Project Profile

A Zero Energy-Capable Building

Overview

Site Details
- Location: San Rafael, CA
- Building type(s): Assembly, Multi-unit residential
- New construction
- 6,200 ft²
- Completed November 2005

JANE D’AZA CONVENT, HOUSE OF FORMATION

When a fire destroyed their grand Victorian landmark in 1990, the Dominican Sisters of San Rafael saw an opportunity to develop a series of smaller buildings that reflected their contemporary vision, including a strong commitment to environmental responsibility.

The House of Formation, one of these buildings, introduces incoming novitiates to their chosen life. In addition to the eight-bedroom residence, the building houses offices and common areas, a large kitchen, a dining room, and a chapel. The tranquil landscaping promotes contemplation and an awareness of the Order’s goal of minimizing its ecological footprint.

Energy

The building is oriented along an east-west axis, allowing for effective daylighting. South-facing windows are shaded to prevent heat gain and glare. The windows are operable, providing natural ventilation and a connection to the outdoors.

The project team used optimum-value-engineering (24"-on-center) framing, which allowed for more insulation at the exterior walls and reduced thermal bridging. Under the roof, raised-heel trusses allow the sprayed-in-place cellulose insulation to extend to the building perimeter, improving thermal performance.

A 7.1-kW photovoltaic system mounted on the project’s pitched roof was anticipated to generate 10,600 kilowatt-hours of electricity per year. In addition, a solar water-heating system replaces the need for about 19 million Btus of natural gas each year. A gas boiler with an energy factor of 0.935 provides backup water heating.

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The team chose gas wall heaters for their individual controllability and their energy efficiency. Attic vents for cooling have their own photovoltaic power source. Other energy-efficiency features include Energy Star appliances and low-flow faucets and showerheads.

**Efficiency Strategies**

- **Wall Insulation.** Use spray-applied insulation in cavities with many obstacles or irregularities. Use advanced framing techniques.

- **Solar Cooling Loads.** Shade south windows with exterior louvers, awnings, or trellises.

- **Daylighting for Energy Efficiency.** Orient the floor plan on an east-west axis for best use of daylighting.

- **Hot Water Loads.** Use water-efficient showerheads. Use water-efficient faucets.

- **Non-Solar Cooling Loads.** Use operable windows.

- **Water Heaters.** Use solar water heaters.

- **Photovoltaics.** Use a photovoltaic (PV) system to generate electricity on-site.

- **Heating Systems.** Size heating systems appropriately.

- **Refrigerators and Freezers.** Use Energy Star-rated refrigerators and freezers.

- **Other Energy-Efficient Appliances.** Use Energy Star dishwashers.

- **Roof Insulation.** Design roof system with raised rafters or trusses to avoid cold corners.

*For an in-depth case study, visit:*

buildings.newbuildings.org/overview.cfm?projectid=895

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New Buildings Institute (NBI) is a nonprofit organization working collaboratively with commercial building professionals and the energy industry to improve the energy performance of commercial buildings.