Primary school's energy management transformed by cloud-based insights

Customer: Peirce School │ Arlington, MA
Website: peirceschool.info
Customer size: 53 faculty, 280 students
Country or region: U.S.
Industry: Education

Customer profile
The Peirce School is a public elementary school in Arlington, MA. The town of Arlington, a state-designated Green Community, oversees school building maintenance.

Partner details:
ICONICS, Inc.
www.iconics.com

Software and services
- Microsoft Azure

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"With Azure cloud services, we don't have to buy a server, and we can store three years of data. In New England, this is important because winters can be very harsh. You really need three years of data to compare."

Ruthy Bennett, Regional Energy Manager for Arlington and Bedford, MA

The Peirce School in Arlington, MA, used the Microsoft Azure cloud computing platform to host its fault detection and diagnostics (FDD) technology from ICONICS, building a system to monitor heating and cooling equipment. The system sped problem detection by 15 percent, reduced energy consumption, and cut outside contractor costs. It is now slated for a second school and helped pave the way for state funding for other FDD projects.

Monitoring energy usage
When Arlington Public Schools consolidated its summer-school operations into one building and purchased a new chiller for the facility, Ruthy Bennett worried about the potentially huge energy bill for the Peirce School.

As Regional Energy Manager for the towns of Arlington and Bedford, Bennett is charged with reducing town energy costs, and the Arlington school district's 11 buildings fall under her domain. Since she came on the job two years ago, Bennett has won thousands of dollars in state and federal grants for the town of Arlington, which was designated a Green Community by the state of Massachusetts in 2010.

Providing air conditioning for an entire school—not just the gym and the administrative offices—was a first for the district and the town. Cooling classrooms when summer temperatures climb into the 80s creates a more comfortable learning environment for students, educators, and staff. But the chiller was a major investment, and the town and the district both operate on tight budgets. They

hoped that consolidating operations would lower energy and operational costs. "Even though we have energy management systems in our buildings, they are really glorified schedulers," Bennett says. "It's hard to know what is working efficiently—and what is just working."

Maintaining the town's 40 buildings often requires guesswork. "Ninety-five percent of [energy management system] alarms are ignored because no one understands them or complains about the conditions," Bennett says. The equipment is maintained annually by a staff of six, which is augmented by a custodian at each school and an outside HVAC contractor.

FDD software reveals hidden problems
Bennett became interested in fault detection and diagnostics (FDD) technology after learning about the energy savings gained at Microsoft headquarters in Redmond, WA. The company's 2014 CityNext Partner of the Year, ICONICS, supplied the FDD software used on the Microsoft campus.

Bennett learned the Massachusetts Institute of Technology had developed similar FDD technology, but she chose to work with ICONICS and Microsoft because of the CityNext initiative, which helps build safer, smarter, healthier, and more modern cities.

In addition, "ICONICS technology was the most user-friendly, providing a dashboard with all the information on one screen," said Bennett, who does not have a mechanical engineer on staff. "I wouldn't have to call a third party, who would then write a report each month—and in the time it took to get the report, I could miss seeing a problem for a month."

Bennett and town officials piloted Facility AnalytiX, an FDD software solution from ICONICS, in conjunction with the Microsoft Azure cloud computing platform at the Peirce School in summer 2014. Based on advanced FDD technology, Facility AnalytiX

uses customizable fault rules to weigh the probability of equipment failure, and it alerts staff to actions they can take when faults occur. When equipment fails, the software analyzes current and historical information (along with symptom/cause relationships), executes probability algorithms, and provides a list of possible causes sorted by probability.

Microsoft Azure stores all the information generated by the FDD in the cloud, which allows the town of Arlington to access and store millions of data points across time, rather than the 72 hours of limited data available previously. "With Azure cloud services, we don't have to buy a server, and we can store three years of data," Bennett says. "That's important because in New England, winters can be very harsh. You really need three years of data to compare."

Without hardware to install, implementation didn't take long. ICONICS engineers exposed points on equipment with control boxes that could send information electronically to the cloud, then deployed the system on Azure.

Early detection prolongs chiller lifespan
As soon as the FDD system was turned on, it revealed the new chiller was cooling Peirce School within half a degree of perfection. This meant it was running constantly, confirming Bennett's fears. "We would have never known it was cycling every five minutes, especially at night, without fault detection," she says.

The chiller should have hit a specific temperature and cycled when the temperature rose 3 to 5 degrees, but that wasn't happening. Acting upon the FDD solution, Bennett reset the chiller's temperature bandwidth, assigning different comfort levels for occupied and unoccupied school times. "If we hadn't corrected that, it would have shortened the lifespan of the chiller by a third," says Bennett.

FDD speeds detection by 15 percent
The ability to see data reporting on equipment in Peirce School's 40 classrooms helped Bennett's team know exactly where to look for problems. Previously they had to poke around the buildings, lifting ceiling tiles and turning equipment off and on. Pinpointing problems cut 15 to 20 percent from the time the HVAC contractors spent searching for a malfunction.

"With the FDD system, it is really easy to look at one floor plan and know what the problems are. I'm not in the building, but I know what's happening," said Bennett, who admits to checking the system on weekends from her mobile phone.

Pilot reduces natural gas consumption
Bennett estimates that natural gas consumption at Peirce School is down roughly 20 percent, despite this year's colder-than-normal winter. She is so encouraged by the pilot that she's seeking state funding for FDD technology for another Arlington school—and later the district, town, and other cities in the state.

"Because of the success of Peirce, doors are now opening to allow others to apply for state-level funding for the same type of FDD solution," says Melissa Topp, Director of Global Marketing for ICONICS. "Ruthy has established the blueprint for smart cities and towns."

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