback?

Interviewee: We should have done the energy audits when we were putting our budget together. There was probably \$20,000 that we didn't plan to spend. Even though the rebate plan is required in the RFP, we got away with submitting a paragraph that said we'd do it. But in the technical assistance, as the state providing it in the pre-application, reinforcing that point, how important the energy audits are and the cost impact on your project. The project was over budget anyway and this was part of what was over budget. Ultimately there were things we planned to do that we had to cut. This would be something that if I could do it again, I would have done this earlier.

Katherine Teiken: Would you pay for this?

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee: Yes. I would. It is important to have access to a benchmarking tool, but if I had to pay for it, I would shop around. I don't know if I would choose this one, I don't know if it is more user friendly than the next one. It depends on how much it costs. But I think I could make a case to have the properties pay for energy efficiency coaching. Or maybe a one time or 5-year audit. But the ongoing quarterly calls until I got in the habit of doing it myself.

Ashly McFarlane: Tell me more about the projects.

Interviewee: One building's project cost \$30,000: lighting in common areas, exterior lighting, occupancy sensors in laundry rooms, a moisture sensor for snowmelt system, daylight sensor for exterior lights because they were on all the time. We didn't know that. That wasn't the only thing that was on all the time. The snowmelt system was also on all summer. A good angle for this program, which I would pay for, would be seasonal transition planning. That is where you run into a lot of waste and broken equipment. And broken equipment and equipment that isn't properly maintained is inefficient. That would be a cool angle that this program could take because a lot of energy rebate programs don't count preventative maintenance. It's better for the properties in lots of ways. Changing weather seasons and the effect on equipment: irrigation, summer boiler maintenance.

Katherine Teiken: How often do your maintenance people turnover?

Interviewee: I have been here two years, and all of the assistance techs have turned over and the head maintenance person has turned over once. I think all over the industry, people are having a really hard time finding good maintenance guys because there is a shortage and the economy is so good people have so many options. A lot of institutional knowledge is lost.

Ashly McFarlane: For training, what would work best?

Interviewee: It would need to be a personalized walkthrough at the building. I don't know how scalable that is. I know they have standard maintenance training that they send folks too, but I don't know whether weather transition is part of it. I don't think a lot of maintenance technicians are thinking about preventative maintenance. That's another subject but it is connected to energy efficiency.

Ashly McFarlane: LEDs and energy efficient furnace was \$6800

Interviewee: That building we spent \$3200 on LEDs. We used the remaining balance to help cover the furnace.

Katherine Teiken: Any final thoughts?

Interviewee: It was a great resource. You guys were really helpful whenever I asked a question. It was good to have a resource. You guys had a good sense of the big picture, what is available in Minnesota. You knew who to contact. I thought it was a great experience and I would do it again. This is part of a good asset management and maintenance plan.

Final Interview with Organization 4

INTRODUCTION

Katherine Teiken: How did the pilot go for you?

Interviewee 1: Overall, it went alright. I appreciated the direct installs that you were able to help coordinate with Xcel Energy. They came in and did all that. It was very little work on my end. It would have been nice to have a little more options for what hardware they put in. They just said, this is it. There have been some issues.

Interviewee 2: The low-flow water, for the sinks, the aerators, not just at this property, but at other properties that we've done this, are not holding up to the standard. Definitely spending more on maintenance than we are saving. They are needing to be replaced within a year.

Interviewee 1: The lights are great. The showerheads are great too. It's just the aerators for the sinks. They're getting clogged and not working very well. That was very little effort on my end. I just had to send notices essentially and have a staff person to let them in units. That was helpful. And going through quarterly with how the building was doing was helpful just to let me know what was going on. Overall, those were the two bigger things. The energy grant helped when we had boiler improvements. We were able to get something done here that we probably wouldn't have done without the energy grant.

Interviewee 2: In one building, we needed new boilers and we were able to utilize that money for new boilers. Which is just great. The boilers will certainly be more efficient, no questions asked. Here, what will be interesting, will be this three way valve. To really be able to track this. By installing this \$4000 valve, are we able to see noticeable change? We probably won't really know that. That is what it is. Last time, when we did this, it was \$500 per year per property. And ownership didn't think it was worth it. If there is a free benchmarking application or website, given to where the city councils are going, I would absolutely want to look into that and how we do that.

BENCHMARKING

Katherine Teiken: Have you used any other benchmarking tools?

Interviewee 1: No.

Katherine Teiken: How did you like EnergyScoreCards?

Interviewee 1: I liked that it had different options, like being able to add years in the graphs. It was a little bit slow. Loading pages or graphs. Not prohibitively slow. I liked the visual aspect. The year on year was the most helpful. Comparing to a previous month doesn't help much. Comparing to the previous two or three years was helpful. That was the best thing about it for me.

Katherine Teiken: Did you use the tool in between calls?

Interviewee 1: Not often.

Interviewee 2: What I struggle with, with all of this information, is what can we really gain from it? We see that our water is at par or below, well, why is our water below? Or if it's higher, are we doing a water check? With water, from a month to month, you could really try to figure out what's going on. With the other usage, we have this information, it's tough to know how to use it. That's what I struggle

with. How can we use that then to save energy? There is a part of me that thinks that if you're able to, when doing this program, put in smaller meters or smaller readers, to really be able to break things out. Is the electric that we're spending mostly on the first floor? Is it just that lights aren't being turned off? Alright, then we probably want to spend money and what does that look like? Or is it just hallway lights and the payoff isn't there? So, I think to be able to break it out more, with an intent to try to figure out where the issues are to then lower them.

Interviewee 1: And with water, is it irrigation or is it household water?

TECHNICAL ASSISTANCE

Katherine Teiken: Were you able to use the technical assistance?

Interviewee 1: The energy audit was really helpful. We still have those on our server for reference for things for the future. I wasn't aware that there were other options for assistance. We ended up going with projects that were more urgent, things that we were likely going to spend money on anyway, rather than the lighting projects, which at some point will be nice to do, especially as more and more the industry standard is LED, it would be nice to have LED compatible fixtures. It's just an expensive project to undertake.

Katherine Teiken: What is the best way for you to receive assistance?

Interviewee 1: Is it possible to meter different areas?

Interviewee 2: I think the audit and CEE coming out, that was pretty eye opening just in terms of boilers, and what are we doing. Here versus anywhere else, the HVAC system is very wonky and designed very poorly. We are just spending a ton of money just trying to maintain it and keep it operational. There are multiple boiler rooms. It is a mess here. That certainly was helpful for someone to come in. They were very knowledgeable and understood the challenges. The audit report was great, but in an ideal world for us, it would have been great for CEE or someone to come in and say: "After reviewing all of this, given the \$3000 grant, if you put in \$5000 of your own money, you can do x, y, or z and you will see the payoff in x years. Here's the return. A real comprehensive report. Then we can say, do we have that \$5000 and what does that look like? That would be very helpful. It's almost like, someone acting as a rep for the grant and putting the grant together. We threw together a grant of lights, and not really knowing what we are doing, getting an electrician to be like, I think you should do this. That's what we threw together. We didn't actually even use any of that for the grant money. But to have someone hold our hands or do the work for us, and for us to then make the decision, is this worth it? That to me would be ideal.

Ashly McFarlane: What data would you like to see?

Interviewee 2: The initial cost, it's going to cost x amount of dollars. For there to be a bid or several bids if we're talking about more than \$3000. Here are the three bids to do what you want to do, choose, this is what they're going to do, so if it's putting photo lights or dimming, this is what it is. This is the product that we want to install, because whatever we're installing, I'm going to want to know that if we need to replace it, where can we replace it. Ideally it's saying here is a comparable replacement where you can get it not at a wholesale area. And this is what it is going to do. And this is what we think, looking at your energy uses, this is what we think you'll save per year, the payback will be x year, do you want to move forward? Putting everything together for us to be able to review, and say yes or no or we have questions. What is challenging with this, is everyone has a lot on their plate. What is the most important? Energy is probably at the bottom of the rung. But the theory that we're spending an

ENERGYSCORECARDS MINNESOTA PHASE II

exorbitant amount of money on energy. We're doing low flow toilets at a property, and we've cut the water savings in half. We think that's why, but we don't have any real idea. The payback is within the first year. Should we be doing that at other places? Should we be doing this at other places? We're just being reactive.

Ashly McFarlane: Would it be helpful to have a whole picture across all of your properties?

Interviewee 2: I don't think so. Every property is so different. One property has electric baseboard heating, that's just a bad design. The boiler system here is so different than a boiler system somewhere else. But certainly, like the aerators, in some areas, like water prevention, I would say yes, that can be universally adopted. Potentially hallway lights could also be. But then again, it's like, are there windows in the hallways or that kind of stuff that can be looked at.

Katherine Teiken: Does it matter more to know which building is performing the worst or more to know where you actually have money to do projects?

Interviewee 2: All of the ownership is not intertwined. Which is somewhat unusual. So we can't commingle funds or move funds around. Within the individual ownership group, some are more willing to put up front costs to replace toilets and do energy stuff, where other people are like, I'd rather not. There might not be money or they want to use that money for something else.

ENERGY PROJECTS

Katherine Teiken: Would you have implemented these projects if we hadn't done this pilot?

Interviewee 1: They were on our radar. The boilers we would have done at some point. But the three way valve was put on ice until you guys had the grant available. We probably would not have spent the money to replace all of our aerators and lightbulbs within the units. That was definitely something, because it was a free program through Xcel, that we took advantage of that would not have been accomplished, at least in the near future. I would say it's a mix. Some things we would have done. Some things we were aware of. Some things we would not have done.

Katherine Teiken: Have you seen any impact on these projects?

Interviewee 1: Here, from the three way valve install, we don't have feedback yet of any kind. Tenant feedback, the only negative feedback was the aerators. No feedback is positive feedback in my mind, so the other things were successful. Boiler, it's nice to have working and efficient boilers.

Interviewee 2: What else is interesting with boilers, the cost for efficient boilers, is not there. It's not financially sound for a property to purchase efficient hot water heaters. There is a pilot program doing a case studying with CEE, on doing tankless water heaters. Talking with other people in the industry, no one has high efficient water heaters. It's just a side note. It's kind of shocking.

Ashly McFarlane: In the survey, you had \$60,000 in project costs in one building.

Interviewee 2: That is for replacing two boilers. I guess looking at water, we did all of this stuff to save in water. And it's showing it worked, looking at Minneapolis, compared at 2017 and 2018. We're showing decreases in water usage in both buildings. We did things to really affect the water. What would be interesting, is the cost of those implementations and the potential payback. So it's even saying, you could do this at other properties and the savings is there in x years. That's going back to the report, I think for water, we can do this without EnergyScoreCards. We can see that we have a high water bill and

go into every unit and see that we have 3 flappers that are ripped. What is tough though are the gas and electric.

Katherine Teiken: How did you decide which projects to invest in?

Interviewee 2: I didn't know there were options. I thought it was like, we're going to take what we get.

Interviewee 1: I had Collins come out and bid us four different projects base on the lighting recommendations from Xcel. There was significant cost for that. We went with the boilers because there was more urgency to it and we were able to get more efficient boilers in the process. One project, we had the bid, we had thought of the option, we had put it on ice but this made it possible. The pieces seemed to fit. One of the reasons we didn't go with the lighting was the initial cost of it. The 10 year payback is good, but is still a hard sell. We went with projects that were more palatable to the owners as well as be beneficial to the property. We looked at different options for lighting. One was changing the fixture. One was changing the bulbs themselves. We also did it in partitions, what if we did just the first floor versus the whole building? There were four actual options that Collins was able to provider us. Motion and light sensors were part of it.

PROJECT REIMBURSEMENT

Katherine Teiken: How was the project reimbursement for you?

Interviewee 1: IT was pretty smooth. Not too burdensome. You needed the original, so I had to mail it. It was nice having an email to see if it was an approved project before we go ahead and do it and then it's not a qualified project. That was particularly nice. You were helpful with the request process. It really didn't take too much time.

Katherine Teiken: Do you have any opinion of what the right grant amount is?

Interviewee 2: As the price goes up, the percentage needs to go up. One of the light things was \$10000. We have to replace the HVAC software here and that's going to be \$10000. If it were like you're going to get 50%. Or maybe you get more money if you can show you're saving more energy. But we can't personally put a grant together that will be able to show that. We would need someone in our corner to be doing that. But that's what I would say, if you can show you can save more energy, you should get more money.

UTILITY REBATES

Katherine Teiken: Did you receive rebates through the Xcel program?

Interviewee 2: The boiler one we definitely got.

Katherine Teiken: How was it working with Xcel and CenterPoint?

Interviewee 1: CenterPoint reached out to me before I even reached out to them. They gave me what the options were. We had our contractor fill out the application. So we didn't have to do a lot of work for that.

Interviewee 2: For rebates, normally our contractors handle that. I don't think we've every filled out a rebate form.

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee 1: I've filled out a partial one and then I've handed it to the contractor to fill out the technical stuff.

Katherine Teiken: Have you used HomeEnergySquad or EDA?

Interviewee 2: We used another one through Xcel. Energy Advisor - Franklin Energy Services at a property that replaced some refrigerators. That was nice. But, we did that at another property at a really large scale. 5 years down the year we had to replace a lot of those refrigerators. Because the ones they were installed weren't great. They didn't have great shelf life. Who knows, I don't know if that is common. But yes, we have used others. And right now, for another property, I filled out another MFBE application with Xcel. I filled it out online, and someone was like yes, we got it, but it has been two weeks and I haven't heard anything back, what the status is. There is just so much out there to navigate. We've done this at the property for the refrigerators, I'd love to get shower heads for free, and then try to get a grant for these toilets. How to piecemeal these all together is very challenging. CEE has been out there, because we did some major boiler rehab because we wanted their invoice. Now we're trying to figure out what to do. I did sign up for the MFBE program and I'm not sure where I am in the pipeline. I do think there is value in all of this. Sometimes more value and sometimes less. But certainly doing something is better than doing nothing.

OVERALL

Katherine Teiken: What was the most helpful?

Interviewee 2: CEE coming in to look at our boilers. That hour long, here as well as other places, that was the most beneficial. They take a different approach, even with glycol. For example, Mark is saying that glycol is this made up thing that you don't really need it and it's slowing your boiler down. Or flushing water heaters in townhomes, having these conversations, there is no point in flushing water heaters once a year, you're not saving anything, you're using more water, and it's demand power is also expensive,. But you talk to a large plumber and they say, absolutely you should do it. And the glycol is a big one because it is a big expense. And I think there is energy, if there is glycol in the system, the system is going to work slower, lowers the efficiency. The scary part, we've been using glycol in a property from day one. I'm not going to remove glycol, having one water pipe burst, is going to lose any potential savings in the lifetime. But having those conversations is very beneficial and to get other perspective. Just general large mechanicals, boilers, water heaters, things we're spending a lot of maintenance time already on, and having the conversations of should we do this or should we do that. For that, we have decided that we're going to slowly phase out glycol at one of our properties. We're crossing our fingers and we're going to see how it goes. And that was all because of a conversation with Mark.

Katherine Teiken: What changes would you recommend?

Interviewee 1: Getting specific projects, doing the numbers on them, that saves a lot of time investment and allows us to be able to see a little easier the cost and benefit analysis for each potential project. I think that would be helpful. More details as far as specific areas of usage as we're analyzing it would be helpful.

Interviewee 2: If we were going to do this again, I think the quarterly meetings are fantastic. But I think it's starting with a more dialed in approach. What are we really trying to do? Saying, we're trying to save energy, is a really broad saving. So maybe, this is a two year program, year one, we're going to tackle water. That's the easiest. We're going to do xyz, here's the company that's going to do it, here's the

grant. And while that's happening, what's the next goal or the next mindset. We want to lower electricity or gas and how are we going to do that? Trying to implement something, is very daunting. We're looking at 20,000 feet and need help to drill down.

Katherine Teiken: Is it easier to do multiple projects at once or spread it out?

Interviewee 1: Budget wise, it is easier to spread it out over a number of years, keeping in mind that we are on a non-profit budget. We have to sell everything.

Interviewee 2: Operationally wise, as long as we are planned for whatever is happening. We replaced water heaters and boilers within a 3 day period and needed to provide hot water for the cdc, Peter did a great job of orchestrating and planning that so there wasn't any issues. So if we're looking at multiple things, we just need to have a plan in place and timelines. 10 this will happen. 12 this will happen. And if that is there, we can do anything. And that's only if you're going to be throwing big things in within the same week. If you have to x in order to do y, that is where if one thing is delayed it all gets delayed.

Katherine Teiken: Would you pay for these services?

Interviewee 1: Probably not.

Interviewee 2: For EnergyScoreCards, I know that the ownership has already said no. I'm not going to go back to them this year and say, hey, do you want to spend \$500 on this. On that note, there is real value in dealing with CEE. If we had to pay for CEE to come out once a year to look at our boilers, I would say I would pay for that, even as just a double check. There is value there.

Ashly McFarlane: Before you had access to EnergyScoreCards, how did you keep track of bills?

Interviewee 2: I would look at water. The bills make it pretty easy. You can look at the previous month and if we have an issue we can address it. For electric, it is looking at the vacancies. If we have a vacant unit, that's \$40 per month. We go turn of the lights in that unit. And gas is what it is. That is what we do. Other owners are checking water meters every day or every week. I don't think that's worth it. If there are other tools to be able to deal with electric, I'd be very open to that. But certainly with gas, it is what it is.

Katherine Teiken: Any final thoughts you want to share?

Interviewee 2: I think this is worth it. If we could do this again in two years, if there is no cost to it, absolutely I would sign up for it. In terms of getting the companies out to change aerators and showerheads, I would absolutely do that. I would want to have the conversation about aerators. What aerator are we using. How much is it to replace the aerator. That is the other thing that has been expensive. That is totally worth it. To have you act as the liaison or navigator in this very complicated area that we are not even proficient in at all is very helpful. To orchestrate everything and put less on our plate, why wouldn't we do this? I would sign up another property tomorrow.

Katherine Teiken: Would you do the same properties again or new properties?

Interviewee 2: There's no real value in doing the same properties again. But for us, since these are the only two properties, we'd want to take advantage of it again. And we have seen real value in the CEE relationship.

Final Interview with Organization 5

INTRODUCTION

Katherine Teiken: A couple updates. One, you have access to the tool until the end of the month. If there is anything that you have questions about or need, just let us know. We are doing interviews with all of the building owners and then we are taking the data from the EnergyScoreCards tool and calculating: overall, all of the buildings in the pilot saw x savings. We'll do those kinds of calculations. The first 3 months of 2019 we will compile all of that into a final report that will include: how the pilot did, if the buildings saw savings, and our tentative recommendations for how Minnesota Housing wants to move forward. What we are really hoping to get out of this pilot is information on: does having access to benchmarking, technical assistance, and grants for energy-saving projects motivate building owners to implement energy-saving projects? If it does, do we actually see real results and savings from those projects. If the pilot has gone well, what should Minnesota Housing do in the future? Should we roll something like this out on an application base to the entire portfolio? If you want a service like this for one or two years, apply and then we will help you look at a number of buildings. Should it be mandatory for buildings with high utility bills and are struggling with their operations and reserves budgets and could really see a benefit from cutting down on energy costs. These are the types of conversations we are having internally and how we hope to use this.

Katherine Teiken: Today's meeting is to get your honest reactions about how the pilot worked and didn't work. What changes you would recommend in the future and how it could be more useful for you as an owner/manager. Overall how was your experience with the pilot?

Interviewee: Overall it was very positive. Our situation may be unique because we already had a rehab project planned that included a lot of these projects. Having the reports and energy data, and being able to be more aware of that was helpful for me. You (Katherine) always seemed willing to do whatever to be helpful. You were extremely helpful in explaining this. I think it is important for owners to be educated on this and aware of it. Owners get bills and don't really know "Are we good, or not?" compared to other buildings. That was really helpful.

Interviewee: Having grants available for certain projects was an easy motivation. If we know we're getting a D or C grade on heating, we know something needs to change. You provided these grants and that give us the opportunity to improve.

Katherine Teiken: I have more specific questions about each of those topics.

BENCHMARKING

Katherine Teiken: My first question is, EnergyScoreCards is a benchmarking platform. There are other platforms out there called WegoWise and EnergyStar Portfolio Manager. Have you had experience with any of those other platforms?

Interviewee: No. (Have not worked with WegoWise and EnergyStar Portfolio Manager)

Katherine Teiken: How did you think using the tool was? When we were online and looking at the different graphs that are here and working through the data, what was your reaction for how the tool worked for you? Are you seeing the information that you would want to see as an owner? Did it seem easy to use?

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee: It seemed pretty user friendly and how you could break it down by quarter and do that comparison. I thought it was good.

Katherine Teiken: Did you ever go into the tool in between our calls?

Interviewee: Yes. (Did go into the tool in between calls)

Katherine Teiken: One of my frustrations with the tool, not specific to EnergyScoreCards but a general frustration is that there is a lag. You had your usage in October, and it gets billed in November, and it might not make it into the tool until December. There is a bit of lag time. Did you notice or have thoughts about this?

Interviewee: Yes, obviously it would be ideal if it was in real time. I don't know if that is realistic. But I feel like that's just part of it.

Ashly McFarlane: How did you review your utility bills before this tool? Did you go online to look at the bills?

Interviewee: I have only been here two years. It's hard to have a full comparison. Since I have been here, we are really old school. We have spreadsheets to track utility costs. I could look back at the previous year and compare we paid this amount compared to this amount last year.

Ashly McFarlane: Did you stop doing that when you got access to the EnergyScoreCards tool?

Interviewee: No, I still do this because we do a monthly cash flow report. The ESC tool is easier to access and may be more accurate (takes out human error).

TECHNICAL ASSISTANCE

Katherine Teiken: One of the other things we were offering through this pilot was access to technical assistance through CEE. We were hoping that when you came across problems in the building and were trying to figure out which boiler to install or do I want to do this project, what are my options here? That you would have someone you could call and talk to that would be an objective third party and not a contractor that was trying to sell you something. Do you feel like you got anything from having someone on call that you could reach out to?

Interviewee: I didn't utilize it like I probably should have. We already had a rehab in progress and the scope was already defined. We already had decided on boilers, and that sort of thing. But even with seeing these numbers, they're not showing much of an improvement. Maybe I should have reached out and had someone to come out to the building to look closer at things.

Ashly McFarlane: In terms of technical assistance, what do you find is the most helpful? To have someone come out and meet with you? An email explaining with a response to a question?

Interviewee: A phone call would be good, but it depends on the issue. Email is fine, but I wonder if you can understand the problem completely without going to the building. For example, we are seeing that our heating bills are up but we've replaced these boilers. I remember we have had a couple conversations but I don't remember with who during our quarterly meetings.

Katherine Teiken: Ashly was on the phone for most of those. Megan, who manages the EnergyScoreCards tool, was also on the phone. Dan May was replaced by Ashly.

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee: I remember having a conversation about it with Dan, and it was hard for him to know without being there.

ENERGY PROJECTS

Katherine Teiken: It sounds like from our conversation, that you were already planning on going through with these projects before we started with the pilot. Is that correct?

Interviewee: Yes. (We were already planning on going through with projects before the pilot)

Katherine Teiken. Talk to me about why you were already planning this project. Why was it important for the building?

Interviewee: Any building needs to be updated and updating equipment and making sure it is more energy efficient. For us, our operating budget is super tight. These projects are really important to us, for any way we can reduce operating costs.

Katherine Teiken: The main motivation for the projects was ongoing needs of the building. Is that correct?

Interviewee: yes.

PROJECT REIMBURSEMENT

Katherine Teiken: We had \$3845 in project reimbursement. Talk to me about how that worked for you. Did the process work well? You had the grant application and then the draw request. The amount of money was a drop in the bucket, but was it enough of a motivation that you thought about doing something in addition? Talk to me about how the reimbursement worked for you.

Interviewee: The whole process was really easy. Fill out an application, list project, provide invoices. That was super easy. As far as motivation, it is hard to say because we were already planning this. If we were to do the same thing again, I could definitely come up with projects to do that we could use the money for. And for how simple the process was, I think that would encourage a lot of owners.

Katherine Teiken: For the ease of the pilot, we decided to give out a flat amount of reimbursement to everyone. Long term that likely isn't the right way to figure out how much reimbursement to give someone. Do you have any thoughts about, it would have been better if you had gotten x amount more or if we were able to plan on getting 10% of the project cost paid for. Any thoughts? We don't know what we are going to do, so we're trying to figure out what would be good for owners.

Interviewee: Any assistance is helpful. 10% seems fair, but how you determine what projects count is important as well. If you're replacing boilers, it can be really costly. 10% of that would be really helpful for owners.

Katherine Teiken: The City of Minneapolis has a 20% match on any energy projects up to \$20,000. From my perspective, it allows owners to plan more. I always know that it is available and I can put it into my calculations as I'm trying to plan what projects to do. But I'm not an owner.

Interviewee: A set percentage would be really helpful for planning and doing a capital needs assessment and having that in mind that you can get a set percentage from MHFA.

UTILITY REBATES

ENERGYSCORECARDS MINNESOTA PHASE II

Katherine Teiken: Did this property go through the MFBE Program? How did that work for you?

Interviewee: Yes, it went well. We reached Tier 3 and got 80%. That was extremely helpful. The projects costs were getting tight near the end. That rebate helped the project get completed. The whole process was pretty simple. They came out, did the audit, the direct install.

Katherine Teiken: Did you like the direct install? Some of the properties had less than great experiences with it?

Interviewee: Some our tenants didn't like the LED lighting. The color. And some had issues with the aerators. But that was only like 2 tenants. Overall I thought it was great.

Katherine Teiken: Do you have any experience with any of Xcel's other projects? They have the EnergyScoreCards program for townhomes and the Energy Design Assistance program for substantial rehabs.

Interviewee: No. We've worked with Franklin Energy for appliances. I like that program. We got 14 ACs and a couple refrigerators.

Ashly McFarlane: You did a lot of projects, boiler, water heater, LED. Did you see any benefits beyond cost savings?

Interviewee: Less maintenance. The tenants should have seen a slight reduction in their electrical bill. The other work was cosmetic.

Katherine Teiken: Sometimes I hear from tenants, oh my unit is always too hot or too cold. Did you have any feedback on comfort issues?

Interviewee: Not yet.

Ashly McFarlane: Were there any complications with installing these projects?

Interviewee, Model Cities: The biggest challenge was that this was a rehab taking place while the tenants were still in the units. It wasn't ideal for them and if they were upset it wasn't ideal for me. I was the punching bag. But overall I think they understood that this was going to improve the building and should make them more comfortable and make it a safer environment for them and their children.

OVERALL

Katherine Teiken: If you had to pick one thing about the pilot, what was the most helpful thing for you?

Interviewee: I like data. Having this was a really good tool. Having you and bright power as a resource was really helpful to talk through it. So I had a better idea about how to properly interpret the data.

Katherine Teiken: If we were to do the pilot again or do a similar program, what changes would you recommend? Is there something that didn't work well that you wished we could have done something differently?

Interviewee: Not really. We weren't seeing the reduction in heating bills, but we never got an answer why. You offer the technical assistance, which I didn't really utilize. Maybe another audit sometime during the process. Come out to the building and go through it.

ENERGYSCORECARDS MINNESOTA PHASE II

Katherine Teiken: Any thoughts in general about Minnesota Housing?

Interviewee: So far my experience has been really positive.

Katherine Teiken: Would you pay for these services, the benchmarking and technical assistance pieces. Is this something that is valuable enough that you would want to pay for it?

Interviewee: As a non-profit, probably not. We're too tight right now. I don't think we'd be able to, but we'd like to.

Ashly McFarlane: For the EnergyScoreCards reports, what graphs were the most useful?

Interviewee: The line graphs were really helpful, to get comparisons for each year.

Katherine Teiken: If we were to continue doing a pilot like this, would you want this building to continue participating or do you have other buildings?

Interviewee: This is just one building. It would be nice to do all 5 supportive housing buildings.

Katherine Teiken: Because all 5 have needs or because it is helpful to compare the buildings to each other?

Interviewee: All are different. They're not the same size. It would be good to know if one is way out of whack and understand why and see what we can do to improve that.

Ashly McFarlane: Do you have a process for comparing buildings and deciding what one to invest in?

Interviewee: This property includes three buildings. Based on our funding, it does pretty well for operating. We have two other twin buildings, very limited funding there.

Ashly McFarlane: So it sounds like you have pots of funding for each building and can't pull from these other pots.

Interviewee: Some other buildings are really tight and probably have the greatest need. If there are any energy savings, these would be the buildings we would want to focus on. They are two 8 unit buildings, one bedroom. Boiler, radiant heat, in Saint Paul.

Katherine Teiken: That is really the end of the questions we had prepared today. Do you have any other thoughts? Anything we didn't ask you that you feel strongly about that we didn't share?

Interviewee: No

Katherine Teiken: We are finalizing everything this month. If there is any remaining questions that you have about the data, if you want any additional data, let us know. We'll be working on the report next spring and you will get a copy of it. You'll be able to see how the pilot performed in general and what our recommendations are. I don't know what our recommendations will be yet. With the new governor, that potentially means change at the leadership level at Minnesota Housing. We'll be taking time to update the new leadership. If we do decide to expand this program, it will likely be in 2020. Things don't move quickly. But my goal specifically is how can we help owners and managers make their units as energy and water efficient as possible and how can we help them save money? We are also cognizant of privacy issues, so we won't be disclosing any specific energy usage.

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee: For me, it would be interesting to see a comparison between all the buildings. For certain buildings that did see great benefits, I'd like to know what exactly did they do? IT would be great to have that information. Even, to be able to interact with those owners and share ideas. Sometimes it is a silo and we don't think about the other property managers out there. It would be great to learn how they do things best.

Katherine Teiken: We may have a couple case studies in the final report. But I like the idea of being able to create a network. Please don't hesitate to reach out to us if you do have any issues that come up, either with Minnesota Housing or energy issues in general.

Final Interview with Organization 6

INTRODUCTION

Katherine Teiken: This is your opportunity to be honest with us about what worked and didn't work so that we can make it easier for owners and managers to save energy in their properties. How did the pilot go for you?

Interviewee: Fine. We've gone through a couple different times of looking at this stuff. I still don't know if we got a great comparison with other similar buildings. More the first time, because we used to see that more often, a ranking with other similar properties. At that point, the building was being lopped in the wrong category. Maybe now this time I haven't looked closely enough, how the comparisons match up with similar buildings and if I feel like they are actually similar buildings. That would be the only thing, maybe a better way to match similar buildings. Because that's where you want to be. If you are comparing to another 67 unit property building in the 80s section 8 elderly. It would be awesome to drill down like that. With original equipment. And then be able to see those ones that did do an update and how that compares. And probably, that has been skewed by us because we don't have a great square footage number. That messes us up too. Maybe square footage isn't the greatest thing to compare. Maybe it is units or bedrooms. I know if I got to a 70 unit elderly building in the Midwest, they're pretty similar. There isn't much difference. Down to the vinyl on the bathroom floors and cabinets are exactly the same. Boiler systems are pretty similar from that vintage of building. I do think that talking about programs that are available for owners to access has been awesome. In my case, a couple times I was underestimating my project cost. That hit me in a bad spot, where I thought it was an \$80,000 project and it turns out to be a \$130,000 project. I could have found a way to do a 50/50 on an 80,000 but not so easier to do 50/50 on a \$130,000 project. That's not a problem with the pilot, just overall.

Ashly McFarlane: Do you think being able to compare to more similar properties would motivate you to do more projects?

Interviewee: I think so. I think then you can share that with an owner and say look, here is where the other buildings are. And especially to show a benchmark of one that did do major upgrades. I can give an example. A few years back we did change out our boiler system to an efficient system. As an owner, you're not looking at what it might have been. You're looking at what it is compared to what it was. That property, for a couple years we were able to look at dollars and see that the dollars were lower. But over that time it was the warmest winters we had in a long period of time. Then last winter comes and all of the sudden it is back to a more normal winter. We were used to warm winters as the normal but they weren't the normal. But then all of a sudden you have gas bills that are higher than they were for the 3 or 4 winters before then, and all you can think is what the heck? Those are the parts that are hard for me. I'm not taking my monthly financial statement and breaking it down by heating degree day. That's not something we do normally. You set a budget based on recent history and then all of sudden, you get something out of the ordinary. That's not a problem with the pilot. But if I can say, here is our building. here is one really similar that did this upgrade and look at what their costs were compared to this one. Even in this bad/normal year. I think that is an easier sell.

BENCHMARKING

Katherine Teiken: What were your thoughts on the EnergyScoreCards benchmarking tool?

Interviewee: I don't know if it was as easy as I wanted it to be.

ENERGYSCORECARDS MINNESOTA PHASE II

Katherine Teiken: Did you ever log in in between our calls?

Interviewee: Maybe 2 or 3 times. At that time, I was trying to answer questions about how come gas is higher. Those were the times that I was using it. I wasn't looking at it every month. I probably didn't look at it quarterly. Just when I was trying to answer a question.

Katherine Teiken: Do you recall if any of the graphs or data was more helpful?

Interviewee: Nothing in particular.

Katherine Teiken: Have you used WegoWise or energy star portfolio manager?

Interviewee: No.

Ashly McFarlane: How do you track utilities across your properties?

Interviewee: Just in financials. Dollars for dollars. No software program. We just look at our accounting stuff. We have done some buildings where we have had an energy efficiency group come in, most of the time water saving, and I've been unimpressed. We've done it with a couple different groups in a couple different buildings. Almost all the time we end up with more operational issues than we end up with savings. That gets to be disheartening. Things that are installed and then the reduced water doesn't work. Flushing type issues. Really nobody has any issues with aerators that put out less water in a sink or a good shower head that reduces flow but makes you still feel like you are taking a shower. We haven't had issues with those. But we have had issues with toilets, especially in a 7 story high building. Sometimes you just need the extra power.

TECHNICAL ASSISTANCE

Katherine Teiken: One of the things we tried to do with the second phase was add in technical assistance. Encourage people to get energy audits, provide information on programs that were out there, and then having CEE available. Did we give you what you were looking for?

Interviewee: I think so. You got great information out of the energy audits. I can't imagine getting anything different. If it were possible to get more cost information out of it. Not with your program, but recently I was working with another property that had an energy audit. They had numbers they were spouting for cost of systems, and I was like what are you putting in? Those aren't anywhere near the numbers that I've been seeing. They were like 3 times higher. I asked where are you finding those? They said we talked to an engineer. I think sometimes more information from a vender, rather than an engineer. Not that there is anything wrong with engineer, but rather someone that has installed systems, not just designed them, for better cost ideas.

Ashly McFarlane: You found the estimates were too high?

Interviewee: The estimates from an energy-saving program were way higher than what my experience says. Although, I'll say that in your program, they weren't trying to sell me on a number. At the same time, I think that would be helpful. More of, you get us a number and we'll see if that will fit and if it's going to work. That's okay too, but it would be nice to have a better pool of information on what the costs are. Even to help when I am talking to venders. It never hurts to have some kind of number in your head as a guess to know if I am coming up with somebody that is in the ballpark or nowhere near the ballpark because we don't do big systems every day.

ENERGYSCORECARDS MINNESOTA PHASE II

Katherine Teiken: What type of resources do you prefer? Email, in person, etc.

Interviewee: I think when you have a real problem, it is perfectly fine to do it on your own. When you are just talking about things that you might be able to do, the reminders are good. If I had something that was broken and I need to fix it, I am going to figure out a way to get it fixed. If there is something out there that might save me something that is probably smart for me to look at but real life doesn't plop it up on my calendar, it is good to have a reason to have to think about it.

ENERGY PROJECTS

Katherine Teiken: In terms of the energy projects that you do in your buildings, how do you prioritize them?

Interviewee: Broken we do first. After that, our company isn't worried about estimated useful life. A lot of places are. A lot of places will say, well my boiler has lived past its estimated useful life and we are going to get a new one. Unless we are going to be able to show a payback and ours isn't broken, we're not going to change it just because. I know that's not what everybody does. If we found out that compared to other similar buildings, that ours was costing us 25% more than everybody else's, that is the kind of thing that gives me that extra tool to say, not only are we past our estimated useful life, but right now this one is costing you 25% more than it would, even if we just had our own back in the beginning, let alone if we switch to this more efficient system, this would be an estimate of what we would save. So by spending \$130k, in 5 years we can cover that in our savings.

Katherine Teiken: What kind of payback are you looking for?

Interviewee: I could probably convince people of a 10 year payback.

Katherine Teiken: From your perspective as an owner, what is the biggest benefit for you to saving energy?

Interviewee: Right to the bottom line. Increases your NOI which increases your building value. At the same time, everyone is aware that resources aren't endless. That is a nice plus if you can improve your buildings value and at the same time do something that is smart for the world, why wouldn't you?

Katherine Teiken: Do you ever get feedback from renters on your projects?

Interviewee: We get more negative than positive. Times when we have done CFLS or LEDS, whenever you do that, you only hear from the people that are complaining. When we do water savings, we only hear from those that have a clogged toilet or think that it took them longer to wash their dishes. Even in buildings where they pay their own electricity, they are not going to see dollar savings that jump at them. If they look over a whole year, they'll see dollars. But if they look at it over month to month, let's say it is 3 or 4 dollars, they're not going to notice that. If it were 50% they would notice it, but then they would think, oh I'll just leave my lights on longer or leave my computer running all the time. Residents are goofy.

Katherine Teiken: When you took the survey, you hadn't finished the boiler or the lighting project.

Interviewee: The lighting is done but the guy hasn't sent me my invoice. The boiler we haven't done.

Katherine Teiken: Would you have still considered doing those two projects without going through this pilot?

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee: I would have considered it, but without having the reminding, that was helpful. Everyone knows LED lights last longer and use less. Now everyone is thinking about it. But I think the reminders are good. I think the information is good. I think everybody would want to be part of the program just for that.

Ashly McFarlane: It sounds like you've had audits done. For projects that you've decided not to move forward with, what is the reason? Capital costs? Time?

Interviewee: Capital costs. Time is always an issue. But it isn't the main issue.

UTILITY REBATES

Katherine Teiken: With the MFBE program, how was your experience?

Interviewee: Good. You always get good, useful information. In the beginning, they did lighting things. We've always had great luck with them. We've done lots of things over time. In Mankato, through Xcel, we did a bunch of refrigerators and air conditioners, lights. Those programs went really well. I don't know if it was only because of the one person that was leading it up, but even since I know he is still there.

Katherine Teiken: What is the most helpful thing that the utilities provide? Audits, rebates, direct install, etc.

Interviewee: I count it all together the same. I have done energy audits in buildings all along. I think that is always good information. I have never had a single issue with direct install stuff. It has gone really smooth. We have never had people complain that the installers were rude or nasty. They have been great. And rebates are always helpful.

Katherine Teiken: Have you used Home Energy Squad or Energy Design Assistance?

Interviewee: No.

Ashly McFarlane: Was the fridges through Franklin Energy?

Interviewee: I don't know the program. One was a 72 unit property where we did 35 fridges that were older than 10 years old. In that one we did the same number of through the wall air conditioners that weren't energy star then and are now. Those are awesome programs.

OVERALL

Katherine Teiken: What was the most helpful thing about the pilot?

Interviewee: The recommendations from the audit.

Katherine Teiken: What would you change?

Interviewee: Better benchmarking. Maybe you have something on one building that has been outstanding, one in a 12 unit building, one in a 40 unit building, one in a 70 unit building, one in a 150 unit building. Finding that one building to benchmark against. That way people can hone in on where theirs was before and what it is now.

Katherine Teiken: Any other thoughts about Minnesota Housing?

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee: I think that they should keep this program going. It was useful for me and I am sure that other people with similar properties would find it helpful too. We are just in Iowa and Minnesota now, but MHFA should be proud of what they are doing. I don't get that from IFA. There isn't anything wrong with IFA, but in my experience MHFA works hard to be a resource and not just a monitoring place.

Katherine Teiken: Would you pay for these services?

Interviewee: Maybe. I wouldn't run out when the program is over to look for someone to do it. But maybe. It depends on how much it would cost. If we had an issue, then you're always looking for ways to come up with solutions. Then it isn't out of the ordinary to look for someone to pay to help you with that. I don't know that ongoing, over time there have been people, like trash consultants, that you can hire to get you the best deal. I've used one once, but I don't use them all the time. But the more and more you look at stuff, it is crazy how high water and sewer bills are. It is your highest utility. That hasn't always been the case. It would be nice if water consultants were a little bit more honest. Personally, I haven't been convinced by any of them but others with more authority have been convinced. I don't think any of them have gone the way they were supposed to. We recently started managing properties that we don't own where the old ownership group worked with a consulting group and we continue to get these giant bills for their services for supposed water savings and I have no way to say that I am saving anything. I know that I'm not saving the amount of money that their invoice is each month.

Katherine Teiken: Is there anything we didn't touch on that you would like to share?

Interviewee: No. Again, I think that this is a worthwhile program and hopefully your new commissioner thinks that it is. I sure think it was worthwhile. Real life jumps in and changes around your priorities, but I think the reminders are good and everyone should think about whatever they can do to conserve.

Ashly McFarlane: If you had access to a free benchmarking service, would you check it regularly on your own without the quarterly calls?

Interviewee: I would if I thought I was getting good data.

Final Interview with Organization 9

INTRODUCTION

Katherine Teiken: How is your experience as an owner/manager trying to manage energy and water in your buildings?

Interviewee: It is pretty difficult considering tenants don't have to pay for energy and water so they treat them with a looseness that you don't do when you actually have to pay for it and see that bill come every month or every two months. It's hard to talk to people about energy efficiency and water conservation when there is no stake in the game for them until it is gone and then they have a lot to say.

Katherine Teiken: With regards to this pilot, how was your experience?

Interviewee: The pilot went as well as it could go. I took cues from you about what needed to happen and did my best as I could to see that happen, given the time. I think someone in my role, considering what I do, it was too much for me to manage as one person. I think in the future, it needs to be drilled down to a person at the specific site. There were 3 properties and when you showed me the tool over a conference call back in 2017, I haven't touched it since. I didn't really know what I was looking for or what I could do. I didn't know what I was supposed to do, not that you didn't tell me, because you did tell me, because I didn't know what information I was looking at. And truthfully, what could I do or have the organization do as a team to get people who don't pay for water and don't pay for electricity to change their ways. We can say it. We do say it. But we need more education for tenants and something more than, don't waste water, turn off those lights. You need more than that. But what can we have people do? How can we conserve, we really can't, it has to be there because we provide it.

Katherine Teiken: What is the best way to do tenant education?

Interviewee: Having someone come in could be helpful. One of the things that we do as an agency on the property management side of things, is we have something called unit care trainings. When new people come in, it's done quarterly depending on how many people we have move in during the quarter. It's an opportunity for people to learn how to take care of their units and I know that energy is touched on, but maybe hearing it from someone else could be helpful. It wouldn't need to be done quarterly, but once or twice a year as a part of the conversation.

Ashly McFarlane: How long do your tenants stay?

Interviewee: This building wasn't a part of the pilot, but just to give you an idea, this building is almost 6 years old. Over 101 units, we have a little over 30 people that are still the original tenants or around year 4. There are some long term tenants here. The idea is that this is supportive sober housing, and that is how it is at the other places as well. You can stay for as long as you want. We're in the business of keeping people housed. It's a choice that they make based on choices and consequences of not wanting to be sober. The idea is that they would move out to a market rate unit where that expectation and responsibility is that you are paying for your electricity and water yourself.

BENCHMARKING

Katherine Teiken: Going back to the tool, was there anything that was helpful for you?

Interviewee: I don't have an answer.

ENERGYSCORECARDS MINNESOTA PHASE II

Katherine Teiken: Have you ever used other benchmarking services?

Interviewee: No.

Ashly McFarlane: What is your process for tracking utilities?

Interviewee: I don't know how it is done at other sites. Here at Emmanuel, which isn't part of the pilot, but just to answer the question about what we do as an agency, the housing manager here is given a report of the electricity and tenant usage from the accounting department. The accounting department gets all the bills, put it in a spreadsheet, and gives it to him. Every month or every other month, he sends it to me. It kind of ties in to this, Ti can handle energy. I don't know what I'm supposed to do with that information, but it's given to me. But it's only for Emmanuel, not for other properties. I don't know how exactly it is done at other properties. Probably similarly.

Ashly McFarlane: You see each unit's usage?

Interviewee: I believe that is how the report is doctored. We have support services staff here, case managers for the tenants, the Director of Support Services for the site is also given that information. It prompts a conversation with the tenant that someone in unit 609, their electricity bill is through the roof, can you close those windows. It's an opportunity for a conversation for support services to have with the tenant about ways they can be energy efficient in their unit. A person can say yeah, and do it for a day or two and then go back to opening up windows that they shouldn't be opening or letting water run.

TECHNICAL ASSISTANCE

Katherine Teiken: What kind of help are you looking for as an owner/manager?

Interviewee: Nothing readily comes to mind.

ENERGY PROJECTS

Katherine Teiken: Did you implement energy projects?

Interviewee: No

Katherine Teiken: What were the barriers that prevented it?

Interviewee: I think it was time issues. That is why I was thinking that in the future it might be helpful to drill down more on it to people at the site level just so they can devote more time to it. Something like this is probably, if I had to put a percentage of my job title on it, it's probably 7%. It doesn't get that priority that it needs. For someone on the site level, it could be a priority for them to look at the information and do something more on a site level. Because one person to capture it or run with it and do something with it in my role, it's too much. I probably could have said something before during the pilot, but I didn't.

Ashly McFarlane: What is your process for approving projects?

Interviewee: That general process doesn't come through me or come to me. It comes to our facilities director because she is head of maintenance, she is already on those things and so a site manager or housing manager would almost never have that conversation. There is a process. It is more repair than

replace. I think that across the board, these properties are all older so things are getting to the point where they need to be replaced. I know that they've budgeted for things like that and are mindful of it.

Katherine Teiken: How does your organization prioritize projects?

Interviewee: I think it has to do with budgeting and looking to the year ahead. Seeing what was broken or needed repair the previous year and going from there. It will all get taken care of when it needs to. Definitely when it is an emergency or even just doing the preventative maintenance all along the way to get it to where it doesn't become an emergency but with age it needs to be replaced.

Ashly McFarlane: How do you choose the efficiency of projects?

Interviewee: Once it needs to be replaced, we just go out and get bids. That's her process. She's always talking about bids and getting people down on the price. She's really good at negotiating prices.

Katherine Teiken: Do you prefer a low up front cost or a higher up front cost that will save you money in the long term?

Interviewee: We lean toward lower upfront costs. The facilities director would probably try for the more expensive long term option, but would need to get them down on the price. No band-aid fixes. Something that is going to solve the problem, fix the problem, but still be cost effective.

PROJECT REIMBURSEMENT

Katherine Teiken: If MN Housing had another grant, what would you want to do?

Interviewee: When I look at these properties, at all of them, it would be energy efficient lighting in units and tenant education about what that means. Water aerators and showerheads. Things like that. And people knowing why those are there, that education piece of it always. It's a youth property, 18-24, so if they didn't get it when they were younger, at least they can get it at that window. At all of these properties, the whole lighting thing could probably be helpful. And we as an agency could couple the funding with education, and then they can see, that light bulb uses less energy and when I turn it off it uses no energy.

Katherine Teiken: Do you generally apply for grants?

Interviewee: No. I don't even know exactly who that person would be. I've never done it before, which is why I say no. But I don't know who the other person would be.

Katherine Teiken: If we had funds available, what would you want the deadline to look like?

Interviewee: Have a deadline based model because it gets priority.

Katherine Teiken: Is it easier to have a set amount of money for there to be more funding available for projects that save more energy?

Interviewee: It ties in with the timing of it. Having that deadline, needing to apply, with the idea that once that's done, \$5k to \$10k is coming based on us applying for that grant and meeting that deadline. That would help with budgeting and planning for the next year and how to use those funds.

Katherine Teiken: How much time do you need to spend the money?

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee: Never longer to spend money. A shorter period of time is fine.

UTILITY PROGRAMS

Katherine Teiken: Do you have experience with MFBE, Home Energy Squad, EDA?

Interviewee: No.

Ashly McFarlane: How do you want to hear about programs?

Interviewee: I think someone reaching out and sending an email. That serves as a prompt to click on that link and see what is available to us as an agency with our buildings.

OVERALL

Katherine Teiken: What was most helpful about the pilot?

Interviewee: I can't really say. It wasn't a negative experience. It just was an experience that didn't get a lot of time devoted to it to look at this.

Katherine Teiken: What would you recommend we change?

Interviewee: Nothing beyond what I've already mentioned. It needs to be more site level with someone who can devote more time to it.

Katherine Teiken: Any thoughts on Minnesota Housing?

Interviewee: No. All I can say, is that if it is done again, it just needs to be done at a site level so that it can get the energy it needs.

Final Interview with Organization 10

INTRODUCTION

Katherine Teiken: How was your experience on the pilot?

Interviewee 1: I think you guys have been very responsive to any questions. You've been very good about keeping people on track. We were going to talk and meet and it would be nice to have those check-ins. Those check-ins are really good prompts because, to be honest, I would have let it slide almost entirely. I think the graphs on the tool are really interesting. I still don't know if it really provided that much more information than we get from looking at our financial statements and the invoices that we receive. It's like, whoa, what's going on in building 2 because all of a sudden our water bill just went sky high there or something. Working with your group was very nice. But it got a little confusing because there were three different initiatives going on. Because there was the EnergyScoreCards where we just come in and do this stuff. And then there was, oh and by the way, we can hook you up with Scott Schoolmeester to come in and do the energy audits. And then there was the MHFA grant. So coming out of at least the audit, then there was the opportunity to participate in another kind of reimbursement if we spent x number of dollars. It was great, but it was just a little confusing.

Interviewee 2: I still don't understand how it is all interconnected. I'm doing it, and I don't understand.

Interviewee 1: That was the delay for our submissions. We have this grant for \$3000 for each building, but one building, is also eligible for this other reimbursement grant. How do they overlap, can the same things be done, can we spend the same, how's it going to work? That's the only thing. It's all to the good. We appreciate both of those grant opportunities and appreciate the audits because it is always valuable information when you can get more about how your property is doing. IT was difficult sometimes to compare our properties against other ones. That one wasn't so intuitive in this tool.

Interviewee 2: I would agree. The interaction has been great. You've been very responsive in trying to navigate us through it. I felt the information was almost too much. I never really, it seemed like we were always struggling to identify what the discrepancies were. We have very identical buildings sometimes with very different results. We did get it on track. We did figure that out. We went down a lot of wormholes. I failed to see what we were benefiting and where the benefit was. What was actually embedded in these graphs and numbers, it was just so much. Go to this graph and do this. I just felt that with some of those things, we got a little lost. I kept thinking what is this really telling us, that we can constructively use to reduce our energy and save money. I don't know if we really got there. It's really hard to tell. I guess we'll see. We made big changes. And so next year we'll see if those changes pan out.

Interviewee 1: We did make some big changes there. And we have made some big ones, in terms of water and lighting. We haven't seen the water efficiencies presented in bills yet, in invoices yet, because that project was gradual over the summer. We just finished this month. We'll see in January and February.

Interviewee 3: The graphs really threw me off. I couldn't understand them. I couldn't see the savings in it. But otherwise, with the grants and installing the toilets and that, I think that will really help. We replaced all of our toilets with 1.2 gallons.

Interviewee 2: We'll see if that works. I really firmly believe that people flush more. That's what we have over at Jamestown, but we don't have anything to compare it to. We can't compare it to the old ones because we've changed every one at rehab. So it's not an apples and apples comparison.

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee 3: We should be able to compare it because we just finished the project this month. We did all new aerators and bulbs through the energy audit.

Interviewee 1: We had real issues with the aerators in N. Minneapolis. They clogged. There were chunks in them. We don't know what the deal is with that. Are we just bringing up well water in N. Minneapolis?

Interviewee 3: I haven't heard any complaints. We haven't had to clean them out.

Interviewee 1: Barb said that was the issue at Caliber too. They did the same thing at Roseville and I think that happened there as well. Big nasty chunks. Visible.

Interviewee 3: I haven't heard any water or plumbing issues. Nothing to do with faucets or anything.

BENCHMARKING

Katherine Teiken: Was there one graph or type of data that was more helpful?

Interviewee 1: The year to year. I like the bar graphs better than the line graphs. It's easier to see, here's how far we were last year and now we're down here. When you're glancing at it quickly, that's the most visually connecting. The year to year graph was really good. The very very frustrating part was comparing two identical buildings and trying to figure out why they were so different. It was left to us to figure that out. That was the frustration, where are the experts coming in and telling us, omg, that is an anomaly, here's what we should check out. Instead, it was more like, huh, that's odd.

Interviewee 2: I will add that when Ashly and Mark came and we were going through the differences between the boilers and the delivery systems on them. That really helped. I guess I am trying to recall if that really squared with what we were seeing in numbers, I think it did. But I could see the differences. Mark pointed out, there are a number of turns in one room versus the other. The recirculation pump was pulling the water in one circumstance and pushing in the other. I think pulling was considered more efficient than pushing. So that was helpful. I've never understood how this all really connected. You were all there and you were identifying some of that and that was helpful. Some of that identification.

Interviewee 1: But for example, we've had this outstanding question about whether we should put glycol in our system. We never got very clear information. We got conflicting answers. Someone says it doesn't matter. Someone says don't ever do it. Someone says it doesn't make any difference. We are lay people trying to figure out complex building mechanics. We are on the internet trying to figure out, why these would be so different. What are the differences and what can we highlight. And it turned out, probably the fact that the meter was broken. And that is why the heat costs were so different between the two buildings. One of the meters was shot. And we were seeing the benefit of that. And we were so confused. One has an older boiler, they're identical buildings, they're performing much better, and it's because the meter is broken. Probably. I don't know how we check for that. I don't know how anyone checks for that. But when CenterPoint comes out and replaced it, all of the sudden our heating bills went up. They lined up more squarely with the other building. I felt like we wasted a year and a half trying to figure out why these two buildings are so different. Looking at windows and AC covers. And that was a putzy thing to do but I think we ended up with a really good solution for insulating the through wall AC covers in a better fashion. It's a 60s building and nothing really fits. I think we ended up with the best solution we could without completely replacing them, with the technology at our disposal, such as the weather stripping.

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee 2: And where the AC penetration is in the building is really a challenging space for us, because between the heat register and the window you have no space. That was just really challenging. But I think we came up with a good solution.

Katherine Teiken: Have you used other benchmarking platforms?

Interviewee 1: No.

Katherine Teiken: How do you currently track utility bills?

Interviewee 1: With invoices, YARDIS trend.

Interviewee 1: For us having identical buildings enrolled in this made it easier to compare.

TECHNICAL ASSISTANCE

Katherine Teiken: How can we do better with technical assistance?

Interviewee 1: I have a suggestion. Barb mentioned at a staff meeting that she had been a workshop at Dominion. Dominion said that as a matter of course, we go in and replace all toilet flappers every year on a preventative basis. They had the data that then said our water bills have gone down 10% a year based on that alone. That may be an exaggeration, but they had a measurable amount that they said we really believe that it is because we do this. We looked at the cost of the flappers which is minimal and then the labor, we work it into our preventative maintenance schedules, so if someone is going to be in there doing the smoke alarm battery they do the toilet at the same time. I'm assuming it is the same maintenance staff. Every year. They do it all in one fell swoop. It is that kind of real-time practical information that shows what the payoff is. Rather than, man your water bills are kind of high. What could you do? But to say, we know property managers have instituted quarterly leak checks, which we already do. Or we make sure all the hose bibs are turned off and there are no frozen cracked pipes. That whole list. That is an expansion of that that is a really simple maintenance thing that at least one very large developer and property manager has determined that this makes a big difference. It is those kinds of things. You guys have all the stuff up here and all of our staff need to bring it down here. What does that mean? We're looking at different costs and theoretically, it could be this or could be that. Here's a list of things you could try. Give people a formula, for saying, put in how many hours it will take for someone to change a flapper, here is your hourly rate for that, and here are the cost savings we think would originate for that. Without having people have to go and look up their own water rate and what gets billed. That is something that is really practical that is easy to do. Changing out LED light bulbs, here is the cost savings associated with that. Instead of just, it's a great idea and you're going to see some savings. Try to make it really specific.

Interviewee 2: That's always my problem. I always hear these solutions but I'm not always convinced that they are solutions. It sounds great. A low flush toilet sounds like a good idea. And aerators, these sound like good ideas. But as we're experiencing we're spending way more money doing the maintenance of these aerators we replace than we saved in water bills for sure. So it is just, what is proven? That is a really interesting study. I did find with CEE coming to the properties, I was picking up valuable information. For example, our ceiling fans weren't sized right for the height of the ceiling. He looks up there and says that is doing absolutely zero, why do you have that? So, it is, all this stuff is real heady. But in practicality, are these changes really significantly having an impact.

Katherine Teiken: So you want some kind of written list?

Interviewee 3: Discussing it on the phone has really helped on the phone. Versus just having it sent to you.

Interviewee 1: To make you think about it because otherwise you get this and say, I'll get back to that.

Interviewee 2: And finding examples like the Dominion example, and bringing us together and saying, here's what they did and this really worked and this is why this is the numbers. A few years ago, we spent a lot of money and investment, \$50 a unit, to installed fire stops. We've had 15 stove fires that they've put out. Those types of real situations and scenarios, that if I was sitting with other property managers, I would say absolutely do this. That saved us a \$50,000 claim and \$50,000 on our insurance for the next three years. And hearing about replacing flappers, those are things that we would like to hear, to go, oh maybe we should consider this. And sometimes, like the glycol conversation or the aerators or the air separator. We get conflicting advice. There was a question about if this is really going to make a difference in our maintenance calls. We did get some valuable feedback from CEE.

Interviewee 1: We did see the benefit at one building. They figured out that the original one was put in backward. So just by fixing that, the no heat calls went from oh my god every week there were tones of them to none. So we have bled fewer lines. The stack damper. We got conflicting information on installing that. We got a lot of feedback from contractors about why are you doing that, that's just going to be one more thing to maintain, it doesn't do anything. This is where we have the theoretical people coming in and saying this is what you need to do and then the feet on the ground people ask us what are we doing, who said to do this, that's a stupid idea. So if you're a manager trying to figure out what to tell the owner, so I got bids for this, it would be nice to have that borne out, the theoretical and the recommendations, here's what you will see or where's what you might hear from people, but here's what they're not thinking about or here's why we think it would still be beneficial.

Interviewee 2: Where's the true cost benefit? If you're spending thousands of dollars doing something, is the benefit stretched out to 12 years? And in those 12 years, has that thing failed and you've had to replace it.

Ashly McFarlane: Would you prefer to have someone come to the site or an email?

Interviewee 2: I prefer the conversation because it opens up to other things. I found a lot of value in the times CEE came out to our sites. Other things would come up. I would say the same if we were sitting in a room with property managers that all have different experiences with different programs and solutions that they've tried that have either succeeded or failed. I'd find more value in that than an email that I'll probably read 20% of.

Interviewee 3: I think more clear understanding and clarification when you're in person than going back and forth in an email 10 or 15 times.

Interviewee 1: If you're at a site, it often connects a little better. Oh, I see the turns in the pipes and how that would make a difference in the delivery of the hot water. Or why we get leaks in certain areas.

Interviewee 3: It is tough explaining your system in an email versus seeing it visually.

Interviewee 2: We do like clarity. The glycol question was difficult because we were putting the question out there but we were still spending a lot of time ourselves on the question and we never really had an answer.

Interviewee 1: I think Mark finally said, that's a bunch of BS. You don't want to use that stuff.

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee 2: Mark obviously comes with years and years of experience and seeing stuff. He is the person that is also throwing a lot of doubt in my mind and confirming my own suspicions about stuff. I was giving a lot of gravity to his opinions, but then I would hear these other things or read about something else. And I would start to get a little confused. He's like a guru.

Ashly McFarlane: Would it be helpful to know up front what the recommendations are and what others might tell you?

Interviewee 2: Yes, and why. For example, with glycol, is there a heat loss with glycol? Yes, there is. We had to answer that question ourselves.

Interviewee 1: We had been using glycol in several of our boiler systems because it started out at one building because we had pipes freeze in a stairwell that was not as protected or heated by other means. The recommendation was to use it there running through the whole system.

Interviewee 2: This is where I got one of my best tidbits of wisdom from Mark, why are you treating a local problem universally. Why don't you just insulate those pipes. Fix the local problem.

Interviewee 1: That's the type of stuff, you have to step back and go, duh! That would make more sense.

Interviewee 2: And glycol, it can be corrosive and it is harder on your pumps and systems.

Interviewee 1: And some people recommend draining it out every year and storing it in these big things. Because if you let it sit in the boiler in the system all summer, it can be more corrosive. And so you're like, why do we even use this stuff?

Interviewee 2: And the intended use is in cooling towers. It's like an antifreeze. It's not for a boiler system. Or a geothermal system.

ENERGY PROJECTS

Katherine Teiken: You were able to implement projects, would you have done them anyway?

Interviewee 1: Definitely the toilets, we would have, because we had been searching for ways to deal with the water usage. So that would definitely be one. We had looked at replacing some of the lighting with LED lighting anyway but just hadn't moved forward with that.

Interviewee 2: We replaced all the exterior lighting. But these are things that as things failed, we would have eventually moved to better technology and more energy efficient anyway. I think the program may have pushed us to do stuff because there was money.

Interviewee 1: Definitely the grants escalated those projects. We can do that now instead of doing it in a phased situation or waiting.

Interviewee 2: Lighting is a good example. We would have eventually gone to LED lighting and photo sensors but probably not as quickly. We would have waited until there were a lot of bad fixtures.

Katherine Teiken: Have you seen any impacts from the projects?

Interviewee 2: The aerators are definitely negative.

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee 1: Tenants don't volunteer a lot of information about anything ever. People like the new lighting. You're not going to get tenant feedback about your heat working. If it is something that is supposed to be there, you're never going to get praise. Hey it's warm, I didn't have to call you three times this year.

Interviewee 2: I don't think we've had enough time to compare on the bills.

Interviewee 1: We redid all of the AC units, which I am hoping really stops a lot of heat loss in the units. But again this is our first heating season with that in place. And also a new meter.

Interviewee 2: It's hard to isolate the true savings because we have done other things.

Interviewee 1: When you do things in a group, this and this and this, there is no way to identify which thing is potentially contributing.

Katherine Teiken: How did you choose your projects?

Interviewee 1: The other lighting, we decided to put off because we had replaced lighting fixtures in the common area hallways 5 or 6 years ago. We had already switched them to the fluorescents. The difference between moving to LED was not going to be sufficient to do it without the other fixtures failing. That is where we will end up, but there wasn't a need necessarily. Exterior lighting we are going to do because there is a need. We did exterior lighting, we still have to see if the boiler proves out. We did the AC covers. That was about it. Other minor things like weather stripping the doors, fire doors, entry doors. Insulating the boiler pipes. Those were good reminders which were inexpensive, easy to do. It wasn't that we had chosen not to do that, we just hadn't even thought to do it.

Interviewee 2: I recall Mark talking about people insulating their water heaters and how that is a ridiculous fix because water heaters are already insulated. You're throwing insulation on insulation, which does you zero good. Doing that but ignoring the pipes that are running through cold basement spaces. So that's where those conversations are good, that's where it's better to have people at the property and having conversations.

Interviewee 1: With multifamily, it is also really intriguing, especially in a townhome setting, if there is more information or more relevant information, how do the tankless ones work in our climate? If they're gas or electric, they're coming down in price, still at a premium over a regular hot water heater. Are there industry recommendations that would make sense for looking at other options. We were looking at that at our Jamestown Homes property, 73 units all common, and everyone had their own hot water heater. We eventually pulled it to building domestic hot water. But at the time, these are little 2 bedroom units, why don't we just put in tankless, which should work just fine.

Interviewee 2: We shouldn't be having tanks of water that we're heating that are just sitting there all day. And then heating up again when they chill down. We are looking at doing an on-demand project. It's a full building modular project.

Interviewee 1: Those are the kinds of innovative projects. But if you talk to developers, no one wants to get their toes wet first. They always want someone else to try it because we don't want to be the guinea pig that pays the premium. So, case studies about newer technologies.

PROJECT REIMBURSEMENT

Katherine Teiken: How was the grant process?

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee 1: It was super easy. Wonderful.

Katherine Teiken: What grant system works best for you for planning? What is easiest for you for planning?

Interviewee 1: I thought it was easy to just have a dollar amount. To say, here we have this amount to spend, what can we accomplish with this. If it was something we were going to do anyway, this is great, we can just do more of it at one time. It made it so simple. You didn't have to go get bids. You didn't have to submit a proforma for how everything was going to work. It was just, here. And we'll verify for you that we spent the money on what we said we were going to spend it on. That's the absolute simplest and I think it worked well. The next option would be, go ahead and get bids. If you know you're going to be doing something, like we're still thinking about replacing a boiler. If it goes really funky again in a couple years. If you know you've got some things that you've got planned as an eventuality. It's like, oh my god, this would be great. We could get bids now from contractors, and submit something, if we get bids that average \$12,000, we could request \$12,000 and see where that takes us. Knowing it would be for a specific thing that we would have already documented with we think this is the cost of it. The matching thing gets more complicated. I think the more you do, the bigger the match is hard for smaller properties to deal with. It is very confusing. One of our buildings was eligible for the MFBE program. You have to do everything that they tell you to do, and then if you do all that, you are eligible for a 50% reimbursement for the cost of those things. But if for some reason you weren't able to get one of those done or the specifications change and you decide to do B instead of A that was specified, you may lose every single bit of match. That is risky.

Interviewee 2: It is difficult to navigate and track. They have been pretty good keeping us on track because I think they understand how confusing it is. But it shouldn't have to be so confusing. This whole idea of percentage, if you don't make this percentage you're going to lose it all, it was frustrating and irritating and a pain. It would be a lot easier to go, here's x amount of dollars, here's the things you should do with this x amount of dollars, here are the recommendations, once you've done them, submit the invoices. That would be the most ideal.

Katherine Teiken: Would you prefer an annual application or rolling?

Interviewee 1: The concern about the open pipeline is that you never know when the money is going to run out. It is nice because if you find something, and all the sudden some mechanical thing blows up, it would be nice to be able to turn to something on an open pipeline. There are benefits to either. If that's the case, it would be nice to say, here's the total dollar amount and then keep a running tally of how much is left. A little ticker, the ticker keeps running, so that no one is surprised.

UTILITY REBATES

Katherine Teiken: Have you worked with any other programs?

Interviewee 1: We are working with the HomeEnergySquad now. We do all multifamily, but if they're townhomes, they don't qualify for MFBE. So you get bumped over to the HomeEnergySquad. We have properties with a combination of building sizes, duplexes to 7 plexes. To do it at one property, we would have had to piece together two different programs. And so we said, we are going to put this on hold. We eventually decided to do it, because we are going to do the larger buildings under the HomeEnergySquad program. That option isn't put out there. We had to whine about it - this is really hard. We don't like to do hard things.

OVERALL

Katherine Teiken: What did you like best about the program?

Interviewee 1: The grants. As we've said, we look at our financials every month and track what is going on with utilities and are able to generally highlight big anomalies. There is a lag time, but there is a lag time with the tool too in terms of identifying. It is useful information, but the actual grants are far above anything else. The second thing would be the consultations with CEE or a comparable organization.

Katherine Teiken: Is there anything that we didn't ask that you'd like to say?

Interviewee 1: One big deal that the EnergyScoreCards thing could help with because you track so much data if there is a way to somehow work with Xcel and CenterPoint to do it on an individual basis to help with utility allowances for project-based section eight developments. We have to submit to HUD an average utility usage for every unit. We would pay for that, but when we talked about paying for it two years ago, Bright Power wanted way more money than would be reasonable at the time. For a 7 unit development, it would have cost \$500 for the service. That's not really worth it. And it's not just our project-based, we have to do utility analysis for our other sites as well. That would be a huge cost savings and time savings and improve accuracy. The thing is that we have to get the releases from every resident.

Interviewee 2: If MHFA fully signed on to that, that we're using this company to do a utility analysis, and then when we submit it, it is fully accepted as correct. Because otherwise they question it. What I see, is that if we do this in this isolated case and I take it to MHFA, and then it's wrong or I didn't have this or that, or we needed 10 months and this unit only have 9. So if it was something that MHFA would sign off on across all their programs. Saying yup, properties are using this, if they're engaged in this, use their numbers. We are confident that they are correct and accurate. That would be huge.

Interviewee 1: We really would pay for it. It takes so much time to get the information. We struggle. You have to have tenants sign a release. Then you have to work with Xcel to get the information. And multiple other utilities. So that would be huge. The requirement to say you have to do it for every unit, and there are minimum months that you have to include, and if it is vacant for a number of months, or if someone else moves in, or if you have two households in one unit, you have to have a full 12 months. It's really time-consuming for staff. When we talked to Bright Power several years ago, they understood that and had a proposal put together.

Interviewee 2: It would really be MHFA fulling signing off on something that it would work. My fear is that we would pay x amount of dollars for Bright Power or whoever to do something, and we would kick it to MHFA and they would say this is crap. And Xcel and CenterPoint were saying it is the data privacy that is the biggest barrier. It has come down across the board that you can't share utility data. We can get tenants to sign releases on move-ins. Some cover up to five years, but some are annual.

Interviewee 1: That would be a huge boon for multifamily and would be an income stream for whomever wants to do that.

Final Interview with Organization 11

INTRODUCTION

Katherine Teiken: How was this experience?

Interviewee: On your end, it was great. It helped us quantify what we could or should be doing to help things out. The frustration that I ran into was not being able to see a lot of that to fruition. I'm not sure where I should point the finger at for that. I feel like we could have done more on our end as an agency. I don't know what we had available to us for resources, so on our end, it was a little frustrating in that regard. But it did help us work out some issues that we had at the building, as far as educating our tenants on better ways to use the resources, electricity consumption, things like that. In respect to that, because of the type of transition we have in our program, it is hard to maintain a lot of that. We're trying to formulate a program to keep the tenants educated on their energy use, as well as the employees. We try to encourage our staff not to leave lights on if they're not going to be in their office. Just keeping people in that mindset is something we're still working on. I liked having access to this information so that we could do our own tracking.

BENCHMARKING

Katherine Teiken: Did you use the tool in between calls?

Interviewee: Probably not as much as we should have used it. I think right up until the point that Kelly left, we were using it more, and then everything tapered off after that. We did use it, especially at first as we were trying to sit there and use that information to try to push to get some of this stuff done, like the boiler upgrade for example. We were really trying to show what the savings would be, the payoff, over 5 years. But, as you know, it didn't go anywhere. That's where we're at with it. I thought it was great. I wish we could have used it in our other properties, especially some of our smaller properties where we don't have a lot of reserves. 12 units plus one office space and a basement shop. There is a laundry facility. We have steam and hot water heating systems that are antiquated. We have rooms that were originally intended to be front porches. They're not the best in the winter time as far as insulation. We had mapped out some ways to mitigate that. We had Flannery group come in and help us do an assessment, but again, we just didn't have the resources to do it. We had an individual from MHFA that was helping us navigate through a 1.2 million grant, but we didn't get it. If we had received it, it would have allowed us to do everything with all of our properties that we wanted to do. That's where it is at.

Katherine Teiken: Have you ever used other benchmarking platforms?

Interviewee: EnergyStar, Jeremy Davis did some work for us for a couple of our other properties. I wasn't involved in that so I'm not sure where it went.

Ashly McFarlane: Is there any other information that would have been helpful?

Interviewee: Having an apples to apples comparison to some other like properties. It would have been nice to see how we were in comparison to those. It would have been nice if we would have been able to more easily identify each of the unit usage. They're not on their own meters. So, it was hard for us in that regard, in terms of educating the tenants, you've used x amount of kwhs this month. Was it because you've been doing this, or this, or whatever the case may be. That would have been a little more helpful, but that falls on us because we have a house meter and not sub meters for each of the

ENERGYSCORECARDS MINNESOTA PHASE II

tenants. That is the only thing that I could have used more so, and I don't know how you do it without changing the meters.

Ashly McFarlane: Did you use numbers from the report for the tenant education?

Interviewee: We tried to. Sometimes it is easier to tell them in layman's terms than trying to give them number crunching. They lose interest in what you're trying to explain to them if you try to browbeat them. It was more, just saying, don't use your oven for supplementing heating, not only is it a fire and safety risk, but it also consumes a tremendous amount of electricity and throws off your thermostat. There are a number of things like that. Once we get them to understand that there is that component of it, it helped to mitigate some of it. Lengthy showers was a big problem we were having. There are tenants that would take showers that were close to an hour long. Not only is that wasting water, but you're depleting the hot water for the other tenants to use. Trying to keep time limits and that kind of stuff. Being neighborly in that regard. There is more of how I would approach those things. The biggest thing for us is leaving electricity on. The tenants just leave lights and televisions on, that they would leave on when they were gone, for whatever reason. Just trying to get them to be mindful of turning things like that off when they're not present. There are a couple of them that sincerely have safety concerns when they're gone and that's why they do it. Which is understandable and we just try to make them feel better about not having to feel unsafe. That is what it boils down to. Outside of that, with the transition, we have people coming and going every year and a half. It's not one or two families, it's a mass exodus of families. Trying to get everyone back on board, there is an ebb and flow in that regard. If I had some easier resources to provide to educate tenants, I think that would be helpful. Xcel Energy was really good about coming out and they said they'd send a representative to come out to talk about stuff. When they came through and they did all the showerheads and faucets, there was a big push to do that. And then for some reason that fell to the wayside, I'm not exactly sure who that fell on. We had a gentleman representing Xcel, that was taking care of all of that part of things. Something like that would be nice to have, to have Xcel come out. Some of these tenants, I don't feel like we're being very supportive in that regard. When they move out into a regular market, they'll have to be responsible for paying for their utilities. If they come from a background of disregard and waste, they're going to get kicked in the shorts. It is a disservice to them not to educate them.

TECHNICAL ASSISTANCE

Katherine Teiken: How was your experience having access to technical assistance?

Interviewee: We tried to, but especially in regards to some of the rebates, it felt like we got pushed around from one individual to another. We did deal with Jeremy quite a bit, but even just trying to figure out, with the appliance for example that we buy, we were trying to figure out if we could get rebates for those even though they weren't brand new. That took months and months for us to get an answer, and in the meantime we're still having to replace these appliances. On the back end, we figured out that the payoff versus what we were saving wasn't worth buying them brand new. That kind of information would have been helpful to have up front. And if we had to go through a specific vender or if there was a specific brand they wanted to use. We just buy whatever is on sale. I'd like to keep things consistent just for repair purposes. But if it is saving \$150 versus going with another appliance, I'm going to go with the cheaper one. That would have been more helpful. And navigating through some of the funding processes would have been a little more helpful as well.

ENERGY PROJECTS

Katherine Teiken: Are these projects you would have done without this pilot?

Interviewee: Not the lighting. At some point, it would have been a project for us. But it wouldn't have been a priority. For me personally, the boiler upgrade would have been a bigger priority. But you're talking \$10,000 vs \$80,000. I'd like to do more lighting in the common areas. We didn't achieve all that we wanted to do because it was cost inhibitive. The heating side of it, I would have preferred to do that. It would have been a priority in my regard. That's still something that we want to do. Window upgrades. The ones that we have currently are still usable but a starting to fail with their argon. That's going to be something that we have to look at in the near future, especially on the south side of the building where they receive more sunlight. That is for that particular property. Some of our other properties where we didn't have this program, we are still trying to implement some of those changes to the lighting.

Katherine Teiken: I jumped ahead. Ashly, do you have more to say about technical assistance?

Interviewee: Honestly, you're the most consistent piece that we've had throughout this whole thing. We've gone through other people that are affiliated with you. There is a lot of bouncing around in that regard. We felt that. That made us standoffish and not as motivated with some of this stuff. Admittedly too, we were discouraged when we started putting all this effort into trying to do these upgrades and then all of a sudden the tape was cut on us. That's not a reflection on you. It's just the reality of the situation. We were really looking forward to doing a lot of this stuff, we had a lot of people who were pumped up about it. And then it just was swept out from underneath us. We had all of this energy for the past year and a half, and then it was: Nope.

Katherine Teiken: In terms of the projects you have done, what is the impact?

Interviewee: The heating would be a benefit. We would have more consistent heating throughout the building. One of the challenge that we have right now, is that our staff takes care of the afterhours on call scenarios. In this building, we end up having to aerate the system quite often, especially when we have huge temperature swings. If there is an airlock in someone's heating run, it may be 3 in the morning and they don't have any heat. So we have to respond in the dead of winter. In this scenario, when you only have one person to do this, it is tedious. You have to energize the boiler, go upstairs to bleed off the air, which depletes the boiler, which depletes the boiler, go back downstairs and reenergize the boiler. Go back up to the unit. This is 3 in the morning, you're running up and down the stairs. It is very invasive and isn't very efficient. I would like to have a heating system that can not only be monitored remotely, but self-mitigates some of these issues. It exists but it is a monetary issue for us.

ASHLY MCFARLANE: Do you see any benefits of the lighting projects?

Interviewee: Absolutely. One of the things we did, once we did the initial part of the lighting, which was primarily to upgrade the outside existing lighting to LEDS. They provided us a lot more illumination but inadvertently caused pockets of dark, what we witnessed, was individuals would gather in the areas that were dark and take care of whatever nefarious activities they were going to take care of. We went through and added more lighting. So we have a full 360 degree lighting for the perimeter. Which not only allows us to better utilize our outside cameras, but it has illuminated enough of the areas that the neighbors have been able to see more activity and respond to that accordingly, as well as our tenants being able to see. With the exception of one area we can't do anything about, it has really diminished a lot of the stuff that has been going on in the sidewalk and the street. Which has helped us with the neighbors because we want to be good neighbors. I also like the fact that we have a motion sensor in the laundry rooms. Primarily because we were going in there constantly to change all the lightbulbs. I do appreciate having that in there. I would like to have it where in the common areas during non-business hours, you do a 20% use but when people walk through they illuminate brighter. Just so we're not using

ENERGYSCORECARDS MINNESOTA PHASE II

quite as much. There again you still have the safety issues that we have to be concerned about. I think the lighting upgrade was a good thing. I wish we could have done all of it. In the future I'm sure we will. We've been comparing what it would cost, the T8 light bulbs we use right now are getting expensive because they're getting harder to find. We're looking at the cost comparison of doing that versus doing our own in house conversion. Getting rid of the ballast and using LEDs with the drivers. The problem we have right now is time. As short staffed as we are, taking on projects like this isn't something that is very easy for us to get into. If we do, it would literally be one fixture at a time, simply because we don't have the time to dedicate to it.

PROJECT REIMBURSEMENT

Katherine Teiken: How was that process for you?

Interviewee: As far as the process goes, I wasn't too heavily involved in that aspect of it. I don't know how smoothly it went. I'd have to defer to our CEO on that. As far as it being a drop in the bucket, just given what we needed to do and the scope of the project, certainly it was. But with regards to the project we tackled, it took care of a substantial amount of it. I think we only ended up paying \$1600 for that lighting project, which was substantial for us. That makes the payoff even better. I wish that there could have been more funding available for us outside of the reserves to do some of the larger type items.

Katherine Teiken: Would you have still done the lighting project without the reimbursement?

Interviewee: Yes, but it would have been more of a challenge for us to do so. Only because of the fact that we're putting that money out there. We do have that reserve for this property so it wouldn't have been that big of a hit. In my personal opinion, it was 100% necessity for the safety of the people in this building. I don't think it would have been an issue if I had been able to be in charge of it. There was a little bit of a battle back and forth for it, and having access to the reimbursement, certainly helped motivate the decision to go ahead and move forward to it. Vince Sewerth (a contractor from Ulta Energy) was good for helping to explain the payoff for it and helping to figure out the best scenario for us for a cost effective perspective. He came and did a massive lighting project for us, \$100,000, for this building, that was also part of an energy audit from CEE. It was only after he had been here doing some of this stuff, that I was able to show the powers that be, hey look at what he's putting in over here, that's what we should put in there and why. He helped with regards to that. I don't know how he came to be part of the project, if he was someone that we brought on? Maybe Energy Insight? There was a gentleman from that program that came out, Scott Schoolmeester. They came and did the direct install. I think the 18 units that they did, they were maybe in and out in 45 minutes. The only issue I have with regards to that, they weren't able to provide us with a few extra aerators or shower heads in case one of them broke. It was an even exchange, one for one kind of deal. Which I get, but at the same time, at least giving us access to where we could have procured them. Where did they buy them from, if there was a vendor or something like that. Since that happened, we had 4 units we had to replace the showerheads on for whatever reason. We put efficient showerheads in, but just not the same style as the ones that were provided. That would be my only complaint in that regard. It was really quick. Those guys were in and out of there. We had already started doing some of the in house lighting upgrades for the units themselves. We didn't have as many lights. Which was fine and that was probably what helped with how fast it was. It was quick and painless for the most part.

UTILITY REBATES

Katherine Teiken: Have you done EDA or HomeEnergySquad?

Interviewee: No we haven't done any of that. Scott described some of those programs to us. It was when we realized that we weren't going to be able to move forward with any of this stuff, it just kind of faded. We have townhomes. And those tenants pay for everything. We're looking at doing a massive overhaul on this property. At some properties, we have these front rooms that are poorly insulated. Not only does that put excessive wear on the boiler system. We get calls for those units nonstop in the winter time. It may be 68 in the unit, but the tenant wants it to be 80, but the reality is that it can't go above 68. We have a vacant unit right now. This is a project that I'd like to see done next year. They are two bedroom apartments. One of the bedrooms, when it was in its original design, was actually a front porch. What they did was blocked it in and windowed all 3 of the sides. So that is all it is, windows and cement block. There is almost no insulation. It is a 4 plex.

OVERALL

Katherine Teiken: What changes would you recommend?

Interviewee: Allowing us to incorporate some of the smaller properties. That would be nice so that we had a broader spectrum of things we're doing for the agency. It's nice to be able to do it for one property, but the reality is that you're not really saving us that much if we're still having to go through with the other properties. That would have been nice. The time burden is tremendous. All of our systems are different and so is how we respond to them. We primarily use steam for heating but the boilers in this building are far newer than others. I have one over there that is 40 years old.

Katherine Teiken: If you're doing it for one property, then is it really easy to add other properties?

Interviewee: I would like for it to be that way, but currently it is not. They are their own individual entities and have their own individual needs. It is going to have far less to deal with as far as some of the amenities. The radiators at one building are so incredibly antiquated, it's not even funny. Through the years, they've been improperly painted, and you're not supposed to paint them. You've got problems with the PHA coming through. You're chasing your tail, because now that it has been painted you have to keep painting them. And you don't want to paint these things. It's not what they're supposed to have on them. There are other things we have with regards to those. For example, we don't have safety covers for any of them. So cranking up the heat is also problematic because of safety problems with the kids. That is an independent problem for just that site that we don't have over here. It would be nice if we could have everything uniform, but it's just not happening. It's a huge time burden for us, for sure.

Ashly McFarlane: What about the time to go online to look at utility bills?

Interviewee: I think it would be great to see them, but the only thing we have that we utilize is if we have a high water usage notification. We try really hard to educate the tenants on flappers and things like that. At one building we have a very unique system there with pressurized vessels because it is a 3 inch plumbing stack instead of a 4 inch. When those pressurized vessels leak, you can't tell the same was as you can with a normal household toilet. We don't know until 3 months after the fact that we've been doubling our water usage for that reason. And admittedly some of our tenants are reluctant to call in for things like that because they don't want maintenance in their units. It has been a battle between the two. At one building we have commercial flush valves. If that diaphragm or vacuum breaker goes, the tenant might not know that they need to call maintenance because it takes extra-long for their toilet to flush. There's more water being used in that case. So that is pretty time consuming.

Katherine Teiken: What was the most helpful?

ENERGYSCORECARDS MINNESOTA PHASE II

Interviewee: Being able to see how much energy we're using as a whole. I don't pay the electric bill, so for me to have access to those on a monthly basis is different. I know I can go online and look at it, but again, with water usage, at one point I was the one responsible for taking care of those, and that was specifically so I could see excess water usage and I could tell how many units they used each month and we could go off from that and gauge, oh this unit probably has a leaking toilet, let's go check it out. Having access to all where all that information was quantified right up front. The time lag in EnergyScoreCards is an issue. I wish it would have been a little bit more fast as far as picking up the data and compiling it into the tool. We weren't on the tool frequent enough for it to be an impact. But when we would get on the tool and take a look and have our conference call, it was certainly noticeable. I wanted more real time information rather than what we did a month or so ago. That would be my only complaint.

Katherine Teiken: Any thoughts on MHFA that you want to share?

Interviewee: How restrictive some of the reserves can be. That is a huge issue for me. There were some projects we wanted to do that we simply weren't allowed to tap into those funds for. We had ample amount of money for it. That would be the biggest issue.

Katherine Teiken: Would you pay for this?

Interviewee: It would depend on what was included. I think it would be good to have someone to help us monitor and navigate through what areas we needed to work through. I don't know that it would be a recurring situation, but maybe to have someone come in to do a onetime consultation for us, I think it would be worthwhile to pay for something like that, for sure. If we could have someone come in there and do a full assessment for us, I think it would be worth our time and worth our money spent, especially if on the backend it could save us thousands of dollars.

Ashly McFarlane: On the benchmarking, what is the most helpful graph?

Interviewee: The first graph for sure, and the monthly graph are the ones I like. It was better able to look at the swings we're having, the trends. It was nice to see that we were somewhat on the same trend each year and each month with regards to our consumption. I'm not saying that they're good trends, but at least we were consistent.

Ashly McFarlane: In terms of technical assistance, what kind of support would be the most useful?

Interviewee: Energy projects. I am an old hat, so I'm not too savvy on the newer components that they have out there, especially for the heating side. It would be nice to have more education. Especially so I could have that information so I can back up any recommendations that I have for my supervisors. I could bring in a third party to reinforce what I'm telling them, but it would be nice to have some of that education myself. From the technical standpoint. That is where Vince was a really big help for the lighting upgrades. There is a lot of stuff that we were looking at doing that would have been wasted money. He found some workarounds for us that ended up saving us a lot more money than we expected. That is why we went for it with having him go do the rest of the lighting because it saved us money. For what we did out there, we were looking at closer to a \$10,000 lighting upgrade and we got it for just over \$4000.

Katherine Teiken: Any final thoughts?

Interviewee: Having Xcel as a resource to help educate the tenants, especially with things like recycling light bulbs, batteries, smoke detectors, farming light in the units versus using electricity to get lighting. Having someone in that regard, not necessarily from Xcel, would be helpful. Having that component as part of the program to bring the tenants in and incorporate them into everything that you're doing. Bring someone in every 6 months to a year. On average, we have 3-5 families move out a month. When we do lease signings, I do give them a printout from Xcel on energy savings. But it is directed at people who own homes. Although there are a few tips I can point out, it's not friendly. It is also language restricted. We have a lot of mixed nationalities and not all of them have English as their primary language. We need to give them more of layman's tip too. You lose people when they start reading, and they don't have an understanding of kWh, what do you mean? I don't leave my stuff on all these hours, and then you have to explain how it is metered. But having something with basic terms and pictures, that we could hand out. There are times when we have an influx of when we have 10-15 families move out at a time. Because the tenants don't pay for their utilities, when they move out, we're doing them a disservice by not helping to educate them more on how to be energy conservative. We have redone our leases where we have put some of this stuff in there, but it is so many words. We need something simple on a little flyer. Even just getting the tenants to understand that if the power is out in your unit and the unit next door, it is probably a problem with the building or Xcel energy. Trying to get the tenants to know that they have to call Xcel, rather than us, is also a challenge. They think that it is an issue we can deal with. The community action center in Hennepin County made magnets that said what to do in an outage, and also had energy-saving tips that were on it. I would slap it on their fridge whenever they moved in, but they stopped making those. A cheat sheet that they don't have to lose a piece of paper and can just put it on their fridge. You need to make sure it is not just in English. We have people that speak Karin, Vietnamese, Somali, Arabic. We have to make sure there is a broad spectrum of language.

Interviewee: Will the rebates be available after the pilot be available? We'd like to reach out and get project reimbursement for another property in 2019.

Katherine Teiken: Utility rebates will always be available, but our MHFA project reimbursement may not.

Interviewee: I have two more buildings that I for sure want help with. I wish we could have included them in this. Two identical buildings that are side by side. 138 and 142 Grotto have two separate heating systems. Their energy consumption, for both buildings is high. I'd like to find out what the reason for it is. We have one that is on a hydronic loop, steam heat system. Front rooms originally porches that are poorly insulated. The south building is less problematic than the north building. 4 plexes. If we could have someone come out and help with an assessment, that would be great.

Appendix D: Additional Quantitative Analysis and Results

Energy and Water Savings

This section provides additional information on how the change in Energy Use Index (EUI), change in water index, and cost savings was calculated for each building.

First, monthly electric and natural gas intensity was calculated for each building by dividing the monthly utility by the total building square footage. Monthly water usage index was calculated by dividing the monthly water usage by the number of bedrooms.

When a valid regression model could be found for 2015, electric and natural gas usage was weather normalized. The following regression models were created for each building for 2015:

- Monthly electric intensity (kWh/sqft) versus monthly cooling degree days (CDD) with a 65 degree Fahrenheit set point.
- Monthly natural gas intensity (therms/sqft) versus monthly cooling degree days (CDD) with a 65 degree Fahrenheit set point.

A regression model was considered valid if it met the following criteria:

- The coefficient of determination (r-squared) was greater than 0.5
- The p-value for each independent variable was less than 0.05
- The absolute calculated energy savings was greater than the standard deviation of the utility data in the model year

When a valid regression model could be found, the 2015 electric and natural gas usage was modeled at final year conditions and the utility savings was calculated using the following equation:

Equation 1: Utility savings per square foot = 2015 utility use modeled at the final year conditions – final year actual utility use

The final year is defined as the most recent 12 months in which electric, gas, and water data was available. If no data was available for 2018, the building was omitted from the analysis.

When a valid regression model could not be found, the electric and natural gas savings was calculated using the following equation:

Equation 2: Utility savings per square foot = 2015 actual utility use – final year actual utility use

This equation was also used to calculate the water index savings.

ENERGYSCORECARDS MINNESOTA PHASE II

Table 12 shows the utility savings per square foot for each participant. Payment code indicates whether the owner (O) or tenant (T) pays for in-unit electric, cooling, space heat, and DHW respectively.

ENERGYSCORECARDS MINNESOTA PHASE II

Table 12: Utility savings per square foot per year. A positive value indicates an energy savings.

Building	Payment Code	Electricity (kWh/sqft)	Electric weather normalized	Natural Gas (therm/sqft)	Natural Gas weather normalized	Water (kgal/bedrm)
Building 1	(O)000	0.52	Yes	-0.1	Yes	5.35
Building 2	(T)TOO	0.16	Yes	-0.04	Yes	-8.5
Building 3	(O)000	0.41	Yes	0.06	Yes	7.34
Building 4	(O)000	1.17	No	0.11	Yes	-3.81
Building 5	(T)TOO	1.17	No	-0.13	Yes	No data
Building 6	(O)000	1.34	Yes	-0.1	No	-1.98
Building 7	(T)TOO	-0.03	No	No data	Yes	-5.54
Building 8	(T)TOO	2.57	Yes	-0.04	Yes	4.33
Building 9	(T)TOO	-0.33	Yes	-0.01	No	-13.6
Building 10	(T)TTO	0.15	No	-0.02	No	1.5
Building 11	(T)TTO	0.4	No	-0.02	No	3.18
Building 12	(T)TOO	0.24	Yes	-0.04	Yes	5.16
Building 13	(T)000	-0.15	No	-0.09	Yes	1.42
Building 14	(T)TOO	-0.21	Yes	-0.06	Yes	4.61
Building 15	(T)TOO	0.1	No	0.02	No	No data
Building 16	(T)TOO	No data	No	No data	No	No data
Building 17	(O)000	0.28	Yes	-0.15	Yes	6.16
Building 18	(T)TOO	-1.23	No	0.01	No	No data
Building 19	(T)TOO	0.77	No	-0.13	Yes	-2.24
Building 20	(O)000	-1.57	No	0.25	No	-8.49
Building 21	(O)000	-0.64	No	0.24	Yes	7.87
Building 22	(O)000	-8.59	Yes	-0.1	Yes	1.3
Building 23	(O)000	0.39	No	0.08	No	-7.28
Building 24	(T)TOO	0.02	Yes	0.05	Yes	26.05
Building 25	(T)TOO	0.12	Yes	-0.06	No	15.67
Building 26	(T)TTO	0.16	No	0.01	Yes	0.76
Building 27	(T)TTO	0.22	No	0	No	-10.43
Building 28	(T)TOO	0.29	No	-0.03	No	-19.56
Building 29	(T)TOO	0.22	No	0.27	Yes	-6.41
Building 30	(T)TOO	0.06	Yes	0.15	Yes	2.41
Building 31	(O)000	-0.25	No	-0.02	No	3.77

Utility savings per building was calculated using the same approach as described above, except the utility use was not divided by building square footage or bedrooms. Percent savings shown in

ENERGYSCORECARDS MINNESOTA PHASE II

Table 13 is the ratio of the utility savings to the 2015 total energy or water usage.

Table 13. Utility savings per building per year and percent savings.

Building	Payment Code	Electricity (kWh/yr)	Percent savings	Natural Gas (therms/yr)	Percent savings	Water (kgal/yr)	Percent Savings
Building 1	(O)000	25,997	2.40%	-5,082	-11%	642	28%
Building 2	(T)TOO	3,419	4.20%	-919	-10%	-331	-29%
Building 3	(O)000	43,536	4.90%	6,784	9.40%	1,160	19%
Building 4	(O)000	38,630	9.50%	3,793	47%	-122	-25%
Building 5	(T)TOO	53,291	19%	-6,046	-16%	No data	No data
Building 6	(O)000	70,772	11%	-5,004	-17%	-190	-5.30%
Building 7	(T)TOO	-1,546	-0.80%	No data	No data	-637	-16%
Building 8	(T)TOO	136,030	35%	-2,024	-8.40%	234	10%
Building 9	(T)TOO	-5,373	-25%	-204	-2.00%	-340	-32%
Building 10	(T)TTO	9,528	8.30%	-1,002	-17%	116	4.20%
Building 11	(T)TTO	33,595	14%	-1,611	-15%	318	7.40%
Building 12	(T)TOO	14,988	7.40%	-2,455	-12%	433	27%
Building 13	(T)000	-13,372	-2.50%	-7,798	-28%	117	7.90%
Building 14	(T)TOO	-1,872	-20%	-504	-9.30%	88	19%
Building 15	(T)TOO	7,491	6.80%	1,375	3.30%	No data	No data
Building 16	(T)TOO	No data	No data	No data	No data	No data	No data
Building 17	(O)000	18,113	4.70%	-9,532	-25%	560	20%
Building 18	(T)TOO	-98,522	-101%	749	2.30%	No data	No data
Building 19	(T)TOO	57,725	28%	-10,069	-16%	-240	-6.70%
Building 20	(O)000	-12,948	-8.40%	2,068	42%	-153	-60%
Building 21	(O)000	-4,120	-22%	1,523	31%	126	46%
Building 22	(O)000	-72,845	-40%	-872	-4.20%	64	5.10%
Building 23	(O)000	20,861	3.60%	4,251	58%	-189	-28%
Building 24	(T)TOO	343	2.00%	864	9.20%	729	56%
Building 25	(T)TOO	2,125	10%	-1,172	-13%	470	42%
Building 26	(T)TTO	3,776	19%	181	7.70%	27	3.20%
Building 27	(T)TTO	5,050	21%	-19	-0.70%	-355	-43%
Building 28	(T)TOO	3,447	22%	-369	-5.60%	-293	-54%
Building 29	(T)TOO	2,649	16%	3,255	51%	-96	-19%
Building 30	(T)TOO	1,116	6.30%	2,692	26%	111	7.20%
Building 31	(O)000	-6,462	-6.50%	-510	-2.70%	136	19%

Cost savings was calculated using the buildings' monthly utility rate for the most recent 12 months of data available.

Table 14: Cost savings per building and per unit per year.

Building	Payment Code	Cost savings per building			Average cost savings per unit		
		Electricity	Natural Gas	Water	Electricity	Natural Gas	Water
Building 1	(O)000	\$2,452	(\$2,958)	\$7,707	\$20.44	(\$24.65)	\$64.22
Building 2	(T)TOO	\$433	(\$596)	(\$3,206)	\$27.08	(\$37.26)	(\$200.36)
Building 3	(O)000	\$4,008	\$4,221	\$12,532	\$25.53	\$26.88	\$79.82
Building 4	(O)000	\$4,373	\$2,991	(\$1,814)	\$136.67	\$93.46	(\$56.69)
Building 5	(T)TOO	\$5,842	(\$4,407)	No data	\$73.02	(\$55.08)	No data
Building 6	(O)000	\$6,135	(\$3,687)	(\$2,254)	\$63.90	(\$38.41)	(\$23.48)
Building 7	(T)TOO	(\$247)	No data	(\$7,064)	(\$5.15)	No data	(\$147.17)
Building 8	(T)TOO	\$15,698	(\$1,366)	\$2,543	\$523.25	(\$45.53)	\$84.76
Building 9	(T)TOO	(\$699)	(\$148)	(\$3,588)	(\$27.95)	(\$5.91)	(\$143.51)
Building 10	(T)TTO	\$1,087	(\$751)	\$1,232	\$26.50	(\$18.32)	\$30.05
Building 11	(T)TTO	\$3,546	(\$1,111)	\$3,273	\$72.37	(\$22.67)	\$66.80
Building 12	(T)TOO	\$1,588	(\$1,651)	\$6,000	\$40.72	(\$42.34)	\$153.84
Building 13	(T)000	(\$1,380)	(\$5,153)	\$1,324	(\$35.40)	(\$132.13)	\$33.94
Building 14	(T)TOO	(\$262)	(\$355)	\$977	(\$26.19)	(\$35.54)	\$97.74
Building 15	(T)TOO	\$799	\$920	No data	\$8.23	\$9.49	No data
Building 16	(T)TOO	No data	No data	No data	No data	No data	No data
Building 17	(O)000	\$1,970	(\$9,079)	\$6,627	\$25.59	(\$117.91)	\$86.06
Building 18	(T)TOO	(\$10,547)	\$552	No data	(\$124.08)	\$6.50	No data
Building 19	(T)TOO	\$7,031	(\$7,782)	(\$2,663)	\$65.71	(\$72.73)	(\$24.89)
Building 20	(O)000	(\$1,722)	\$1,966	(\$861)	(\$95.67)	\$109.22	(\$47.81)
Building 21	(O)000	(\$610)	\$1,063	\$3,792	(\$38.10)	\$66.43	\$236.97
Building 22	(O)000	(\$5,660)	(\$609)	\$717	(\$257.29)	(\$27.69)	\$32.60
Building 23	(O)000	\$2,564	\$3,098	(\$2,259)	\$98.63	\$119.17	(\$86.87)
Building 24	(T)TOO	\$50	\$678	\$8,683	\$2.94	\$39.86	\$510.76
Building 25	(T)TOO	\$306	(\$911)	\$5,345	\$17.02	(\$50.63)	\$296.96
Building 26	(T)TTO	\$569	\$131	\$288	\$24.75	\$5.71	\$12.51
Building 27	(T)TTO	\$686	(\$13)	(\$2,340)	\$29.81	(\$0.56)	(\$101.73)
Building 28	(T)TOO	\$447	(\$253)	(\$3,042)	\$29.78	(\$16.89)	(\$202.81)
Building 29	(T)TOO	\$341	\$2,475	(\$1,023)	\$22.74	\$165.02	(\$68.22)
Building 30	(T)TOO	\$161	\$2,002	\$1,305	\$9.49	\$117.77	\$76.74
Building 31	(O)000	(\$748)	(\$316)	\$1,450	(\$41.56)	(\$17.57)	\$80.57

Multi-Family Building Efficiency Program Payback Summary

The information below was taken from the MFBE Energy Audit Report that was provided to each of the 16 buildings that participated in the MFBE Program. It indicates the cost-effective projects that the utility was recommending to be completed at each building.

Table 15: MFBE Program Payback Summary

Building	Project	Annual cost saved	Annual MMBTUs Saved	Estimated project cost	Estimated rebate	Cost after rebate	Simple payback (years)	% Equiv MMBTU reduced
Building 8	Direct Install	\$2,300	147.0	\$0	\$0	\$0	0.0	3.80%
Building 8	Reduce Garage Temp	\$208	28.0	\$0	\$0	\$0	0.0	0.70%
Building 8	Reduce Hot Water Temp	\$127	17.0	\$0	\$0	\$0	0.0	0.50%
Building 8	Weather Strip Dumpster Door	\$79	11.0	\$75	\$38	\$38	0.5	0.30%
Building 8	Exhaust Fan Controls - Main RRs	\$890	91.0	\$1,000	\$500	\$500	0.6	2.40%
Building 8	Weather Strip Front and Rear Main Doors	\$69	9.0	\$150	\$75	\$75	1.1	0.20%
Building 8	VFD on the core water pump	\$1,656	51.0	\$4,200	\$2,100	\$2,100	1.3	1.30%
Building 8	Stairwell occupancy-based dimming controls	\$176	5.0	\$450	\$225	\$225	1.3	0.20%
Building 8	Exhaust Fan Controls - Office Restroom	\$168	13.0	\$500	\$250	\$250	1.5	0.30%
Building 8	Exhaust Fan Controls - Laundry Rooms	\$305	29.0	\$1,000	\$500	\$500	1.6	0.80%
Building 8	Snow Melt Moisture Controls	\$890	119.0	\$2,975	\$1,488	\$1,488	1.7	3.20%
Building 8	Chiller Condenser Fan VFD	\$677	21.0	\$2,740	\$1,370	\$1,370	2.0	0.60%
Building 8	Exterior LED Lighting	\$1,693	51.0	\$7,510	\$3,755	\$3,755	2.2	1.40%
Building 8	Sub-total	\$9,239	589.0	\$20,600	\$10,300	\$10,300	1.1	15.60%
Building 9	Direct Install	\$1,119	59.7	\$0	\$0	\$0	0.0	3.20%
Building 9	Domestic hot water	\$37	5.4	\$113	Prescriptive	TBD	3.1	0.30%

ENERGYSCORECARDS MINNESOTA PHASE II

	pipe insulation							
Building 9	Boiler tune-up	\$123	17.9	\$500	Prescriptive	TBD	4.1	1.00%
Building 9	Boiler stack dampers	\$308	44.8	\$1,300	Prescriptive	TBD	4.2	2.40%
Building 9	Efficient lighting upgrades	\$1,319	37.5	\$5,950	Prescriptive	TBD	4.5	2.00%
Building 9	Boiler pipe insulation	\$106	15.5	\$706	Prescriptive	TBD	6.6	0.80%
Building 9	Lighting controls	\$49	1.4	\$456	Prescriptive	TBD	9.2	0.10%
Building 9	ENERGY STAR refrigerators (4)	\$57	1.6	\$1,960	\$0	TBD	34.2	0.10%
Building 9	Sub-total	\$3,120	183.8	\$10,985	TBD	TBD	3.5	9.90%
Building 10	Direct Install	\$1,313	55.3	\$0	\$0	\$0	0.0	3.00%
Building 10	Reduce water heater set point	\$59	8.0	\$0	\$0	\$0	0.0	0.40%
Building 10	Lighting controls	\$2,984	84.9	\$13,230	Prescriptive	TBD	4.4	4.50%
Building 10	Efficient lighting upgrades	\$85	2.4	\$577	Prescriptive	TBD	6.8	0.10%
Building 10	ENERGY STAR refrigerators (6)	\$86	2.4	\$2,940	\$0	\$2,940	34.2	0.10%
Building 10	Sub-total	\$4,527	153.0	\$16,747	TBD	TBD	3.7	8.10%
Building 12	Direct Install	\$2,150	146.9	\$0	\$0	\$0	0.0	4.80%
Building 12	Restroom fan controls	\$555	52.9	\$1,500	Custom	TBD	2.7	1.70%
Building 12	East wing boiler tune up	\$143	22.0	\$500	Prescriptive	TBD	3.5	0.70%
Building 12	Efficient lighting upgrades	\$5,757	163.7	\$32,614	Prescriptive	TBD	5.7	5.30%
Building 12	Lighting controls	\$366	10.4	\$2,559	Prescriptive	TBD	7.0	0.30%
Building 12	West wing boiler controls	\$71	11.0	\$500	Prescriptive	TBD	7.0	0.40%
Building 12	West wing boiler stack damper	\$178	27.4	\$1,300	Prescriptive	TBD	7.3	0.90%
Building 12	Air conditioning upgrades	\$578	16.4	\$12,767	Custom	TBD	22.1	0.50%
Building 12	Sub-total	\$9,798	450.7	\$51,740	TBD	TBD	5.3	14.60%
Building 13	Direct Install	\$3,013	166.2	\$0	\$0	\$0	0.0	3.60%
Building 13	Efficient	\$10,337	293.9	\$36,390	Prescriptive	TBD	3.5	6.40%

ENERGYSCORECARDS MINNESOTA PHASE II

	lighting upgrades							
Building 13	Lighting controls	\$407	11.6	\$1,572	Prescriptive	TBD	3.9	0.30%
Building 13	Boiler tune-up	\$158	30.8	\$1,100	Prescriptive	TBD	6.9	0.70%
Building 13	Boiler pipe insulation	\$74	14.5	\$674	Prescriptive	TBD	9.1	0.30%
Building 13	Restroom fan controls	\$798	70.8	\$19,500	Custom	TBD	24.4	1.50%
Building 13	Sub-total	\$14,788	587.8	\$59,236	TBD	TBD	4.0	12.90%
Building 14	Direct Install	\$378	37.4	\$0	\$0	\$0	0.0	5.30%
Building 14	Efficient lighting upgrades	\$498	14.2	\$2,198	\$1,099	\$1,099	2.2	2.00%
Building 14	Weather strip front door	\$6	1.1	\$47	\$24	\$24	4.1	0.20%
Building 14	Domestic hot water pipe insulation	\$20	4.0	\$180	\$90	\$90	4.4	0.60%
Building 14	Lighting controls	\$62	1.8	\$693	\$247	\$247	5.6	0.30%
Building 14	Boiler pipe insulation	\$18	3.5	\$311	\$156	\$156	8.7	0.50%
Building 14	Window AC covers (10)	\$23	4.5	\$600	\$300	\$300	13.1	0.60%
Building 14	Boiler upgrade	\$431	83.8	\$13,484	\$6,742	\$6,742	15.7	11.90%
Building 14	Sub-total	\$1,436	150.3	\$17,513	\$8,658	\$8,658	6.7	21.40%
Building 15	Direct Install	\$1,735	170.3	\$0	\$0	\$0	0.0	2.92%
Building 15	Vending machine controls	\$84	2.4	\$25	\$13	\$13	0.1	0.04%
Building 15	Drinking fountain controls	\$8	0.2	\$25	\$13	\$13	1.6	0.01%
Building 15	Water heating pipe insulation	\$19	3.4	\$100	\$50	\$50	2.6	0.06%
Building 15	Makeup air unit ventilation controls	\$733	85.8	\$4,250	\$2,125	\$2,125	2.9	1.47%
Building 15	Weather strip all exterior doors	\$43	7.6	\$288	\$144	\$144	3.4	0.13%
Building 15	Bi-level controls for stairwell	\$195	5.6	\$1,450	\$725	\$725	3.7	0.10%
Building 15	Condensing water heater	\$928	164.8	\$15,313	\$7,656	\$7,656	8.2	2.82%
Building 15	Boiler upgrade	\$3,609	640.6	\$75,000	\$37,500	\$37,500	10.4	10.97%

ENERGYSCORECARDS MINNESOTA PHASE II

Building 15	ENERGY STAR clothes washers (4)	\$203	24.8	\$5,760	\$0	\$5,760	28.4	0.42%
Building 15	ENERGY STAR refrigerators (5)	\$72	4.0	\$2,450	\$0	\$2,450	34.2	0.03%
Building 15	Sub-total	\$7,629	1109.5	\$104,661	\$48,226	\$56,436	8.7	18.97%
Building 16	Direct Install	\$905	78.3	\$0	\$0	\$0	0.0	2.00%
Building 16	Programmable thermostat	\$156	26.9	\$150	Custom	TBD	1.0	0.70%
Building 16	Water heating pipe insulation	\$217	42.2	\$321	Prescriptive	TBD	1.5	1.10%
Building 16	Boiler tune-up	\$212	42.3	\$500	Prescriptive	TBD	2.4	1.00%
Building 16	Efficient lighting upgrades	\$3,308	94.1	\$12,580	Prescriptive	TBD	3.8	2.40%
Building 16	Space heating pipe insulation	\$47	9.1	\$205	Prescriptive	TBD	4.4	0.20%
Building 16	Bi-level lighting controls	\$203	5.8	\$1,450	Prescriptive	TBD	7.1	0.10%
Building 16	Occupancy sensors	\$24	0.7	\$170	Prescriptive	TBD	7.2	0.00%
Building 16	Weather strip entry door	\$17	3.3	\$138	Custom	TBD	8.2	0.10%
Building 16	Heat exchanger insulation	\$22	4.3	\$400	Custom	TBD	18.3	0.10%
Building 16	Makeup air unit fan controls	\$205	5.9	\$4,250	Prescriptive	TBD	20.7	0.10%
Building 16	Isolate 5 boiler modules	\$20	3.9	\$500	Custom	TBD	25.1	0.10%
Building 16	ENERGY STAR refrigerators (5)	\$72	2.0	\$2,450	\$0	\$2,450	34.2	0.10%
Building 16	Sub-total	\$5,408	317.8	\$23,114	TBD	TBD	4.3	8.00%
Building 24	Direct Install	\$945	76.5	\$0	\$0	\$0	0.0	5.90%
Building 24	Weather strip back door	\$23	3.4	\$47	Custom	TBD	2.0	0.30%
Building 24	Boiler stack dampers	\$269	39.4	\$860	Prescriptive	TBD	3.2	3.00%
Building 24	Boiler tune-up	\$108	15.7	\$400	Prescriptive	TBD	3.7	1.20%
Building 24	Efficient lighting	\$744	21.2	\$3,355	Prescriptive	TBD	4.5	1.60%

ENERGYSCORECARDS MINNESOTA PHASE II

	upgrades							
Building 24	Domestic hot water pipe insulation	\$37	5.4	\$248	Prescriptive	TBD	6.7	0.40%
Building 24	Boiler pipe insulation	\$25	3.6	\$206	Prescriptive	TBD	8.3	0.30%
Building 24	Lighting controls	\$50	1.4	\$605	Prescriptive	TBD	12.1	0.10%
Building 24	Window AC covers (14)	\$28	4.2	\$840	Custom	TBD	29.5	0.30%
Building 24	ENERGY STAR refrigerators (3)	\$43	1.2	\$1,470	\$0	\$1,470	34.2	0.10%
Building 24	Sub-total	\$2,272	172.0	\$8,031	TBD	TBD	3.5	13.20%
Building 25	Direct Install	\$1,222	71.8	\$0	\$0	\$0	0.0	7.70%
Building 25	Efficient lighting upgrades	\$672	19.1	\$2,539	\$1,270	\$1,270	1.9	2.10%
Building 25	Boiler stack dampers	\$154	21.0	\$650	\$325	\$325	2.1	2.30%
Building 25	Weather strip entry door	\$34	4.6	\$188	\$94	\$94	2.8	0.50%
Building 25	Boiler tune-up	\$62	8.4	\$400	\$200	\$200	3.2	0.90%
Building 25	Domestic hot water pipe insulation	\$40	5.4	\$328	\$164	\$164	4.2	0.60%
Building 25	Boiler pipe insulation	\$27	3.6	\$280	\$140	\$140	5.3	0.40%
Building 25	Lighting controls	\$40	1.1	\$484	\$242	\$242	6.1	0.10%
Building 25	Window AC covers (14)	\$32	4.3	\$840	\$240	\$240	13.2	0.50%
Building 25	ENERGY STAR refrigerators (3)	\$43	1.2	\$1,470	\$735	\$735	17.1	0.10%
Building 25	Sub-total	\$2,326	140.5	\$7,179	\$3,410	\$3,410	1.3	15.20%
Building 26	Direct Install	\$1,577	67.7	\$0	\$0	\$0	0.0	7.40%
Building 26	Lighting controls	\$35	1.0	\$335	Prescriptive	TBD	9.5	0.10%
Building 26	Efficient lighting upgrades	\$607	17.3	\$4,467	Prescriptive	TBD	7.4	1.90%
Building 26	Sub-total	\$2,219	86.0	\$4,802	TBD	TBD	2.2	9.40%
Building 27	Direct Install	\$1,414	62.2	\$0	\$0	\$0	0.0	6.80%
Building 27	Lighting controls	\$35	1.0	\$335	Prescriptive	TBD	9.5	0.10%
Building 27	Efficient lighting upgrades	\$607	17.3	\$4,387	Prescriptive	TBD	7.2	1.90%

ENERGYSCORECARDS MINNESOTA PHASE II

Building 27	Condensing hot water heater	\$214	41.7	\$12,075	Prescriptive	TBD	56.4	4.60%
Building 27	Sub-total	\$2,270	122.2	\$16,797	TBD	TBD	7.4	13.50%
Building 28	Direct Install	\$429	44.2	\$0	\$0	\$0	0.0	4.70%
Building 28	Boiler tune-up	\$67	13.1	\$400	Prescriptive	TBD	6.0	1.40%
Building 28	Boiler pipe insulation	\$15	3.0	\$107	Prescriptive	TBD	7.0	0.30%
Building 28	Efficient lighting upgrades	\$373	10.6	\$3,394	Prescriptive	TBD	9.1	1.10%
Building 28	Lighting controls	\$32	0.9	\$335	Prescriptive	TBD	10.4	0.10%
Building 28	Linkage-less boiler controls	\$101	19.6	\$14,000	Prescriptive	TBD	138.9	2.10%
Building 28	Condensing hot water heater	\$82	15.9	\$12,075	Prescriptive	TBD	147.5	1.70%
Building 28	Sub-total	\$1,099	107.3	\$30,311	TBD	TBD	27.6	11.40%
Building 29	Direct Install	\$383	40.9	\$0	\$0	\$0	0.0	4.80%
Building 29	Boiler tune-up	\$63	12.3	\$400	Prescriptive	TBD	6.4	1.40%
Building 29	Boiler pipe insulation	\$14	2.8	\$96	Prescriptive	TBD	6.7	0.30%
Building 29	Efficient lighting upgrades	\$373	10.6	\$3,394	Prescriptive	TBD	9.1	120.00%
Building 29	Lighting controls	\$31	0.9	\$335	Prescriptive	TBD	10.4	0.10%
Building 29	Boiler linkage-less controls	\$94	18.4	\$14,000	Prescriptive	TBD	148.3	2.10%
Building 29	Sub-total	\$959	85.9	\$18,225	TBD	TBD	19.0	9.90%
Building 30	Direct Install	\$723	52.7	\$0	\$0	\$0	0.0	4.10%
Building 30	Efficient lighting upgrades	\$471	13.4	\$1,181	Prescriptive	TBD	2.5	1.00%
Building 30	Weather strip rear exit door	\$17	2.5	\$47	Prescriptive	TBD	2.8	0.20%
Building 30	Boiler tune-up	\$84	12.3	\$400	Prescriptive	TBD	4.8	1.00%
Building 30	Lighting controls	\$11	0.3	\$94	Prescriptive	TBD	8.5	0.00%
Building 30	Boiler pipe insulation	\$19	2.7	\$208	Prescriptive	TBD	11.2	0.20%
Building 30	ENERGY STAR refrigerators (3)	\$43	1.2	\$1,470	Custom	TBD	34.2	0.10%
Building 30	Condensing hot water heater	\$338	49.6	\$12,022	Prescriptive	TBD	35.5	3.90%

ENERGYSCORECARDS MINNESOTA PHASE II

Building 30	Air conditioning upgrades	\$25	0.7	\$2,716	Custom	TBD	106.8	0.10%
Building 30	Sub-total	\$1,732	135.4	\$18,138	TBD	TBD	10.5	10.60%
Building 31	Direct Install	\$472	53.6	\$0	\$0	\$0	0.0	2.30%
Building 31	Efficient lighting upgrades	\$1,733	49.3	\$5,051	\$2,526	\$2,526	1.5	2.10%
Building 31	Lighting controls	\$520	14.8	\$2,869	\$1,435	\$1,435	2.8	0.60%
Building 31	Domestic hot water pipe insulation	\$47	9.1	\$524	\$262	\$262	5.6	0.40%
Building 31	Boiler pipe insulation	\$106	20.7	\$1,261	\$531	\$531	5.9	0.90%
Building 31	Boiler upgrade	\$1,043	202.9	\$31,210	\$15,605	\$15,605	15.0	8.80%
Building 31	ENERGY STAR refrigerators (3)	\$43	1.2	\$1,470	\$735	\$735	25.7	0.10%
Building 31	Sub-total	\$3,964	351.6	\$42,385	\$21,094	\$21,094	7.8	15.20%

Energy and Water Savings Actions Completed

Information on the projects listed below was taken from the online survey, in-person interviews, project reimbursement requests, direct-install reports, and quarterly check-in calls.

Table 16: Energy and Water Savings Actions

Building	Action/Project	Cost estimate	Approximate Date implemented
Building 3	High efficiency domestic hot water heater (DHW)	Unknown	4/1/2018
Building 3	Cooling and air handling unit upgrade	Unknown	7/1/2018
Building 3	Implemented a toilet leak detection and repair program	Time	Ongoing
Building 4	Implemented a toilet leak detection and repair program	Time	Ongoing
Building 5	De-lamped lights	\$0	12/1/2017
Building 5	Occupancy and/or daylight sensors on lighting	Unknown	12/1/2017
Building 5	Implemented a toilet leak detection and repair program	Time	Ongoing
Building 6	Implemented a toilet leak detection and repair program	Time	Ongoing
Building 7	Install limit switches on the furnaces	Unknown	8/1/2017
Building 7	Install water meters	Unknown	8/1/2017
Building 7	Implemented a toilet leak detection and repair program	Time	Ongoing
Building 8	In-unit CFL lighting	\$0	12/16/2015
Building 8	Low flow fixtures (aerators/shower heads) in units	\$0	12/16/2015
Building 8	Reduce garage temperature	\$0	3/2/2017
Building 8	High efficiency pumps	\$3,660	6/1/2017
Building 8	Pump variable frequency drive	\$9,510	4/30/2018
Building 8	Replace common area lighting with LEDs	Unknown	6/1/2018
Building 8	Replace exterior lighting with LEDs	Unknown	6/1/2018
Building 8	Occupancy and/or daylight sensors on lighting	Unknown	6/1/2018
Building 8	Occupancy and/or daylight sensors on lighting	Unknown	6/1/2018
Building 8	Moisture sensor on snow melt system	Unknown	6/1/2018
Building 9	Low flow fixtures (aerators/shower heads) in units	\$0	7/21/2017
Building 9	In-unit LED lighting	\$0	7/22/2017
Building 9	Replace common area and exterior lighting with LEDs	\$3,800	11/26/2018
Building 10	In-unit LED lighting	\$0	7/20/2017
Building 10	Low flow fixtures (aerators/shower heads) in units	\$0	7/20/2017
Building 10	Replace exterior lighting with LEDs	\$3,175	4/12/2018
Building 10	High efficiency furnace & air handler	\$3,915	10/11/2018
Building 11	Improved Parking Lot and Security lighting	Unknown	Unknown
Building 12	In-unit LED lighting	\$0	6/14/2017
Building 12	Low flow fixtures (aerators/shower heads) in units	\$0	6/14/2017
Building 12	Irrigation controls	Unknown	6/1/2018
Building 12	High efficiency boilers	\$46,976	8/15/2018
Building 12	High efficiency domestic hot water heater (DHW)	\$13,024	8/15/2018
Building 12	Boiler tune-up	\$500	8/15/2018
Building 12	Boiler tune-up	\$500	8/15/2018
Building 13	High efficiency motor on rooftop air handling unit	\$2,600	12/13/2016
Building 13	Replace boiler expansion tank	\$4,350	12/28/2016
Building 13	In-unit LED lighting	\$0	4/24/2017
Building 13	Low flow fixtures (aerators/shower heads) in units	\$0	4/24/2017
Building 13	Install a 3-way valve on boiler system	\$7,165	12/6/2018
Building 13	Controls on cooling system	\$1,300	8/3/2016
Building 14	Insulated ducts	\$156	1/15/2017
Building 14	In-unit LED lighting	\$0	4/25/2017
Building 14	Low flow fixtures (aerators/shower heads) in units	\$0	4/25/2017
Building 14	AC covers in units	\$825	7/5/2017

ENERGYSCORECARDS MINNESOTA PHASE II

Building 14	High efficiency domestic hot water heater (DHW)	Unknown	12/13/2017
Building 14	High efficiency bath fans	Unknown	12/13/2017
Building 14	Replace common area lighting with LEDs	\$1,099	12/15/2017
Building 14	Occupancy and/or daylight sensors on lighting	\$347	12/15/2017
Building 14	Weather stripping on entry doors	\$194	1/10/2018
Building 14	Air source heat pumps (mini-splits)	\$9,268	1/10/2018
Building 14	Insulated domestic hot water pipes	\$90	1/15/2018
Building 14	High efficiency boilers	Unknown	9/1/2018
Building 14	Low flow toilets	Unknown	9/1/2018
Building 15	In-unit LED lighting	\$0	8/5/2016
Building 15	Low flow fixtures (aerators/shower heads) in units	\$0	8/5/2016
Building 16	In-unit LED lighting	\$0	8/4/2016
Building 16	Low flow fixtures (aerators/shower heads) in units	\$0	8/4/2016
Building 19	Replace common area lighting with LEDs	\$17,350	6/7/2017
Building 19	ENERGY STAR rated refrigerators	Unknown	6/7/2017
Building 24	Low flow fixtures (aerators/shower heads) in units	\$0	6/6/2017
Building 24	In-unit LED lighting	\$0	6/6/2017
Building 24	Insulated boiler pipes	Unknown	10/1/2018
Building 24	Replace exterior lighting with LEDs	\$4,430	12/1/2018
Building 24	AC covers in units	\$840	12/1/2018
Building 24	Weather stripping on entry doors	\$100	12/1/2018
Building 24	Boiler stack dampers	\$860	12/1/2018
Building 25	Low flow fixtures (aerators/shower heads) in units	\$0	6/6/2017
Building 25	In-unit LED lighting	\$0	6/6/2017
Building 25	Insulated boiler pipes	Unknown	10/1/2018
Building 25	AC covers in units	\$420	10/1/2018
Building 25	Replace exterior lighting with LEDs	\$4,430	11/1/2018
Building 25	Weather stripping on entry doors	\$100	12/1/2018
Building 25	Boiler stack dampers	\$800	12/1/2018
Building 26	Replace exterior lighting with LEDs	Unknown	5/4/2017
Building 26	In-unit LED lighting	\$0	6/13/2017
Building 26	Low flow fixtures (aerators/shower heads) in units	\$0	6/13/2017
Building 26	Replace common area lighting with LEDs	\$4,467	9/1/2018
Building 27	Replace exterior lighting with LEDs	\$0	6/13/2017
Building 27	In-unit LED lighting	\$0	6/13/2017
Building 27	Low flow fixtures (aerators/shower heads) in units	\$0	6/13/2017
Building 27	Replace common area lighting with LEDs	\$4,387	9/1/2018
Building 28	In-unit LED lighting	\$0	6/13/2017
Building 28	Low flow fixtures (aerators/shower heads) in units	\$0	6/13/2017
Building 28	Replace exterior lighting with LEDs	Unknown	Unknown
Building 29	Low flow fixtures (aerators/shower heads) in units	\$0	6/13/2017
Building 29	Replace exterior lighting with LEDs	Unknown	Unknown
Building 30	Low flow fixtures (aerators/shower heads) in units	\$0	6/13/2017
Building 30	In-unit LED lighting	\$0	6/13/2017
Building 30	Boiler tune-up	\$400	10/1/2018
Building 30	Replace exterior lighting with LEDs	\$1,181	11/1/2018
Building 30	Low flow toilets	\$3,789	11/1/2018
Building 31	Low flow fixtures (aerators/shower heads) in units	\$0	5/4/2017
Building 31	In-unit LED lighting	\$0	5/4/2017
Building 31	Replace exterior lighting with LEDs	Unknown	5/4/2017
Building 31	In-unit LED lighting	\$4,405	7/31/2018
Building 31	Occupancy and/or daylight sensors on lighting	Unknown	7/31/2018



400 Wabasha Street North, Suite 400
St. Paul, MN 55102
651.296.7608 | 800.657.3769 | mnhousing.gov

Equal Opportunity Housing and Equal Opportunity Employment. This item can be made available in alternative formats by calling 651.296.7608.