

SUSTAINABLE DESIGN

Two Small Buildings Are Taking 'Green' to Big Extremes



Two small projects in Washington state are emphasizing sustainable design beyond the norm. The 38,000-sq-ft Peace Island Medical Center is designed to use almost one-third the energy of a typical hospital in the Northwest. In Seattle, the 52,000-sq-ft Bullitt Center is a net-zero energy-use project that is designed to produce as much energy as it uses over a year's time. The six-story office building is expected to consume only 16,000 Btu per sq ft per year.

The \$13-million hospital, set on 22 acres in Friday Harbor on San Juan Island, is designed to use less than 100,000 Btu per sq ft per year, says Rachel Jenner, project manager for the Seattle-based architect, Mahlum. Typically, a Pacific Northwest hospital uses 270,000 Btu per sq ft per year, she adds.

Howard S. Wright Inc., Portland, Ore., which started construction in August, plans to complete the hospital next fall. Jenner says Peace Island is likely to be the "greenest" hospital in the U.S.

From the start, the building's energy loads required a non-traditional design approach to the mechanical systems, says Greg Romaniuk, project manager for the mechanical-electrical-consulting engineer, CDi Engineers, Lynnwood, Wash.

For example, mechanical systems are decentralized so that the entire hospital doesn't operate 24/7. Occupancy sensors are tied to not only lighting, as required by code, but also to heating and cooling

DIET Hospital is designed to use nearly two-thirds less energy than most Pacific Northwest facilities.

equipment and air-flow controls.

The result is a variable air-supply system with an expected payback period of less than a year, thanks to a design that fluctuates energy consumption throughout the building, says the engineer. In addition, the mechanical system decouples the heating and cooling systems, removing nearly 20% of typical energy consumption by eliminating air reheating.



ENERGY MISER At 52,000 sq ft, office building is designed to use 16,000 Btu per sq ft per year.

Energy modeling helped to evaluate how much energy each system saved. The modeling included cost estimates and projected payback periods.

To minimize energy use, a ground-source heat-pump system, with 22 bore holes, will serve as a heat sink. The system—expected to pay for itself in less than five years—creates three to four hours of heating or cooling energy from every kilowatt hour put in, far outpacing the less

than the one kWh returned on conventional systems, says Romaniuk.

The building is designed to allow daylight to penetrate farther into the interior. South-facing overhangs block summer sun but let sunlight in during the winter for passive heating. The structure also accommodates the site's trees, which are used for shading. The building has three tiers on the sloping site, which eliminated costly bedrock excavation, says Jenner.

'Living Building'

Meanwhile, Schuchart Construction, Seattle, expects to complete the \$30-million Bullitt Center toward the end of next year. The building is designed as a so-called Living Building, which means it follows the standards of the Living Building Challenge. LBC is a sustainable building certification program of the International Living Building Institute (ILBI).

LBC provides "a framework for design, construction and the symbiotic relationship between people and all aspects of the built environment," says ILBI, Portland, Ore. A Living Building is "informed by its bioregion's characteristics, that generates all of its own energy with renewable resources, captures and treats all of its water and operates efficiently for maximum beauty," according to ILBI.

Plans call for solar photovoltaic arrays with the capacity to produce 230,000 kWh of electricity per year. There will be 26 geothermal wells bored 400 ft deep. Window blinds will be controlled by an on-site weather station. The building also has daylighting features, says Brian Court, project manager for the local architect, the Miller Hull Partnership. The design also includes gray water, black water and composting systems to treat all building water and waste.

Court expects the building to achieve net-zero energy use its first year. "Our assumptions on solar income are based on the average annual number of sunny days over the past 30 years," says Court. "If we have a cloudy year, we might not make it on the first try. But if it's a sunny year, we could ... sell power back to the grid." ■

By Tim Newcomb