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September 2022

Plumbing Engineer



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Profile on Two-Term ASPE President Carol Johnson

Phoenix Convention Center Invests in New Hydronic Systems



The Phoenix Convention Center's now-retrofitted West Building boiler plant. Photo credit: Laars/Ken Epstein

For convention centers, LEED certification is a distinction setting them apart. The Phoenix building was granted LEED Silver status.

By Dru Bussiere and Chuck O'Donnel

In the 147 years since Phoenix was first settled through a land patent by President Ulysses S. Grant on a 320-acre site for the cost of \$550, a lot has happened. At the time, downtown lots at the dusty crossroads were selling for \$7 to \$11. Within a year after its settlement, there were 16 saloons, four dance halls and two banks.

Phoenix now boasts about 5 million people in its metro area and has become the most populous state capital in the country. The city also is the region's primary political, cultural, economic and transportation center.

Today, at the center of downtown Phoenix is its sprawling, ultramodern convention center. In 2008, the facility underwent a \$600 million expansion. The facility is continuously modernized and improved; it is now regarded as among the world's finest venues for large conventions.

The Mandate: LEED

Back in 2002, city managers, well aware of the potential for growth stemming from a premier convention center, began planning for a two-phase expansion. By 2008, they pushed to complete phase two. It was a smart thing to do, as Phoenix quickly attracted some of the largest conventions in the United States. Quickly into its "ready for business" status, it booked a convention for the National Rifle Association, an event that drew 63,000 delegates.

The convention center's expanded size — with three times the floor space of its puny predecessor, the Phoenix Civic Plaza — shifted the convention center's status in

2006 from the 67th largest U.S. convention facility into the top 10 currently. The facility now offers 1 million square feet of rentable space.

Following completion of the second phase, managers received approval from the U.S. Green Building Council, stating that the Convention Center had met LEED Silver standards as a fully sustainable facility. The decision was based in large part on energy efficiency, continuous indoor air quality, and water conservation (a very hot topic in Phoenix). In fact, the move toward LEED certification was one of the first mandates from the city when early planning meetings were held.

During phase one of the construction schedule, much of the major work was accomplished. It was also during this phase that most of the key, ultra-efficient mechanical and electrical systems were installed. This included photovoltaic (PV) solar panels that, for more than a decade since, have helped to supply power to the building at a rate of approximately 150,000 kWh annually. City officials admit the amount is a small fraction of what the building uses.

At the time, the 732-panel project was the biggest solar-panel installation on a downtown building, and it was the first time that PV technology was used in downtown Phoenix. By putting the sun's energy to work, the center's carbon-dioxide pollution was cut by 95 metric tons annually.

Heating in Phoenix?

Even in Phoenix, winter can take the thermometer into the 20s and 30s, though — on average — it gets less than

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During system commissioning, Dave Steel (left) of Universal Control Systems and Ray Harper, building equipment operator I at the Phoenix Convention Center, use a combustion analyzer to check control board function with close attention to the OmniTherm boiler's low water cutoff. Photo credit: Laars/Ken Epstein



a week of below-freezing temperatures a year. However, since the city's new convention center is now a hot winter destination for large groups of people, it must accommodate the need for heating.

Phoenix-based HACI Mechanical Contractors, a commercial and industrial mechanical contracting firm with more than 300 employees, was brought in to replace all the boilers installed in 2007. It also attended to piping and plumbing needs and some modifications to the venting to accommodate the new hydronic systems.

HACI crews installed 10 high-efficiency Laars OmniTherm boilers in the fall of 2021, notes Tim Byrd, project manager for HACI's service group. "We replaced two of the existing boilers initially in September, each with a 2,000 mbh boiler," he says. "Several weeks later, we replaced the other eight — all the same size — completing the job just before Thanksgiving."

OmniTherm boilers (or volume water heaters), manufactured in Rochester, N.H., by Laars Heating Systems Company, are also available as volume water heaters in six sizes from 1250 MBH to 3000 MBH with 7-to-1 turn-down. The systems can accept cold return water temperatures down to 85 F without the need for an external mix-

ing. The near-condensing heating systems — with thermal efficiencies up to 87.7% — include electronic air-to-fuel ratio control, long-life stainless steel heat exchangers, and the Laars Linc icon-driven control system that displays key performance measures, a quick start option, and USB input for parameter uploads.

The OmniTherm is ideally suited to meet the convention center's needs, says Sean Crombie, director of sales and operations for Mechanical Room Inc., the Phoenix-based manufacturers' rep firm that specified the boilers. "It can be installed in Category I, II, III or IV vent systems for new or replacement applications, is easily connected to building automation systems via BACnet, and offers many other valuable features," he explains.

Two Million BTUs Per Boiler

"With all 10 of the new boilers installed, we provided for a total heat load of 20 million BTUs," Crombie adds. "Even in a large convention center, space is at a premium. The new boilers, oriented vertically, fit perfectly in the space vacated by the earlier boilers, and their near-condensing operation meant they also would provide greater energy efficiency and fuel savings."

"The boilers are designed to operate predominantly in a noncondensing mode, although with their stainless-steel heat exchanger, they can handle lower return water temperatures. In instances when condensation happens, it takes place, by design, in the heat exchanger."

Enrique Yanez, the convention center's building equipment supervisor, says: "The new boilers feed hydronic warmth to terminal units via 58,000 lineal feet of carbon steel and copper piping. From the boilers, it's 800 feet to the South Hall, where the boilers are heating 143,000 square feet of space through air handlers, coils and variable air volume (VAV) systems. The other building, 300 feet from the West Hall where the boilers are, is the Phoenix Symphony Hall, where we provide 90,000 square feet of heated space."

It's in the convention center's West Hall, where the boilers are providing heat for 210,000 square feet through 22 air handlers, 178 VAV boxes and 81 fan-coil units, most of which require heating, although some carry only chilled water for use during the summer.

Dave Steele's firm, Universal Control Systems, is a subcontractor to HACI. Steele was brought in to solve problems that developed with the old controls system. "I quickly saw that the old sequencer had to be removed," he says. "I then re-wired and networked all the boilers, sequenced for lead-lag operation, five in a set."

He adds that the new boilers are prepped for BACnet if the convention center later decides to go that route. "I also added a secondary or redundant master so that if something would go wrong with a boiler, controls would automatically shift operation to others in the group," Steele explains. "The controls platform now provides 100% backup, too."

Minor Adjustments

A unique feature of HACI's updating and retrofit work to the large hydronic system was the need to make minor

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adjustments to a unique configuration of the multiple boiler's exhaust flue. "The earlier boilers were manifolded into two 8-inch exhaust headers, each with five boilers," Byrd says.

The next challenge was whether the team could easily reduce the venting to 7-inch flues to accommodate the OmniTherm boilers.

"The original design allowed exhaust to be carried through the roof in only two locations, minimizing the need for multiple penetrations," Crombie explains. "Fortunately, after careful calculations and extensive testing at Laars, we found that the venting — with minor adjustments — worked well. It points to the versa-

tility of the boilers and substantially reduced installation cost."

Byrd adds: "Staying with the lead-lag boiler arrangement, we arranged the new OmniTherms in a similar fashion, so each boiler runs for a set number of hours before it cycles off as another system comes onboard to meet the need. This way, we've set equal run time for all the boilers."

When demand requires multiple boilers, the convention center's OmniTherm boilers activate one at a time until heat needs are met.


"We haven't yet seen a situation where all the new boilers were on at the same time, though it's possible," he says. "In most instances, four to six boilers operate simultaneously to meet winter heat needs. Yet, with 10 boilers, all the systems get run time. And we've secured the redundancy the convention center needs for the assurance of no downtime, ever."

Crombie adds: "The new boilers availed an upgrade to higher operational efficiency without the need to accommodate fully-condensing systems that would've involved completely different venting, new piping and support equipment. ... Another key need was the units we selected would need a small footprint; the boiler's compact size allowed us to install 10 units in a space big enough for a few three-pass boilers — if we could have gotten them in there."

For convention centers, LEED certification is a distinction setting them apart. To date, only three existing venues in the United States are LEED-certified: the David L. Lawrence Convention Center in Pittsburgh; the Oregon Convention Center in Portland, Ore.; and the Spokane Convention Center in Spokane, Wash. ●


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