

Serious About Sustainability

When the ‘S word’ is part of a project’s name, the lighting design must follow suit

BY PAUL TARRICONE

At Loyola University’s Institute of Environmental Sustainability in Chicago, a key objective is to give students the practical experience that will help prepare them for their future careers. “Entrepreneurial solutions to environmental problems” is the catchphrase, and in one example, students have converted cafeteria vegetable oil waste into biodiesel, which they then sell, for a profit, to both Loyola’s and Northwestern University’s inter-campus shuttle bus companies.

This type of tangible sustainability—i.e., an emphasis on results over theory—is front-and-center throughout the institute, which raised the stakes for Chicago lighting designer Schuler Shook. Their mission was to match the details of the lighting plan to Loyola’s ambitious goals regarding sustainability. The



Photos: Dave Burk, Hedrich Blessing Photographers



Pendant-mounted CMH downlights designed by architect Renzo Piano light the aquaponics area in the EcoDome, where plants are cultivated without soil.

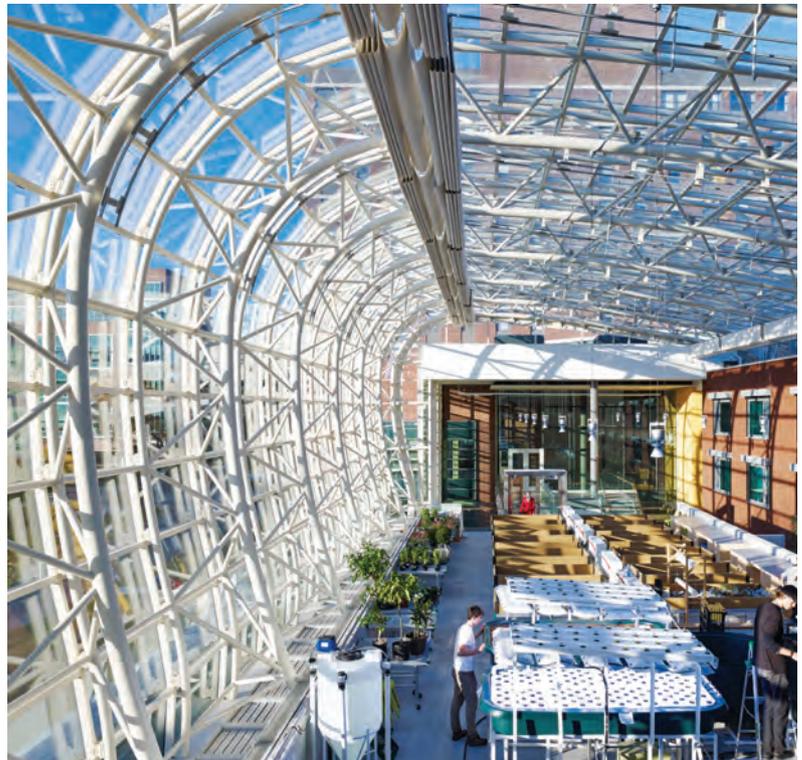
university “focused on the big picture and laid it all out for us,” recalls Schuler Shook principal Giulio Pedota. “They wanted us to reduce energy, minimize artificial light, maximize daylight, minimize toxic and hazardous waste, and avoid light pollution and trespass by using technologies that were environmentally friendly.” With the big-picture strategy in hand, Schuler Shook and architect SCB filled in the details by using energy-saving sources with low mercury content, abundant natural light, and photosensor controls and dimming to produce a lighting power density of just 0.91 watts per sq ft—a 20 percent reduction over the ASHRAE/IES 90.1-2007 requirement. The design earned Schuler Shook a 2014 IES Illumination Award of Merit.

The energy savings are impressive at Loyola, but there’s more to the story than just a low LPD. Pedota says the design considered aesthetics as much as energy. “Absolutely. We always study the architecture, try to enhance and reinforce the architectural concepts, and design spaces with aesthetics in mind.” The most conspicuous example at Loyola is the glass-enclosed 3,100-sq ft EcoDome greenhouse—“the jewel” of the project, he says—which turns into a glowing lantern at night.

In addition to the iconic EcoDome, the project scope included 217,000 sq ft of classrooms, labs, offices and student housing; a “green” café featuring seasonal, local and organic produce (some of which is grown in the EcoDome); a large-scale clean energy biodiesel production lab; and the largest geothermal facility in the Chicago area buried deep beneath the EcoDome. The \$58 million project was completed in the fall of 2013.

DELIVERING DAYLIGHT

Several strategies were used to facilitate the use of daylight on the project. SCB, with daylighting consultant Transsolar, first commissioned daylight studies that factored in window height and the spectral quality of the glass to be used.





Daylight is allowed to penetrate all spaces—even the basement classrooms—via windows, clerestories, glass curtain walls and skylights, thereby offering occupants a healthier and more comfortable working environment. To reduce potential glare from direct sunlight, automated or manual solar shades are provided in every room.

Meanwhile, other daylighting techniques complement the clean, minimalistic architecture throughout the project, including solar fins in the atrium that filter daylight. The solar fins work in tandem with wide, rectilinear fluorescent fixtures that uplight the ceiling plane.

As for the electric sources, the project is predominantly fluorescent, and also uses LEDs and ceramic metal halide. The overwhelming majority of fixtures are directed downwards, located remotely from building openings, or shielded to avoid light pollution or trespass. Fixtures throughout the facility respond to daylight sensors and are turned off or dimmed during daytime hours when daylight is present or when spaces are unoccupied.



Daylight does most of the work, but flourishes such as these randomly placed pendants (above) add appeal in the student lounge.

Automated shades combat excessive heat and glare in the greenhouse (far left), while solar fins (left) fit perfectly with the clean architectural lines.

ENTER THE DOME

The centerpiece of the institute is the EcoDome greenhouse. Its soaring glass ceiling ventilates the building, collects rainwater and provides plenty of natural light for the plants growing inside.

The lighting in the EcoDome helps show off these green initiatives, without showing off itself. To reveal the intricacies of the ceiling structure while minimizing light pollution, 8-W louvered LED uplights were discreetly attached to the bottom of the curtain wall ribs. “We illuminated the building from within to showcase its unique structural frame and create a beacon for sustainability,” says Pedota. These lights are among the very few in the facility that point upward.

The most prominent electric lighting in the EcoDome is strategically placed pendant-mounted CMH downlights that provide general illumination

The 8-W LED uplights integrated within the curtain wall ribs are one of the rare examples where light is directed upward. They emphasize the dome's frame at night.



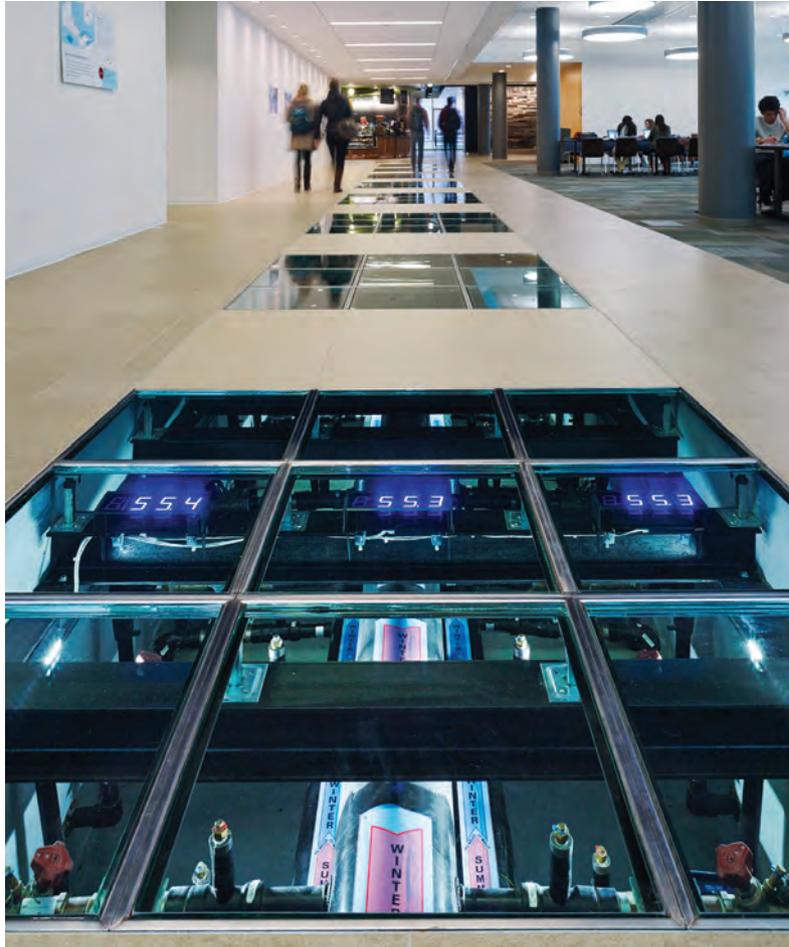
to the aquaponics area, where plants are cultivated in water without soil. The pendants also illuminate a bridge leading to the main lobby, the biodiesel labs and classrooms, and are a prime example of how design was not sacrificed for sustainability. Notes Pedota, “They were designed by Renzo Piano,” the Pritzker Prize-winning Italian architect. While Schuler Shook looked for places to deploy LEDs, they were not viable in this application. “When the project was designed, there weren’t high-power LEDs that we trusted for the height of those pendants,” explains Pedota. “They couldn’t deliver the footcandles we needed, and the color consistency was not very reliable.”

In any case, natural light does the bulk of the work in the greenhouse. But while it’s good for growing plants, Loyola did not want too much of

a good thing. “Daylight is the main source of light even in the winter. We measured 300 footcandles even on a cloudy day, and in the summer it can get too hot and too bright, and reach 600-plus footcandles.” The solution was an automated shade system (Lutron) with transmittance of 12 percent that’s activated when excessive direct sunlight is present.

LOOK DOWN

Pedota mentions how Loyola “loves to communicate its environmentally friendly strategies” to students and the university at large. One of the best examples—believe it or not—is the geothermal system, which heats and cools the building, cutting yearly costs by 30 percent. The system reaches 500 ft below ground, where the tempera-



Who knew a geothermal system could be so interesting? Hoping to show off its greenness, Loyola made the main pipe and system visible by using 12-in. cool-white LED fixtures under the glass.

ture remains at about 58 deg year-round. To draw attention to the main pipe of the system, 12-in. cool-white LED fixtures were concealed within the wells beneath a glass-paneled corridor walkway.

At ground level in the EcoDome is the student lounge, another area where the architectural aesthetic was paramount. “We could have just done rows of downlights,” Pedota says, but instead, Schuler Shook specified round decorative dimmable LED pendants, which are scattered randomly to reinforce the flexible nature of the lounge. Dimmable, compact fluorescent downlights provide general illumination and minimize contrast between daylight areas and those away from windows.

Finally, much like the student entrepreneurs who must demonstrate real-world results for their green initiatives, the university has at-

tached specific metrics to its pursuit of sustainable design. Loyola has pledged that all of its new academic buildings and renovations must meet at least LEED Silver standards. The institute achieved Gold, proving that it’s not just students who can earn extra credit. □

THE DESIGNER



Giulio Pedota, IALD, LC, LEED AP, Member IES (1996), is a principal with Schuler Shook, Chicago.

FAST FACTS

- A low LPD (0.91 watts per sq ft) was essential to establish the institute’s green bona fides.
- Almost all the lighting points down to prevent light trespass.
- Daylight is the workhorse, as fixtures are dimmed or turned off during the day.
- Decorative pendants in select spaces add aesthetic appeal.