



Pepco Energy Services' (PES) Midtown Thermal Control Center (MTCC) sells chilled water and steam to numerous Atlantic City casinos, Pier Shoppes and the Atlantic City Boardwalk Hall.

## Data Center Upgrade Ensures Critical Systems are Managed and Protected to the Highest Possible Level

Pepco Energy Services (PES) recently completed a multi-million dollar cogeneration and chiller plant energy control upgrade at its Midtown Thermal Control Center (MTCC). This improvement also put into place a plant control system that receives and processes real-time performance data used to diagnose and resolve system faults. Their data center — that is the keeper of the facility data as well as other mission critical information for the business of the Atlantic City, NJ based operation — soon became the next high priority item for improvement. "When we looked at the massive investment on the plant side, we knew we needed to do the same thing to make sure the business side was protected," said Alex Negron, analyst at PES. "Our data center was aging and unable to provide the necessary behind-the-scenes support. We needed a full overhaul that would provide strong investment protection as well as meet our evolving data protection needs over the next decade."

### Security and Reliability a Top Priority

The security and reliability of its data center is a top priority for PES. It relies on a network of mission-critical systems for almost all of its daily operations. Any loss of data from power outages could potentially cause inaccuracy and vulnerability in billing and audits with customers. "We needed improved reliability, reduction of service interruptions and the subsequent downtime involved in trying to get systems back on line," said Negron.

### Assessment: Need for Mission – Critical Mechanical and Automation Systems

An assessment of the infrastructure indicated a fragile network that was "cobbled together over a period of 15 years." Past retrofitting and patchwork modifications of electrical systems had been conducted without regard to the load on the system. Nor was there any documentation of the electrical infrastructure. "While there was some built-in redundancy, it was not robust enough for the new business requirements," said Negron. "We needed a backup system that would ensure system availability in the event of component or power failure which is critical to preventing service interruption. We needed to start really thinking about how we address and protect mission critical systems."

*To protect our business, we invested in advanced, web-based, redundant systems to meet our evolving data protection needs over the next decade.*



Redundant UPS Systems, Redundant HVAC, Chromatic Cabling

*The densely packed server racks created predictable heat loads that required redundant cooling to protect the equipment and ensure maximum productivity.*

*We also had to get creative on the air flow distribution to accommodate both the server room needs and occupant comfort.*

### Temperature Control Issues

The computer room, that houses the network and server infrastructure, was struggling with temperature control issues. In the enclosed space of the server room, it was impossible to keep the temperature within the recommended range due to heat generated from the data collection equipment. "If the servers get too hot, they will shut off and that puts data collection at risk" explained Negron. "The air conditioning system was connected to an office wide area so there was no way to create a single room cooling fix."

### Upgrade Planning and Implementation

To determine the optimal cooling infrastructure for the data center, Pepco consulted with Brad Pappal, General Manager of Tustin Energy Solutions, a commercial HVAC automation energy management company headquartered in Norristown, Pennsylvania. The Tustin Group had previously worked with Pepco on optimizing its chiller plant operations. In meetings that followed, it became clear that Tustin, through its various divisions: TES (Tustin Energy Services), TMS (Tustin Mechanical Services) and TCS (Tustin Construction Services), could offer all the services necessary to reconfigure the data center with cooling, multiple power feeds, generators, UPS systems and

added automation capabilities. They could engineer the center to provide power and connectivity to PES' critical computer systems with no interruption in power or cooling.

"The project took about four months," said Pappal, who acted as the outside project director for all the service work. "It required careful planning and staging of all segments. We purchased all the equipment, and designed the piping, sheet metal, and general contracting requirements for the walls, doors and painting.

### CRAC Units

For precision cooling, the Tustin Group installed two computer room air conditioning (CRAC) units, properly sized and located relative to the equipment. The units are equipped with humidity control alert systems and online monitoring to control/monitor cooling to the server equipment. "Densely packed server racks operate continuously which creates continuous predictable heat load," explained Pappal. "This kind of heat dissipation requires redundant cooling in order to protect the equipment and ensure maximum productivity." Due to the construction of the server room, a raised floor system was not an option for air distribution. To address the room construction, the Tustin Group designed a passive air distribution system that handles both precision and comfort cooling. "Most data center applications do not account for comfort cooling," said Pappal. "However, the use of this particular server room is multifaceted. To address the customer's need, we had to get creative on the air flow distribution to accommodate both the server needs and occupant comfort." In this case, the air distribution system specifically moves air throughout the data center via a fan system, and delivers temperature-controlled air directly to the servers.



Directional air flow creates an environment suitable for the server equipment and for a workstation.

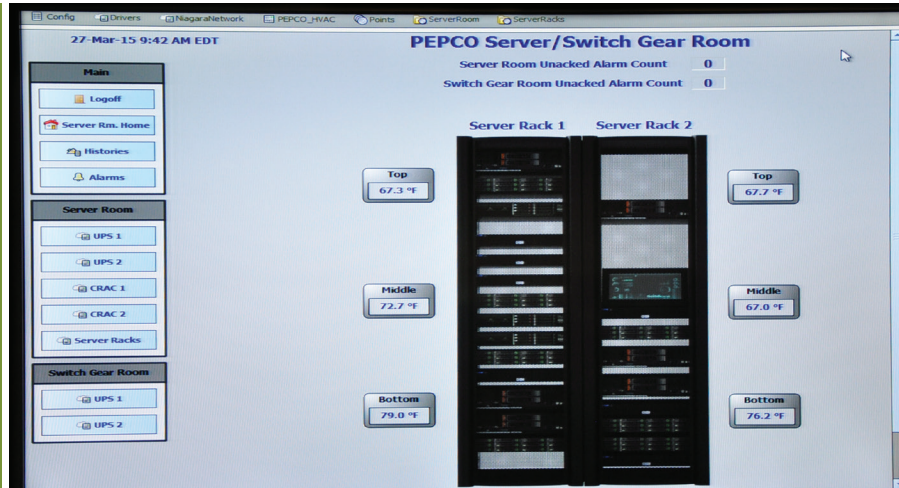


## UPS Units

To mitigate the risk of a power outage, PES installed Uninterruptable Power Supply (UPS) units with a 20-minute battery life to power the server room during the transition to generator backup power. "The intent was to build redundancy upon redundancy," said Pappal. "The UPS units have yet an additional connection to an on-site emergency diesel generator that can be brought on line in the time provided by the UPS." UPS units have an alert system in place and feature online monitoring/control.

our equipment. It allows us to remotely log in and see the environment analytics of the room, and know the temperature at three different points in each of the server racks. We know all the parameters of the UPS system and the air conditioning units. We can see everything that's going on in that room remotely. The key parts are all alarmed so if there is an issue we will get an alarm notification. For example, we will get an alarm if the temperature is too warm or if the rack temperature is too high or if a unit has failed. This kind of information and the ability to do remote diagnostics did not exist before."

*The new platform allows us to remotely log in and see the environment analytics of the room and conduct remote diagnostics.*



Each server rack has three temperature zones that feed real time data for remote monitoring and alerts.

## Equipment Upgrade

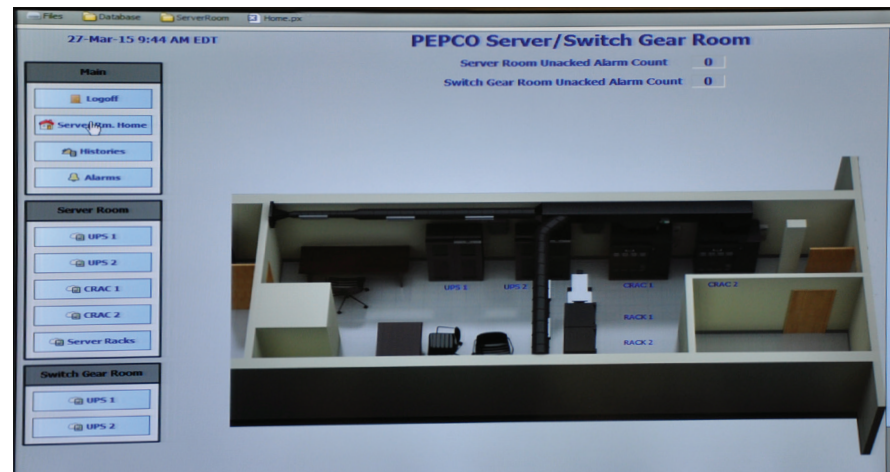
PES was responsible for the IT equipment upgrade and electrical work that included dual power feed paths to the servers. "While we didn't replace the existing sixteen servers, we added 12 new gigabit switches and ran new labeled Cat6 wiring for them," said Negrón. "We also added two larger server racks with smart power distribution units (PDUs) that send alerts via e-mail. Each of the racks has three thermostat sensors for temperature readings." The upgrade also included Visio graphic representation with color-coded wiring by server function and a new keyboard, video and mouse (KVM) station that allows control of multiple servers.

## Ceiling Tile Replacement

An area identified as a risk was the potential for an overhead leak. "We have a flat roof that is very spongy," explained Negrón. "The cooling towers are located above the server room and we have had roof leaks in the past." To solve the problem, PES replaced the room's ceiling tiles with AquaTray® brand drainage and diversion trays. "If an overhead roof leak or broken pipe occurs, water is channeled from tray-to-tray, then to a building drain."

## Automation System

Tustin Energy Solutions designed and installed the automation system that allows PES to have immediate alarm notification for full status indication of rack temperatures, room temperatures, equipment condition and all electrical conditions of the UPS'. "The system was incorporated into the existing platform developed for the chiller plant said Negrón. "The new platform is a one-stop shop for information on a large portion of



Automation system gives a virtual layout of the server room and equipment.

### Modified Room Layout

Tustin Construction Services division worked closely with the management team at the facility to coordinate the room layout. New, more robust data collection equipment allowed us to make the data center smaller and more controllable. The Tustin Group constructed the walls and doors for the reconfigured 800 sq. ft. space, which also saved on required capacity and long term operating costs.

### Metering and Billing Separate From Plant Operations

Not too long ago PES upgraded its metering and billing system and made it completely separate from plant operations. "In the past, there would be an issue if we shut something off in the plant while doing some maintenance work," said Negron. "With the way the electrical setup was configured it would shut down the server rack or trip the air conditioning which would then trip the servers. Metering data was vulnerable during those unplanned shutdowns. However, until this data center upgrade was in place, our new metering and billing system was still at risk because of the multiple issues with the data center. Now, everything is completely isolated. If a power outage occurs in the plant, it is not going to affect the metered data collection and the billing system."

### Conclusion

To support its plant upgrade investment, PES needed to improve its legacy data center whose network of fragile systems was not robust enough to support the company's growing and expanding needs. By reconfiguring its data center and installing mission-critical mechanical and automation systems, PES is able to manage and protect its data to the highest degree possible. "The new upgrade will provide strong investment protection and will more than pay for itself by ensuring system availability in the event of component or power failures, thus ensuring continuity of service and no loss of revenue," said Negron.



Water tight ceiling tiles with drainage provides protection for essential equipment.

### About the Tustin Group

The Tustin Group delivers high quality commercial, industrial and institutional mechanical services, water management services, building energy management solutions, fire protection systems, expert planning and construction services for new and retrofit building applications. For more information, contact Tustin Energy Solutions at 2555 Industry Lane, Norristown, PA 19403, call 610.539.8200 or visit the website at [www.thetustingroup.com](http://www.thetustingroup.com).

### About Pepco Energy Services

Pepco Energy Services (PES) delivers a complete range of renewable energy, energy efficiency products and energy efficiency services to a wide variety of clients, including: state, local and federal government; educational; institutional; industrial; and commercial concerns. Pepco Energy Services is a subsidiary of Pepco Holdings, Inc., one of the largest energy delivery companies in the Mid-Atlantic region, serving about 2 million customers in Delaware, the District of Columbia, Maryland and New Jersey. For more information, contact Pepco Energy Services, 1300 North 17th Street, Suite 1500, Arlington, VA 22209, call 703-253-1698, or visit [www.pepcoenergy.com](http://www.pepcoenergy.com)



## TUSTIN ENERGY SOLUTIONS

2555 Industry Lane | Norristown | PA | 19403 | P: 610-539-8200 | F: 610-539-2890 | [www.thetustingroup.com](http://www.thetustingroup.com)