

**Addressing Growth's  
Changing Challenges**  
By Ron Smith 10

**Fire Up Sales With  
Compensation**  
By Jackie Rainwater 14

**Non-Competitive  
Agreements**  
By Mike Coyne 17

**Prepare For  
Slow Times Now**  
By Ruth King 18

**Set Your Sites  
On High-End Sales**  
By Tom Piscitelli 24

**Web Site Blunders  
To Avoid**  
By Guy Kawasaki 26

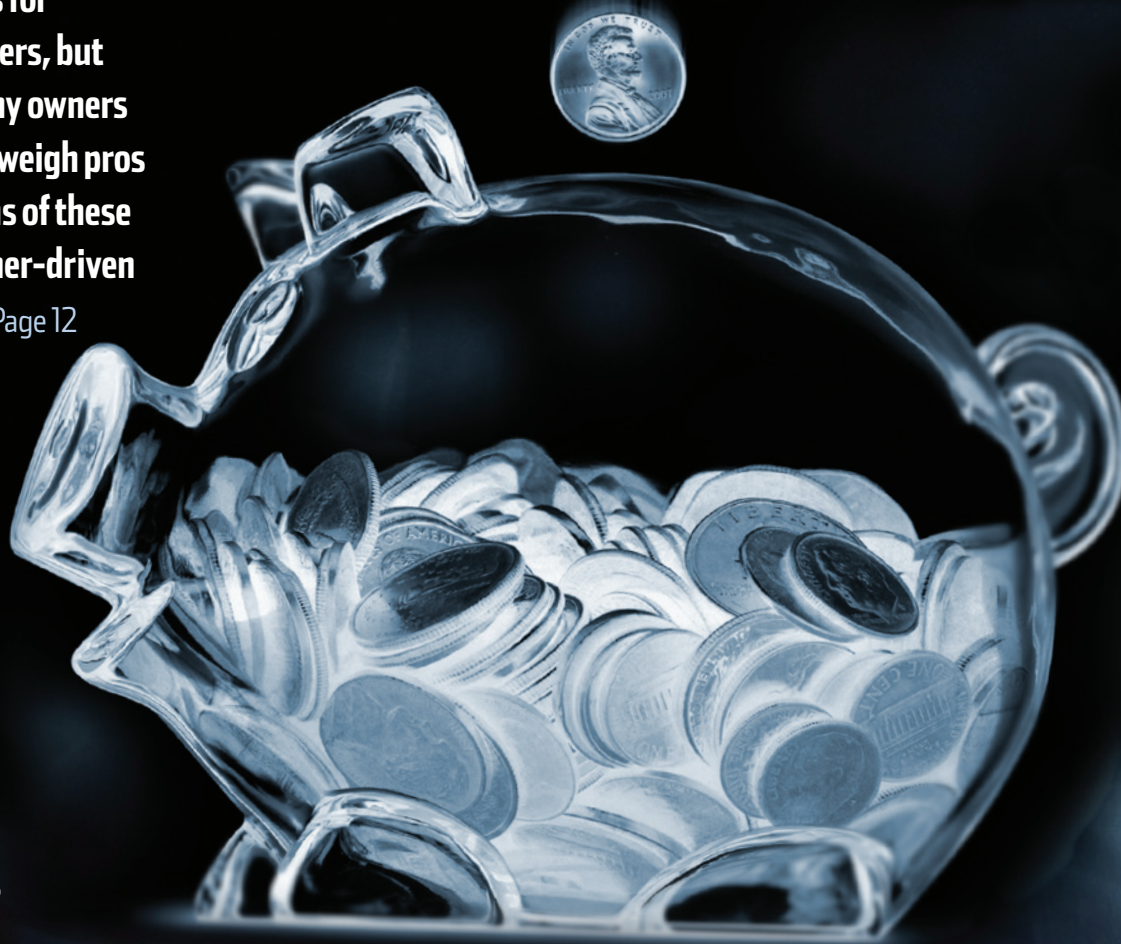
# HVACRBUSINESS<sup>®</sup>

THE HVACR MANAGEMENT MAGAZINE

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## Health Savings Accounts

**HSA's can mean  
savings for  
employers, but  
company owners  
should weigh pros  
and cons of these  
consumer-driven  
plans.** Page 12



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### ALSO INSIDE:

**Marketing to Hispanics,** Page 16

**How to LEED The Way,** Page 20

**20 Questions With Don Strang III,** Page 32

# Keep LEEDing the Way

How hvac/mechanical contractors can make green by going green – Part II.

BY **ELLIS G. GUILLES JR.**

Director of sales and marketing, TAG Mechanical Systems Inc., Syracuse, N.Y.

*This is the second of a two-part series on Leadership in Energy and Environmental Design (LEED). The first article, which ran in the June issue, is available at [www.hvacrbusiness.com](http://www.hvacrbusiness.com)*

In the last article, we reviewed why the LEED (Leadership in Energy and Environmental Design) process is important to hvac/mechanical contractors, provided a quick overview of the commissioning process, and briefly discussed how commissioning could prove to be a profitable service for hvac/mechanical contractors to offer. (Architects and engineers already offer LEED commissioning, which our customers want to ensure buildings are not making occupants sick or uncomfortable, which hinders job performance. Customers also want energy efficiency and environmental responsibility from building-related service providers.) Hopefully, some of you have started to investigate commissioning and are figuring out how best to integrate it into your current business.

Let's continue looking at the LEED process and the areas where hvac/mechanical contractors can create value for their customers and communities and profit for themselves. Within the Energy and Atmosphere category of the LEED rating system, there are two other prerequisites beyond commissioning. These are refrigerant management and minimum energy performance. The LEED rating system gives "points" for performance in these areas.

## REFRIGERANT MANAGEMENT

For new buildings, LEED processes require zero use of CFC-based refrigerants. This means hvac equipment using HCFC-22 (R-22, Freon) cannot be used. In existing buildings, contractors must have a plan for phasing out CFC usage in the building prior to completion of the project. Fortunately, most of the major hvac equipment manufacturers now sell equipment that does not use CFC-based refrigerants, so it's not difficult to meet this requirement.

For packaged equipment up to 20 tons, most manufacturers use R-410a as the refrigerant. R-410a is a chlorine-free refrigerant with an ozone-depletion potential of zero. However, it does have a global-warming contribution of 1,890. Other non-CFC based refrigerants (used in packaged rooftop units, water-source heat pumps, water- and air-cooled chillers, and split systems) are R-134a, R-407c, and R-417a. The Montreal Protocol places no restrictions on the use of any of these refrigerants.

Because R-22 (HCFC-22) can still be used under the Montreal Protocol, the majority of packaged equipment still is being produced using R-22. However, as I mentioned above, if packaged equipment is being considered for a building, it is possible to obtain products that do not use CFC-based refrigerants. These products cost slightly more; however, they typically are more efficient than their R-22 counterparts and have reasonable payback time periods.

## ENERGY PERFORMANCE

The largest number of points available within the LEED rating system typically is obtained from the Optimized Energy Performance area. Up to 10 points can be earned based on energy reduction as compared with a baseline building as described in ASHRAE 90.1 Appendix G. (This must include all energy used within the building.)

Developing this analysis can be time consuming, and a licensed professional usually performs it using a variety of energy-analysis programs. DOE 2, BLAST, Trane Trace, Carrier Hourly Analysis Program, or other energy-modeling software can be used, provided it is capable of producing an hour-by-hour analysis for the 8,760 hours available to the building for a single year.

You should become familiar with at least one of these modeling tools. Many professional engineers, just like contractors, have taken to using "rules of thumb" when determining heat loss and gains for a building, simply because it's the fastest, easiest way to get the job done. But by actually calculating heat losses and gains, we often can show owners how to reduce costs by using different equipment and associated distribution systems, which often do not need to be as large as designed.

For buildings 20,000 square feet and smaller with a primary occupancy of "office," LEED provides a way to receive four points. To obtain these points, we must comply with the measures outlined by the ASHRAE Advanced Energy Design Guide for Small Buildings – 2004. For many hvac/mechanical contractors, such buildings are the bread-and-butter of our businesses because we maintain and build them. Become familiar with this guide, and then educate your customers on the benefits of implementing the strategies it recommends. We can help lower customers' operating expenses and improve their indoor environments by implementing these strategies.

More points are available and can represent potential revenue and profit opportunity for hvac/mechanical contractors under the Indoor Environmental Quality section.

**Air quality:** One point is available for monitoring the level of outdoor air delivered to the building. Another point is available if breathing-zone outdoor-air ventilation rates are 30% or more than recommended by ASHRAE 62. This is challenging because

we need to determine the impact on the energy used within the building as we increase the ventilation rates. Obtaining this point could result in lower energy reduction than we might have anticipated.

Developing and implementing during-construction and pre-occupancy Indoor Air Quality (IAQ) management plans can earn an additional two points. These plans can provide a methodology for "flushing" the building prior to occupancy, which will be good for the future occupants as the level of volatile organic compounds (VOCs) can be reduced substantially.

**Controllability:** By increasing the controllability of the system (provide individual comfort controls for 50% or greater of the occupants), one point can be obtained. Hopefully, if we did our job correctly, and developed heat-loss and -gain calculations for the buildings, we used ASHRAE 55 guidelines for thermal comfort. By demonstrating that we followed ASHRAE 55, an additional point can be obtained. There are other points available within this area, but perhaps the one I like the best is a result of monitoring the thermal comfort of the occupants.

**Thermal comfort:** A point can be earned for monitoring the thermal comfort of the occupants for six to 18 months after formal occupancy of the building has taken place. This is accomplished by performing a survey of the occupants. If more than 20% of the respondents are dissatisfied, then an action plan must be developed and implemented to correct the discomfort. This survey also provides a good marketing tool: What better way to brag about our hvac systems than to be able to say we made people comfortable, and we know it because we asked!

We've covered a lot of ground in two short articles.

I hope you've found them to be useful and will begin to explore the LEED process and how you, as a professional hvac/mechanical contractor, can use it to improve your business and make our world a better place for our families, friends, and future generations. ■

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*Ellis G. Guiles Jr.'s certifications include P.E. MBA, HERS Rater, and BPI Certified Professional (building analysis, envelope, heating, A/C and heat pump).*

## What is LEED?

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System is the nationally accepted benchmark for the design, construction, and operation of high-performance green buildings. LEED promotes a whole-building approach to sustainability by recognizing performance in five key areas of human and environmental health: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality.

Source: U.S. Green Building Council, [www.usgbc.org](http://www.usgbc.org)

# LEED The Way

How hvac/mechanical contractors can make green by going green.

BY **ELLIS G. GUILLES JR.**

Director of sales and marketing, TAG Mechanical Systems Inc., Syracuse, N.Y.

**L**eadership in Energy and Environmental Design (LEED) is the building-rating system conceived and introduced by the U.S. Green Building Council (USGBC) in 1999. LEED uses a holistic system to quantify and measure the performance of a building as it relates to five key areas: sustainable site development, water savings, energy efficiency, materials selection, and indoor environmental quality. USGBC chose these areas because they provide a way for us to obtain a broad perspective of how a building will affect our communities — from how it affects the humans occupying it to how it affects the environment in which it is constructed and occupied.

Why should we, as hvac/mechanical contractors, care about the LEED approach to construction? First, because we are the professionals responsible for installing, commissioning, maintaining, and sometimes designing systems for two of the five LEED areas (energy and atmosphere; and indoor environmental quality) within buildings. Second, professional consulting service providers, such as architects and engineers, are already offering these services to our customers. It is time, for us as hvac/mechanical contractors, to become familiar with the LEED process, with commissioning requirements, and if necessary, become accredited LEED professionals and certified commissioning authorities. If we don't, we'll find our customers being served by other firms in this area.

## IMPACT ON OUR COMMUNITIES

The buildings we construct and op-

erate consume 30% of the total energy (electricity and fossil fuels) as well as 60% of the generated electricity in the United States. They consume 5 billion gallons, annually, of potable water simply to flush toilets. They also create 2.5 pounds of solid waste per square foot. It's not hard to see why it's important that we take a broader view of the buildings we construct and their impact on our communities.

Research has shown buildings constructed using the LEED approach create environments that result in lower absenteeism, improved work quality, up to a 16% increase in employee productivity, less solid waste, and improved local economies; and are healthier places to work and live. How different would the development and construction process be if building owners and managers understood the "total" impact of their decisions when constructing and operating their facilities? Would they be willing to spend slightly more if they knew of the above benefits? Lower absenteeism, improved work quality, and increased employee productivity are goals every company would like to achieve. Now it's possible simply by employing the LEED process.

The LEED system uses a points-based process to determine the level of success the building will and has achieved during its construction or renovation process. The largest number of points can be achieved via the energy and atmosphere category. This is where hvac contractors can and should have the largest impact.

Each of the five areas of the LEED rating system have prerequisites that must be met prior to earning any additional points. For energy and atmosphere, these prerequisites are commissioning,

**"It is time, for us as hvac/mechanical contractors, to become familiar with the LEED process, with commissioning requirements, and if necessary become accredited LEED professionals and certified commissioning authorities. If we don't, we'll find our customers being served by other firms in this area."**

minimum energy performance, and refrigerant management.

In order to meet the prerequisites, a commissioning authority must be part of the design/construction team and an independent third party, except for buildings with less than 50,000 square feet. The authority must commission energy-related systems including hvac and associated controls; lighting and associated controls; domestic hot water; and renewable energy systems. Research

has shown the median cost to commission an existing building is 27 cents per square foot with average energy savings of 15% and paybacks of 8.5 months. For new construction commissioning, cost typically is 0.6% of total construction costs (about \$1 per square foot) of the project with a payback of 4.8 years.

## THE CASE FOR COMMISSIONING

A study by the Lawrence Berkley National Laboratory found an average of 11 deficiencies per building for existing buildings and 28 deficiencies per buildings for newly constructed buildings; and the majority of the deficiencies were directly related to the hvac systems. The majority of these were directly associated with the air-distribution system. In the buildings studied, corrective measures were focused on building operation and control systems.

Buildings with less than 50,000 square feet represent the majority of buildings in the United States and therefore don't require a commissioning authority to be an independent third party within the LEED process. This provides a unique opportunity for the hvac/mechanical contractor to bring substantial value to the design/construction team and profitability to their business.

Consider an existing 20,000-square-foot building with rooftop equipment for its hvac system; where the building owners also operate a business employing 100 people earning an average salary of \$45,000 and with operating expenses of \$2 per square foot annually. The business is experiencing absenteeism rates of 3% of total annual employee salaries.

The hvac contractor proposes to the

*This is the first of a two-part series on Leadership in Energy and Environmental Design (LEED). The second part will appear in the July issue.*

# GOING GREEN

building owners that they should retro-commission their building for a cost of \$6,000 (30 cents per square foot). During retro-commissioning, the hvac contractor finds the rooftop equipment is delivering 70% of the design airflow

(total and outdoor) to the spaces. As part of the retro-commissioning, the system is rebalanced to meet the original design intent for total and outdoor air.

After six months, the owners discover that the absenteeism rate has dropped to

1.5% of total hours annually, and operating expenses have been reduced by 15%. Cutting the absenteeism rate by 50% represents \$67,500. This alone would be a great reason for a company owner to decide to retro-commission its build-

ing. A 15% drop in operating expenses, represents \$6,000, a one-year payback on the cost to retro-commission the building.

With this simple commissioning example, it's easy to see how an hvac/mechanical contractor can provide valuable, professional services in the area of commissioning. We are the professionals with the most intimate and in-depth knowledge of these systems. We are the ones who install them, in some cases design them, and in many instances maintain them. We simply need to begin to educate our building owners/managers, who are our customers, about the advantages of commissioning or retro-commissioning their buildings. We shouldn't let the architects and engineers become the dominant players in this market area. While these professionals are necessary team members, ultimately it is our responsibility to ensure the hvac and indoor environmental systems are properly installed, operated, and maintained. We not only design and install these systems, but we turn the wrenches and other tools that ensure these systems are maintained and operated properly. If we don't step in to fill the need for commissioning services, we'll find our customers being served by other firms, and once again we'll simply be the hands that turn the wrenches or change the filters. ■

*Next month's article will review other areas within the LEED process. Ellis G. Guiles Jr.'s certifications include P.E., M.B.A., HERS Rater, and BPI Certified (Shell, Heating, AC/Heat Pump).*

Fresh [ a i r ] ideas for green buildings.



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## Heck, we were green before green was cool.

For decades, Greenheck has focused on the environmental side of the building industry—developing reliable, energy-efficient products and systems to promote occupants' health and comfort. As one of the first manufacturers of air moving and control equipment to join the U.S. Green Building Council, Greenheck is ready to provide products that support sustainable design projects based on LEED certification guidelines. We help engineers, architects, contractors and owners succeed in their green initiatives, or any project. Going green? Go Greenheck—visit our Web site or contact our representative nearest you.

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