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Advanced Data Centers Claims Super-Efficiency

by: [Jeff St. John](#)
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The San Francisco startup says the data center it's building in the Sacramento area will have a power use effectiveness, or PUE, ratio of 1.1 – a measure of data center building energy efficiency that analysts say will be hard to reach.

[Advanced Data Centers](#) wants its future customers to know they're going to get about the most efficient building they could ask for.

The San Francisco startup says the data center it's building on the former McClellan Air Force Base near Sacramento will have one of the best measures of power efficiency in the business, in part because it barely uses any air conditioning.

The way ADC and other data center operators measure that is with something called a power use effectiveness, or PUE, ratio, which represents the total amount of power consumed by a data center divided by the amount used for computing.

For an industry that spends billions of dollars on electricity – sometimes almost half of it on cooling and other infrastructure needs rather than on the equipment itself – that's an important number to know.

Most data centers' PUEs hover in the 1.5 to 2 range, said Bob Seese, chief data center architect at ADC. [NetApp](#) scored a \$1.4 million efficiency rebate from Pacific Gas & Electric last month for reaching a PUE of 1.3 at its Sunnyvale, Calif. data center, and Google is claiming [an average PUE of 1.21](#) for six of its large data centers.

But Seese said that ADC's new data center is expected to reach a yearly average PUE of 1.1, meaning that only about 9 percent of the power going into the center would be used for non data center equipment needs.

The Sacramento Municipal Utility District seems to agree. It has awarded ADC its largest-ever rebate under the "Savings by Design" program hosted by it and other California utilities for customers that improve energy efficiency. ADC's data center will save about \$2 million a year on the building's power bills, the utility said.

Data centers suck up 1.5 percent of the nation's power, and 2.5 percent in Northern California. The U.S. Environmental Protection Agency estimated in 2007 that data centers and servers will double that energy consumption to 100 billion kilowatt-hours by 2012, which would cost data-center owners \$7.4 billion in power bills (see [Data Centers Could Hit 'Resource Crisis'](#)).

Given those demands, plenty of data center operators are zeroing in on energy efficiency measures, said Martin Reynolds, vice president at Gartner.

"People didn't care about PUEs when they were building data centers a few years ago," he said. The average PUE of older centers is between 2 and 3, he estimated, though it may be possible to retrofit older centers to reach about a 1.7 PUE.

"The newer data centers, I'd expect them to come in at about 1.7 PUE as a baseline," he said.

Still, Reynolds and other data center analysts questioned whether ADC could reach its PUE projections.

"What that says is that only 9 percent of the energy in the data center is going to lighting, cooling, power distribution, power backup and all that stuff," Reynolds said. "That's a really, really, really aggressive number. It's really hard to get there."

ADC expects to spend about \$100 million on the first 66,000 square feet of the data center, set to open in about eight months, Seese said. Out of that price tag, the cost of the efficiency improvements are in the hundreds of thousands of dollars range, he said.

"But the savings we reap from this are far greater than the cost," he added. "The return on investment is less than a year for all these improvements we've done."

All told, ADC's efficiency decisions match those at other data centers seeking to lower their building infrastructure power bills, said Dan Azevedo, director of data center architecture, strategy and innovation at Symantec and chairman of the metrics and measurements working group at The Green Grid, an industry group focusing on efficiency in data centers and computing.

"If you can power your IT equipment for half the amount of money, that translates to actual green dollars," he said. And, according to [this report on data center efficiency](#) from Google, the greatest gains are being made in building infrastructure, rather than in the data center equipment itself.

Chief among ADC's improvements is using outside air drawn by high-efficiency fans for cooling the center's raised floors. Seese said the building will be able to use that outside air about 75 percent of the year, which is a lot cheaper than using air conditioners or water chillers all the time. Even on the year's hottest days, it's cool enough in the evening and morning to use outside air about half a day, Seese noted.

For when the outside air isn't cool enough, ADC is building a water-cooling system built to reduce the pressure needed to move water through the building, yielding more energy savings, he said.

Then there's the decision to convert the alternating current supplied by the power grid to the direct current needed for data center equipment only, Seese said. Other data centers convert AC to DC first to charge backup batteries, convert it back to AC to get it to the equipment and then re-convert it to DC (see [DC for Data Centers?](#)).

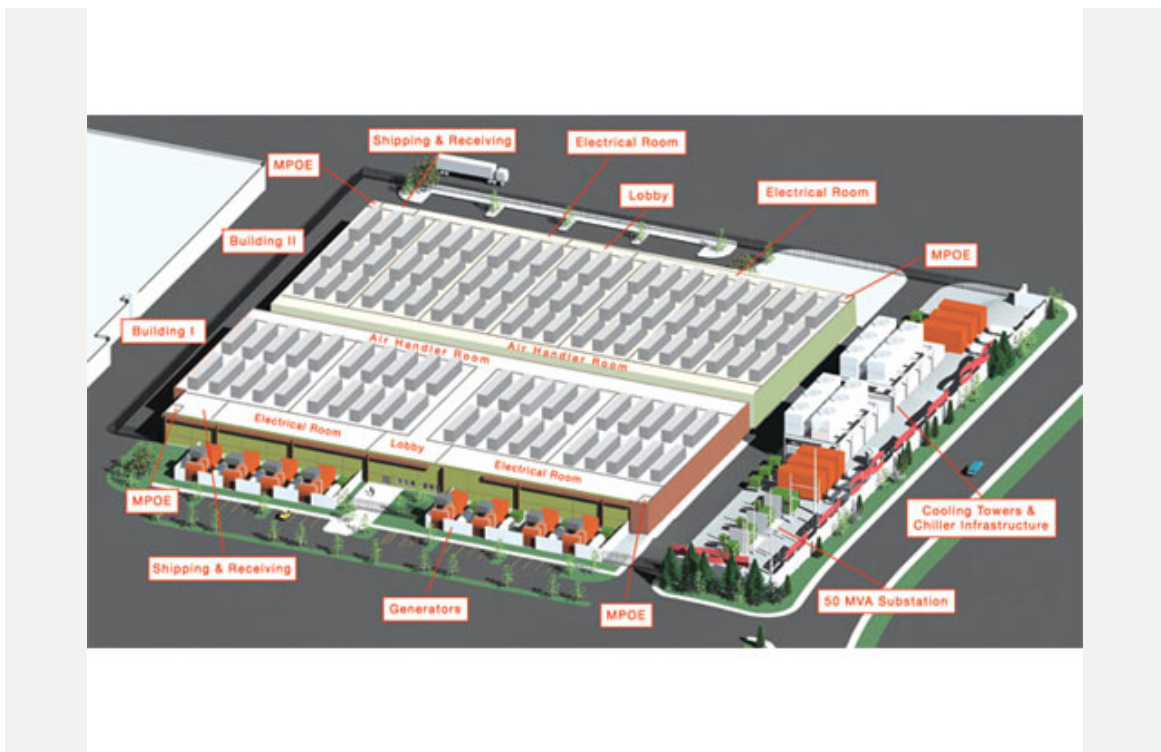
ADC chose to use flywheels – devices that store kinetic energy for emergency backup power – instead of batteries to make that possible, Seese said.

ADC also is asking its future customers to contribute to energy savings by offering lower cooling prices to those that incorporate energy-efficient products and techniques into their data center systems, Seese said.

Among the IT powerhouses pledging to reduce their energy use are [Hewlett-Packard](#), which said in 2007 that it would reduce the combined energy consumption of its operations and products 20 percent by 2010, and [IBM](#), which in 2007 said it would spend \$1 billion per year on new products and services for data-center efficiency.

[Sun Microsystems Inc.](#), Samsung Electronics Co, EMC Corp., Spansion and Virident Systems are among the companies building solid-state memory devices meant to save power in data centers (see [Spansion to Google: We Can Save You Money](#), [Sun Shoots for Power Reduction in Data Storage](#) and [Samsung Plugs Solid-State Drive for Green Cred](#)).

ADC expects to see the data center to be built in phases and expand to an eventual 200,000 square feet. The company hasn't signed any customers yet, but Seese said it's seen a lot of interest from companies that don't want to take on the costs of building their own data centers in today's poor economy.



ADC's McClellan Park data center was built by the United States Air Force.

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