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Emerging Sector

Despite Shaky Economy, Data Center Sector Continues to Grow in Tri-State Region

April 1, 2010

By *Diane Greer*

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As the demand for information technology has exploded, so, too, has the need for data centers housing servers, storage devices and networking gear. And though the financial crisis and ensuing credit crunch severely constrained data center construction with many projects put on hold or canceled, the sector is still seeing plenty of activity and is expected to surge as the recovery gains strength.



Photo: Gilbane Building

Work underway on an HVAC system for a recently completed data center project.

Despite the slowdown, 2 million-sq.-ft. of data center development is underway in New Jersey, says Michael Pembroke, senior vice president at Hackensack, New Jersey-based Russo Development, a developer with 1.8 million-sq.-ft. of leased data center space in northern New Jersey. "The market is weak but there is still a lot of activity."

"There is a lot of demand in the market that is not being met because of the credit crunch and current economic conditions," explains Terence Deney, vice president at New York based-Structure Tone. "Probably at the end of 2010 to the beginning of 2011 you are going to see a release of the pent-up demand."

"The inability to get financing to build new data centers hit the sector hard," says Jason Schafer, senior analyst, Tier1 Research. "Data centers are insanely expensive to build. The

average cost of a premier data center is running about \$1,100 per square foot."

The falloff in construction has pushed data center utilization rates near 90 percent. "We do not see the supply and demand parity being reached until sometime in 2012 to 2013," Schafer says.

In Mahwah, N.J., Russo is developing a 400,000-sq.-ft. data center for the NYSE Euronext. The NYSE enlisted Structure Tone to manage construction of the interior build out, slated for completion in the second half of 2010.

Russo is also working on a 284,342-sq.-ft center in Clifton, N.J. on the site of an Automatic Data Processing Inc. facility demolished in 2008. The site has all the elements critical to a data center, Pembroke explains. It is close to Manhattan and features redundant sources of power, excellent water capacity, good fiber optic connectivity and sewer capacity.

Cervalis, a colocation provider housing multiple companies' data center operations in its facilities, signed a triple-net-lease with Russo in April on a 150,000-sq.-ft. facility in Passaic County, N.J. The site is near Manhattan and located next to a PSE&G substation which will supply 16 MW of redundant power at 13kv, eliminating the need to build a costly onsite substation. Build out of the interior is underway.

Digital Realty Trust, a leased space developer, recently completed a 127,800-sq.-ft. data center shell in Franklin Township, N.J. Colocation provider DuPont Fabros is building a 360,000-sq.-ft. facility in Piscataway, N.J. In upstate New York, Structure Tone will complete 115,000-sq.-ft. data center for Yahoo in June.

Data Center Energy Efficiency Data centers consume tremendous amounts of power, with energy costs per square foot 10 to 30 times higher than an office building. At the current growth rate, power requirements for data centers could double in five years.

"The amount of power and electricity that goes into these data centers is becoming the single biggest operating cost," Deneny says.

To reduce power consumption and costs, data centers are focusing on energy efficient design and construction techniques.

"Hot aisle and cold aisle containment processes have been evolving over the last 7-years," says Dennis Cronin, principal at Providence, RI-based Gilbane Building. The basic concept is to better control hot and cold air flows to increase the efficiency of the data center cooling system.

Typically server racks are lined up in alternating rows with cold air intakes on equipment fronts...

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...facing each other along a “cold aisle.” Hot air is exhausted out the back to the “hot aisle”.

With hot aisle containment the idea is to capture and evacuate the hot air away from the equipment. Various fan and duct configurations are used to move the hot air into a return air plenum, Cronin explains.



Photo: Gilbane Building

An illustration of a containerized data center. All data center infrastructure, including servers, switch gear and mechanical equipment comes preassembled in a shipping container.

raised floor to heat exchanger-equipped cooling doors on the server racks. “The water to air heat exchanger removes heat from the racks more efficiently,” says James Herr, president, VIP Structures, Inc., Syracuse, N.Y. “It is like a miniature refrigerator.”

Free cooling increases energy efficiency by using the ambient environment to reduce or eliminate mechanical cooling. Yahoo will cool its Buffalo data center using 100 percent outside air. Operable louvers on the data center’s sidewalls and equipment fans draw in outside air to cool the servers. Hot air exhausted by the equipment is vented out of top of the building through louvered roof cupolas.

“Estimates are that in cooler climates, air-side economizers can reduce electrical bills by as much as 33 percent,” says David Bonifacic, managing principal, New York-based WB Engineering.

Cold aisle containment methods, which are actually more efficient, seek to enclose the cold aisle with plastic strips akin to freezer curtains, doors and/or roofing systems over the racks to ensure the cold air is delivered to the equipment intakes. Meanwhile the enclosures prevent the hot air from circulating back to the cold aisle, instead routing it back to the air handlers.

In-rack cooling systems employ cooling coils mounted on the rear doors or tops of enclosed equipment cabinets. Hot air exhausted by the equipment is push through the cooling coils and the resulting cool air re-circulated within the cabinet. Air flow paths are shorter, since you are not moving air to CRAC (computer room air conditioning) units, resulting in less energy usage, Cronin says.

Syracuse University’s new \$12.4 million, 12,000-sq.-ft. data center is feeding cooled water pumped through pipes beneath the

A tri-generation system producing electricity, heating and cooling at Syracuse's data center will consume 50 percent less energy than a comparable data center, Herr explains. The system employs 12 natural gas-fired microturbines generating AC and DC power, avoiding conversion losses. Waste heat from the turbines is used by two absorption chillers. During the winter, the waste heat produces hot water to heat an adjacent office building.

Modularity and Containerization Modular phasing is helping companies deploy capital more wisely. Rather than building a large data center and waiting for it to fill up, more companies are building data centers in stages to meet current usage, says Chris Strom, director of project development mission critical at Skanska.

Instead of 100,000-sq.-ft. of wide open white space, companies are building 10,000- to 20,000-sq.-ft pods, Deneny explains. "It's easier to have the engineering to cool and power a smaller footprint." Designing for modular growth increases energy efficiency and helps the overall redundancy of the facility since each pod has dedicated infrastructure.

Modular or prefabricated construction techniques are also catching on. Schafer believes modular construction will help drive down the cost of the data center construction process.

Containerized data centers are another emerging trend. All data center infrastructure, including servers, switch gear and mechanical equipment comes preassembled in a shipping container. Simply slide the container in place, connect it to chilled water supply and return lines, power and bulk communications and you are off and running, Cronin says.



DAVID BONIFACIC



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Using metrics from Hewlett-Packard, 40 containers are roughly the equivalent of 160,000-sq.-ft. of raised floor data center. "If I took those 40 containers and built them 4 high and 10 wide I would need a building 100-foot-squared," Cronin explains. "Think of the cost metrics. I'm going from a 160,000-sq.-ft. structure to a cube 100-ft.-sq. x 50-ft. tall."

Green Data Centers Beyond energy efficiency, companies are seeking green data centers. Syracuse's new data center is designed to attain a LEED silver rating. Roughly half of Structure Tone's clients are asking for LEED certification, Deneny says.



JAMES HERR



CHRIS STROM

LEED certification is achievable for data centers but is more difficult than an office building due to resource usage, Pembroke says. USGBC is currently working with a volunteer group of data center industry experts on a LEED 2009 adaption focused on revising selected credits to make LEED more accessible to data center projects.

BIM and IPD Building information modeling (BIM) and integrated project delivery (IPD) techniques are proving advantageous to data center design and construction. "BIM is advancing rapidly to where now we create the model, use it for clash detection and client orientation of the equipment and then tie into an electronic turnover package," Cronin explains. All the data is integrated into an object oriented maintenance management system with real time alarms displays.

Clash detection found and resolved 1,400 conflicts and reduced the time for trade coordination by six-weeks on a \$53-million 96,000-sq.-ft. data center project managed by Gilbane for an undisclosed client, Cronin says. Prefabrication of MEP components decreased field hours by an estimated 15 percent and mitigated congestion of materials and contractors on site.

Skanska is getting involved earlier, during the site selection process with data center projects. The site can determine the efficiency of the building, the cost of power and available tax incentives, Strom explains. "Companies are trying to make those first initial investment decisions in a more

sophisticated manner and are trying to move very quickly. Whether it is an official IPD tri-party contract or not, it is really about a much more collaborative delivery.”