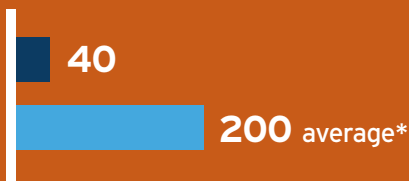


Case Study: Solstice Northeast

Completed March 2024 by Footprint Development, Solstice Northeast is a 4-story, 23 unit, market-rate, all-electric, Phius certified, low embodied carbon apartment building located in Minneapolis, MN. Comprised of 1- and 2-bed apartments, Solstice features a 33.75 kW rooftop solar array, Alpen™ triple pane fiberglass windows, heat pump hot water heaters, and MINOTAIR PENTACARE-V12 units for heating, cooling and fresh air supply in each apartment. Amenities include a ground floor Bike Hub with 1.5 spaces per unit, bike repair station, and a bike/pet wash station. Units are fitted with LG heat pump washer/dryers, quartz countertops and stainless-steel Energy Star appliances. 20% of the apartments in the building are certified affordable at 60% of Area Median Income (AMI).

Embodied Carbon

Cradle-to-gate, kg CO2e/m²



*Average based on report from 2022.

Reduction Strategies



Set concrete GWP targets



Cellulose wall and acoustic insulation



Engineered wood siding and thin brick cladding



Lower-carbon carpet and LVP alternatives



USG Ecosmart panels in place of standard gypsum wall board

Carbon Storage



Dense pack cellulose insulation



Engineered wood siding



Certified FSC lumber

90 tons of CO2 stored



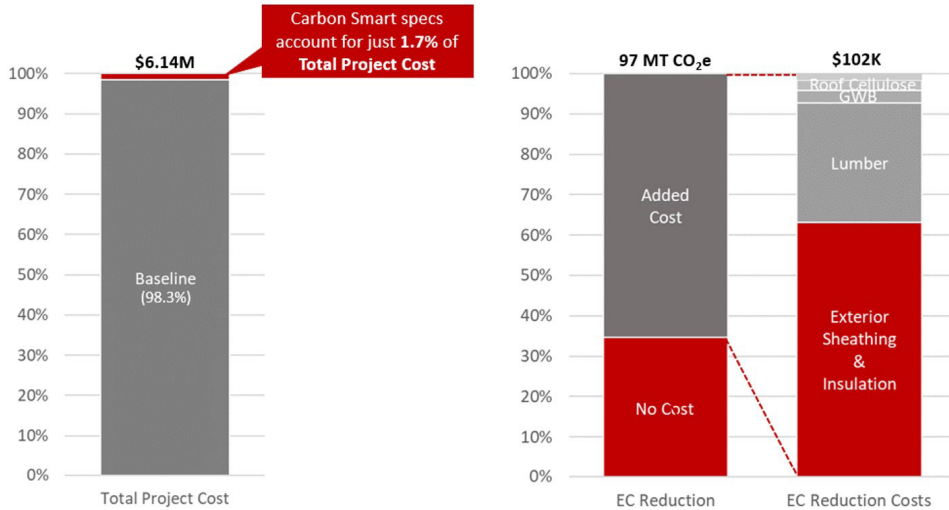
Photo by Footprint Development



Solstice Northeast is Minnesota's first low embodied carbon, passive house (Phius) certified apartment building. Achieving passive house performance with a ~60% reduction in embodied carbon emissions was no small feat, but it also wasn't expensive! Fully 1/3rd of that EC reduction was cost neutral.

Cody Fischer, President, Footprint Development

Operational Carbon | The Solstice Northeast apartment building was designed as fully electrified, and certified to Phius Core which considerably reduced operating energy consumption. The building was designed with no mechanical equipment located on roof. To maximize space for a rooftop solar array, a special roof anchor system was designed in coordination with the location of roof ventilation points.



About 35% of embodied carbon reduction was achieved with no added cost to the project. The strategies that showed the highest ROI and had the highest certainty on embodied carbon reduction impact included wall cavity and roof insulation substitution, exterior cladding substitution, concrete mix optimization, flooring product substitution, and gypsum wall board product substitution. Overall, interventions to reduce the embodied carbon for the project compared to a baseline building resulted in less than 2% of total project costs.

Baseline	Solstice Northeast	Carbon Reduction
Fiberglass batt insulation	Dense pack cellulose insulation	-20.6 tCO ₂ e
Fiber cement siding and full-depth brick	Engineered wood siding and thin brick	-14.4 tCO ₂ e
Standard carpet and LVP	Interface™ carpet and LVP	-9.2 tCO ₂ e
Standard gypsum wall board	USG EcoSmart™ Panels	-9.1 tCO ₂ e

By making substitutions for products with lower embodied carbon for several key material categories including wall and roof insulation, exterior cladding, cladding, and gypsum wall board, a total of 53.3 tons of CO₂e was avoided compared to using industry standard products. An additional 13.2 tons of CO₂e was saved by incorporating GWP targets for the concrete mixes in the foundations.

Lessons Learned

1. Major embodied carbon reductions can be achieved for no or low cost.
2. Market rate passive house and low embodied carbon apartment buildings can be achieved without subsidy, using readily available materials and familiar trade techniques.
3. For “missing middle” scale housing, reducing the embodied carbon of the structural system had the highest impact.

Project Information

Project name: Solstice Northeast
Location: Minneapolis, MN
Developer: Footprint Development
General Contractor: Copeland Building Corporation
Year built: 2024
Typology: Multifamily Apartment
Size: 17,880 SF GFA
Cost: \$6,000,000 - \$6,250,000