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New requirements and opportunities

By Stephen Carpenter, P.Eng.

The long-awaited revision to the Canadian Leadership in Energy and Environmental Design (LEED) New Construction (NC) rating system arrived earlier this year. With it come new requirements for building teams striving to achieve this certification, as well as new opportunities to push the envelope when it comes to greener buildings. Those in the construction industry must quickly learn the companion reference guide, since all buildings registered after June 2010 are judged against the new system.

In many ways, the 2009 rating system is similar to the previous version—the same six categories and the same number of core credits. The principle changes are:

- different credit weightings;
- new thresholds and requirements;
- regional priority credits; and
- a two-stage certification process.

Different credit weightings

A major revision involves reallocating the points associated with each credit (Figure 1). In Version 1.0, most credits were equally weighted

at one point each. In LEED 2009, credits are allocated points based on their anticipated environmental benefit.

This is most clearly seen in changes to Energy and Atmosphere (EA) credits. Under the original LEED system, this category made up 24 per cent of the available points (17 of 70 total points). Under the new system, it makes up 32 per cent of the available points (35 of 110 total points [Figure 2]).

For example, EA Credit 3, *Enhanced Commissioning*, and EA Credit 5, *Measurement and Verification* (the key to getting a building that performs up to its predicted energy savings), are now worth two and three points respectively, instead of the previous two points combined. Also, rather than 10 points for energy savings, LEED 2009 offers a significant 19 points.

New thresholds and requirements

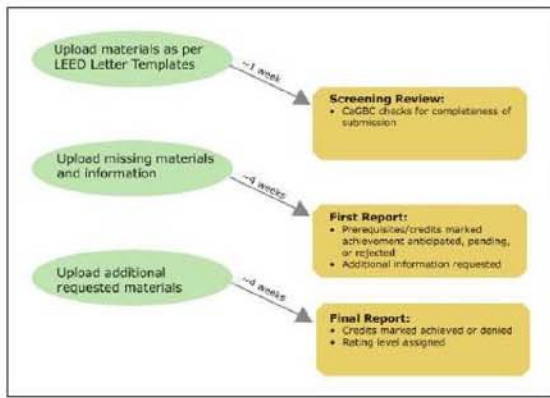
A common question regarding LEED 2009 is whether credits are harder to achieve. The answer is some credit thresholds have been raised while others have been lowered.

Figure 1

LEED Level	Points Required
Certified	40–49
Silver	50–59
Gold	60–79
Platinum	80+ points

Figure 2

Core Credits	Points
Sustainable Sites	26
Water Efficiency	10
Energy & Atmosphere	35
Materials & Resources	14
Indoor Environmental Quality	15
Innovation in Design	6
Regional Priority	4



In an effort to address longer waiting times between submission and certification, the CaGBC included this schedule with LEED 2009.



The roof of Enermodal Engineering's new building, "A Grandeur View," features 5.5 kW of photovoltaics (PVs). Under LEED 1.0, this system received one point whereas the same system would receive three points under LEED 2009.

In the last few years, LEED consultants realized some credits were relatively easy for all projects to achieve, while others were nearly impossible for all but a handful of boutique projects. LEED Canada 2009 aims to make all credits achievable (for teams committed to sustainability), but challenging enough that the program pushes the industry forward and rewards the top of the pack with certification.

An example of a credit more difficult to achieve under LEED 2009 is Water Efficiency (WE) Credit 3, *Water Use Reduction*. The performance thresholds are increased by 10 percentage points to 30, 35, and 40 per cent for predicted water savings. Additionally, a new prerequisite mandates using water and energy meters and a minimum water savings of 20 per cent.

An example of a credit with a lower threshold is Materials and Resources (MR) Credit 6, *Rapidly Renewable Materials*, which has been reduced from five per cent to 2.5 per cent of building material costs. Also on the material side, the threshold for recycled materials (i.e. MR Credit 2, *Construction Waste Management*) has increased from 7.5 to 15 per cent to 10 to 20 per cent respectively, and the regional material threshold has increased by 10 percentage points.

In some cases, the requirements have been updated. For example, a commonly achieved credit, the provision of bike racks—Sustainable Sites (SS) Credit 4.2, *Alternative Transportation—Bicycle Storage and Changing Rooms*—now includes the need to provide covered racks.

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Enermodal Engineering's new headquarters is set to achieve Platinum certification under LEED 1.0. Buildings with significant energy savings (this one has metered savings of 82 per cent over a conventional office) are benefited in LEED 2009 as energy savings are more heavily weighted. Projects that barely made it to Certified or Silver levels under 1.0 may experience a greater challenge.



Regional priority points

There is some confusion in the marketplace over the concept of regional priority points introduced for LEED 2009. These are not new credits with new requirements. The regional priority points are additional points awarded for achieving an existing credit deemed to have special regional significance. A project can achieve a maximum of three regional credit points in this manner. The submission must prove the credit in question is of particular importance to the surrounding region.

For example, a region may have a landfill that cannot be expanded and thus is shipping waste far away. In that region, the credit for recycling or for construction waste diversion (*i.e.* MR Credit 2) may be eligible for an additional regional priority point.

Two-stage certification process

LEED 2009 has a two-stage certification process designed to decrease the time required for Canada Green Building Council (CaGBC) reviews and certification. The initial submission now requires the applicant to supply more information, but there is no full audit. The reviewer may request a 'data check' (*i.e.* confirm the source of the data) but will ask for no further audit materials.

From a contractor's perspective, not as much detailed material is needed for the submission. The CaGBC increasingly requires only photos of credits such as erosion and sedimentation control (*e.g.* silt fences and designated construction truck entrances) rather than narratives or reports. Also, for waste diversion (MR Credit 2) no waybills are required from the contractor, just a monthly summary of the materials diverted from the landfill by weight.

Additionally, proving a particular material is locally extracted and manufactured is now the manufacturer's responsibility, not the contractor's. The manufacturer will have to show where every material going into its product comes from.

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LEED 1.0 v. 2009

There are both advantages and disadvantages to the LEED versions. If a building was registered before this past June, it could use either one. As such, an Ontario university research lab, currently in the design stage, recently investigated whether to pursue Silver certification through LEED 1.0 or 2009. To help the owner and the rest of the design team make their decision, this author's firm did a credit-by-credit comparison of the 1.0 and 2009 scorecards to see which system made the most sense for this project. In the end, the university decided to stick with the LEED 1.0 system due to the facility's high process load energy use.

The lab facility consists of two research 'domes' and an attached two-storey staff building. The domes contain research equipment and large pumps and fans for study simulations. One significant energy efficiency measure in the design is the large amount of waste process heat produced in the study simulation area is reused elsewhere in the building (*i.e.* space heating).

Advantages of 1.0

Under LEED 1.0, the lab would lose a Sustainable Sites (SS) point as it is located on prime farmland, which is unacceptable under the 2009 rating system.

A cost increase for the lab project—should it pursue 2009—would be required due to the fact bike racks need to be covered. However, this is a very small expense compared to the total project cost.

In LEED 1.0, the energy models for predicting energy savings essentially ignored process energy loads. In 2009, such loads must be taken into account. This could be an issue for a building like this lab, which has a huge process load of 3 MW. Thus, the same mechanical/electrical design could achieve a higher percentage of the available energy savings LEED points in 1.0 than 2009. Modelling the baseline process load for the lab building is a challenge as few similar comparisons for this specific type of research facility exist.

During this stage of the design process, the building is targeting 37 to 43 points (well above the 33 points needed for LEED Silver).

Advantages of 2009

Despite losing the prime farmland credit, the design team could likely gain back an SS credit thanks to changes to SS Credit 4.1, *Alternative Transportation—Public Transportation Access*. Previously, a building needed to be located near bus routes to get this credit, and the lab's somewhat remote location would make this credit impossible to get under 1.0. However, under 2009, a Transportation Demand Plan reducing single occupancy vehicle commuting gets three points for a 25 per cent reduction and six points for a 50 per cent reduction.

There is a mixed blessing for the lab in regard to water savings. In the 2009 system, there are more points for water savings—which this project will likely achieve. However, the overall thresholds for these points are higher, which would probably increase the cost of the project, as items like cisterns would need to be implemented.

The main change to the point weighting in 2009 is in the Energy and Atmosphere (EA) section. Energy efficiency is more important



Enermodal's Kitchener headquarters uses only native, drought-resistant species for landscaping as well as employee vegetable garden plots to eliminate the need for irrigation. Under LEED 2009, the water savings prerequisite has been increased to 20 per cent, with additional points available for 30, 35, and 40 per cent savings.

than ever before. This author's firm is providing EA Credit 3, *Enhanced Commissioning*, and EA Credit 5, *Measurement and Verification*, for this facility, combining for five points (compared with two points under 1.0).

Additionally, the threshold for green power has been reduced from 50 per cent to 35 per cent of total power for two years, and the number of points allocated for achieving this credit has been raised to two. The lab design team intends to pursue this credit.

Although it was previously mentioned that modelling the process load for the lab was a challenge, the new requirement regarding process energy may allow the design team to better show the benefits of their mechanical design efficiency improvements. This includes reusing the waste process heat from the study simulation area elsewhere in the building.

The lab will pursue what was previously in the Materials and Resources (MR) section as Credit 8, *Durable Buildings*, and is now found in the new Regional Priority (RP) category. There are four regional priority points available and a general rule of thumb is a Silver candidate building would pursue two of these 'bonus' points.

Under LEED 2009, this author's firm expects the lab would achieve anywhere from 48 to 65 points (50 points are needed for Silver in 2009) depending on certain design decisions and the results of the energy model including how the baseline process load is calculated.

Conclusion

The new LEED 2009 encourages development of greener buildings through higher standards in key areas such as energy and water use. The system also recognizes the importance of flexibility and the consideration of regional priorities and unique compliance paths. The building owner and operator benefits by being rewarded for best practices and the Canadian public benefits through progressive building designs. 🇨🇦

Stephen Carpenter, P. Eng., is president of Enermodal Engineering, a Canadian green building consulting firm. Operating since 1980, Enermodal is currently working on 250 LEED projects at its offices in Calgary, Edmonton, Denver, Toronto, and Kitchener, Ont. Enermodal was contracted to deliver the LEED 2009 Reference Guide by the Canada Green Building Council (CaGBC). Carpenter can be reached at info@enermodal.com.

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■ Sounding off on performance space acoustics

A new book offers lessons learned from J. Christopher Jaffe, the acoustician responsible for international projects including Kingston, Ont.'s Grand Theatre, the Concert Hall at the Kennedy Center (Washington, D.C.), and Mexico City's Sala Nezahualcōyotl. *The Acoustics of Performance Halls: Spaces for Music from Carnegie Hall to the Hollywood Bowl* (WW Norton) attempts to answer why so many concert halls fail to live up to expectations. It explores common misconceptions about classical concert spaces and offers a methodology for symphonic venue design.

■ Air movement standards collection

The Air Movement and Control Association International (AMCA) has released its 99-10, *Standards Handbook*, which compiles individual short standards covering various topics related to axial and centrifugal fans, including dimensions, operating limits, and drive arrangements. It also encompasses subjects like metric conversion, glossaries, and classifications for spark-resistant construction. The resource is available for purchase online at www.amca.org.

■ Building science conference coming to Winnipeg

The 13th annual Canadian Conference on Building Science and Technology (CCBST) will be held at Winnipeg's Hotel Fort Garry from May 10 to 13. The event, expected to draw delegates from across the continent, focuses on design methods past, present, and future. Planned educational sessions include discussions on building enclosure products, retrofits, modelling tools, commissioning, and the profession. For more information, visit www.becwinnipeg2011.com.

Calendar

September 22–25

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Interior Designers of Canada
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Glass Connections 2010

Canadian Glass Association
Vancouver, B.C.
Delta Burnaby Hotel
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October 20–22

Metalcon International

Metal Construction
Association
Las Vegas, Nev.
Las Vegas Convention Center
www.metalcon.com

November 1–3

Canadian Brownfields 2010

Canadian Brownfields
Network & Canadian
Urban Institute
Toronto, Ont.
Westin Prince Hotel
www.canadianbrownfields.ca

November 17–18

Managing Risk in Construction Contracts

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Crowne Plaza
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www.canadianinstitute.com/contracts

November 17–19

Greenbuild

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Chicago, Ill.
McCormick Place West
www.greenbuildexpo.org

November 30–December 3

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Green Roofs for Healthy Cities
Vancouver, B.C.
Vancouver Convention Centre
www.citiesalive.org

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Concrete

Where to LEED?

By Vrej-Armen Artinian, CSC, CSI

The Canada Green Building Council (CaGBC) rating system, Leadership in Energy and Environmental Design (LEED), has become virtually synonymous with sustainable buildings in this country.

By achieving certain parameters—whether a ratio of recycled construction materials, a reduction in operational energy consumption, or smart site selection in order to reduce reliance on transportation—points are garnered for a project via credits divided up among categories.

The final tally determines whether the project is LEED-certified or achieves the higher levels of Silver, Gold, or Platinum. There are LEED Canada reference guides for homes, existing buildings, new construction, and commercial interiors. Regardless, having a project deemed 'LEED-worthy' can be an important reward for building owners or facility management who want to be seen as green leaders.

This author believes LEED (and similar 'carrots' offered to entice private or public sector builders toward greener construction) should ideally be a temporary measure for that purpose. Eventually, what is good for the environment, and for the health and security of building occupants, must be incorporated into the country's standard codes and regulations. Once this happens, 'sticks' can be used instead of 'carrots' to oblige people to preserve our environment and ourselves.

For now, as an increasing number of projects seek recognition under LEED, there is still some confusion over where in the Project Manual the specifier introduces the associated credit requirements further elaborated in the documents. Before exploring this aspect of sustainable project delivery, one must also decide what to include.

The endeavour to obtain a LEED certification is a team effort. It cannot be realized without a concerted action by all concerned: the owner or promoter, the design professionals, the contractors, and

the building users, along with the manufacturers/suppliers, who have already started to produce and distribute greener products. They all will have a role to play in scoring credit points in the rating system. There is also the special consultant (often a LEED Accredited Professional [AP]), who is instrumental in determining the different environmental performance criteria that must be satisfied—and at what cost—to achieve the targeted certification level.

Depending on many factors, that level can be reached by combining very different criteria (hence credit points) from project to project. It is the prerogative of this new specialist (who may be an architect, an engineer, or an administrator), brought into the team by the owner, to consider carefully the pros and cons for each credit point.

Sections

In many sections of the specifications, LEED requirements will be prescribed, but they will be dealt with especially in two Division 01 sections:

- 01 35 21—LEED Requirements; and
- 01 74 21—Construction/Demolition Waste Management/Disposal.

In the approach most often taken by this author, those two sections (the first more than the second) constitute the 'hub' to which all other sections concerned will converge.

To ensure all players are on the same wavelength as the owners and consultants in pursuing LEED requirements, a clause can be added that the contractor have a LEED AP professional on his/her team. This may be done in the following sections:

- 01 35 21;
- 00 73 00—Supplementary Conditions (*i.e.* in reference to GC 3.6—Supervision, in addition to the site superintendent); or
- 01 45 00—Quality Control (*i.e.* in an article that concerns the qualification of labour).

The Scope of Work for Section 01 11 00—Summary of Work should mention this is a LEED project, and refer readers to Section 01 35 21 for details. While others suggest including the LEED objectives here, this author's preference goes to put those too in Section 01 35 21.

Other sections will refer to 01 35 21 for all aspects related to LEED requirements. These may include:

- 01 33 00—Submittal Procedures;
- 01 35 29 06—Health and Safety Requirements;
- 01 35 43—Environmental Procedures;
- 01 45 00—Quality Control;
- 01 61 00—Common Product Requirements; and
- 01 91 13—General Commissioning Requirements.

As modified by this author, Section 01 35 21 brings together the requirements concerning only the contractor. These include:

- Scope of Work;
- environmental objectives (stating targeted level of certification, as well as mentioning the contractor's responsibilities);
- annexed sections (to complete the information in the section itself);
- references;
- legend and definitions;
- submittals—generalities; and
- submittals—credit-specific requirements (this is done individually by credit for each category).

This section itself refers also to section 01 74 21 for the waste management requirements, and to other sections as required, as will be mentioned below.

While the main contents concern the submittals, this section does not repeat all the data found in CaGBC's *LEED Reference Guide*—the contractor or his/her LEED expert is expected to be well versed in its contents.

The annexes added to the main LEED section include:

- Section 01 35 21-A1 (schedule of all the credits targeted, and all the technical sections of the project manual, indicating which credit is sought in which section);
- Section 01 35 21-A2 (technical data sheet form to be filled by the contractor for every product for which certain credit points are sought—must confirm compliance with written proof from the manufacturer in addition to the regular technical data sheets provided through the prescriptions of other sections);
- Section 01 35 21-A3 (construction indoor air quality [IAQ] management plan, prepared by the LEED expert);



Images © BigStockPhoto.com

Photovoltaics (PVs) are one of the more visible aspects of green building. Projects pursuing points under Leadership in Energy and Environmental Design (LEED) require careful specifications.

- Section 01 35 21-A4 (incorporated into the main section in *National Master Specification [NMS]*, this lists the maximum volatile organic compound [VOC] contents allowable for various products as established by the codes or standards in force); and
- Section 01 35 21-A5 (schedule summarizing responsibilities of all concerned for each credit point sought).

Differences with NMS

The main difference of this author's Section 01 35 21 with *NMS* is the former defines all requirements through the required submittals, instead of describing them separately (which is done more extensively in the applicable *LEED Reference Guide*). Further, some specific requirements pertaining to various products (e.g. wood) or procedures (e.g. interior air quality control) are described in the technical sections, so are not repeated here.

Finally, this section refers to others that complete the requirements for green construction, especially Section 31 25 00—Erosion and Sedimentation Control (which can also be a whole series of sections and part of *MasterFormat*, but are non-existent in *NMS* and are preferably prepared by the civil engineer) and Section 01 74 21 and its aforementioned annexes for waste management.

NMS has a group of other sections—01 47 13, 01 47 15, 01 47 17, and 01 47 19—concerning sustainable requirements, but this author has not used them for LEED projects. They are more comprehensive than LEED, and also involve design strategies, which are more the

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Accounting for demolition waste management and disposal is an important aspect of sustainable building.

owner/consultants' domain than the contractor's, unless it is a design-build project, where responsibilities are shared and blurred.

As mentioned, Section 01 74 21 is the other major place where LEED requirements are extensively described concerning construction/demolition waste management. This author's version follows very closely that of NMS, with two principal differences. First, an article is added that concerns sorting of waste material, which is a compilation of all requirements repetitively found in the technical sections, stating what to do with all sorts of waste, from metals and wood to paper. All sections refer to 01 74 21 and every type of waste treatment is described herein.

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The second difference is the separation of the schedules from the main section. We therefore have the following annexes:

- Section 01 74 21-A1 (construction waste audit with different materials, minimum diversion percentages expected, and disposal options);
- Section 01 74 21-A2 (a similar demolition waste audit);
- Section 01 74 21-A3 (contract between contractor and subcontractor for waste reduction); and
- Section 01 74 21-A4 (waste-handling process, to identify diversion or processing sites, and include a plan for progression of waste and a model waybill).¹

Apart from these Division 01 areas, LEED requirements also appear in the technical sections.

First of all, in the Submittals article in Part One, LEED documents are mentioned referring to Section 01 35 21, with the precision of which credits are needed for which materials. For example, in the drywall section, Materials and Resources (MR) Credit 4, *Recycled Content*; and Credit 5, *Regional Materials*, are sought for all boards and steel elements. At the same time, Indoor Environmental Quality (EQ) Credit 4.1, *Low-emitting Materials: Adhesives and Sealants*, is asked for adhesives, and so on for each section related to LEED requirements, according to the specific project objectives.

Secondly, all sections refer to 01 74 21 for any requirement concerning waste management.

Finally, sections with particular products that are required to comply with certain codes or standards concerning green properties (e.g. wood, adhesives, sealants, floor coverings, and paints) also refer to Section 01 35 21 and its annexes for specific prescriptions.

Conclusion

Specifying for a LEED project, especially for the first time, is a long but very instructive process. The designer must work hand-in-hand with the specifier to select green products, which eventually should become the first choice of the type of materials specified even for non-LEED projects.

This author offers a word of caution—LEED compliance does not necessarily mean acceptable performance. Finding the right balance between sustainability and functionality is the main challenge. And then of course, there are the balances between sustainability and cost, sustainability and esthetics. 📌

Notes

¹ This annex may not be necessary if the owner's LEED consultant does a methodical compilation of the contractor's waybills.

Vrej-Armen Artinian, CSC, CSI, is a graduate of Cairo University (B.Arch, 1964) and McGill University (M.Arch, 1969). He started his career specializing in the design of school buildings, then moved on to industrial buildings, laboratories, and research centres. Artinian has been a specification writer at Montreal-based NFOE et associés architectes since 1992. He is a member of Construction Specifications Canada (CSC), Ordre des architectes du Québec (OAQ), Construction Specifications Institute (CSI), Conseil du bâtiment durable du Canada (CBDCa) Section du Québec, and Conseil de l'enveloppe du bâtiment du Québec (CEBQ). A writer contributing to Montreal's Armenian press, he can be contacted via e-mail at vrejarmen@hotmail.com.