

The Making of the First Certified-Green Data Center

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When it comes to claims of energy-efficient design, the U.S. Green Building Council's [Leadership in Energy and Environmental Design](#) (LEED) standard is the ultimate credibility test. Certification is a process that makes building designers jump through hoops to prove they're being sufficiently considerate of the environment. Design firm [Advanced Data Centers](#) is building the very first data center to be pre-certified LEED platinum. (The USGBC does not yet have a set of requirements specifically for data centers, but it is said to be considering developing one.) Although the San Francisco-based firm does not have any Wall Street customers yet, many of the firm's green design ideas could be applied to Wall Street data centers.

The data center, which is located in Sacramento, Calif., got early LEED points based on site selection — it's being built on a "brownfield." "That's a nice way of saying the place is contaminated," explains Bob Seese, chief architect at Advanced Data Centers. The site used to be the McClellan Air Force Base, and groundwater 350 feet below the building is polluted, he relates.

On a more positive note, the location is outside California's seismic area and floodplain, which reduces the likelihood of natural disasters, and it has access to the lowest-cost power in the state. It's also about a 75-minute drive from San Francisco, the right distance, according to Advanced Data Centers president Michael Cohen, to provide disaster recovery to Bay-area firms.

Despite the green points received for building on the contaminated site, Advanced Data Centers still had to work for the LEED platinum status. "It's very difficult to get data centers [LEED] certified because they're energy hogs and it takes a great deal of effort to mitigate that," Seese says.

The firm, therefore, spent a great deal of time designing efficient cooling systems. "I've been uncomfortable with the traditional method of cooling data centers for a number of years because it didn't make sense to me," Seese relates. Typically, computer room air conditioners sit around the perimeter of a room and force cold air up from underneath a raised floor. "The mere fact that it's under a raised floor means that the air has to be of a high quantity and volume and low temperature," Seese notes.

Another common data center cooling problem is stratification of temperature — cold and warm air mixing together, causing equipment close to the computer racks to overheat and fail. Advanced Data Centers has designed a system that produces a wall of "cold aisle" air of constant temperature and pressure in front of the racks. Then the firm encloses the space behind the computers, where the hot air exits, drawing the hot air out of the space so it can't mix with the cold air. "Essentially, we've put the computers inside a duct of air that maintains a constant temperature all the way from the ceiling down to the floor across the entire length of the room," Seese remarks.

A Breath of Fresh Air

But the most powerful energy-saving step Advanced Data Centers has taken with the McClellan Park data center has been to use outside air to cool the space. This is known as using an "air-side economizer." "We use the outside air in Sacramento to cool the data center when that ambient air is in ideal condition," Seese says, noting that 75 percent of the time the outside air is in the right temperature and humidity range. "That

eliminates the need for chillers, pumps, cooling towers and a whole range of equipment that draws a huge amount of energy," he explains.

With all of the innovative cooling techniques, the McClellan Park data center will have a power usage effectiveness (PUE) of 1.12, which means that 88 percent of the energy consumed will be used to power servers and only 12 percent will be used to cool the space, according to Cohen. By contrast, "A data center built five or more years ago typically has a PUE of 1.8 to 3.0," he says, meaning much of the energy delivered to the facility is consumed by cooling equipment.

Even the building itself is green, according to Cohen. "We did a demolition of an adjacent building and recycled 96 percent of that material," he says. "In the LEED process, we picked up a lot of points for imaginative items, such as using gray water as a redundant water source and the reuse of the base in general," Cohen says.

The firm coordinated with the local municipal water system to provide treated gray water from a well across the street that will be used as a backup source for the data center's cooling tower as well as for landscaping and bathroom fixtures. Rainwater will be captured on the roof to be used in the cooling towers.

The data center will use low-mercury lamps and fixtures. Zone lighting will allow lights to be turned off where they're not needed. "We've chosen products that are easily replenished, using wood flooring that's not an endangered species," Seese says. "More than 50 percent of our materials are sourced locally so we reduce the transportation cost of bringing materials to the site."