

Award-Winning Multifamily Phius Project

Center for Energy and Environment's (CEE) New Homes team helped achieve Passive House Institute U.S. certification (Phius+) for this 82-unit affordable housing project in St. Paul. Located in the West Side Flats neighborhood, Verdant Apartments is the first Phius+ certified multifamily building in St. Paul and the second in Minnesota to reach this high-performance energy efficiency standard. Notably, this entire 93,010 square foot building tested tighter (at 3200 cfm50 total air leakage) than many single-family existing homes. The project was awarded Best Affordable Housing project at the 2023 Phius Passive Projects Design Competition.

Project Background

Verdant Apartments is an 82-unit affordable housing building with 93,010 square feet of conditioned space on the west side of St. Paul. This new construction project began in March 2020, with the goal of building environmentally conscious, affordable, and accessible housing for St. Paul residents. By achieving Phius+ certification, this mid-rise multifamily building is 90% more energy efficient than a standard building. CEE's New Homes team played a crucial role in reaching this certification by providing recommendations early in the building process and having CEE's in-house Phius+ rater, Jake Selstad, perform testing and verification throughout to ensure the building was on track to achieve Phius+ certification.



Home Certifications and Ratings

- Phius+ 2018 Passive Building Standard (Version 2.1)
- DOE Efficient New Homes, formerly Zero Energy Ready Home
- EPA Indoor AirPlus
- ENERGY STAR® Multifamily New Construction
- HERS® Score average (per apartment unit): **33**
- Air tightness (total building): **0.036 cfm50/ft2 surface area or .177 ACH50** (residential code for buildings three stories or less is 3.0ACH50)

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Energy Efficient Features

- **Super air-tight construction**
- **Minimal thermal bridging**
- **Increased R-values on all building assemblies**
- **Double-framed wall** for increased R-value (R-38 for total wall assembly includes R-23 batts plus continuous R15 on the inside) and minimally separated to prevent thermal bridging while lowering the risk of moisture damage through carefully designed vapor control layer.
- **Triple-pane windows** (U-Value: 0.15) for improved comfort and energy performance.
- **Energy Recovery Ventilation** providing 7,000 cfm of fresh air to living spaces and extracting the same amount from pollution sources like kitchens and bathrooms. All 7,000 cfm is distributed to 82-units and common spaces.
- **Water loop heat pumps** in dwelling units, served by high-efficient condensing boilers and an evaporative cooling tower.
- **High thermal efficiency condensing water heaters** providing domestic hot water through a demand-based recirculation system.
- **All appliances ENERGY STAR rated**

Partners

- Phius
- Sherman Associates
- Frana Companies
- Kaas Wilson Architects
- Cain Thomas Associates, Inc
- Precipitate: Architecture, Planning, Research
- City of Saint Paul - Government



Inspection/Testing

To meet the Phius+ low-energy performance requirements, CEE helped prepare the project for Phius+ design certification by ensuring all pre-requisite certifications would also be achieved (EPA's ENERGY STAR and Indoor airPlus along with DOE's Efficient New Homes). Throughout construction, CEE performed frequent insulation inspections, mid-construction blower door tests to ensure effective air tightness of building assemblies, air leakage tests of the HVAC ductwork, and assisted with testing and balancing the whole building Energy Recovery Ventilation Unit. Near the end of construction, CEE performed final testing and verification to ensure the project met or exceeded all the stringent performance targets of Phius+ certification, including the whole building leakage threshold and critical ventilation rates.

Results

After final testing was complete, the New Homes team submitted for third-party verification through the RESNET and Phius quality assurance teams. As part of the Phius+ certification, this project was also received ENERGY STAR Multifamily New Construction, EPA Indoor airPLUS, and DOE Efficient New Homes certifications. In total, the New Homes team helped this project achieve an average HERS score of 33. The entire 82-unit building air leakage measured at 3200 cfm50, which is less than some single-family homes. The Energy Recovery Ventilation Unit provides fresh air with high-efficient recovery to the entire building. This ventilation strategy also allowed for greater air tightness by replacing approximately 250 individual exhaust vent penetrations to the building's envelope, which are more common in a code building ventilation system.



Center for Energy and Environment