

# BUILDING POWER

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ENERGY SOLUTIONS FOR COMMERCIAL BUILDINGS

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*Going Green with  
Smart HVAC*  
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*Phoenix' new LEED Silver convention center makes use of smart HVAC equipment to keep energy costs down.*

# Going Green in The Desert With Smart HVAC

Copper Square in downtown Phoenix showcases the city's historic sites and recent revitalization. The city is the most populous state capital in the U.S. and the region's primary political, cultural, economic, and transportation center.

The 24-acre Phoenix Convention Center is in the center of it all. Now in the midst of a \$600 million expansion—and surrounded by restaurants, premier hotels, retail shops, museums, and a sports arena—the facility is soon to be a prime venue for large conventions.

City managers, well aware of the potential for growth stemming from a premier convention center, began planning for the three-phase expansion several years ago. Currently in phase two, the center is now open for convention business and will be nearing completion by January 2009. At that time all key facilities will be operable. Within a few months, the facility will be able to offer nearly 900,000 sq. ft. of rentable space and more than 2 million total sq. ft. By 2013, convention center managers estimate the annual number of trade show visitors will reach 375,000.

## LEED mandate

The Convention Center has been certified LEED Silver, based on use of renewable materials, energy efficiency, continuous IAQ, water conservation (a very hot topic in Phoenix), recycling programs, and the use of earth-friendly chemicals for cleaning and maintenance.

*Phoenix Convention Center benefits from high-efficiency gas boilers.*

• John Vastyan, Common Ground •





“I think it will definitely be an added incentive to many groups that the facility is a green building,” said Douglas MacKenzie, spokesman for the Greater Phoenix Convention & Visitors Bureau.

In fact, the move toward LEED certification was one of the first mandates from the City of Phoenix when early planning meetings were held. Green Ideas, Phoenix, an environmental building consultant group, and a variety of other LEED-certified professionals were commissioned to assist with compliance.

Ultra-efficient mechanical and electrical systems were installed during phase one of the construction schedule, including photovoltaic solar panel technology and a bank of high-efficiency gas boilers supplied by Laars Heating Systems Co., Rochester, NH.

Crews from Phoenix-based Code Electric installed peel-and-stick solar panels on roughly a third of the West Building’s two-acre roof. The panels help supply power to the building at an anticipated rate of 150,000 kWh annually, though city officials admit that the amount is a small fraction of what the building will use.

The \$850,000, 732-panel project is the largest solar-panel installation on a downtown building, and is the first time this type of solar-energy technology has been used in downtown Phoenix. It is estimated that the center’s carbon-dioxide pollution will be cut by 95 metric tons each year.

According to Lexie Van Haren, director of communications for the Convention Center, the mechanical equipment specified for the facility is the key ingredient to achieving energy efficiency. “An energy-management system tracks and optimizes energy consumption levels, further reducing heating and cooling costs,” Van Haren said.

## Heating in Phoenix?

Even in Phoenix, winter temperatures can fall into the 20s and 30s, though, on average, the area gets less than a week of below-freezing temperatures a year. However, since the city’s new convention center will become a hot winter destination for large groups of people, planners needed to accommodate the heating requirement.

Mechanical contracting firm Imcor Inc., Phoenix, performed all of the key phase one and two plumbing, piping, HVAC, and hydronic installations. During the phase one work, crews installed 10 high-efficiency Rheos+ boilers by Laars, a subsidiary of Bradford White Corp., Ambler, PA. Each boiler is two million BTUs in size, for a total heat load of 20 million BTUs.

“The boilers feed 58,000 lineal feet of carbon

steel and copper heating water piping,” explained Dan Brown, Imcor’s project manager for the firm’s phase one and two work. “From the boilers, it’s 800 feet to the newly renovated South Hall where the boilers are heating 145,000 square feet of space through air handlers, coils, and variable air volume systems (VAVs). The other building, 300 feet from the West Hall where the boilers are, is the Phoenix Symphony Hall where we provide for 90,000 square feet of heated space.”

Located in the convention center’s West Hall, the boilers provide heat for 210,000 sq. ft. through 22 air handlers, 178 VAV boxes, and 81 fan coil units. Most require heating, though some carry only chilled water for use during the summer.

A unique aspect of Imcor’s installation is the way the contractor configured the multiple boilers’

center needs for the assurance of no downtime, ever.”

In the West Hall’s mezzanine level is the mechanical room, where the boilers are lined up on two sides like soldiers in formation. A bevy of TP 80-160/2 pumps from Grundfos Pumps Corp., Olathe, KS, circulate the heated water in many different directions.

The boilers are said to be perfectly suited for the job because their controls monitor the demand for hot water and automatically adjust each boiler’s capacity to meet the required heating load, from 1.2 million to 2 million BTUs, with variability of modulation between 100% and 25% of the input rate.

These are reportedly among the greenest heating systems in the marketplace, with NOx levels of less than 10 ppm and low CO greenhouse gas emissions. The systems offer as much as 96% efficiency, according to the contractor and supplier.

“Another key need was that the units we selected would need to have a small footprint; the boiler’s compact size allowed us to install 10 units in a space where only a couple three-pass boilers could’ve been installed, if we could have gotten them in there,” said Brown. “These boilers will pass through a standard 36-inch doorway and can be transported on any service elevator. The high-efficiency boilers have also reduced the amount of natural gas required to heat the domestic water, lowering energy consumption and operating cost.”

“We particularly like the Grundfos circulators because of their reliable, wet rotor design,” he added. “They’re cooled by the liquid they circulate.”

The new space joins only three existing convention centers with LEED certification: the David L. Lawrence Convention Center in Pittsburgh; the Oregon Convention Center in Portland, OR; and the Spokane Convention Center in Spokane, WA. **BP**



**Multiple boilers monitor demand and adjust capacity accordingly. Efficiency is currently at 96%.**

exhaust flue. “We manifolded all of the boilers with two exhaust headers, each with five boilers, all of them connected to a computerized draft control system. This allowed us to carry exhaust through the roof in just two locations, discharging into VFD [variable frequency driven] chimney fans, minimizing the need for multiple penetrations,” added Brown.

“And, with our series lead-lag boiler arrangement, we set up the system so that each boiler runs for a set number of hours before it cycles off as another system comes on board to meet the need,” continued Brown. “This way, we’ve set equal run time for all of the boilers.”

“When demand requires multiple boilers, they activate one at a time until heat needs are met,” said Brown. “We haven’t yet seen a situation where all boilers were on at the same time, though it’s possible. In most instances, just a few of the systems—somewhere between four and six—are operating simultaneously. But that’s just as we knew it would be. This way, all boilers get run time, and we’ve secured the redundancy the convention

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