DC Current being tested for the Data Center

By Staff Writer

Researchers at the U. S. Department of Energy’s Lawrence Berkeley National Laboratory (Berkeley Lab) have teamed with Silicon Valley giants including Sun Microsystems, Intel, Cisco, and others to demonstrate technology that could save billions of dollars a year in the energy costs of operating data centers, as well as improve reliability and lengthen equipment life. The demonstration is taking place this summer at a test facility in Newark, CA. More than 20 high-technology companies are participating.

Eliminating power conversion losses by using DC (direct current) rather than AC (alternating current—from the electricity grid) power delivery throughout the data center can trim the energy costs of data centers by 10 to 20 percent and improve reliability. Preliminary measurements from the demonstration center in Newark support this estimate.

Researchers in Berkeley Lab’s Environmental Energy Technologies Division (EETD) proposed this technology demonstration and the California Energy Commission’s Public Interest Energy Research (PIER) program sponsored the work.

The Berkeley Lab team, which consists of project leader William Tschudi, Steve Greenberg, and Evan Mills, conceived the project and provided oversight for the demonstration’s planning and design, executed by private-sector firms ECOS Consulting and EPRI Solutions under a contract with Berkeley Lab. The partner companies had advice, equipment, and staff to set up the demonstration facility.

Data centers are the backbone of the Internet, providing access to websites and databases accessible over the World Wide Web. As supporting virtually every larger sized private corporation and government entity, data centers are huge energy users. Data center managers say that the rapid growth in computing requirements, and the growing cost of electricity, is a major concern.

According to a recent report by Berkeley Lab, SEM/CT leaders (“High-Tech Means High Efficiency”), data centers use much of their power hours a day, seven days a week, have among the highest density of energy-consuming equipment of any modern building.

"They can use 100 times the electricity of a typical office building on a square foot basis," says William Tschudi, the Berkeley Lab leader for this project. "Energy costs of $1 million per month are not uncommon in large data centers that require megawatts of electricity."

Such factors as the rapid growth of the web, the increasing use of networks to help geographically dispersed teams, and power has led to rapid growth in data centers and in the Internet service providers searching for ways to reduce associated costs.

"We’re excited to be able to demonstrate and evaluate the efficiency merits of two different data center DC power delivery approaches and expect our results can inform data center operators, facility designers and this global industry regarding efficient options for future designs," says My Ton of ECOS Consulting.

A number of strategies can be used by designers and managers of these facilities to decrease their power needs, such as optimizing airflows to get the most out of the cooling system, upgrading the energy efficiency of the...