The Omega Center Vies to Be the First Designated “Living Building”

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The 2010 AIA COTE awards reflect the escalating standards of sustainable building—in both design and performance.

This year’s COTE Top Ten jury kicked the program up a notch from recent years in terms of energy and environmental performance of the winners. Juror Dennis Hayes captured their choices well when he said that in an era of constrained and expensive energy, priorities change: “We are redefining what we see as beautiful and effective.” Did they compromise on design quality in making those choices? Judge for yourself.

It wasn’t the jury alone that chose to emphasize energy performance, however. The AIA Committee on the Environment (COTE), which runs the program, inserted an extra step into the awards process to make sure that reliable energy and water data were available to the jurors. The committee selected a team of experts to prescreen all the project data. This team identified areas where data was missing or unclear, and AIA staff then contacted submitting teams to clarify and supplement the data. There were very few projects that did not require some revision or clarification, according to committee chair Filo Castore, AIA.

The jury process began after the technical review ended. Their selections included three projects that have been featured in recent issues of GreenSource. We summarize them, but take a deeper look at the seven remaining projects on the following pages. In the words of jury chair Peter Busby, AIA: “COTE Top Ten should be the premier design award, because it blends both design and performance like no other design award program out there.” —NADAV MALIN
A new building on the campus of the Omega Institute performs a very practical function, but also serves the organization’s loftier, pedagogical goals.

More than five years ago, when the Omega Institute for Holistic Studies first began to contemplate a new sewage treatment facility for its wooded, 195-acre campus in Rhinebeck, New York, the nonprofit organization’s management, at least at first, viewed the undertaking solely as an infrastructure replacement project. But it soon grew into a larger endeavor with goals in line with those of the institute itself, which offers educational programming intended to support wellness, personal growth, and social change. “We decided the new system should satisfy three basic criteria, explains Robert “Skip” Backus, Omega’s CEO. “It needed to consume little energy, use no chemicals, and be accessible and educational.”

In place of the campus’s aging septic tanks and leaching field system, Omega opted for a multi-step filtration process known as an “Eco-Machine,” which mimics nature and relies on beneficial bacteria, plants, and other organisms to break down and consume pollutants in water. And to enclose this unusual system, Omega hoped for a structure that would be similarly forward looking. “Since we were taking a leadership position for water treatment, we wanted a building that would match it,” explains Backus.

The result is the 6,250-square-foot Omega Center for Sustainable Living, or OCSL, which houses part of the treatment process and includes a classroom that the institute uses for general educational programs and to teach guests and the general public about the water cycle and sustainable building. The center, designed by BNIM Architects and completed in May 2009, is on track to receive LEED Platinum certification. It is among a handful of projects vying to be the first designated as a “living building” as part of the Living Building Challenge, a program launched by the Cascadia Green Building Council. To qualify it must satisfy a list of prerequisites that includes generation of enough electricity on site from renewable sources to offset purchased energy, capturing and treating of all wastewater, and avoiding materials that contain certain chemicals.

Despite these big ambitions, the OCSC has a modest appearance. Clad in weathered cypress salvaged from a nearby mushroom farm, the center is made up of two shed-like structures connected by a flat-roofed lobby. The smaller volume is supported by a laminated timber structure and contains a mechanical room and bathrooms, while the larger one is steel-framed and encloses the classroom and two aerated lagoons. The roots of tropical plants suspended inside the concrete tanks provide habitat for microbes that scrub the water of unwanted nutrients, explains Jonathan Todd, president.

>KEY PARAMETERS
Location Rhinebeck, New York (Hudson River Valley watershed)
Gross area 6,250 ft² (576 m²)
Cost $2.8 million
Completed May 2009
Annual purchased energy use (measured) 2.4
kturh/yr (20 MWh)
Annual carbon footprint (predicted) 0.5 lbs. CO₂/ft² (2.7 kg CO₂/m²)
Program Wastewater treatment, laboratory, classroom

>TEAM
Owner Omega Institute for Holistic Studies
Architect BNIM Architects
Engineers Chazen Companies (civil); BGR Engineers (MEP); Lippincott (structural)
Commissioning agent SME Group
Consultants Conservation Design Forum (landscape); John Todd Ecological Design (Eco-Machine)
General contractor David Semeir Construction

www.greensourcemaq.com
Rhinebeck, New York

The Omega Center for Sustainable Living shelters a pair of aerated lagoons and overlooks a series of lush constructed wetlands. Both the lagoons and the wetlands are part of a wastewater treatment system that mimics nature.

For extended slideshow coverage, go to greensourcemag.com/projects
of John Todd Ecological Design, the
designer of Omega’s Eco-Machine.

The OCSL is configured to provide
conditions that will allow the lagoons’
plants to thrive while maintaining a
pleasant environment for people. Solar-
tracking skylights and a completely
glazed south elevation maximize sunlight.
However, a generous roof overhang and a
light shelf limit summertime direct solar
exposure and reduce glare. Ventilation is
assisted by ceiling fans but otherwise
provided by natural means through low
operable windows positioned on the primary
façade and in a clerestory on the opposite
call. “The building feels a little like a
 greenhouse,” says Laura Lesniewski, AIA,
BNIM principal, “but it is still comfortable.”

Other building systems have
been designed to consume as few resources
as possible. The OCSL’s toilets, for instance,
are flushed with roof runoff collected in
an underground 1,800-gallon cistern.
Equipment such as lighting, a geothermal
heating system, and the lagoons’ pumps and
blowers require electricity to operate, but
these needs are more than covered by three
photovoltaic arrays which generated 38,994
kWh from June 2009 through this past May
about 15,000 kWh in excess of what was
consumed by the building systems.

One difficulty was finding affordable
materials that satisfied performance goals
and could be obtained within the tight
transportation limits outlined in the Living
Building Challenge. For example, fly ash was
originally specified as part of the concrete
mix, but was not available from nearby
suppliers. So in the end, the team decided to
use slag, and identified a source in Maryland.

Above: The OCSL has a greenhouse-like
atmosphere with solar-tracking skylights and
south-facing glazing providing the daylight
that the Eco-Machine’s water-scrubbing plants
need to thrive.

just within the allowed 250-mile radius
for high-density materials.

The OCSL and the tanks it encloses are
just one piece of a cycle that begins when
water is drawn from wells and is distributed
to Omega’s 115 buildings for activities such
as food preparation, bathing, and toilet
flushing. Then, in a process that takes about
two and a half days, the wastewater (as
much as 52,000 gallons each day during
peak periods) flows through a system that
includes underground septics and anoxic
tanks, constructed wetlands, and the indoor
aerated lagoons. Along the way, organic
material is removed, as are contaminants
such as nitrates and ammonia. Finally, the
Eco-Machine-treated water gradually
infiltrates an aquifer below the Omega
property and feeds a nearby lake.

After some initial problems with the
plants in the aerated lagoons during the
first winter, the Eco-Machine works almost
fluently. The remedy involved modifying the
control sequence so that the water
cycles through the tanks more slowly in
cold weather. Now, “it performs amazingly,”
says Backus. “All I do is cut the flowers and
clean the filters. The snails and the plants
do the rest.”

> SOURCES
Exterior cladding Green Courage
Building wrap VaproShield WolfShield
Windows and doors Loewen
Low-slope roofing Corflee Sure-White EPDM
Sloped roofing Drexel Metals DrexJume
Paints and stains TNEMEC Hydro-Zinc Series 94 H20
Interior sound insulation Green Fiber Cocoon
Water source heat pumps Waterturnace E Series

SITE AND FLOOR PLAN
1 Entry
2 Lobby
3 Classroom
4 Aerated lagoons
5 Mechanical
6 Outdoor classroom
7 Constructed wetlands
8 Sand filter

SUMMER
SUMMER
10 M.
50 FT.
10 M.
10 FT.