Y2E2

SUSTAINABLE STANFORD

THE JERRY YANG AND AKIKO YAMAZAKI

Environment and Energy Building is home to a bevy of multidisciplinary research initiatives that promote sustainability and address global warming. It is projected to use 56 percent less energy and 90 percent less potable water for fixtures than a comparable building of its size.

Recycle, Recycle, Recycle

Redwood was considered ideal for the second-level trellis because it is resistant to rot and insects, as well as aesthetically pleasing. But purchasing new redwood would promote destructive logging practices. The answer? Recycled redwood. The university worked with Norcal Lumber in Marysville, Calif., to salvage the wood from an old mill building in Northern California. The Y2E2 building also made use of recycled steel. The asphalt from the parking lot on the building site was crushed and used as a base material for the plaza and the adjacent roads. All of the desks, shelves and tables for the more than 500 people in the building are built from recycled particleboard with a veneer of bamboo, a rapidly renewable resource.

A Living Lab

In many ways, Y2E2 is a "test tube" building, bringing together people from many different disciplines and testing a variety of green building techniques on an institutional scale. In the case of solar energy, the Y2E2 building is testing three different types of solar panels: monocrystalline, polycrystalline and thin film. The panels, all on the south-facing roof, are metered and monitored separately so that students and faculty can compare their performance and durability. The polycrystalline panels are projected to be roughly 12.8 percent efficient at converting sunlight into electricity. The estimate for the monocrystalline panels is 16.9 percent efficient, and the thin film panels about 9 percent efficient. But the exact numbers will be determined over time as data is collected on their efficacy.

"The Lungs of the Building"

This atrium is one of four in the building that allow natural light to penetrate to all of its levels, including the basement. They rise 89 feet, jutting 24 feet 6 inches above the roof. Called "the lungs of the building," the atriums provide ventilation. Instead of relying completely on air-conditioning, the building uses the atriums in conjunction with open windows as a giant siphon, sucking heat out of the building. A computer monitors the difference between inside and outside temperature and opens and closes the windows appropriately. At night, the windows are opened to bring in cool air; mid-morning they close. The bare concrete floors also act as a thermal mass to help trap coolness during summer and retain heat during winter.

Arcades Bridge the Centuries

The original Stanford campus, consisting primarily of the Main Quad, was designed in the California Mission style. Even though Y2E2 is a modern building, architects wanted it to connect with Stanford's past. The new arcades—13 feet tall and 13 feet 6 inches wide, with 36-inch columns—echo the dimensions of the arcades in the Main Quad and provide a shaded and rain-protected place to walk and socialize. Other aspects of Y2E2, such as the alignment, open space design, exterior stone walls, red tile roofs and recessed windows, are also consistent with the Main Quad.

Architectural rendering by BOORA. Text by Clare Baldwin.

Careful Use of Water

The Y2E2 building does not use any potable water for irrigation. Instead, it pipes rainwater from nearby Felt Lake, a reservoir on university property. In the future, rainwater and storm runoff may be collected in an underground tank and pumped out for irrigation as needed. Within the building, water clean enough to drink is used only for drinking. For other uses, such as flushing toilets, recycled water from the university's Central Energy Facility is piped across the street.

More Sustainable Environmental Research

The lower level of Y2E2 features at least eight laboratories. Of particular note is the Environmental Fluid Mechanics Laboratory (EFML), which studies flows in surface water, groundwater and air, and often conducts experiments using large flumes. These flumes are recirculating tanks of water that are used to simulate waves, turbulence and currents in complex flows over corals, kelp and sea grasses. Previously, the water would be disposed of after just a few experiments. But now lab members drain the water into tanks beneath the floor where it can be bleached of fluorescent dyes, algal growth can be removed and the water can be filtered for additional experiments. With the new system, researchers in the EFML will be able to reuse water for weeks to months before needing to change it out, thus saving large amounts of water annually.

THE DESIGN TEAM

BOORA Architects of Portland, Oregon, is the lead architect for Y2E2 and two other buildings now in construction in the Science and Engineering Quad. The landscape architect for Y2E2 is Hargreaves Associates, a firm that serves an international clientele and has projects addressing a broad range of scales and types. The third member of the team is Arup, an international consulting firm providing planning, engineering and project management services. They all worked in conjunction with Stanford faculty and staff.