

VAV diffusers critical to green agency's Platinum building

▶ For over 30 years, StopWaste.org has been helping Alameda County, CA, residents and businesses adopt sustainable consumption and disposal habits. Therefore, there was no question that the 14,000-sq-ft, two-story Oakland, CA, building that it purchased and renovated for its offices had to be green. The question was how green.

Using the USGBC's LEED® Green Building Rating System, the initial goal was a LEED Silver rating. As the project progressed, however, StopWaste.org decided to aim for the highest possible rating, LEED Platinum. An important part of achieving this goal was earning all of the possible LEED credits for optimizing energy performance.

GOING FOR ALL 10

To achieve the 10 energy performance points, StopWaste.org asked Rumsey Engineers, an Oakland-based firm with extensive experience designing low energy building systems, to make the building and its HVAC systems far more efficient than a standard building — using at least 40% less energy than a standard building built to meet the stringent state Title 24 energy code.

Energy modeling was an important design tool used to optimize the building's energy performance. Maximizing the mechanical system efficiency required close coordination with the building architects, Komorous-Towey Architects, and StopWaste.org. Modeling showed that combining increased wall insulation levels with high-performance windows allowed for both large system control zones and also eliminated the need for a perimeter heating system.

The investment in the envelope allowed the design team to completely eliminate reheat; this yielded significant construction cost and energy savings. The building was divided into four master zones: perimeter and core offices on the second floor, plus perimeter offices and a large boardroom on the first floor. The three office master zones are conditioned using a high-efficiency packaged DX and gas heat rooftop AHU with a variable-speed fan. The master zones are subzoned with 29 Acutherm model ST-HC and two model TK-HC Therma-Fuser thermally powered VAV diffusers.

Therma-Fuser diffusers were selected in order to gain energy savings, and to meet budget concerns. Rumsey Engineers' detailed energy models calculated that these systems use less energy than a standard VAV box-based system.

UNDER CONTROL

Controls were kept as simple as possible to minimize project costs and to protect against efficiency decay — the inevitable misadjustments, overrides, and sensor drift — that increases the energy use of more complex control systems over time.

The use of Therma-Fuser diffusers, combined with the elimination of reheat, through the use of high-efficiency windows, met the client's demands for tight, zoned control and resulted in significant budget savings. Because of the high-efficiency goals, these savings were invested in high-efficiency package units with variable-speed fans and modulating gas valves in the heating sections.

Natural ventilation from open windows is used in the building whenever possible to save heating and cooling energy. Outdoor conditions



“In the design of the Stopwaste.org Project, Rumsey Engineers used eQuest energy modeling to simulate envelope insulation, glazing electric lighting, and mechanical systems. All 10 LEED credits for optimizing energy performance were awarded.

are continually monitored with green or red LEDs, notifying occupants when the mechanical cooling is off and the outdoor conditions are optimum for opening windows. Allowing occupants to control the windows reduces the amount of controls hardware required and provides another degree of individual control.

At night, based on the time and outdoor air temperature, the system operates at a reduced air volume to precool the building mass, providing a significant flywheel effect in the mild California climate. This night purge operation is controlled in a manner similar to an economizer cycle, which is also enabled after hours. A comparison of indoor and outdoor temperatures detects the times in summer when night purge is not optimal.

Four sensors monitor CO₂ levels; this indirectly detects the number of people in the building and increases or reduces the amount of outside air. The CO₂ sensors do not alter the amount of air delivered, but rather the percentage of outdoor air included in the delivered air. Therma-Fuser diffusers control airflow volume via fan pressure control, while the CO₂ sensors actuate outside air dampers.

While commissioning is a prerequisite of a LEED certified building, the owner elected to have enhanced commissioning performed, gaining another LEED point.

THE RESULT

StopWaste.org received a total project score of 54 (two points more than required for LEED Platinum certification), and all 10 credits for optimizing energy performance. Software energy modeling shows that the building outperforms Title 24-2005, California's stringent energy code, by 47%. “Occupants' comfort, energy-efficiency and an affordable system — we wanted all three and were able to get them,” said Wendy Sommers, senior program manager at StopWaste.org. “Getting a LEED Platinum rating is icing on the cake.” **ES**

The final scorecard of LEED points for StopWaste.Org is as follows.

54 points out of possible 69 (52 required for Platinum).

10 in Sustainable Sites

4 in Water Efficiency

14 in Energy and Atmosphere

10 **Optimize Energy Performance***

- 2 On-Site Renewable Energy
- 1 Enhanced Commissioning
- 1 Green Power

8 in Materials and Resources

- 2 Building Reuse
- 2 Construction Waste Management
- 1 Materials Reuse
- 1 Recycled Content
- 1 **Local/Regional Materials***
- 1 Certified Wood

5 in Innovation & Design Process

13 in Indoor Environmental Quality

- 1 Outdoor Air Delivery Monitoring
- 2 Construction IAQ Management Plan
- 3 Low-Emitting Materials
- 1 Indoor Chemical & Pollutant Source Control
- 1 Controllability of Systems, Lighting
- 1 **Controllability of Systems, Thermal Comfort***
- 1 **Thermal Comfort, Design***
- 1 Thermal Comfort, Verification
- 2 Daylight & Views

***The Therma-Fuser system assisted with a total of 13 points of the 54 awarded.**