



## IBM, Syracuse University, New York State to build one of the world's most energy-efficient data centers

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IBM (NYSE: IBM), Syracuse University and New York State have entered into a multiyear agreement to build and operate a new computer data center on the University's campus that will incorporate advanced infrastructure and smarter computing technologies to make it one of the most energy-efficient data centers in the world. The data center is expected to use 50 percent less energy than a typical data center today, making it one of the "greenest" computer centers in operation.

Through its "Smarter Planet" initiative, IBM is helping clients take advantage of the fact that the world is becoming more instrumented, intelligent and interconnected. IBM is working with SU and New York State to use smarter technologies in the new data center. For example, the project will focus on the actual infrastructure of the data center itself, not just the computer hardware and software. A key element will be an on-site electrical co-generation system that will use natural gas-fueled microturbine engines to generate all electricity for the center and provide cooling for the computer servers.

The \$12.4 million, 6,000-square-foot data center will feature its own electrical tri-generation system and incorporate IBM's latest energy-efficient computers and computer-cooling technology. SU will manage and analyze the performance of the center, as well as research and develop new data center energy efficiency analysis and modeling tools. IBM will provide more than \$5 million in equipment, design services and support, which includes supplying the electrical cogeneration equipment and servers such as IBM BladeCenter, IBM Power 575 and IBM z10 systems. The New York State Energy Research and Development Authority (NYSERDA) is contributing \$2 million to the project.

The center will expand Syracuse University's leadership in the development and use of "green" innovations in nationally strategic domains. IBM intends to showcase the data center and its energy-efficient technologies to help clients design new data centers or improve their current operations.

"Energy use is becoming the largest single cost in operating data centers-with \$2 billion per year wasted nationally due to inefficiencies-and IBM is dedicated to helping customers reduce electricity consumption to benefit their businesses and the environment," says Vijay Lund, vice president for development and

manufacturing operations in IBM's Systems and Technology Group. "IBM is joining with Syracuse University to address the end-to-end data center infrastructure, from analytical modeling and simulation to electricity generation to cooling systems to the operation and management of servers, in order to develop the greenest, most efficient data center possible."

Through its vision of *Scholarship in Action*, the University is building on its historical strengths and pursuing cross-sector collaborations with partners from all sectors of the economy-collaborations that simultaneously enrich scholarship and education and address the pressing issues of the world.

"This project yields benefits in every direction imaginable-just as Scholarship in Action aspires to do," says SU Chancellor and President Nancy Cantor. "It's a perfect example of how effective cross-sector partnerships can be. IBM, NYSERDA and SU each are bringing their strengths to the table to gain vital insight into solving crucial aspects of the intensifying global problem of increasing energy consumption that none of us could achieve separately. Best of all, the solutions we find ultimately will serve the public good."

The project will address a critical concern for modern data centers run by businesses and organizations around the world: ever-spiraling energy consumption and cost driven by growing demand for computer services such as Internet communication, entertainment, global commerce and services. Data centers in the United States consume annually more than 62 billion kilowatt hours of electricity-equivalent to the amount used by approximately 5.8 million U.S. households-for a total cost of about \$4.5 billion. If current trends continue, that usage could double by 2011.

"Syracuse University will be the home to the first university data center powered by onsite generation in New York State, which will showcase the substantial energy and environmental benefits of combined heat and power," says Francis J. Murray, Jr., president and CEO of NYSERDA. "This public-private partnership will complement Governor Paterson's comprehensive energy agenda, which will make New York the most energy efficient state in the nation, encourage the use of state-of-the-art energy technologies, and tackle the crisis of global warming."

"This concept is important because it addresses growing concerns that businesses face every day-reducing energy costs and mitigating environmental impact," says New York State Sen. David J. Valesky (D-Oneida). "I commend Syracuse University and IBM for undertaking this partnership and leading the way with research that has the potential to transform the way businesses operate."

"It is exciting to see Syracuse University and IBM working together to implement innovative energy-saving technology, and I'm pleased that NYSERDA is providing funding," says New York State Assemblyman William B. Magnarelli (D-Syracuse). "This sort of project inspires others to evaluate, design and employ green technology."

### **Data Center Infrastructure**

The project will feature an on-site electrical tri-generation system that will use an array of natural gas-fueled microturbines to generate all the necessary electricity for the center and provide cooling for the computer servers. The data center will be able to operate completely off-grid.

IBM and SU will create a liquid cooling system that will use double-effect absorption chillers to convert the exhaust heat from the microturbines into chilled water to cool the data center's servers, with sufficient excess cooling to handle the needs of an adjacent building. Server racks will incorporate IBM's Rear Door Heat eXchanger "cooling doors" that use chilled water to remove heat from each rack far more efficiently than conventional room-chilling methods. Sensors will monitor server temperatures and usage to tailor the amount of cooling delivered by each Rear Door Heat eXchanger-further improving efficiency.

The project also will include the creation of a direct current (DC) power distribution system. In a typical data center, alternating current (AC) electricity is delivered by a central power plant through the local utility's electric grid and then converted to DC to power the servers. This conversion process results in power loss. By directly generating DC power on-site, transmission and conversion losses are eliminated.

### **Research and Analysis**

Syracuse University will conduct research and analysis of the data center's power and cooling technologies and develop models and simulation tools to monitor, estimate, plan and control energy use to achieve the goal of reducing average data center energy use by 50 percent.

This will include determining the optimum data center layout and cooling system, thermodynamic models to predict energy consumption, analyses of plant and chiller energy efficiency, evaluating the energy savings advantages of on-site tri-generation systems and DC power supply for data centers, and testing and measurement of the performance of water-cooled server racks.

The data center is expected to be completed by the end of 2009.

About IBM: For more information about IBM, visit <http://www.ibm.com>.

About Syracuse University: Chartered in 1870 as a private, coeducational institution of higher education, Syracuse University is a leading national research university of more than 18,000 full- and part-time students from all 50 states and 90 countries, and more than 1,400 faculty members. Syracuse University is propelled by the bold idea of Scholarship in Action - education that is not static, but the living expression of insight that drives change. It is a place where students become leaders, teachers and collaborators and where the community is continually impacted by the energy of new ideas. For more information about SU, visit <http://www.syr.edu>.