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LEED: A Primer

An overview of sustainable design issues in the LEED context.

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Architects are becoming aware of a need to assess the negative impact that buildings have on our environment. A broad question might be, "what is sustainable design?" A more refined question might ask: "How green is it?" When working both to create and market sustainable design, it is increasingly important to be able to make definitive assessments so that proposals may be quantified and compared. And if "green building" is design that incorporates improved environmental performance, precise knowledge of the specific performance criteria is essential to the success of the project.

The Leadership in Energy and Environmental Design (LEED) Green Building rating system represents the US Green Building Council's effort to provide a national standard to what constitutes "green building". Through its use as a design guideline and third-party certification tool, it aims to improve occupant well-being, environmental performance and economic returns of buildings, using established and innovative practices, standards and technologies.--USGBC Web site

What is LEED?

The Leadership in Energy and Environmental Design (LEED) Green Building Rating System is an assessment tool that has been designed to address the question of what constitutes green sustainable design. It is currently being promoted throughout North America for the evaluation and promotion of sustainable design. LEED's goal is to initiate and promote practices which limit the negative impact of buildings on the environment and occupants. The design guideline is also intended to prevent exaggerated or false claims of sustainability and to provide a standard of measurement.

In addition to the creation of a working definition of "green building" LEED promotes whole-building integrated design practices (IDP). In fact, most practitioners currently striving to achieve LEED certification cite the IDP as essential components to the attainment of adequate levels of green design. IDP requires a teamwork-styled approach to building design that commences with the first sketch. The primary objective of LEED is to transform existing building markets so that sustainable design, construction and operations practices become mainstream. LEED accreditation aids in identifying leaders in green design through an incentive-based program. Such acknowledgment is intended to serve as a marketing tool and to raise consumer awareness of the importance of green design.

The current LEED standard is LEED v.2.1, released in November 2002, evolved through consensus-based committee work. Currently there are several new versions of LEED in development, including a modified Canadian draft version that is being developed by the Canadian Green Building Council.

The structure of the LEED Rating System is segmented into sections, credits and points. The five key sections ("initiatives") are identified as sustainable sites, water efficiency, energy and atmosphere, materials and resources, and indoor environmental quality. In addition to these five initiatives, a sixth section is reserved for design process and innovation. This framework definition of sustainable design extends former ideas of energy efficient design to include aspects encompassing the whole building, all of its systems, and all questions related to site development. And most sections include one or more basic prerequisite items. These must be fulfilled, or the balance of the points in the category will not be counted.

Sustainable sites deals primarily with issues of site selection, site access and site design (materials, density, drainage). The prerequisite concerns erosion and sedimentation control on site. There are eight credits offering a total of 14 potential points. The development of sustainable site design is seen as a critical starting point for shaping an attitude towards the entire building design in the IDP.

Water efficiency is the smallest section comprising only three credits, worth five points. This section deals with landscaping, wastewater treatment and water use reduction. Items such as Living Machines, use of the Waterloo Biofilter, waterless urinals and composting toilets can be rewarded with points in this category.

Energy and atmosphere includes three prerequisites--fundamental building systems commissioning, minimum energy performance, and CFC reduction in HVAC&R equipment. The prerequisites are followed by six credits for energy performance, renewable energy and additional building monitoring, with a potential value of eight points. Prior to the adoption of LEED, energy efficiency might have been the only motivation to improving design strategies. Within the holistic sustainable design framework provided by LEED, the relative importance of these issues has been revised to represent only 25% of the potential credits.

The section on materials and resources, with 13 points generated in seven credits, has only one prerequisite: storage and collection of recyclables. The credits focus on building reuse; waste management; reused, recycled or certified materials, and local or regional materials.

Indoor environment quality is the largest category with two prerequisites, IAQ performance and environmental tobacco smoke control, eight credits and a total of 15 points. The credits in the indoor environment quality cover many issues of air quality, including ventilation and carbon dioxide monitoring, low-emission materials, construction IAQ, controllability of systems, thermal comfort and daylight access. This category places high emphasis on occupant comfort and well-being--issues that are not addressed in other mandatory code requirements--and falls outside issues of life safety, structural integrity and minimum energy requirements.

Innovation and design process allows a building to obtain as many as four design innovation points, as well as one additional point for including a LEED accredited professional in the design process. The design innovation points may be awarded for achievements such as lifecycle analysis, community development or education of occupants. Substantially exceeding one of the earlier credits may also merit an innovation point.

The collected LEED base sections amount to 64 points in 32 credit categories. Adding the 5 points for Innovation & Design Process results in a potential of 69 points. Buildings are accredited by the number of points gained: 26 to 32 points is LEED certified; 33 to 38 points is LEED Silver; 39 to 51 is LEED Gold, and LEED Platinum is awarded to projects with 52 or more points. By awarding a medal to successful buildings, LEED is an incentive-based system, which can be easily understood by designers and clients alike. It can also be used as a forceful marketing tool, by "brand naming" buildings with the LEED award label. Several cities in the United States have adopted LEED Silver for instance, as the minimum standard for all new municipal construction.

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as \$3,750 for registration into the program. The registration form requests a variety of information where available, such as the project team, program data and LEED checklist information. The registration fee includes two credit interpretations, a service which mitigates difficulties encountered while applying LEED credit standards to special building circumstances. Also included in the registration fee is access to LEED letter templates for preparing the application submittals.

Once a project is registered, the project team can begin compiling the necessary documentation for the submission. All of the prerequisites must be met, and a sufficient number of points earned to achieve accreditation. The submittal is completed as a binder or CD document, and is best achieved with the assistance of a certified LEED professional. A separate template is completed for each LEED prerequisite and credit. The accreditation submittal is accompanied by a second fee (between \$1,500 and \$7,500) again, depending on membership status and square footage of the project. The submittal document is reviewed, and within 30 days, notification is sent in regards to anticipated credits achieved, denied or pending. For submittals in LEED 2.1, an additional audit is performed on six random LEED credits. When prerequisites and credits have been acknowledged and/or audits have been completed, the project team is notified of the accreditation ruling. Where there is a question of credit(s) denied, an appeal process is in place to re-visit these issues.

Technical support is available in three ways: through the LEED Reference Guide (available at <http://www.usgbc.org/LEED/publications.asp>), a LEED-accredited professional, and through a request for credit interpretation. The LEED Reference Guide is the initial document that identifies the intent, requirements, technologies and strategies for each prerequisite and credit. The Reference Guide also identifies the pertinent reference standards for each credit and prerequisite. The use of a LEED accredited professional is worth one credit. The LEED professional is trained in the details of the LEED program and can facilitate sustainable design and LEED application documents. Credit interpretation requests (CIR) can be filed with the USGBC via an online form. All previously logged CIRs are available on-line for access by registered project contacts.

The LEED program is branching out to provide assessments catered to a variety of building conditions (including core and shell, commercial interiors and existing buildings). Comparing LEED with other standards

Current reference standards, such as ASHRAE 90.1 and the MNECB address only issues of energy conservation. Neither of these addresses site usage, materiality, air quality or water efficiency, to any significant degree. The national and provincial building codes, again, do not make any reference to sustainable site use (these are concerned solely with utilitarian issues of parking and fire access), water efficiency, air quality or materiality.

The British predecessor to LEED, the British Research Establishment's Environmental Assessment Method (BREEAM), is a complex system with a broader range of credit values. But LEED is the first program to identify the larger scope of 'green' building issues, categorize the design items and develop a simplified accounting system for credits. With each item being valued at 1 point, and an easy to understand breakdown, LEED is accessible to both designer and client.

LEED in Canada

British Columbia is a member of the Cascadia branch of the USGBC. As a joint enterprise between the Ministry of Competition, Science and Enterprise, the City of Vancouver, the Greater Vancouver Regional District (GVRD), BC Buildings Corporation, BC Hydro and BC Gas, the LEED BC Adaptation Guide has recently been submitted for USGBC approval. The Canada Green Building Council has further developed the LEED BC guidelines as a draft LEED Canada document for national application. New in these versions are the equivalent and pertinent Canadian and regional standards for energy efficiency and building practice, including the Model National Energy Code for Buildings (MNECB) and the Commercial Building Incentive Program (CBIP). While the essence of the LEED structure is unchanged, the program becomes much more applicable to the Canadian building context. The only significant change to LEED BC is the addition of one prerequisite to acknowledge the necessary protection of riparian wetlands along the coast of British Columbia.

Until the draft version of LEED Canada is approved and adopted, LEED projects in Canada will continue to pursue the LEED 2.0 standard provided by the USGBC. While there are many Canadian projects (46 as of November 2003, 27 of which are in BC) registered on the LEED website, only two have been certified to date--White Rock Operations Centre and the Vancouver Island Technology Park. Both of these achieved the LEED Gold standard.

The Vancouver Island Technology Park, designed by Idealink and Bunting Coady Architects, with Keen Engineering, was awarded LEED Gold in February 2002. The project involved the reuse and redevelopment of an existing hospital facility (165,000 square feet), converted to high tech office space, as well as the construction of an additional 235,000 square feet of building. The project scored 41 out of 69 potential points. The project was recognized for its innovation in developing an integrated site water management plan and rehabilitation program for Salmon Bear Creek that is used to treat stormwater from other sites and which provides for rehabilitation of local creek. VITP also participated in a transportation program that resulted in promotion of alternative transportation--which can be key to gaining several associated LEED points. VITP also developed green building guidelines and an educational program for tenants. Occupant education has been found to be essential to the success of many sustainable projects beyond the point of building commissioning.

In July 2003 the White Rock Operations Centre in British Columbia became the first new building in Canada to achieve LEED Gold. The project was designed by Busby + Associates with Keen Engineering and Flagel Engineering. The building scored 44 of a potential 69 points.

The City of White Rock, through the design of the White Rock Operations Centre, is attempting to provide community leadership in more environmentally responsible building practices. Some of the initiatives include: a green roof to reduce the urban heat island effect; gravel parking lots to maximize infiltration of rainwater, and the revegetation of nearly 400 square metres of asphalt with native species. The Centre also uses stormwater collection for toilet flushing and to help heat and cool the building.

There is a commitment to purchase renewable energy and to generate solar electric power onsite. High efficiency fixtures and mechanical systems were selected to reduce energy consumption. Indoor air quality was deemed important by the City, so this has been achieved by the use of natural ventilation, operable windows, and direct ventilation where necessitated by specific building use.

Daylighting is an important LEED criteria. It has been employed as a main feature in the building, incorporating sunshades, wall trellis, larger roof overhangs, and light shelves to optimize lighting while at the same time, controlling heat gain. Building materials were selected to ensure that all new materials were regionally manufactured and that ninety-nine percent of the original building was recycled, either in the new building or others. This succeeded in diverting almost a million tonnes of waste from landfill.

Hopes are that wide adoption of LEED in Canada will result in an increasing number of certified buildings and a general lowering of the negative impact of building on our environment. By recognizing environmental leadership in the building industry, LEED hopes to stimulate green competition, thereby raising consumer awareness of green building benefits that will ultimately transform the building market.

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Photos



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File size: 20 KB (266px X 177px)

Caption: Reducing heat islands through green roofs on top of the...



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File size: 32.8 KB (267px X 360px)

Caption: Caisse de Depot in Montreal

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File size: 17.3 KB (240px X 180px)

Caption: The Vancouver Island Technology Park in Victoria, by Id...

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Caption: A stormwater management strategy at the Green on the Gr...

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Caption: Offices for Revenue Canada in Surrey, by Busby+Associat...

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Caption: The BC Gas (Terasan Gas) building, by Musson Cattell Ma...

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Caption: YMCA Environmental Learning Centre, by Charles Simon Ar...



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Caption: The Liu Centre for Asian Studies at UBC, by Architectur...

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Caption: Using flyash concrete as a "green" alternative at the B...

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Caption: The U of T Bahen Centre for Information Technology, by ...

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Caption: Richmond City Hall, Richmond, BC, by Hotson Bakker Arch...

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