



# HIDDEN GENIUS

Loisos + Ubbelohde Associates is the smartest design firm you've never heard of. Its views on energy and light efficiency are illuminating the way forward for some of the architectural world's biggest names.

**story**  
Julie Schaeffer

LEFT: Principal George Loisos (top) and Professor Susan Ubbelohde (bottom) are the brainpower behind Loisos + Ubbelohde Associates, a consulting firm specializing in energy, light, and thermal modeling.

**A**lthough Loisos + Ubbelohde Associates has worked on dozens of renowned buildings—from the newest Apple stores to the Goldman Sachs headquarters—the firm isn't a household name even among those familiar with leading architects. This is because the bulk of its work isn't architectural design, per se, but rather in helping architects and others solve unique problems, often (but not exclusively) in the areas of energy and light efficiency.

The firm, founded in 1985 by architect George Loisos and university professor Susan Ubbelohde, was based on a simple but unique vision: apply research to architecture. "The firm arose from a desire to take advances we were seeing only in research and apply them in practice," Loisos says. "We wanted to obtain a deeper understanding of a project's impact on its immediate and less immediate environment by modeling rather than by simply finding ways energy and light can be used to assist a project from a business perspective."

As an example, Loisos points to energy. "If your building uses energy in a flatter way—that is, if you don't have peaks and valleys of energy usage—you're in a sense making your neighborhood a better place," he explains. "So we'll ask, is there any way to quantify that? Is there any way to make it available to others as well?" It's a novel approach, says Loisos, because buildings affect the environment in many ways that aren't recognized in current architectural practice—which is why Loisos + Ubbelohde Associates' consulting services are in such high demand.

The business took off around 2000, about the time that sustainability entered the mainstream architectural vernacular, and since then, it's flourished through word of mouth. "We're not quite sure how we get work—usually the phone just rings," Loisos says. "I think what happens is that someone is trying to figure out how to solve a problem, asks around, and eventually finds us."

It helps that Loisos + Ubbelohde rarely has to say no. "We get phone calls from people asking, 'Can you do this?' And our answer usually is yes," Loisos says. "Anything that has to do with energy and light and thermal modeling, we can tackle."



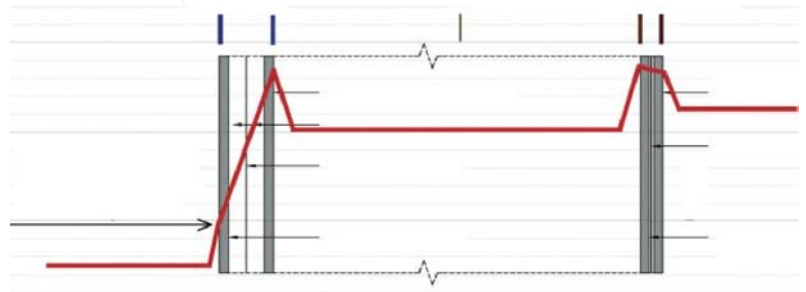
### A GLASS BUILDING IN THE DESERT

The Cleveland Clinic Abu Dhabi (CCAD) is a 2 million-square-foot hospital in the United Arab Emirates' capital city. The hospital, which is scheduled for completion in 2012, was designed by San Francisco's HDR and won a 2010 Best Hospital Design Award from Hospital Build Middle East.

"The design team at HDR wanted a glass building in the desert, but that's obviously illogical, so it hired us to provide skin, energy, and daylight analysis," says Loisos, explaining his firm's role—a typical one for an atypical structure.

Loisos + Ubbelohde's solution, working in conjunction with Ted Jacobs Engineering, was to create a double-layer glass skin and use the space in between the layers to extract the last bit of cool air from the building's exhaust. The firm also used multiple layers of glass to filter out just about everything other than the visible spectrum of the sun's radiation.

"By finding a way to make a glass skin an asset, the building went from one that was consuming the same amount of cooling as San Francisco's entire financial district to one that was consuming 40 percent less than ASHRAE 90.1," Loisos says.



TOP: The clinic features a high-performance, double-skin facade system to deliver low energy costs and high occupant comfort in a demanding climate. CENTER: Detail section through Cleveland Clinic double-skin showing glazing assembly and thermal performance. BOTTOM: A diagram of daylight levels at the Cleveland Clinic Abu Dhabi.



### A SUSTAINABILITY BASE ON EARTH

Another project, under construction at press time, is the NASA Sustainability Base, on which renowned architectural firm William McDonough + Partners hired Loisos + Ubbelohde to consult in 2009.

The project is a 50,000-square-foot, steel-frame office building contracted by NASA Ames Research Center at Moffet Federal Airfield in Mountain View, California. The structure is designed to consume no more energy than it generates and use 90 percent less water than standard buildings. But the building's real draw may be its brains: the building is designed to be intuitive, anticipating and adjusting to changes in environmental elements, such as sunlight, temperature, and wind in real time—in essence, learning over time how to maximize its own systems.

In doing so, the structure will provide NASA with data on how remote structures can best minimize resource consumption—which is useful information for an agency whose “remote structures” could be on the moon or Mars, hundreds of thousands of miles away from assistance.

“We worked with the design team at the pre-conceptual stage to establish what the building would do and how it would work, then carried our ideas through the project with energy modeling, daylighting, and electric light design to make all the pieces fit together,” Loisos explains.

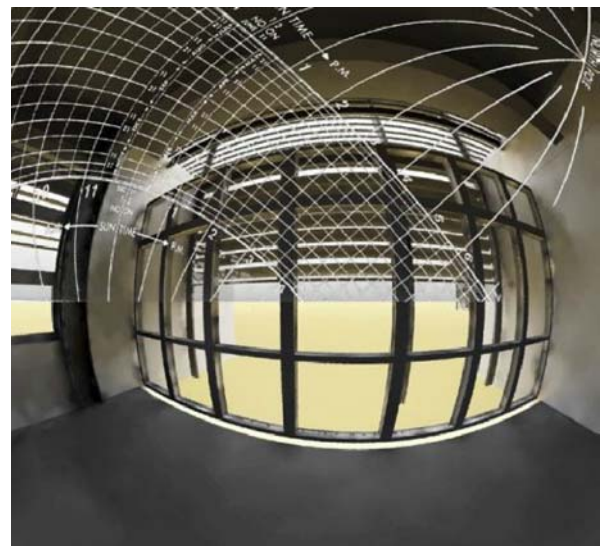
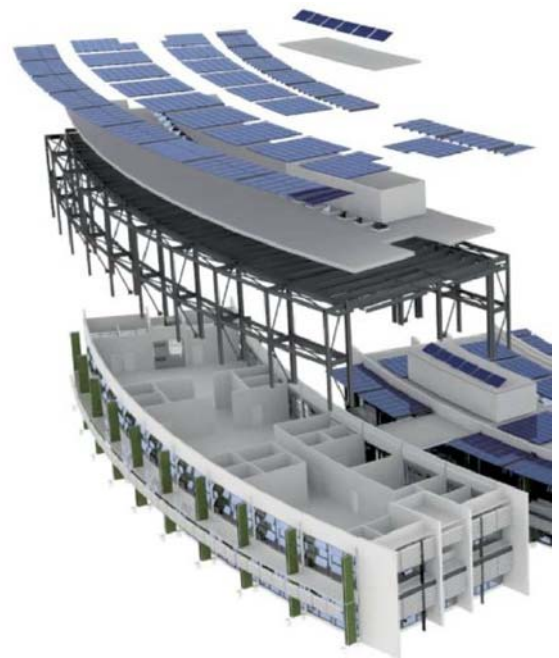
### A SOLAR TELESCOPE TURNED UPSIDE DOWN

Many of Loisos + Ubbelohde's projects involve light on both a functional and aesthetic level. Currently under construction is a unique project at the Linde + Robinson Lab for Environmental Science at the California Institute of Technology: the renovation of a solar telescope that was built in 1934. “We turned the telescope, which had been idle for a number of years, into a device that would

provide a real-time image of the sun, shooting light to underground laboratories and providing columnated light for experiments,” says Loisos of the project, which won an AIA East Bay Unbuilt Merit Design Award in 2009. “In doing so, we took a long-forgotten historic artifact and made it an active part of an everyday experience.”

Because Loisos + Ubbelohde understands light and can model it well, clients have started asking the firm to take on lighting projects that are purely aesthetic. One example is a light cannon—a shaft of light that shoots 80 feet down a staircase inside a building three times a day—that the firm designed for architecture practice SmithGroup. “Our solution was an acrylic and polycarbonate device suspended inside the staircawse,” Loisos says of the eclectic addition to the building.

RIGHT: The project's exploded axon shows structure, shading, space planning, daylighting, ventilation, and solar-collection systems. BOTTOM LEFT: The NASA Sustainability Base, designed by William McDonough + Partners and AECOM, uses advanced systems to adapt automatically to its environs. BOTTOM RIGHT: A shading study for the west conference room at the Sustainability Base.





### A MODEL FOR 600 DIFFERENT ENERGY SCENARIOS

It may sound like what Loisos + Ubbelohde does is more engineering than architecture, but Loisos says it's drastically different on a conceptual level. "An engineering approach is analytic; you take a problem, divide it into its component parts, and solve it that way," he explains. "Our approach is more synthetic; we essentially make a proposition and test it."

The benefit of Loisos + Ubbelohde's approach is that it allows the firm to ask and answer questions that seem hard to define. "If you ask a normal energy modeler about a building you haven't even designed yet, he'll say, 'Draw me something and I'll tell you how it works,'" Loisos says. "Our approach is to ask how many potential ways are there to have that building on the site."

As an example, Loisos points to a 300,000-square-foot laboratory, for which HOK hired the firm. "There were three or four different ways you could put the building together, and five or six ways you could situate it on the site, and a number of other ways to configure other aspects of the building," Loisos says. "When we put all the pieces together, we ended up with around 600 different permutations. We modeled all of them."

The result was that the firm was able to fully understand the forces on the building site that affected energy performance and occupant comfort. "Our approach allows us to give the designer a starting point: for example, the building should face in this direction, or this configuration will work better than the others," he says.

Because of the firm's conceptual approach, all of its 14 employees are architects—albeit architects with an interest in science and how things work. "We have people who can write software, people who can build planes," Loisos says. "We can solve the challenges we solve because we spend the time and resources to get really deep into a subject." **gb&d**

ABOVE, RIGHT: Loisos + Ubbelohde is renovating a once-idle solar telescope, originally built in 1934, and turning it into a device capable of providing a real-time image of the sun. The telescope is currently housed at the California Institute of Technology.



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