

The Collaboratory

Applying HLR Technology for a LEED Gold Project



The Building

The building, in Fort Myers, FL, formerly a small museum, is being renovated and more than doubled in size to accommodate office space and meeting rooms. The original floorplan of 8,246 ft² is being entirely renovated, except for the restrooms, bringing the total size to 21,848 ft². The owner decided to target LEED Gold certification, under LEED v4 BD+C for new construction and renovations.



HVAC Energy Optimization Measures

TLC Engineering designed the HVAC using Variable Refrigerant Flow (VRF) systems and a pair of high-efficiency Dedicated Outdoor Air Systems (DOAS). This HVAC design, combined with all the other energy saving measures related to lighting, windows and building construction, is enabling them to apply for 12 energy optimization LEED points relative to an ASHRAE 90.1-compliant baseline design.

To earn more LEED points, HVAC Load Reduction (HLR) modules were added to the design. HLR modules clean indoor air of contaminants, and thereby reduce the amount of outside air required for ventilation in accordance with the ASHRAE 62.1 Indoor Air Quality Procedure (IAQP). Based on IAQP calculations for this building, TLC added two HLR 1000E-R modules to be installed on the rooftop. With this new design, the two DOAS systems were modified to treat a mix of return air and outside air. Figure 1 shows a comparison of the two design schematics.

Challenges: Improve HVAC energy consumption to meet LEED Gold Certification

Solution: Two enVerid HLR modules installed on rooftop to scrub air of contaminants and reduce the amount of outside air ventilation required

Results:

- 46% less outside airflow
- \$65,000 savings on HVAC systems
 - » Eliminated DCV
 - » Lower Capacity DOAS
- \$4,000 per year energy savings
- 6 LEED points
 - » Energy Optimization: 2
 - » EQ Enhanced IAQ Strategies: 2
 - » EQ IAQ Assessment: 2

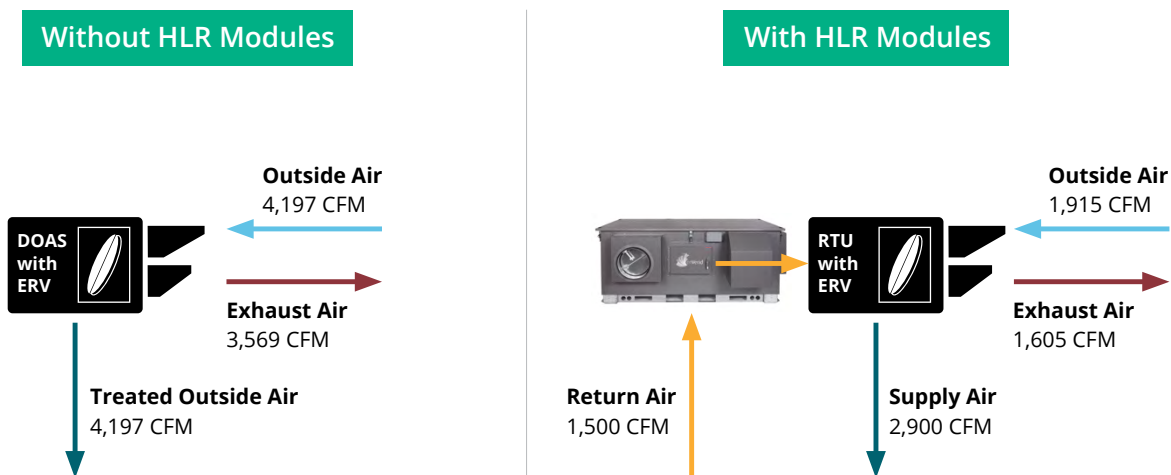


Figure 1: HLR modules reduce the required outside airflow

The Impact of HLR Modules

Energy Savings

The HLR modules reduce the total outside airflow by 2,282 CFM. This results in an incremental \$4,000 annual energy savings* on an already highly-efficient HVAC system. The building is expected to be open 8am-6pm, 7 days per week, with outside air assumed to be shut off at night, so HLR savings are based on daytime hours only.

The incremental energy savings is 7.4% above the original LEED design, and brings the total energy savings to 37% relative to the baseline.

First cost savings

By using HLR modules, TLC engineering reduced the overall cost of the HVAC system because the HLR module installed cost is less than the following estimated savings on other HVAC equipment and installation:

- Eliminated DCV: \$36,000 deduct
- Lower capacity DOAS systems: \$29,000 deduct

Total savings on other HVAC system costs: \$65,000 savings

Although the owner chose not to, an ERV could have been removed from the design while still complying with ASHRAE 90.1 and LEED. This was due to the percentage of outside air on one of the DOAS systems falling out of the range that requires an ERV. Eliminating this ERV would have produced another \$2,000 in savings.

Intelligent Indoor Air Quality (IAQ) Management

Just like the thermostat revolutionized temperature control in buildings, HLR modules are doing the same for IAQ. Rather than provide the owner with a static ventilation scheme, TLC's use of HLR modules enables the building to have actively managed indoor air quality. HLR modules can respond to the changing conditions of IAQ by increasing or decreasing air cleaning.

LEED points

LEED points that are being applied are:

- Energy optimization
 - » 2 points
- EQ Enhanced Indoor Air Quality Strategies
 - » 1 point for CO₂ monitoring
 - » 1 point for Exemplary performance
- EQ Indoor Air Quality Assessment
 - » 2 points for IAQ testing

*Electric utility rate of \$0.0923/kWh from the US Energy Information Administration (EIA)



I have been extremely impressed with the energy efficiency impact of HLR technology. I plan to recommend this technology for all HVAC designs to cost effectively achieve additional LEED points.

Alyssa Faircloth

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By specifying HLR modules, we are reducing the first cost capital expenditures for our client, while simultaneously giving them a more energy efficient HVAC solution. The extra LEED points, the reduced intake of outside air pollution, and the intelligent IAQ management are extra benefits that essentially come for free.

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