When I was asked to write this article, I was at a factory class on chillers. During that week, I heard many comments concerning LEED initiatives—some people did not like it, while others thought it was necessary. There were also many who asked “what is LEED?”

LEED, or Leadership in Energy and Environmental Design, was developed by the U.S. Green Building Council as a means to help save natural resources while also providing a better home and working environment and lowering costs. LEED is a voluntary program but certain jurisdictions have made it mandatory. The General Service Administration, which finds office space for government agencies, has embraced the LEED program, and LEED-certified buildings are now a requirement when leasing space to the federal government. The county in Washington, D.C. where I live has made it mandatory that any new office building be LEED-certified, so even though it is not mandatory, it is market-driven. Despite personal opinions about LEED, many in the industry can agree that we have been wasteful in the past and need to do something about it.

In my professional opinion, many LEED parameters are just good common-sense practices. For example, the image on pg. 17 shows a variable-frequency drive from a LEED Platinum building, which these were installed on all the various motors in order to lower energy costs. The average return on investment is three years. LEED has various categories that a building can be rated: Certified, Silver, Gold or Platinum. This rating system is available for different types of projects, including: building design and construction; interior design and construction; building operations and maintenance; neighborhood development; and homes. Each type of building is given a scorecard and points are awarded for energy-saving installations/practices, such as: using low-flow fixtures for sinks and toilets, using higher-efficiency HVAC units, or installing bicycle racks to encourage less automobile use. All of the point items cannot be included in this article, however, complete can be found at www.usgbc.org.

Individuals may also obtain various LEED designations. The process starts with an exam the individual must pass in order to become a LEED Green Associate. This 100-question multiple-choice test asks general questions to determine overall knowledge. Although no experience is required, this is not an easy exam. Once an individual passes this test, they may then go for a LEED Accredited Professional designation. To achieve this credential, a more detailed exam on the rating systems of new buildings, schools, and operation and maintenance is given. This is also a 100-question exam and, again, it is not easy. I recommend taking a preparatory seminar or class before sitting for either exam. I have been teaching a LEED preparatory class for the past five years on these subjects at the National Association of Power Engineers. I have found that even though someone might have a very strong understanding of HVAC mechanics they also need...
to understand things like site selection, recycling and water along with LEED criteria. Preparation is the key to success when taking these exams.

**Energy and atmosphere**

How do LEED designations affect HVAC personnel? In many cases, companies are requiring their employees to obtain at least one of the designations listed above to show their clients that they are keeping current with the ever-changing market. LEED has opened the door for the HVAC industry to enter into a very profitable arena. The areas of LEED designations that most affect building engineers and service technicians include: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Environmental Quality. There is also a section called Regional Priority that allows projects to earn points for specific issues that are in a certain geographic area.

The remainder of this article will focus on energy and atmosphere. Keep in mind though that the HVAC personnel will be involved in some areas from the other categories. One example of this could be in the water-efficiency area, which talks about cooling-tower water use. The intent is to conserve water while also controlling corrosion and scale in the condenser. Water has always been cheap but that has been changing and the price is now starting to increase.

Remember, building owners are not just paying for water on the bill, but also the sewer, so it is important to check out the locality to see if they offer sewer credits. These could be attained if the evaporated water from the cooling tower is not directed to go down the drain (however when you energize your bleed cycle based on cycles of concentration, it does go down the drain). Could condensate from an air-conditioning unit or water from sink drains be used to provide the tower make-up water?
Indoor Environmental Quality talks about Minimum Efficiency Reporting Value (MERV) filters and using CO₂ sensors. All of this adds up to a lot of very different systems the technician must understand. I will take a minute here and talk about MERV filters. The range is from 1 to 20 and was started by ASHRAE 52. The higher the filter’s MERV number, the more efficient it is, and a LEED designation target is 13. However, before just changing out a lower MERV filter for a higher one to attain the points, building operators need to look at the change in pressure drop and if the air-handling unit can produce the cfm and fpm required under these new conditions. Many times I have been called in because someone put it in higher MERV filter and the motor burned up or caused other air-flow issues.

Most of the time, the equipment for a new building has been chosen by the architect or the mechanical engineer, so I will concentrate on the operation and maintenance of existing buildings. Energy and Atmosphere looks at improving building operations by energy reduction, efficient design and using renewable energy. Many new stringent standards and codes are all part of this, such as ASHRAE 90.1 and ASHRAE 189. The image above shows a green roof on a building. This design was used to lower the equipment cooling size, which lowers electric use. Caution needs to be used as various issues, such as structural integrity, need to be addressed. In some cases, achieving a point in one category might hurt getting one in another category so communication is key.

Existing buildings

Another topic that is getting a lot of attention is net-zero buildings, which are buildings that can create as much (or more) energy than they use. This mandate is being led by the federal government, but is likely to impact the private sector as well.

There are four prerequisites to attain Energy and Atmosphere LEED points for existing-buildings:

- Energy-efficiency best-management practices;
- Minimum energy performance;
- Building-level energy metering; and
- Fundamental refrigerant management.

The first three, as their name implies, deal with controlling energy use and monitoring it. They also deal with performing an energy audit and setting a baseline. Energy Star is also included in the prerequisites. The intent of the last prerequisite, fundamental refrigerant management, is to reduce ozone depletion potential. I feel most HVACR professionals have been working on that for years by using refrigerants such as R-410A, R-134A and R-407C for comfort-cooling needs. There are exceptions to this, as it is not economically feasible to replace or retrofit the system, and it often takes more than 10 years for payback to occur. This is yet another area HVAC professionals can show their LEED knowledge and make a sale happen.

There are eight credits to this section for existing buildings. We will discuss commissioning, renewable energy and carbon offsets, and enhanced refrigerant management. I am often asked by an owner why commissioning is necessary; after all, the contractor was supposed to have installed systems per the manufacturer’s instructions. However, after years of people turning knobs, machines no longer work at their maximum efficiency.

The goal for commissioning is to improve building operations and energy use and to resource and develop an implementation plan that will look at low (or no) cost measures, and long-term projects and ROI projections for the owner. It is also used to train the in-house staff on the proper way to run the equipment. I often find equipment not working properly because the staff was not well trained. There have
been times when the commissioning took place during weather conditions that prohibited a piece of equipment from being run, such as trying to commission a chiller on a 20°F day.

The renewable energy and carbon offsets section can be found in the “Operations and Maintenance Reference Guide.” The intent of this section is to encourage the reduction of greenhouse gas emissions. With a new commercial building, items like solar panels for hot water, photovoltaic and wind turbines can be designed right from the start. Examples would be space requirements and load calculations. This is much harder to do, if not impossible, with an existing building. In these cases, LEED allows the purchase of a two-year contract to purchase green power, carbon offsets or renewable-energy certificates.

I will back up for a second and talk about how the HVAC professionals can provide the service of installing this type of equipment and how his service personnel or building engineer will need to service it again, which is another door that opens for a new profit center. I have found buildings where HVAC equipment is being run off of photovoltaic panels, so it was important that the building manager know how the equipment is supposed to work and why it is causing the HVAC system to work incorrectly. Many companies over the past few years have expanded their companies to become a complete turnkey operation and hold regular weekly/monthly meetings on topics such as this.

Enhanced refrigerant management takes a step beyond Fundamental Refrigerant Management. It not only looks at ODP but GWP and how both affect the atmosphere. Two options are available. One option offers to use no refrigerants or low-impact refrigerants, such as those that have an ODP of zero and a GWP of less than 50. The second option uses various formulas to select a refrigerant that minimizes or eliminates compounds that contribute to ozone depletion and climate.

Remember, this is just a general overview of the LEED process and how the potential exists for the HVAC contractor to expand his or hers business into this ever-growing market. This article should be a starting point to help professionals get their building or themselves LEED certified. Be sure to visit www.usgbc.com for complete LEED information.

N. Robert Burgess, Jr., CEM, CEA, LEED AP, is the Owner of Burgess Green Facilities Service. He is a Master HVACR Technician and works as an advisor for the real-estate industry. Burgess, who currently holds 14 certifications and licenses within the engineering and property management field, has served as Vice President of Property Management for various companies, has authored three textbooks for BOMI, and has been the lead instructor for the National Association of Power Engineers for more than 28 years. Currently, he serves on the Board of Directors for the Property Management Association. For more information, email robertburgess@burgessgreenfacilitiesservice.com.