

Energy Design Conference & Expo
Breaking Down Barriers to Multifamily
Energy Efficiency: Data and Financing
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Objectives

1. Learn some common barriers to multifamily owners improving the energy efficiency of their buildings
2. Understand the benefits of energy benchmarking
3. Hear how multifamily building owners have used benchmarking information
4. Learn best practices for utilities sharing energy usage data with multifamily owners
5. Hear case studies of multifamily building retrofits
6. Learn how different energy efficiency financing options may suit buildings at different stages in their financing lifecycles, including PACE, on-bill repayment, and other types of energy efficiency loans

What is benchmarking?



Benchmarking is the ongoing systematic monthly review of energy and water utilization in a building.

It is used to determine how a building is performing year over year, or in comparison other buildings in a portfolio, or similar buildings in general.

EnergyScoreCards Minnesota Goals



- Demonstrate feasibility of multifamily energy and water benchmarking in Minnesota
- Create benchmarks for MN multifamily energy and water consumption
- Measure the impact of providing multifamily owners and managers with energy and water feedback
- Understand how building owners use a benchmarking service

Project Partners:



The pilot was funded by:

- Xcel Energy (Emerging Technology Grant)
- Minnesota Department of Commerce, Division of Energy Resources (CARD Grant)
- Minnesota Housing Finance Agency

Results: Process

Benchmarking was used for many purposes:

- To track the results of energy and water improvements
- To inform long-term capital planning
- To inform operations and maintenance
- To enable competitions
- As an internal communications tool to convince decision makers to take action
- As a business management tool for budgeting, key performance indicators, asset management functions

Results: Process

A participant survey documents the importance of hands-on support as part of a benchmarking service.

Key service components:

- Dedicated support staff alongside benchmarking software
- Build a relationship with owners as a long-term partner
- Provide benchmarking services at a portfolio level
- Coordinate with other technical providers/ programs to bridge to action → participants wanted more help

Energy Management Process: EnergyScoreCards helps only at the start and the end.

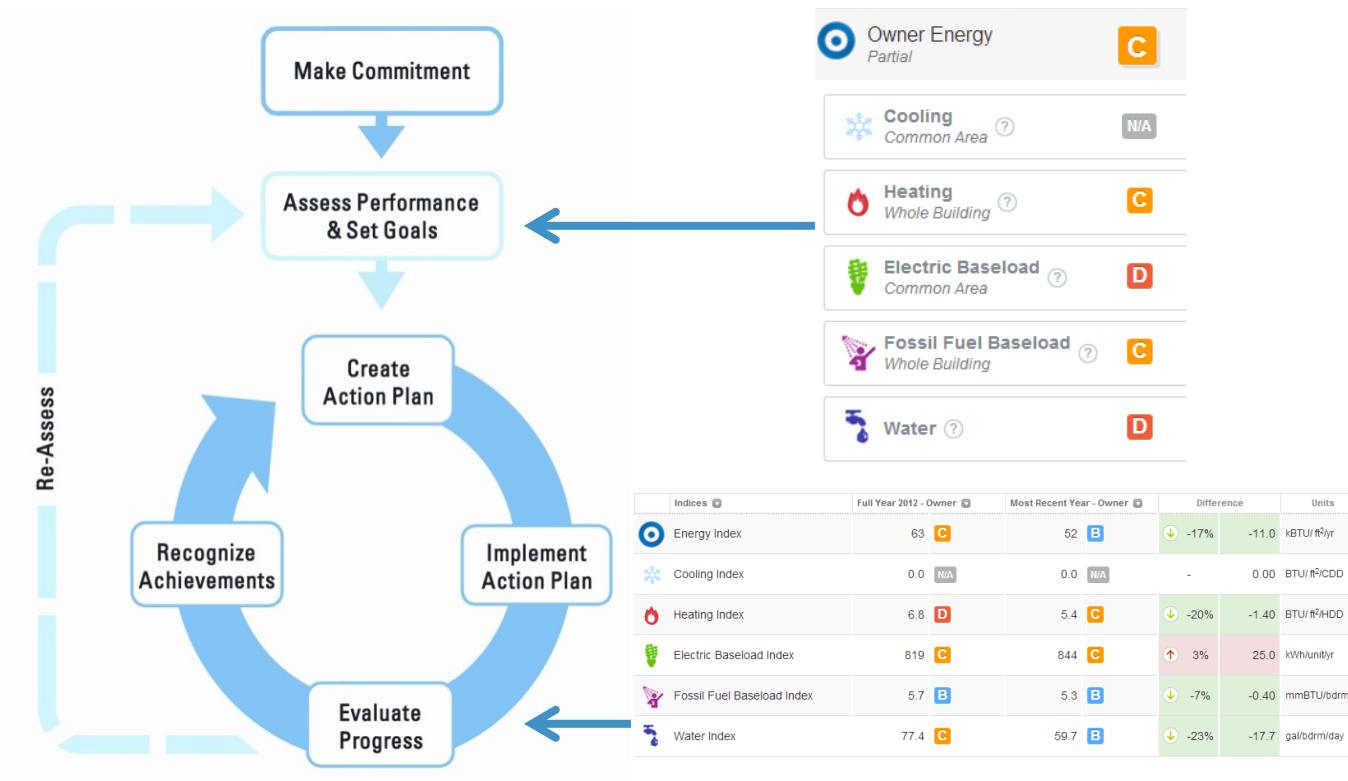



Diagram: <https://www.energystar.gov/buildings/about-us/how-can-we-help-you/build-energy-program/guidelines>

Engagement is key. The people are the “measure.”




EnergyScoreCards Minnesota RESOURCE SHEET

RESOURCE SHEET: Tenant Newsletter Ideas


[These are examples of newsletter articles to build resident engagement in their home's performance. If you provide only one piece of information, Our Current ScoreCard is best. If you have space for two items and are tracking tenant data, include How do You Stack Up?. If there are significant changes use [Building Name] Trends. EnergyScoreCards Minnesota also recommends including a Quick Tip of one simple energy- or water-saving action tenants can take to improve building performance. Find suggested tips in the Enterprise Resident Engagement Tools, especially on the Resident Engagement Cards located at [this website](#).]

Our Current ScoreCard



Happy Apartments Trends

Happy Apartments monthly gas use is shown in this chart. During the last two months (December 2011 and January 2012), our gas use has been below last year's usage! This is due to our recent improvements in equipment. Thanks for your patience during the construction!



The black line shows actual utility usage. The green line shows what we would have used if nothing changed. The gap between black and green line shows savings from improvements.

Connect to decision makers and energy users

- Owners
- Managers
- Staff
- Maintenance Personnel
- Caretakers
- Tenants

Actions ▾ Columns ▾

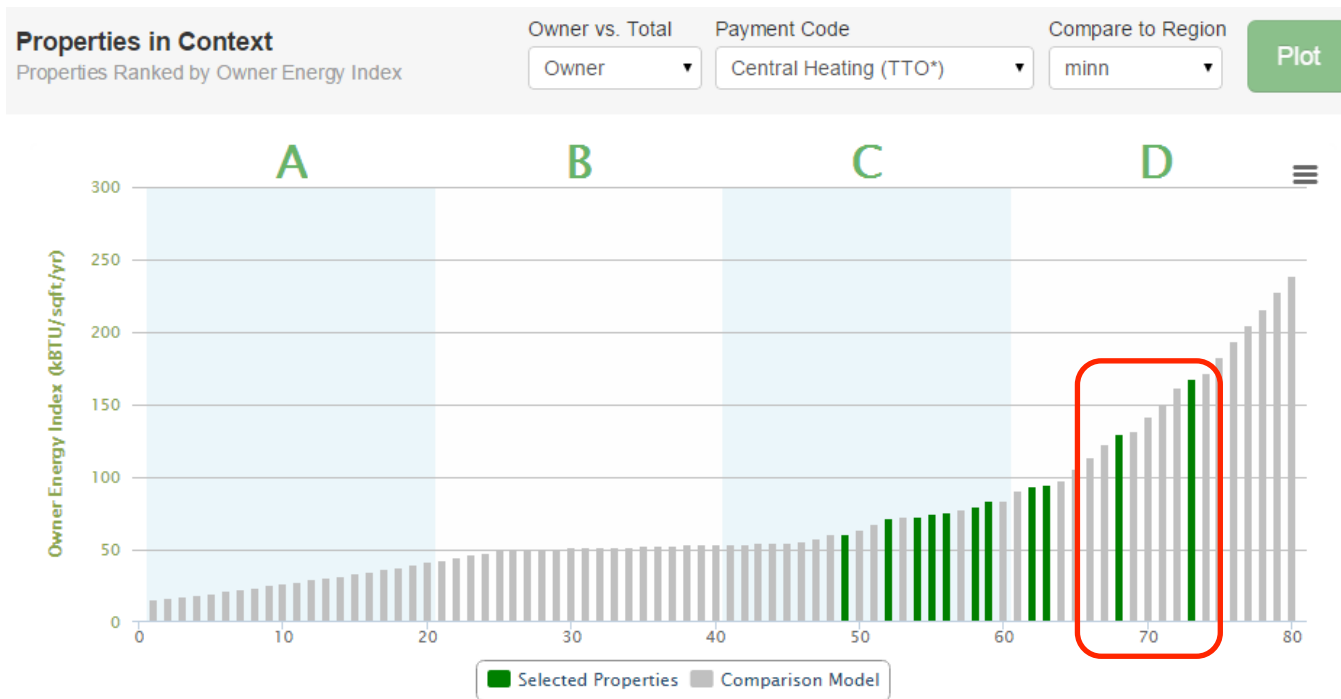
Upload/Update Utility Data

New Utility Account

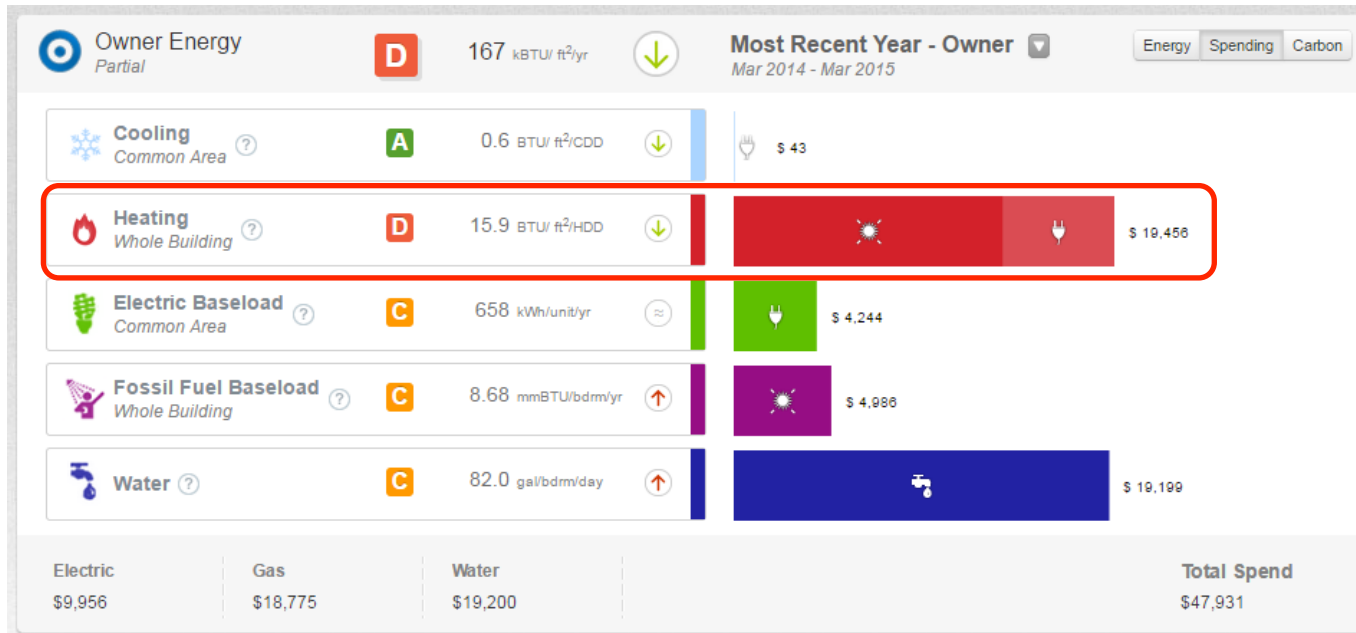
Owner Accounts

<input type="checkbox"/>	<input type="checkbox"/>	Account	Utility Provider	# Bills	Rate	Usage/Day, BTU	Last Bill		
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Electric__XcelEnergy	Xcel Energy	56	\$0.10/kWh	269,296	03/19/2015	Model	Edit
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Electric__XcelEnergy	Xcel Energy	56	\$0.10/kWh	326,610	03/19/2015	Model	Edit
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Electric__XcelEnergy	Xcel Energy	56	\$0.10/kWh	287,250	03/19/2015	Model	Edit
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Gas Account	Centerpoint Energy	68	\$0.78/Therms	2,753,449	02/05/2015	Model	Edit
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<input type="checkbox"/>	<input checked="" type="checkbox"/>	Gas Account	Centerpoint Energy	67	\$0.77/Therms	3,011,448	01/07/2015	Model	Edit
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Water	City of Minneapolis	68	\$7.46/CCF (100 CF)	4,515	03/08/2015	Model	Edit
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Water	City of Minneapolis	68	\$6.32/CCF (100 CF)	3,125	03/08/2015	Model	Edit
<input type="checkbox"/>	<input checked="" type="checkbox"/>	Water	City of Minneapolis	68	\$6.10/CCF (100 CF)	3,396	03/08/2015	Model	Edit

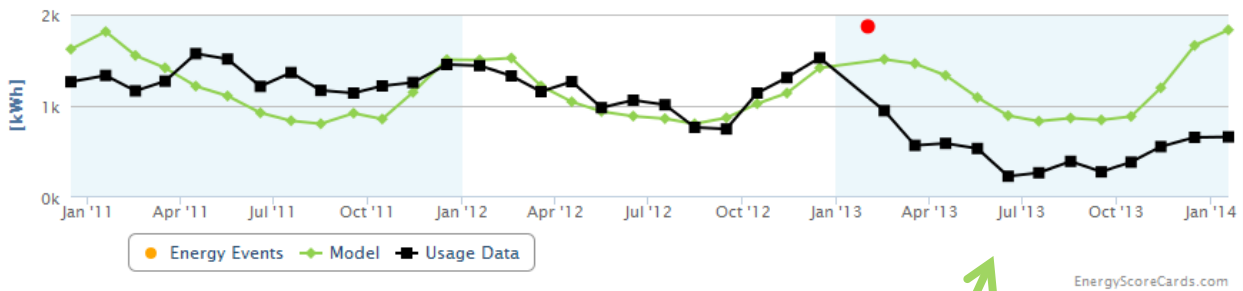
Automatically retrieve utility data.



Why do some properties use more than twice the energy per square foot?



Identification of energy use patterns – in this case, heating is high, and almost \$6,000 from electric heating.



Deep savings from a common area LED retrofit.

Energy competition between buildings

11% portfolio wide energy savings

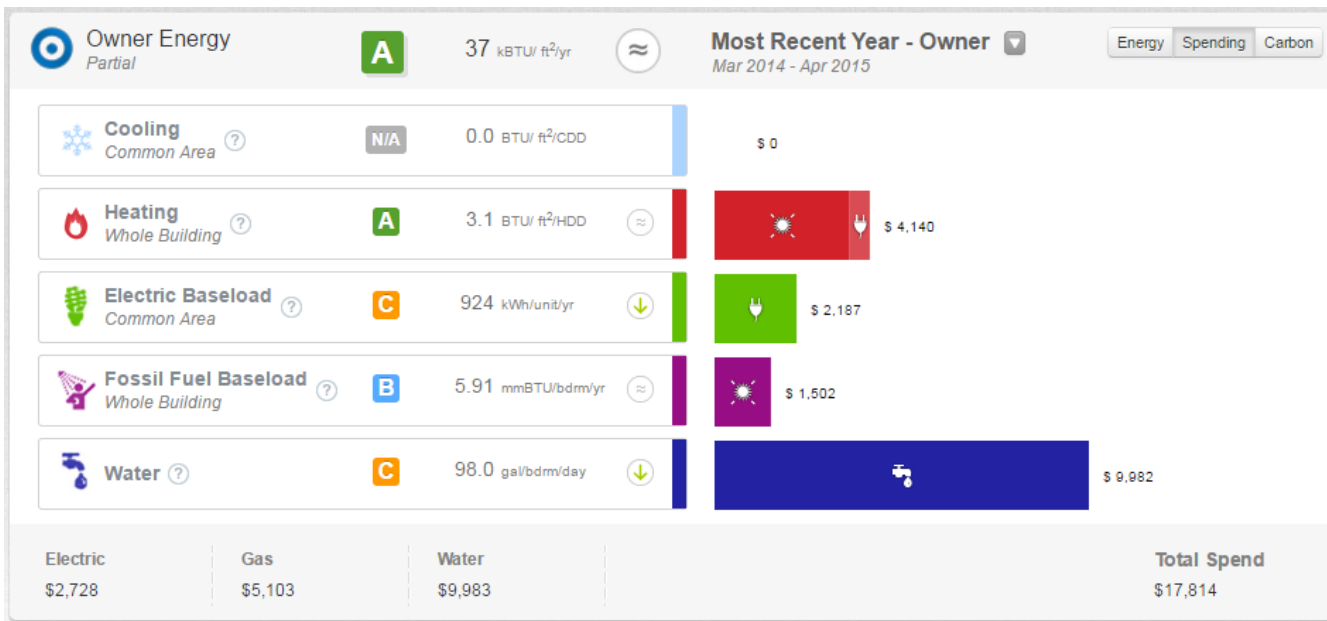
Owner Usage by Property						
Portfolio Property	Full Year 2012	Most Recent Year		Difference		Unit
	2,469	2,035	↓	-434	-18%	mmBTU
	1,783	1,484	↓	-299	-17%	mmBTU
	1,631	1,440	↓	-191	-12%	mmBTU
	2,373	2,087	↓	-285	-12%	mmBTU
	1,479	1,309	↓	-169	-11%	mmBTU
	2,192	1,949	↓	-243	-11%	mmBTU
	2,243	2,010	↓	-233	-10%	mmBTU
	1,671	1,545	↓	-126	-8%	mmBTU
	2,185	2,022	↓	-163	-7%	mmBTU
	2,228	2,075	↓	-153	-7%	mmBTU

Water	Full Year 2012	Most Recent Year	Difference	Unit
Water Usage	12,879	10,503	↓ -2,376 -18%	kGal
Water Spend	\$105,487	\$92,372	↓ (\$13,115) -12%	

What's happening?

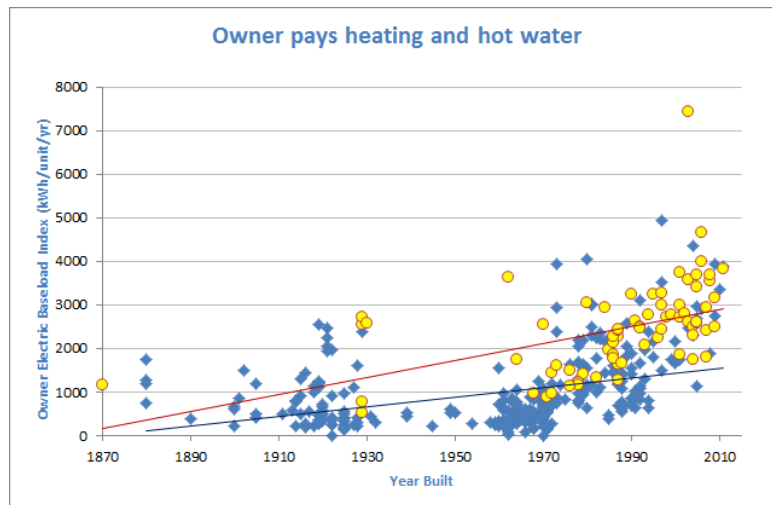
Water Usage by Property						
Portfolio	Property	Full Year 2012	Most Recent Year	Difference		Unit
		821	1,073	↑ 251	31%	kGal
		1,038	1,077	↑ 39	4%	kGal
		826	738	↓ -88	-11%	kGal
		3,187	2,724	↓ -464	-15%	kGal
		2,741	2,114	↓ -627	-23%	kGal
		567	415	↓ -151	-27%	kGal

Portfolio water trend,



Sometimes water is a bigger expense than energy!

Impact of parking garages



Increase in electric baseload is higher for projects with garage space

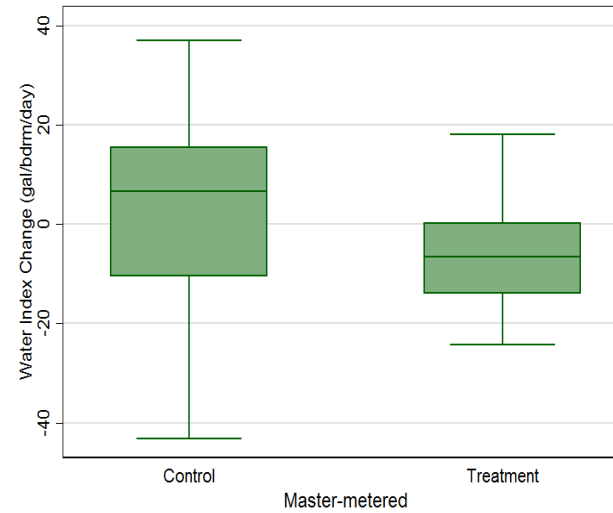
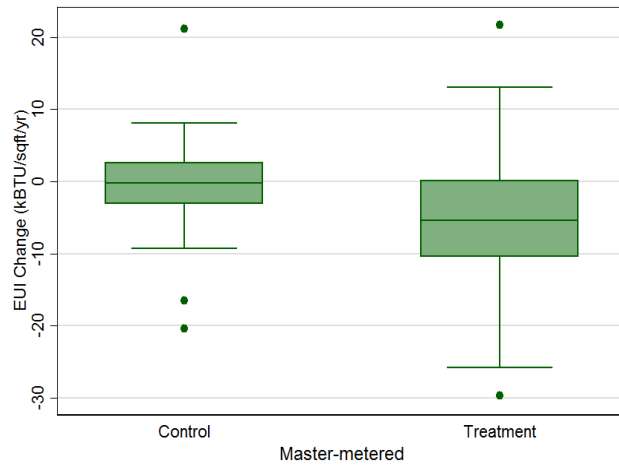
Results: Impact

Statistically significant energy and water savings were found in *master-metered* buildings receiving the EnergyScoreCards service in comparison to the control group.

- **5% energy savings**
- **25% water savings**

measured at the 95% confidence interval.

Results: Impact



Results: Impact

Participants using the service showed a 9% higher participation in utility electric rebate programs.

**Could benchmarking help drive demand for other utility programs?*

case study

PROJECT SUMMARY

HVAC

- Condensing gas boilers (95% efficiency)
- High-efficiency common area heating (90% AFUE)
- ENERGY STAR® wall air conditioning units (9.4 EER)
- ENERGY STAR® bath exhaust, 2-speed fans

ENVELOPE

- R-40 roof assembly with a white membrane
- Building air sealing
- Fiberglass framed double pane low E with argon windows (U-0.3)

LIGHTING & APPLIANCES

- CFL unit and common area lighting
- ENERGY STAR® refrigerators

DOMESTIC HOT WATER

- High-efficiency domestic hot water



SIENNA GREEN I, NONPROFIT APARTMENT BUILDING, ROSEVILLE, MINNESOTA

PROJECT SUMMARY

HVAC

- Condensing gas boilers (95% efficiency)
- High-efficiency common area heating (90% AFUE)
- ENERGY STAR® wall air conditioning units (9.4 EER)
- ENERGY STAR® bath exhaust, 2-speed fans

Aeon's Sienna Green I Apartments is a 120-unit, moderate renovation project of a 1965, five-building apartment complex in suburban Saint Paul. Formerly known as the Har Mar Apartments, the development provides rents affordable for households earning 50 percent of the area median income (AMI), and has 17 units without income restrictions. The project also includes six units designated for individuals transitioning out of homelessness earning 30 percent or less of the AMI. The renovation was the first phase of a project that included construction of a 50-unit apartment building consisting of one- two- and three-bedroom

case study

PROJECT SUMMARY	INCREMENTAL ENERGY IMPROVEMENT COST	REBATE	ANNUAL COST SAVINGS	ANNUAL ENERGY SAVINGS
HIGH-EFFICIENCY BOILER	\$76,045	\$4,676	\$5,082	466,200 kBtu
>92% EFFICIENT WATER HEATER	\$6,430	\$872	\$1,864	171,000 kBtu
PROJECT TOTALS	\$82,475	\$5,548	\$6,946	637,200 kBtu

Rebate, energy, and cost savings reported by Xcel Energy Design Assistance program

“...preserving and investing in existing buildings is a key part of sustainability.”

— James Lehnhoff, Aeon, Vice President of Housing Development

case study

PROJECT SUMMARY

HVAC

- ✦ 95% condensing gas boilers
- ✦ ENERGY STAR® wall A/C
- ✦ ENERGY STAR® 2-speed bathroom fans

DOMESTIC HOT WATER

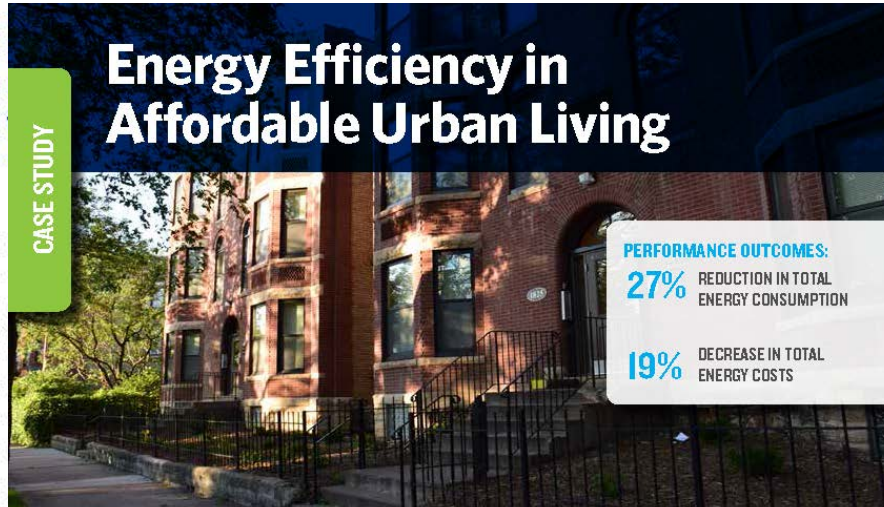
- ✦ 90% efficient domestic hot water

ENVELOPE

- ✦ Pella® Impervia® windows (U-0.31)
- ✦ Roof insulation (R-50)
- ✦ Air sealing

LIGHTING & APPLIANCES

- ✦ LED lighting in common areas and exterior
- ✦ ENERGY STAR® refrigerators
- ✦ Common area occupancy sensor



ELLIOT APARTMENTS, NONPROFIT HOUSING FOR FAMILIES AND INDIVIDUALS, MINNEAPOLIS, MINNESOTA

PROJECT SUMMARY

HVAC

- ✦ 95% condensing gas boilers
- ✦ ENERGY STAR® wall A/C
- ✦ ENERGY STAR® 2-speed

Elliot Apartments, a 1900s-era 24-unit apartment building for low-income families and individuals, consists of eighteen two-bedroom units and six one-bedroom units. It includes six units designated for the formerly homeless and 18 units affordable to households at 50 percent or less of area median income.

case study

PROJECT SUMMARY	ENERGY RETROFIT INVESTMENT	REBATE	ANNUAL COST SAVINGS	ANNUAL ENERGY SAVINGS
ELECTRIC UTILITY		\$6,300	\$2,750	93,837 kBtu
GAS UTILITY		\$1,823	\$3,334	520,900 kBtu
PROJECT TOTALS	\$187,487	\$8,123	\$6,084	614,737 kBtu

Rebate, energy, and cost savings reported by Xcel Energy Design Assistance program

“We prioritize energy efficiency to save costs and improve Indoor Environmental Quality (IEQ).”

— Matt Soucek,
PPL, senior project manager

case study

PROJECT SUMMARY

HVAC

- New common area heating and cooling
- Replaced unit A/C sleeves

ENVELOPE

- Pella® Impervia® with argon windows
- New airlock vestibule

LIGHTING & APPLIANCES

- LED lights in common areas and exterior
- Fluorescent lighting in apartments
- Occupancy sensor controls
- ENERGY STAR® refrigerators

WATER

- Low-flow toilets, faucets, and showerheads
- WaterSense®-certified irrigation



© CONCORDIA ARMS, NONPROFIT SENIOR HOUSING, MAPLEWOOD, MINNESOTA

PROJECT SUMMARY

HVAC

- New common area heating and cooling
- Replaced unit A/C sleeves

ENVELOPE

- Pella® Impervia® with argon windows
- New airlock vestibule

LIGHTING & APPLIANCES

Concordia Arms is a 125-unit renovation project of a 1979 existing senior living apartment building that provides senior Section 8 housing. The project includes seven units designed for the Long-Term Homeless, with additional units serving people with disabilities and special needs. Concordia Arms consists of 124 one-bedroom units and one two-bedroom unit.

CommonBond undertook a renovation of Concordia Arms apartments with key strategies to reduce energy

SOLUTIONS

The renovation made key improvements to address several concerns. An

case study

PROJECT SUMMARY	REBATE	ANNUAL COST SAVINGS	ANNUAL ENERGY SAVINGS
LIGHTING	\$17,000	\$20,700	207,017 kWh
AIR CONDITIONING	\$3,300	\$327	3,271 kWh
PROJECT TOTALS	\$20,300	\$21,027	210,288 kWh

Rebate, energy, and cost savings reported by Xcel Energy Design Assistance program

“...there was a lot of frost on the windows when I moved in, but not now—it is a lot warmer.”

— Joyce Ewest,
Concordia Arms resident

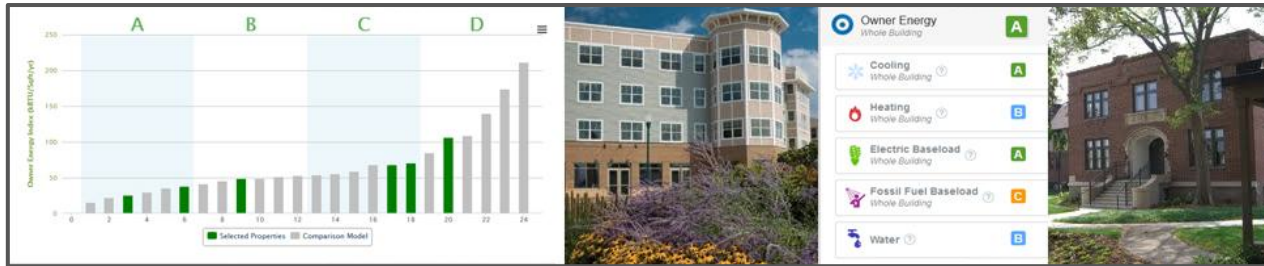
case study

For more information and ways to act, visit: <http://www.mnshi.umn.edu/program/EE4A>

To learn more about the importance of choosing healthy, non-toxic building materials for energy efficiency retrofits, visit: <http://www.bgadata.org/EEHousingProducts/about/about-database>



www.mnshi.umn.edu/projects/EE4A.html



Thank you!

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