

HVAC & LEED

What sheet metal contractors need to know about the environmental-building program

By Jerry Yudelson

What do HVAC and sheet metal contractors need to know about LEED "green" building projects?

LEED, which stands for Leadership in Energy and Environmental Design, is a "sustainable" design-rating system developed in March 2000 by the nonprofit U.S. Green Building Council.

Used on more than 3,000 building projects since then, representing more than 400 million square feet of space, it has become the primary rating system used by commercial, institutional and high-rise residential projects with environmental-building goals.

Figure 1 shows the growth of LEED-registered and certified projects since its inception in 2000. In 2005, more than 1,000 projects were registered with LEED for the first time, and more than 150 were certified, also for the first time. Cumulative LEED registrations grew more than 50 percent in 2005 and are predicted to grow more than 25 percent a year through 2010.

Mechanical contractors have a key role to play in implementing high-performance building designs, especially in two key issues tackled by most LEED projects: energy efficiency and improved indoor air quality. Points are awarded in 32 separate categories dealing with design, construction and operations. About 12 of them deal with issues encountered by mechanical contractors.

LEED for New Construction, the standard sheet metal and HVAC contractors are most likely to encounter, is a point-based system that focuses on five areas: sustainable site design, water and energy efficiency, renewable energy, materials and resource conservation, and indoor environmental quality.

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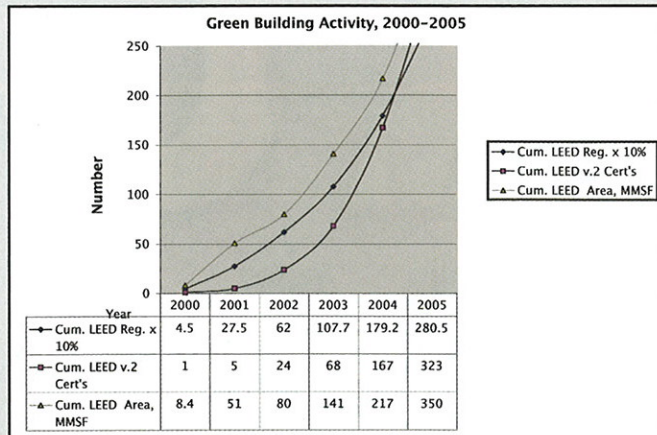


Figure 1. This graph shows the growth of LEED-registered and certified projects since 2000. Certifications are expected to grow more than 25 percent annually through 2010. Graph courtesy of Jerry Yudelson.

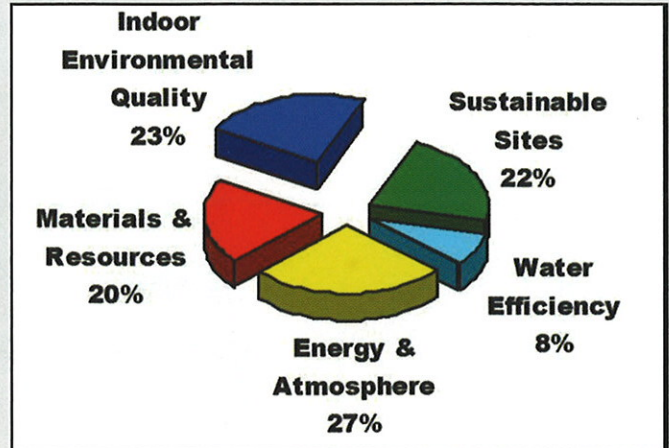


Figure 2. This chart shows the importance given to LEED's five basic categories in determining certifications. Chart courtesy of Jerry Yudelson.

Categories

Figure 2 shows the relative weighting of the five basic categories.

The LEED rating system provides for four project-certification levels: certified (basic), silver, gold and platinum.

More than 350 projects of all types have been certified by the U.S. Green Building Council since the end of 2000. Silver, gold and platinum projects now represent almost 60 percent of all certifications, placing demands on contractors to perform their roles in the process.

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What types of HVAC systems are typically found in LEED projects? Most higher-level LEED projects aim for 35 percent or better energy efficiency, measured against the American Society of Heating, Refrigerating and Air-Conditioning Engineers' standard. This means they will typically be using economizer cycles, variable-air-volume systems, carbon dioxide monitors, occupancy sensors, higher-efficiency cooling

systems, high-efficiency condensing boilers, variable-speed drives or variable-frequency drives in most systems, and all the usual HVAC systems contractors may already have seen.

New technologies

However, new technologies are rapidly being introduced into green building projects as a way to meet higher LEED goals, such as silver or gold. These new technologies include:

- Displacement ventilation, including under-floor air distribution systems, using in-floor air diffusers, as well as "waterfall effect" air inlets along the walls.
- Chilled beams for radiant cooling, involving radiator-type fins with a central tube that provide cooling for far less energy penalty than moving air.
- Radiant heating and cooling products that use radiant tubing in the floors.
- Solar water and space heating systems that need to be integrated with more conventional water and space-heating approaches.
- Ground-source heat pumps for heating and cooling.
- Geothermal energy (where available) for direct radiant cooling.
- Operable windows tied into specific heating and cooling zones that require special controls.
- Thermal-energy storage systems, which use power at night to make ice or chilled water, which is then used for peak-period cooling.
- Natural ventilation systems, typically with some fan-assisted ventilation air movement.
- Higher levels of air filtration, including use of filters with a minimum efficiency reporting value of 13 in all

LEED

LEED projects.

- On-site power systems, involving co-generation and micro-turbines.

Many of these solutions try to separate ventilation air from heating or cooling air, to take advantage of the energy savings from downsizing fans. They all require new approaches to control systems and may involve products contractors are unaccustomed to using.

Integrating designs

A major trend in high-performance buildings involves the use of “integrated” design, in which the mechanical and electrical engineers, along with other consultants, are involved in all key design decisions. This contrasts with the conventional approach where the architect designs the building and then hands it over to the engineers to “make it work.”

Typically, making it work involves specifying large HVAC equipment, with lots of safety factors, to ensure that indoor temperatures are held constant no matter what the weather. The trend toward sustainable design will change that approach increasingly over the next five years.

To stay on top of these changes, HVAC and sheet metal contractors should consider:

- ✓ Making a commitment to sustainable design and to learning the new ways architects and engineers are working to reduce energy use, provide for on-site power and hot water/steam production and improve indoor air quality in building projects.

- ✓ Ensure your designers take the LEED exam and become accredited; this will give you credibility with architects and general contractors.

- ✓ Read the relevant trade magazines to stay on top of emerging options for space heating and cooling, ventilation, indoor air quality and other issues.

- ✓ Designate a “green team” to help the rest of the firm learn, with specific responsibilities for training and project contributions.

- ✓ Consider “greening” your own operations. Focus on energy efficiency, encouraging employees to use mass transit where available, reducing paper use and recycling.

- ✓ Tell clients about your environmental activities.

Fact and fiction

Because some contractors have been slow in learning about the LEED system, there may be misunderstandings about what it does and does not require you to do.

LEED does not require you to source materials from within 500 miles. HVAC and related equipment is specif-



Sweden-based hygiene company SCA's U.S. headquarters was recently awarded a “gold” certification for its building interior. Image courtesy of SCA Americas.

ically excluded from the calculation of the materials and resources credits for locally sourced materials, recycled-content materials and salvaged materials.

For one of the construction indoor air quality credits, LEED's most recent new-construction standards do require a two-week building flush out prior to occupancy, essentially at 100 percent outside air or else a building air-quality test prior to occupancy.

For another construction IAQ credit, LEED requires a “construction indoor air quality management plan,” with contractors expected to use the “best practices” standard in Chapter 3 of *IAQ Guidelines for Occupied Buildings Under Construction*, published by the Sheet Metal and Air-Conditioning Contractors' National Association.

LEED does require you to stop using chlorofluorocarbon refrigerants in renovation projects, but this is a standard practice nowadays.

In the current version of LEED, an energy-efficiency credit does allow for the use of hydrofluorocarbon refrigerants in a very specific format that blends “ozone-depletion potential” with “global-warming potential,” so that R-22, R-123, R-134A, R-245FA, R-407C and R-410A are all acceptable under certain conditions; be sure to check with the specifiers and equipment vendors to find out which refrigerants they are using if they plan to claim this particular LEED credit.

LEED does require building commissioning for all projects; be prepared to include assistance to the commissioning authority in your bids, as you may be required to fix HVAC and control systems on site before leaving the job.

The credit for indoor chemical and pollutant-source control has specific requirements for negative pressure in all rooms with chemical mixing and production (large copy centers, labs, etc.) and requires MERV-13 filters for both return and outside air delivered as supply air.

LEED provides HVAC and sheet metal contractors with unique costs and benefits. Make sure your firm is positioned to prosper in the new era of energy-efficient buildings, and pay attention to specifications and design intent for the many new systems that are coming into play.

The era of designers simply specifying overly large HVAC systems with standard ductwork and air-distribution systems is ending. Contractors who do their homework and are flexible to accommodate new design thinking will prosper; others who are inflexible and uneducated about sustainable design may fall by the wayside.

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