

Solomon Solis-Cohen School

Enhancing Indoor Air Quality and Reducing Project Life Cycle Costs



About the School

Constructed in 2021, the Solis-Cohen elementary school is a two-story, 140,000 ft² educational facility for classes K-5. The largest school in Philadelphia, which is the 8th largest school district in the nation, Solis-Cohen serves 1,400 students.

With an ambitious action plan to dramatically improve education across the city, The School District of Philadelphia prides itself on providing vibrant community centers for its students and their families. For the Solis-Cohen project, the District challenged architects Crabtree Rohrbaugh Associates to design a facility that would serve the district for the next 40-50 years, putting sustainability front and center in the design process along with cost-efficiency. The District's goal of funding great schools with zero deficit was served by the \$2M sustainability grant they secured for this construction project from the Commonwealth of Pennsylvania, but equally important was designing to achieve low operating costs.

The Challenge

The School District of Philadelphia sought project designs that optimized the total life cycle cost (LCC) for the Solis-Cohen School. Additionally, the design team wanted to improve indoor air quality (IAQ) and maximize the LEED® points available under the Indoor Environmental Quality (IEQ) credit category.

Another goal was to reduce energy use by more than 45% by utilizing a building-wide approach for efficiency including increased exterior envelope insulation and an air barrier system, a high-efficiency mechanical system with air scrubbing technology, and a roof-mounted solar array. A key challenge was to improve energy efficiency without negatively impacting indoor air quality. Better indoor air quality is often achieved by increasing outside air ventilation, but bringing in more outside air in a climate like Philadelphia's is very energy intensive on hot and cold days.



Figure 1: Rendering of the school

CUSTOMER: The School District of Philadelphia

CHALLENGES: Maximizing LEED points to achieve LEED Gold, reducing project life cycle costs, and enhancing indoor air quality

SOLUTION: 11 enVerid HLR modules installed on the roof to clean indoor air so that less outside air is needed to deliver good indoor air quality, thus improving energy efficiency and saving money

RESULTS:

- \$135,000 in first cost savings on the new HVAC system by reducing 180-tons of peak cooling load
- \$36,300 in annual savings by reducing 241,422 kWh in annual energy use, \$726,000 in savings over 20 years
- 61% reduction in outside air using enVerid HLR air scrubbers
- Best-in-class indoor air quality resulting in 6 LEED points, contributing to LEED Gold certification

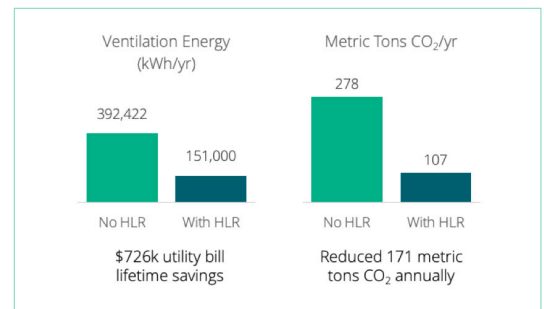
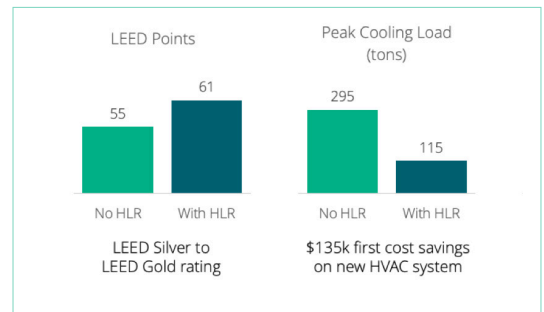
ENGINEER: Global Engineering Solutions (GES), a Salas-O'Brien Company

SALES REPRESENTATIVES: HAVTECH and Tozour

LOCATION: Philadelphia, PA

DEPLOYED: 2021

SQUARE FOOTAGE: 2 floors totaling 140,000 ft²



The Solution

Using the ASHRAE 62.1 Indoor Air Quality Procedure (IAQP) and enVerid HVAC Load Reduction® (HLR) air scrubbing technology, the design team found that scrubbing indoor air was more effective than relying solely on the hot and humid outside air to dilute indoor air contaminants such as carbon dioxide and formaldehyde. Based on this analysis, the design team specified eleven HLR modules to enable a 61% reduction in outside airflow compared to a design based on the Ventilation Rate Procedure. This reduction in outside air had a proportional reduction in ventilation energy use without negatively impacting indoor air quality because the enVerid HLR modules were used to remove all the ASHRAE contaminants of concern and CO₂, providing excellent indoor air quality.



Figure 2: HLR Module installed on the Solis-Cohen Elementary School roof

Reducing Equipment Capital Expenditures by \$135,000

The 61% reduction in minimum outdoor airflow had a systemic impact on the HVAC design of the school. Total peak cooling capacity was reduced by 180 tons, enabling downsizing of chillers and chilled water coils in the rooftop units. Furthermore, the reduction in minimum outdoor airflow eliminated the need for large and expensive energy recovery components within the rooftop units. According to engineer Anil Giri of GES, “Energy code 90.1 and IECC requires energy recovery systems, but we were able to avoid triggering [that requirement] because we were below the threshold for ventilation.” From the cooling load reductions alone, the project team was able to recognize a \$135,000 reduction in project capital costs.

Energy Savings of \$36,300 per Year

The 61% reduction in minimum outdoor airflow also saved energy because, with less hot and humid air coming into the school, the amount of air conditioning required was reduced. Annual ventilation energy consumption was reduced by over 240,000 kWh/year and costs were reduced by over \$36,000/year. This translates to a reduction in carbon emissions of 171 metric tons of CO₂ annually. Indoor air cleaning delivered all of these benefits while still meeting LEED’s stringent indoor air quality targets.



A key goal of the Solomon Solis-Cohen project was achieving the highest possible LEED rating. The HLR air scrubbers, which qualified the project for 6 additional points, were a large contributing factor in allowing the project to improve its rating to LEED Gold while also reducing project life cycle cost.

Anil Giri, Director of Mechanical Engineering, Global Engineering Solutions



Forward thinking, the new school incorporates air scrubbing technology designed in 2017/2018 that is a model for The School District of Philadelphia as it plans how to open schools this coming year with COVID 19 and is being planned into many of their future construction projects.

Jeffrey Straub and Randy Davis, Principals, Crabtree, Rohrbaugh & Associates

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Energy Savings. Air Quality.

enVerid helps buildings achieve ESG (Environmental, Social, and Governance), healthy building, and cost saving goals by improving indoor air quality while saving money and reducing energy consumption and carbon emissions. For new HVAC systems, enVerid’s award-winning HVAC Load Reduction (HLR) Modules enable immediate capital cost savings. HLR Modules also deliver up to 40% energy savings and improved indoor air quality in new and existing buildings. enVerid’s air filtration products remove particulate and microorganism contamination from indoor air without the significant cost of upgrading mechanical systems and increasing mechanical ventilation rates. enVerid’s products are deployed in commercial, academic and government buildings globally. enVerid’s HLR Modules comply with ASHRAE Standard 62.1, deliver significant LEED and WELL points, and are eligible for utility rebates. For more information visit enverid.com.