

New Haven Register

The Greening of Yale: New building ushers in energy-saving design

Sunday, April 12, 2009

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NEW HAVEN - What once was a brownfield site, home to an oil-fired power plant at Yale University, has been replaced with a carbon-neutral cathedral of sustainable design.

Kroon Hall on Prospect Street, its curved roof and glass and Briar Hill sandstone facade echoing elements of other structures on the campus, is the new home of the Yale School of Forestry & Environmental Studies.

"This was one of the ugliest parts of Yale before the project began," said Gus Speth, outgoing dean of the school, who has worked toward the transformation for a decade.

Dedicated to the study of the global environment, Speth said the school "had to give birth to a building that reflected our values. We had to set a high watermark in environmental accomplishment and in aesthetic accomplishment."

Through a number of steps, from the materials used to the four 1,500-foot-deep geothermal wells, Kroon Hall consumes 50 percent less energy than a conventional building of its size.

One-quarter of that energy is generated through solar collectors and a 100-kilowatt photovoltaic array on the roof,

with the rest covered by renewable energy credits.

"It's effectively carbon-neutral," said Michael Taylor, director at Hopkins Architects, the design architects from the United Kingdom, who are known for constructing buildings with high environmental performance.

Yale officials and the architects led a recent tour of the \$33.5 million Kroon and three other building projects, which included the underground addition to the iconic David S. Ingalls Rink, also known as "the Yale Whale," the preservation of historic Stoeckel Hall and the new Sculpture Building and School of Art Gallery on Edgewood Avenue.

The four-story Kroon, which is built into the side of a hill with an east-west orientation, is long and thin, allowing in a lot of natural light. The curved roof is supported by Douglas fir arches, while half of the red oak interior panels were harvested from Yale-Myers, the school's forest in Connecticut.

Other sustainable features include foot-thick concrete floors, ceilings and walls that contain 25 percent recyclable material, and carpets, paints and adhesives low in volatile organic compounds.

Kroon is expected to get a platinum rating by Leadership in Energy and

Environmental Design, the green-building certification program, and will be the second such designation for a Yale building. The Sculpture Building and Gallery was the first in Connecticut out of only 60 in the country.

The Sculpture Building earned the rating not only for its low carbon footprint, but also for its sensitivity to its place in the neighborhood.

Architect Stephen Kieran of Kieran Timberlake, which designed it, said the Edgewood gallery frontage was done to "establish a porch-like building" in a contemporary version of the traditional ones on houses across the street.

Asked if the barn-like design of Kroon was a rustic reference to the original forestry school's mission, Taylor conceded perhaps it was "subliminal."

"We don't particularly make overt references to things like that. We try to think we are very rational, but I guess at the subliminal level, who knows what is going on," he said. Taylor added that the curved roof does "relate nicely" to Ingalls Rink across Prospect Street.

Kroon houses offices for faculty and staff, as well as classrooms, a library and environment center, with an auditorium and cafeteria on the top floor where there are views of West Rock and the Yale campus.

"As academics tend to hibernate, we set the top floor aside for interaction. We wanted a watering hole for the environment, a place where people can come and meet and discuss what are absolutely critical issues of the day," Taylor said.

As important as the structure itself is, University Planner Laura Cruickshank said a lot of care has gone into landscaping.

A green roof, which forms the southern courtyard, has been put over an underground tunnel next to Kroon that will be used for deliveries and recycling for the southwest corner of Science Hill, eliminating truck traffic.

Rainwater will be channeled through gutters off the roof into a 20,000-gallon tank under the adjacent Sachem's Wood, where it will feed a planter that will be filled with lotuses, wild rice, arrowheads, cattails and irises.

The aquatic plants will filter the runoff further before it enters a 940-gallon tank in the basement of Kroon, where it will be disinfected and used for flushing toilets. The recycled water, which will also be used for irrigation, will save 500,000 gallons of potable water a year.

The northern courtyard will be planted with trees and the eastern end of the complex opens onto Sachem's Wood.

"This is a very deliberate attempt to move some of the language of the central campus to Science Hill in terms of the courtyards," said Cruickshank. Yale's next big expansion, once the economy turns around, will be two additional residential colleges at this northern end of the university.

Yale has spent more than \$4 billion in new buildings and renovations in the last 16 years under President Richard C. Levin, with more than half of it in the last five years.

In 2005, Yale committed to leadership in sustainability by pledging to reduce

greenhouse emissions 10 percent below 1990 levels by 2020, a 43 percent drop.

Levin said Yale has demonstrated this largely through its construction program, by retrofitting older buildings and designing new ones to use less energy. "To be carbon neutral is the paradigm ... this is clearly the wave of the future and it is very exciting for Yale to be in the vanguard," he said.

At the heart of the energy savings are heating, cooling and ventilation systems that work around the 1,500-foot geothermal wells that draw water that is close to a constant 58 degrees. Heat pumps exchange energy with the water and a ventilation system sends warm or cool air through a plenum under the floors. To deal with Connecticut's summer humidity, the exhaust air is sprayed with water to cool it by 10 to 18 degrees which is then transferred to incoming fresh air to cool the building, all without use of a mechanical system.

The high thermal mass of the concrete also maintains heat in the winter and slowly releases "coolth" in the summer, Taylor said. The windows in the building open and if conditions are right to do so, a green light comes on in the hallways.

"The whole thing almost breathes as an organism," Taylor said.

The construction also involves suspended floors, rather than suspended ceilings.

"This works much more efficiently than the standard high speed air conditioning that throws air down from a great height using lots of energy," Taylor said of a method commonly used in the United Kingdom.

At the end of any project, no matter how ambitious, the test for the builders is how the occupants react to it.

"For us, it is very satisfying to see how they have taken to the building. You come here late at night and the students are all here. No one wants to go home," Taylor said.

Speth concurred.

"The building has already had a profound effect on the school, bringing people together. It is so spectacularly nice and so spectacularly hospitable and vibrant," he said