

GreenSmart

Sustainable Building in the Northwest

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Column: Mechanical

LEED and your mechanical system - What are the opportunities

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With the advent of U.S Green Building Council's LEED standards (Leadership in Energy and Environmental Design), many developers and design teams are taking advantage of a 'sustainable' design and construction process. The process is at its best when all parties collaborate in looking at a project as a combined sustainable entity and not just a checklist of items. With the mechanical system being a major component, and major energy/resource consumer of a building, we must explore what opportunities we have to contribute to the process. We often discover there are many areas where mechanical systems can contribute, and yet the mechanical systems cannot always 'save the day'.

LEED standards break down into six major areas: Sustainable Sites; Water Efficiency; Energy & Atmosphere; Materials & Resources; Indoor Environmental Quality; and Innovation & Design Process. Mechanical systems can contribute in each of these major categories which are further broken down into 'credits'.

Under Sustainable Sites we find that the mechanical designer can interact with the civil engineer in 'Stormwater Management' by finding ways to provide treatment or reduce the flow of stormwater into the public system. Green roof surfaces and planter beds can absorb rainfall and allow some of it to evaporate prior to flowing from the structure. The side benefit of these planted areas, besides their pleasant appeal, is less heat absorption into the structure, affecting a reduction in cooling loads. The mechanical designer also contributes to the process of explaining to tenants what sustainable elements exist by providing 'Tenant Guidelines' (LEED CS only).

The Water Efficiency section allows the team to explore water saving both indoor and out. The more obvious choices are including low-flow and even no-flow plumbing fixtures. If enough savings can be found then it's possible to earn an additional 'Innovative Design' credit for "exemplary performance". You can also control wastewater by harvesting rain water, or possibly ground water, for use in flushing toilets as well as irrigation.

Besides the basic commissioning, energy efficiency, and refrigeration management pre-requisites, the Energy & Atmosphere section holds the most opportunity for the mechanical designer. The most obvious credits are to 'Optimize Energy Performance'. LEED has now mandated that you earn a minimum of two energy credits! Through computer energy modeling the building as a whole is compared to an energy cost baseline established by ASHRAE Standard 90.1. The standard describes not only baseline mechanical systems, but building envelope requirements as well. The energy model, although somewhat cumbersome, gives an in-depth look at the project. The model creates a basis to first downsize systems, then to look at employing strategies that save energy. Many exciting innovations are hitting the market from 'digital compressors' and evaporative cooling solutions, high-efficiency boilers & reduced hot water flow fixtures, to newer ultra-high performance glazing systems and increased insulation levels. The mechanical designer can also look at using 'alternate refrigerants', and at real-time measuring of building energy and resource use. The mechanical team is of course involved in 'Enhanced Commissioning' as administered by a third party commissioning agent (CxA).

The mechanical team contributes to Materials & Resources by participating in jobsite recycling. There is also the chance of employing mechanical system materials with recycled content, although not for direct credits.

The Innovation and Design Process section is where the team is rewarded for exemplary performance, and for employing new technologies and strategies. Use your imagination!

What can't the mechanical system do? Returning to the subject of energy modeling, the mechanical system cannot 'carry' a successful energy optimization by itself. A 10% savings for the mechanical systems may only translate into a 3% overall savings. The building as a whole (glazing, opaque surfaces, lighting energy, sub-system energy use, and mechanical system use) must be considered. Given that the reference mechanical system that you must compare to is inherently quite efficient, this may limit the choices of heating and cooling systems under consideration. Just as one particular mode of transportation doesn't solve all transportation challenges, mechanical systems may be chosen for function and adaptability, while still being reasonably efficient. After all, the current status of the energy code is such that you will be made to provide efficient solutions regardless of your LEED status. To clarify, the baseline energy model for LEED (ASHRAE) is different than the baseline for Washington State Energy Code compliance. In order to maintain the most flexibility in mechanical system choices the LEED energy model may need significant help from the building envelope and lighting systems. <<