

SKC WHITE PAPER ON GREEN BUILDINGS AND THE ROLE FOR HEALTH AND SAFETY PROFESSIONALS

Introduction

Issues involving the health of our planet have been in the headlines and a new focus on “going green” has emerged around the world. In the forefront of this new focus area is the design and operation of green buildings. The environmental focus on buildings is justified when you consider some statistics from the U.S. Green Building Council. They report that in the US, buildings account for:

- ✔ 72% of electricity consumption
- ✔ 39% of energy use
- ✔ 38% of carbon dioxide emissions
- ✔ 30% of waste output
- ✔ 14% of potable water consumption.

So if we can design, operate, and maintain environmentally friendly buildings, we can have a significant impact on the health of our planet.

Global Rating Systems for Green Buildings

Green building rating systems have been developed by several agencies around the world to consistently define and measure critical building parameters. The LEED® rating system created by the U.S. Green Building Council in 2000 is used extensively in North America. LEED stands for Leadership in Energy and Environmental Design. Their website at www.usgbc.org offers unique rating systems for new buildings, existing buildings, schools, healthcare facilities and more. They also offer a training program and accreditation of green building professionals through the Green Building Institute at www.gbci.org.

Around the globe, there are other green building rating systems in use. The British have developed a green building rating system called BREEAM (Building Research Establishment Environmental Assessment Method). They offer a variety of rating systems for different types of structures at www.breeam.org. Australia also has a rating system called Green Star. Green Star was developed by the Green Building Council of Australia in 2003 and it is somewhat of a hybrid of the LEED and BREEAM systems. Green Star rating systems are available at www.usqbca.org.au.

The design, operation, and maintenance of a green building requires many professionals including architects, engineers, and HVAC specialists. Occupational and environmental health and safety (OEHS) professionals, however, offer some unique expertise to the assessment team as they understand the environmental impact on building occupants. This white paper will discuss aspects of the environmental impact categories in LEED 2009 New Construction and Major Renovations where OEHS professionals can play a role. Green building criteria within the expertise of OEHS professionals that are found uniquely in other rating systems will also be mentioned.

A Role for OEHS Professionals in the Environmental Impact Categories of LEED 2009 New Construction and Major Renovations

1. Sustainable Sites

The goal of this criterion is to have a safe building exterior that preserves the surrounding ecosystem. There are a number of areas where OEHS professionals can contribute valuable expertise towards earning this credit:

- a.) Elimination/substitution of harmful chemicals in paints, sealants, fertilizers
- b.) Stormwater management
- c.) Management of chemical runoff from maintenance vehicles
- d.) Establishment of exterior illumination set-points that satisfy requirements for safety while not disrupting the night sky.

2. Water

The goal of this criterion is to not only reduce the amount of potable water used in the building, but also to reduce the burden on the wastewater system. While many of the issues in this category are building design and plumbing related, there is a credit available for chemical management of the cooling towers. OEHS professionals can contribute their expertise in testing and controlling Legionella bacteria to help achieve this LEED credit. The BREEAM and Green Star rating systems also require a Legionella Risk Management Plan in accordance with designated standards.

3. Energy and Atmosphere

Energy-efficiency is one of the hallmarks of a green building and mechanical engineers and HVAC specialists will take the lead on achieving credits in this area. There are a number of areas however where health and safety professionals with experience in indoor air quality can provide expertise in earning this credit:

- a.) Establishment of set points for illumination that allow job tasks to be accomplished without excessive use of energy
- b.) Establishment of set points for the HVAC system that allow for occupant comfort
- c.) Development of an HVAC maintenance schedule that optimizes air filtration and minimizes moisture accumulation
- d.) Elimination/substitution of refrigerants with ozone depleting potential
- e.) Assessment of outdoor air delivery through air flow measurements at the air handling units and monitoring of carbon dioxide levels
- f.) Calibration and audits of permanent monitoring systems in place on HVAC systems

4. Materials and Resources

Green buildings must utilize building materials and interior furnishings with a low environmental impact. Reused, recycled, and local materials meet this requirement along with items that are low in chemical emissions of compounds such as volatile organic compounds (VOCs) and formaldehyde.

OEHS professionals who have experience in product health and safety can provide unique expertise in earning this credit. There are a number of resources available to assist in the selection of environmentally friendly products. For example, U.S. EPA offers Environmentally Preferable Purchasing (EPP) guidelines at www.epa.gov/epp/.

5. Indoor Environmental Quality

Green buildings must have an indoor environment that is not only healthy, but also conducive to occupant comfort and productivity. This is an area that has been at the

core of the health and safety profession for many years and experienced OEHS professionals have a wealth of knowledge to bring to the green building certification process.

In particular, a working knowledge of published indoor environmental standards and guidelines along with monitoring methods is a valuable asset for green building assessments. LEED criteria for indoor environmental quality reference existing standards and guidelines that experienced OEHS professionals have been using for years. For example, LEED certified green buildings should meet or exceed the minimum outdoor air ventilation rates as described in ASHRAE 62.1-2007. Buildings should meet the conditions for thermal comfort as described in ASHRAE 55-200. (See www.ashrae.org) Similarly, the BREEAM and Green Star rating systems reference existing standards appropriate to their region.

Health and safety professionals can also contribute their knowledge in indoor environmental quality monitoring to the green building arena. Key indoor environmental quality parameters that should be monitored include:

- Carbon dioxide
- Air flow rate at the air handling unit
- Differential air pressures of smoking rooms, copying rooms, etc. that are maintained at negative pressure with respect to adjacent spaces
- Illumination levels
- Air temperature and radiant temperature
- Relative humidity

Prior to occupancy in new buildings or following major renovations, LEED requires the implementation of an indoor air quality management plan to reduce any problems resulting from air contaminants. Options include (a) flush-out of the building with a volume of air at a specified temperature and relative humidity or (b) air testing for specific air contaminants. Designated air contaminants and maximum levels are listed below:

- Formaldehyde - 27 ppb
- Particulates as PM 10 - 50 µg/m³
- Total VOCs - 500 µg/m³
- Carbon Monoxide - 9 ppm and no greater than 2 ppm above outdoor levels
- 4-Phenylcyclohexene (4-PCH) - 6.5 µg/m³
- *If carpets with styrene butadiene rubber latex backing material are installed.*

Australia's Green Star program also requires that a comprehensive hazardous materials survey be done on the building and asbestos, lead, or PCBs must be removed. Green Star and BREEAM also have a criterion relative to internal noise levels. For example, one point is awarded when the entire general office space does not exceed an average of 40 dBA.

Toolbox for Green Building Inspectors

For information on SKC tools for the Green Building Inspector's tool box, see <http://www.skcinc.com/Perspective/LEED.asp>.