

LEED Certified Data Center

Success Stories – January 2009

IBM completed the installation of a 72,000-square-foot raised floor data center at the Boulder facility and received Silver LEED certification. The United States Green Building Council manages the Leadership in Energy and Environmental Design (LEED) program which helps improve the quality of buildings and their impact on the environment. Energy efficiency is one of six aspects of the LEED certification process. The energy efficient design features include:

- . Plate and frame heat exchangers which utilize outside air temperatures to provide free cooling to the data center
- . Variable speed chillers which are able to reduce flow and energy consumption to match the varying cooling loads
- . Variable speed primary pumping which reduces energy consumption at low flows
- . Variable speed computer room air conditioners which modulate airflow and cooling as required by the computer loads
- . Premium efficient motors
- . Dual level lighting controls
- . Energy efficient substations
- . R30 reflective roof

IBM has received several rebates from XCEL Energy for implementing these energy efficient measures. One additional rebate is in process and the rebate amount is dependent on the facility's loaded operational efficiency verification. Because of this design and participation in the XCEL Custom Efficiency Rebate program IBM will be named the "Cooling Efficiency Champion" for 2008 at the upcoming XCEL Energy Expo in February.

Continuous Commissioning Efforts:

IBM engaged the services of Texas A&M University, Energy Systems Laboratory, for two phases of commissioning work at the IBM facility. Commissioning is the process in which mechanical equipment is analyzed and operating specifications are modified to optimize energy efficiency. The first survey was performed on the Central Utility Plant equipment. Recommendations from this survey were:

- . Operate the backup satellite chiller plant as the data center primary cooling system instead of the Central Utility Plant
- . Automate the chiller and the free-cooling control systems

**10 FOR
CHANGE**
A new climate for business

- . Eliminate three-way valves in chilled water systems
- . Improve boiler efficiency with operational changes

IBM will receive a rebate for this survey for participating in the XCEL Energy Building Recommissioning process. Additional rebates are available when these items are implemented.

In a second commissioning effort 70 air handlers were surveyed and their operating specifications were modified to include:

- . Broadening of economizer controls which utilize outside air for free cooling
- . Implementing static pressure resets for cooling airflow which is dependent on outside air temperature
- . Implementing static pressure night setback to reduce airflow for overnight operations
- . Chilled water pump operation for start / stop control based on required demand
- . Control program changes which eliminate the opportunities for simultaneous heating and cooling

The site is expected to save 1,300 MWH/year from these efforts.

Ray Tafoya
IBM Global Energy

**10 FOR
CHANGE**
A new climate for business