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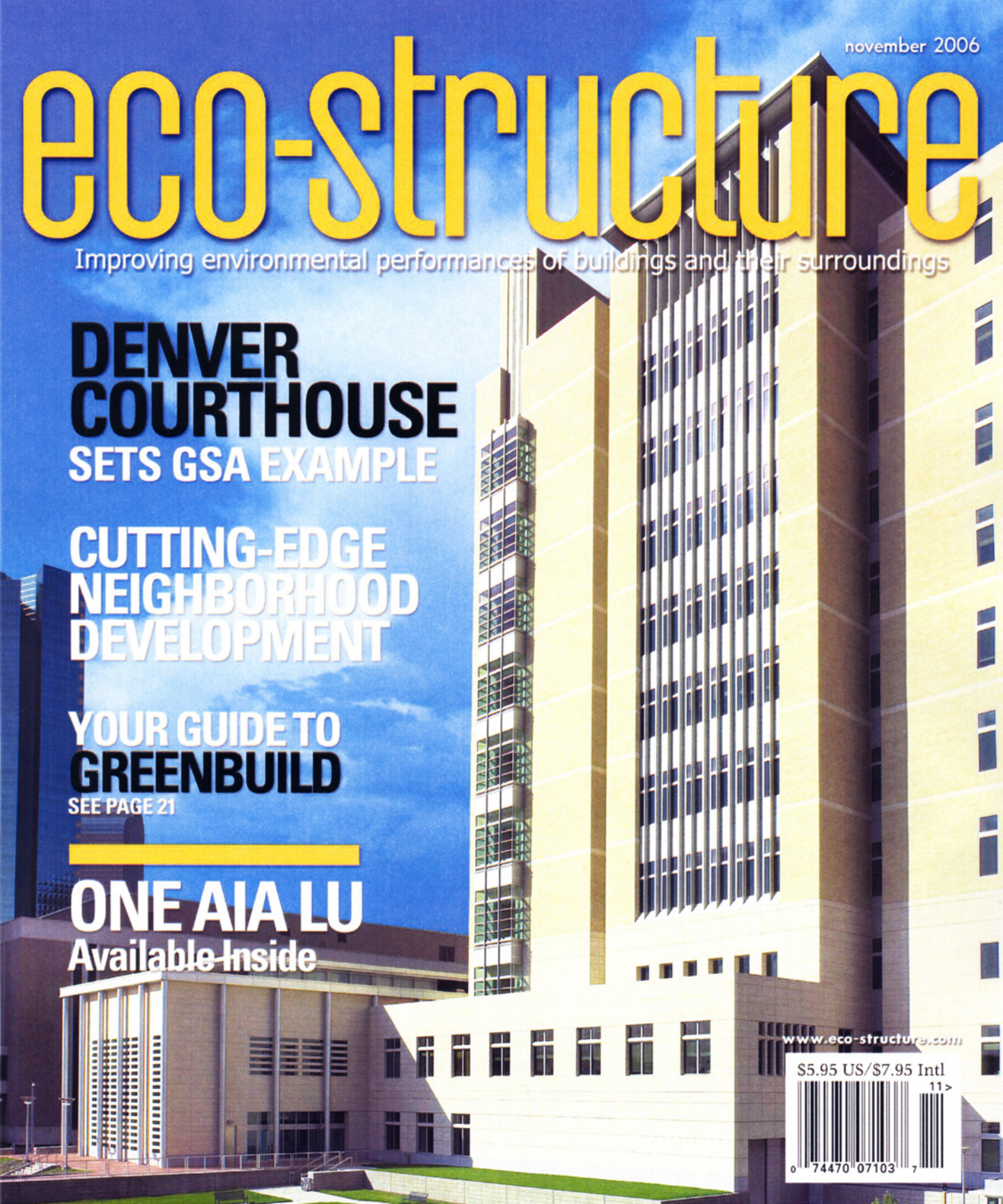

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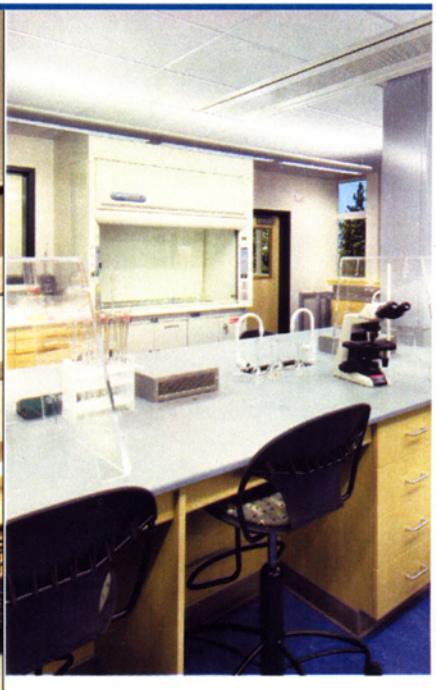
ACTIVE AND PASSIVE

AN ENVIRONMENTAL CENTER REDUCES ITS ENERGY CONSUMPTION WHILE ADDRESSING ECOLOGICAL ISSUES

BY KATE GAWLIK

AS THE SECOND DEEPEST LAKE IN THE UNITED STATES nestled among some of the most breathtaking scenes in the country, Lake Tahoe gets a lot of attention from those who call its basin home and outdoor adventurists who take on the area by land and sea. While probably not as popular as area boaters or ski bunnies, limnologists also flock to the region to study Lake Tahoe and surrounding waters. (Limnology is the study of inland waters, such as lakes, ponds and rivers, including salt and fresh and natural and manmade.) • For years limnologists and other scientists have been studying waterways in the Lake Tahoe Basin, which was created about 2 to 3 million years ago from geological block faulting. But recently the focus has shifted from research and education to preservation. One phenomenon they are trying to reverse is the clarity of Lake Tahoe has decreased 30 feet (9 m) during the past 30 years.



"We have a 3-story atrium space in the center of the building to provide natural daylighting to the exhibit area and all the surrounding spaces on each floor. The atrium has a monumental open stair connecting the main entry of the building with the second floor."

— Todd Lankenau, principal and managing partner of Reno, Nev.-based Lundahl & Associates, Architects

To help determine why the clarity has changed and stop the progression, ensure the quality of other lakes and waterways remains, and address other ecological problems, the Tahoe Center for Environmental Sciences was constructed on the campus of Sierra Nevada College, Incline Village, Nev.

The center began as a joint venture between Sierra Nevada College and University of California, Davis. But the project extends beyond classrooms and laboratories for these primary clients. Others involved include Carnegie Mellon University, Pittsburgh; Desert Research Institute, Las Vegas; RAND Corp., Santa Monica, Calif.; Scripps Institution of Oceanography, San Diego; and University of Nevada, Reno.

"The building has two primary functions. It's an academic laboratory and classroom building for Sierra Nevada College and a research laboratory for UC Davis. Additional functions include meeting rooms, conference rooms, lecture halls, faculty offices, exhibit space and other functions ancillary to the primary uses," explains Todd Lankenau, principal and managing partner of Reno-based Lundahl & Associates, Architects.

Involving so many clients in the design of a 45,000-square-foot (4182-m²) green building on a tight budget was a challenge for project architect Lundahl & Associates, Architects. But together they were able to create a building that fittingly is energy efficient because of a variety of unique and highly integrated mechanical and electrical systems. The facility features a natural gas micro-turbine with cogeneration space heating; laboratory exhaust heat recovery; active and passive solar systems; photovoltaic roof panels; and other systems to conserve energy and produce electricity, heating and cooling.

ENERGY

By their very nature, laboratories are significant energy consumers. But a little ingenuity can help reduce laboratories' energy consumption. For example, because of systems installed at the center, the building's energy consumption was reduced by 64 percent.

"We can cool the building without the use of any compressor-based cooling," Lankenau notes. "There are no chillers, but instead, there are two 25,000-gallon [95000-L] underground chilled water storage tanks and a cooling tower for direct evaporative cooling, which is used only at night to produce chilled water. This has been coupled with the use of induction diffusers, or chilled beams, low-displacement ventilation, radiant floor heating, overhead radiant heating and cooling panels. This is the first laboratory building in the United States to utilize induction diffusers, and we hope this provides an example for the future use of this technology."

> The site was designed so the building doesn't disturb soils, vegetation and water quality. The wildlife habitat also was maintained as much as possible.

The building also has a unique rainwater catchment system. Rainwater and melted snow are collected from the building's roof surfaces, purified and used to flush low-flow toilets and for trap primers. Waterless urinals are used throughout the building. "These, along with other water-saving devices, have enabled us to save between 70 and 80 percent of the water normally consumed by a laboratory building of this size," Lankenau adds.

A cogeneration system in the building produces a substantial amount of the building's power while recapturing the building's waste heat, which then is used for domestic hot water and snow-melt systems. Because the Tahoe area receives significant snowfall, hydronic snow melting of the campus sidewalks is a requirement.

The building also has a PV roof system that produces more than 10 percent of its power demand. The 31.5-kilowatt PV system has 900 PV roof tiles and nine 3,500-watt inverters with combiner boxes. The system can withstand 280 pounds per square foot snow load, which is a requirement for the Lake Tahoe region. But the PVs have glass surfaces, immediately shedding snow off the tiles and preventing shading and subsequent reduction in energy production.

SUSTAINABLE FEATURES

While mechanical systems are a major aspect of the building's sustainability, other green products helped achieve 57 LEED points. (The

PROJECT team

TAHOE CENTER FOR ENVIRONMENTAL SCIENCES

ARCHITECT / Lundahl & Associates, Architects, Reno, Nev., www.lundahlandassoc.com
- Todd Lankenau, principal and managing partner

CONTRACTOR / Turner Construction Co., Sacramento, Calif., www.turnerconstruction.com
- Cliff Kunkel, project executive

STRUCTURAL ENGINEER / John A. Martin & Associates of Nevada, Las Vegas, (702) 248-7000
- Steve Moore, project engineer

MECHANICAL ENGINEER / Rumsey Engineers, Oakland, Calif., www.rumseyengineers.com
- Peter Rumsey, principal

Electrical engineer / Integrated Design Associates, Santa Clara, Calif., www.ideasi.com
- David Kaneda, principal

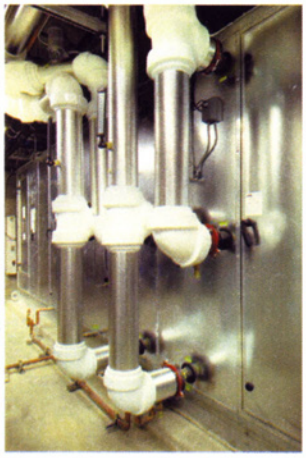
Lighting designer / David Nelson & Associates, Littleton, Colo., (720) 981-4560
- David Nelson, principal

Laboratory consultant / Research Facilities Design, San Diego, www.rfd.com
- Leslie Ashor, principal

Acoustical consultant / McKay Conant Brook Inc., Westlake Village, Calif., www.mcbinc.com
- Dave Conant, principal

LEED commissioning consultant /Architectural Energy Corp., Boulder, Colo., www.archenergy.com

THE FACILITY FEATURES a natural gas micro-turbine with cogeneration space heating; laboratory exhaust heat recovery; active and passive solar systems; photovoltaic roof panels; and other systems to conserve energy and produce electricity, heating and cooling.



building currently is being reviewed for LEED certification; Platinum, which requires 52 points, is the goal.)

For instance, the site was designed so the building doesn't disturb soils, vegetation and water quality. The wildlife habitat also was maintained as much as possible.

Basement walls, shear walls and slabs contain concrete with 25 percent fly ash.

Structural steel used for external and internal wall framing and roof framing has 98 percent recycled content. Forest Stewardship Council-certified wood was used for framing and doors.

Wheatboard was used for cabinets in classrooms and offices, and particleboard substrate was used for laboratory cabinets. Office and classroom floors are covered in carpet tiles with recycled content, and linoleum flooring is used in laboratories.

The building also is flooded with daylighting and features daylighting control systems, a switching module and occupancy sensors. Another daylighting component is one of Lankenau's favorite design elements. He explains: "We have a 3-story atrium space in the center of the building to provide natural daylighting to the exhibit area and all the surrounding spaces on each floor. The atrium has a monumental open stair connecting the main entry of the building with the second floor."

The building has a unique rainwater catchment system. Rainwater and melted snow are collected from the building's roof surfaces, purified and used to flush low-flow toilets and for trap primers.

PRESERVATION

The Tahoe Center for Environmental Sciences opened on Aug. 21, the first day of classes at Sierra Nevada College. In addition to educating students, the center also has developed programs for the public, including a 3-D visualization center to teach visitors about the Tahoe basin and how science is involved in its preservation.

And science undoubtedly is vital to the lake's—and area's—preservation. Through the work of the Tahoe Center for Environmental Sciences, which is committed to "providing objective scientific information for restoration and sustainable use of the Lake Tahoe Basin," young and old hopefully will continue to be inspired by the pristine waters of Lake Tahoe and the rousing mountains, valleys and ranges that surround it.

MATERIALS AND SOURCES

NATURAL COTTON-FIBER INSULATION BATTS / UltraTouch by BONDED LOGIC INC., Chandler, Ariz., www.bondedlogic.com

TRIM AND FASCIA / Harditrim by JAMES HARDIE, Mission Viejo, Calif., www.jameshardie.com

HIGH-PERFORMANCE FIBER-GLASS WINDOWS / MILGARD MANUFACTURING, Tacoma, Wash., www.milgard.com

LINOLEUM FLOORING / Marmorette by ARMSTRONG FLOORING, Lancaster, Pa., www.armstrong.com/flooring

CARPET TILE / INTERFACEFLOR COMMERCIAL, LaGrange, Ga., www.interfacefloor.com

CEILING TILE / School Zone Fizzured Ceiling Tile by ARMSTRONG CEILINGS, Lancaster, www.armstrong.com/ceilings

WOOD PARTICLEBOARD CABINETS / ROSEBURG FOREST PRODUCTS, Roseburg, Ore., www.rfpco.com

DUAL-FLUSH LOW-FLOW TOILETS / Caravelle Washdown Toilet by CAROMA USA INC., Pound, Wis., www.caromausa.com

WATERLESS URINALS / WES-1000 Waterfree Urinal by SLOAN VALVE, Franklin Park, Ill., www.sloanvalve.com

LOW-FLOW BATHROOM FAUCETS / SLOAN VALVE

EXHAUST AIR-TO-WATER HEAT EXCHANGER / CAIN INDUSTRIES, Germantown, Wis., www.cainind.com

DOMESTIC HOT-WATER HEATERS / A.O. SMITH, Ashland City, Tenn., www.hotwater.com

CUSTOM AIR-HANDLING UNITS / Solution Air Handlers by YORK INTERNATIONAL, York, Pa., www.york.com

FLOOR AND WALL DISPLACEMENT DIFFUSERS / PRICE INDUSTRIES, Suwanee, Ga., www.price-hvac.com

SOLAR HOT-WATER COLLECTORS / SUNEARTH INC., Fontana, Calif., www.sunearthinc.com

HEAT REJECTION / AT Cooling Tower by EVAPCO, Taneytown, Md., www.evapco.com

HEAT EXCHANGER / Flat Plat Heat Exchanger by ALFA LAVAL, Lund, Sweden, www.alfalaval.com

RADIANT HEATING AND COOLING / TWA PANELS UK LTD., North Somerset, England, www.twapanels.co.uk

PHOTOVOLTAIC MODULES AND INVERTERS / Solar Save Roof Tile by OPEN ENERGY CORP., Solano Beach, Calif., www.openenergycorp.com

DAYLIGHTING CONTROL SYSTEMS / LS-100 photocell, LS-290C photocell and LCO-203 by WATTSTOPPER, Santa Clara, Calif., www.wattstopper.com

DAYLIGHT SWITCHING MODULE / WATTSTOPPER

OCCUPANCY SENSORS / Automatic Wall Switches (WA Series), Time Switches (TS Series), Dual-tech sensors (DT Series), Ultrasonic sensors (WT Series) and Passive-infrared Sensors (CX Series) by WATTSTOPPER

The 31.5-kilowatt photovoltaic system has 900 PV roof tiles and nine 3,500-watt inverters with combiner boxes.