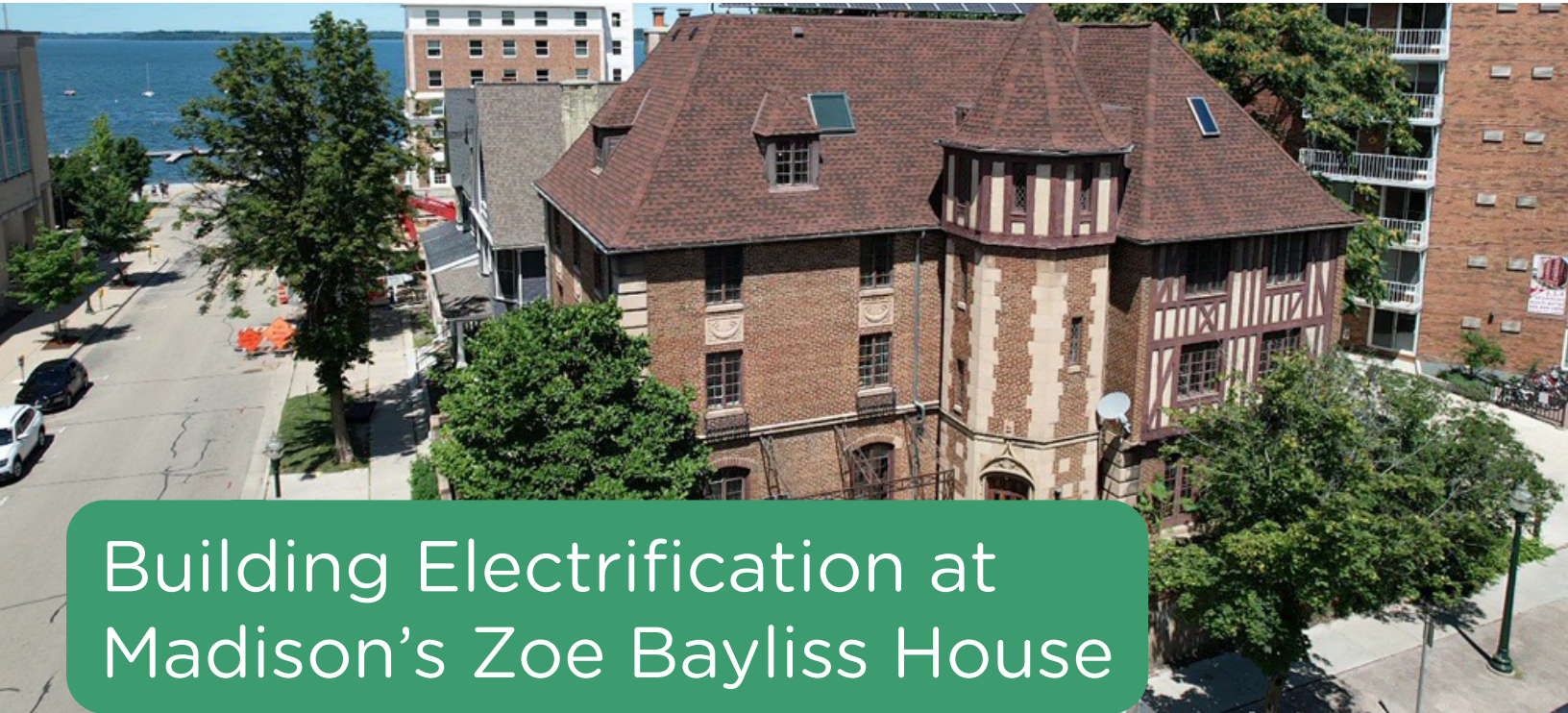




ELEVATE



Building Electrification at Madison's Zoe Bayliss House

As part of its goal of carbon-free housing, MCC began working with Elevate to upgrade its historic Zoe Bayliss house with an electrification project that added air conditioning and improved indoor air quality.

About The Property

Madison Community Cooperative (MCC) is a nonprofit housing cooperative that strives to improve the Madison community by providing affordable and inclusive housing. MCC oversees 11 houses and approximately 200 members in Madison, WI. A housing cooperative, or co-op, is a shared house or building where each member has equal control in operations of the house. The average cost per month to live in a MCC house is \$535 for rent and utilities, making it an affordable option in Madison where housing costs have been driven up as the city grows.

When MCC connected with Elevate, it was a great match for two mission-aligned nonprofits to work together at the intersection of housing and climate action through strategies like equitable building electrification and decarbonization. Sustainability is part of

Project Details

- **Property:** Zoe Bayliss House, Madison Community Cooperative, Madison, Wisconsin
- **Project partners:** Elevate, Madison Community Cooperative (MCC), Harker Heating and Cooling, Inc., Westphal & Company Electrical, Superior Renovation Solutions LLC, BlocPower, and Madison Gas and Electric (MGE).



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MCC's mission, including energy efficiency, electrification, and renewable energy. MCC's Zoe Bayliss house is a 24-unit historic home built in 1928 and located near the University of Wisconsin in Madison (the property used to be

a sorority house for the university). When its boiler stopped working, MCC began working with Elevate to look for opportunities to reduce their carbon footprint and make the building more resilient in the changing climate.

Work Completed

Elevate and MCC decided to do a partial electrification project at the Zoe Bayliss house, replacing the natural gas boiler with efficient electric heating and cooling systems in order to reduce carbon emissions, lower energy use, and add air conditioning.

Heating and Cooling

Elevate replaced the space heating boiler with two variable refrigerant flow (VRF) systems, which are a type of air source heat pump technology typically used in large buildings that provides space heating and cooling. The VRF system includes two outdoor units that connect with wall-mounted heads located in each bedroom and common area that each have their own thermostat. There is a back-up electric resistance heating system that can be used on extra cold days if necessary.

Ventilation

To improve indoor air quality and further reduce energy use, an energy recovery ventilation (ERV) system was installed. The ERV recovers energy from room temperature exhaust air to heat or cool the incoming outdoor fresh air.

Energy Efficiency

MCC completed a number of other energy-saving measures at the house before electrification, including installing storm windows and replacing their lighting with LEDs. Additionally, MCC had solar panels installed on their roof with Madison Gas and Electric (the local utility), adding renewable energy into their energy source.



Elevate typically implements strategies like air sealing and insulation at a building to make it as energy efficient as possible before moving forward with electrification. However, at historic buildings like MCC's Zoe Bayliss house it is very difficult to install wall and attic insulation because it's hard to cost-effectively get into the walls without disturbing the historic parts of the home. Because of this, and the immediate need to deal with a boiler that reached its end of life, Elevate and MCC decided not to insulate and air seal the building before moving forward with the electrification of the space heating and cooling system.

MCC is planning for a second phase of work at the Zoe Bayliss house to electrify their kitchen by converting gas stoves to induction stoves with low-energy hoods that filter air, and continuing their mission to gradually electrify and decarbonize the property and the rest of their portfolio of cooperatives.



Energy Use and Cost Changes

Although natural gas use and cost was decreased by over 90% as a result of electrifying space heating, electricity use and cost is expected to double as a result of electrifying space heating, adding air conditioning, and adding a new ERV system. For these reasons, and because natural gas is relatively cheap in Wisconsin, the Zoe Bayliss house is expected to see total energy use decrease by about 50%, and total energy costs increase by 45%.

Creating high quality, low carbon, affordable housing at historic buildings will often cause energy costs to increase, even when energy use decreases. At MCC's Zoe Bayliss house, the upgrades added improved comfort for residents from central air conditioning and improved indoor air quality from the added ventilation. MCC has a mission-aligned goal of decarbonizing all of their co-op homes, and the Zoe Bayliss house is the first step towards this goal. Understanding the challenges associated with upgrading historic buildings is essential to avoid them being left behind in



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DaMontae January,
MCC Membership
Coordinator

climate mitigation efforts. These upgrades and the benefits they bring are the start of low-carbon and resilient affordable housing for all.

MCC plans to utilize Madison Gas & Electric’s demand response program to lower their energy costs. By taking advantage of the residential time-of-use rates, MCC can use electricity when the demand for electricity from all utility customers is low, also known as off-peak hours, to access discounted electricity rates.

Modeled Energy Use and Cost Changes

At MCC's Zoe Bayliss House

	Annual Electricity Use and Cost		Annual Natural Gas Use and Cost		Total Energy (Electricity and Natural Gas) Use and Cost	
	Use	Cost	Use	Cost	Use	Cost
Before work	50,901 kWh	\$6,550	6,562 therms	\$3,774	829,874 kBTUs	\$10,324
Work done: Electrification of space heating and cooling system	57,413 kWh	\$8,038	(6,022 therms)	(\$3,433)	(406,307 kBTUs)	\$4,605
After work	108,314 kWh	\$14,588	540 therms	\$341	423,567 kBTUs	\$14,929
Total change in energy use/cost	113% increase	123% increase	92% reduction	91% reduction	49% reduction	45% increase



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Financing

The project was funded by Elevate’s Building Electrification Program grant and a green financing loan product from BlocPower.

Source	Financing
Cost of work (electrification of space heating and cooling system with ventilation)	\$856,000
Grant from Elevate	(\$288,000)
Total cost after incentives	\$568,000

Personal Impact

DaMontae January has been MCC’s Membership Coordinator since 2020.

“It’s important to do these kind of projects if you want your buildings to be around for the next 20 or 30 years. You have to start thinking, how can we not just renovate and remodel the building, but make it more sustainable for the future? The way we heat and cool our homes is changing – the systems we’ve been using are from a time gone by, and if we’re planning ahead we need to think of more sustainable options. By doing this at MCC we’re getting our homes ready for future repairs and future projects when the new technology will be the norm.”

Squirrel is the Maintenance Officer at MCC and has lived in their co-op homes since 2019.

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Squirrel, MCC Maintenance Officer

show what happens when like-minded people are able to come together. We’re renovating this building that really is part of Madison’s history. To see such an old building modernized with solar power, new energy efficiency upgrades from heating and cooling to the kitchen and everything else – it’s really impressive. And we’ve done that all while keeping the building looking the way it does. I think we’re proving that things can change, and a building this old can be historic and be efficient and a part of the community.

Learn More

Elevate works with owners to remove and replace on-site combustion of fossil fuels at their properties. Visit ElevateNP.org/Building-Electrification to learn more about our services.