

LeyVa Middle School Administration Building San Jose, Calif.

► Challenge

To select a heating and cooling system that would help the school attain its energy and cost-savings goals.

Named for George V. LeyVa, superintendent of the Evergreen School District for 16 years, this 970-student middle school first opened its doors in 1973 as an elementary school serving students from grades K-6. Resembling a mini college campus on 23.4 acres, the school today has 12 separate classroom buildings, a baseball field, and track, tennis and basketball courts. The new 9,212-square-foot administration building was completed in time for the 2011-2012 school year.

In 2009, John Diffenderfer, AIA LEED® AP BD+C EBOM, principal at Aedis Architecture & Planning (Aedis), San Jose, Calif., received a call from the superintendent of the Evergreen School District. The LeyVa Middle School campus was growing exponentially, and Evergreen had chosen Aedis to design a separate administration building.

Facts About LeyVa Middle School

- First Net Zero Energy Public School building in California.
- The new administration building produces **108%** of its own energy and saves the school district more than **\$90,000** each year in energy costs.

“With a nationwide focus on energy savings, we wanted Evergreen to focus on sustainable building practices,” Diffenderfer said. Working together



with Aedis partner Capital Engineering Consultants, Inc., Rancho Cordova, Calif. (Capital), the LeyVa design team assembled a proposal based on energy modeling. The goal was to design an advanced energy-plus building.

Profile of an Energy-plus School Building

The team’s objective was to make the 9,212-square-foot administration building 41 percent more efficient than required by California’s Energy Code (Title 24). The team intended to make the building capable of generating up to 8 percent surplus energy.

Energy modeling told them the building’s sustainable technologies should include a 39 kW photovoltaic (PV) array on the roof, a highly efficient HVAC system, a super-insulated building envelope, extensive use of daylight harvesting (no lights needed during the day) and super-efficient windows. The PV array on the roof would deflect 70 percent of the sun’s heat back into the atmosphere, and the building’s super-insulated envelope would keep 90 percent of the sun’s heat from the interior, greatly reducing the need to cool it.

Impressive Engineering, Quiet Comfort and Energy Savings

Because cooling and heating typically require more than half a building’s energy use, the team knew LeyVa should have an HVAC system that would operate

George V. LeyVa Middle School

Project Location:
San Jose, Calif.

Completion Date:
June 2011

Project Team

Owners:
Evergreen School District,
San Jose, Calif.

Architect:
Aedis Architecture & Planning,
San Jose, Calif.

Electrical Engineer:
Integral Group, San Jose, Calif.

HVAC Engineer:
Capital Engineering Consultants, Inc.,
Rancho Cordova, Calif.

HVAC Distributor:
Sigler Wholesale Distributors,
San Jose, Calif.

Mitsubishi Electric Ductless Equipment Installed

(2) PURY-P126 R2-Series
Outdoor Units

(4) PEFY Ceiling-concealed
Indoor Units

(3) PKFY Ceiling-suspended
Indoor Units

(1) PLFY 4-way Ceiling-recessed
Cassette Indoor Unit

(17) PMFY 1-way Ceiling-recessed
Cassette Indoor Units

(25) Simple MA Remote Controllers

(1) GB-50A Centralized Controller

efficiently at partial-load conditions, which occur frequently in California’s mild climate.

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Integral Group (Integral), San Jose, was responsible for LeyVa's electrical systems design. Darryl Singleton was Integral's project manager. "Steve Myers at Capital recommended the Mitsubishi Electric VRF [Variable Refrigerant Flow] system for LeyVa," Singleton said. Myers took the team over to see a nearby



Photography by KaraGeorge Studios

The team selected Mitsubishi Electric VRF zoning systems, because they operate efficiently at partial-load conditions, which occur frequently in California's mild climate.



The Mitsubishi Electric VRF zoning system contributed to reduced utility bills, helping the school system save money during a revenue crisis.

Mitsubishi Electric VRF zoning system in operation. "Now that I have seen how the system works, I think it's amazing," Singleton said. "The variable speed compressors, simultaneous cooling and heating capability, the energy efficiency of heat transfer and intelligent controls are all very impressive engineering."

The team presented its recommendations to the Evergreen School District's administration. Diffenderfer reminded the administration that the severe economic trouble of the past few years had produced a revenue crisis for California schools. He said utility expenses are one of the last line items school administrations can directly control: "Creative thinking is desperately required, and we should make this installation a de facto standard for all Evergreen schools."

► **Solution**

By operating efficiently at partial-load conditions, Mitsubishi Electric VRF zoning systems were able to optimize energy savings and provide zoned comfort, while keeping operating costs at a minimum.

"We made a positive impression, and the District approved the Mitsubishi Electric VRF technology over all other feasible systems," Myers said. "This system allows simultaneous cooling and heating with multiple indoor units,

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served from a single outdoor unit. This optimizes energy savings by allowing the system to match capacity requirements in each zone. The office space, which typically would be controlled by a packaged air-conditioning system, realizes superior zone control with the VRF zoning system.

“We liked the fact that the system is able to transfer heat from warm spaces, such as the computer room, and distribute that heat to other rooms with

minimal power consumption,” Myers continued. “The Mitsubishi Electric system provides excellent comfort while keeping running costs to a minimum.”

According to Rob Smiley, director of operations at the Evergreen School District, the system was easy to install and easy to maintain. “This system’s technology has contributed to saving us thousands of dollars this past year. And, because of its exceptional zoning capabilities, there are no more zoning wars, and each office has its own temperature setting. But, I think its greatest benefit is the indoor comfort it brings our students.”

**Pivotal Moment: Future Standard
for Evergreen**

Singleton echoed Smiley’s observation. “With its many advancements, I believe

the greatest overall benefit is the quiet [operation and] comfort the system delivers for the LeyVa staff.”

“The LeyVa project was actually a pivotal moment for me,” Diffenderfer said. “It proved to me that optimizing energy performance is key to the real success of a building design. To this end, I believe Mitsubishi Electric’s technology played a significant role in helping us achieve our energy goals.” ■



Through the BC Controller (pictured right), the system allows simultaneous cooling and heating with multiple indoor units, from a single outdoor unit. The zoning capability of the system enables each area to be controlled individually by its own controller (pictured left).