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LEED for Distribution Centers

DRAFT 4 December 2008

The document details clarifications and modifications from Leadership in Energy and Environmental Design (LEED) Core and Shell version 2.0 and LEED New Construction version 2.2 for implementing the establishment of a proposed LEED for Distribution Centers, which will be added to the U.S. Green Building Council's LEED bookshelf of reference guides for specific building typologies. Attendees from the U.S. Green Building Council, National Association of Office and Industrial Properties and KSS Architects LLP discussed these changes at a September 2008, meeting in Herndon, Virginia.

Overview

KSS Architects LLP, the National Association of Industrial & Office Properties (NAIOP), and the U.S. Green Building Council (USGBC) have been working on a LEED reference guide for distribution centers since 2006. The purpose of the needs assessment was to identify critical areas of the LEED rating systems that require technical modifications in order to measure environmental performance in new and renovated distribution centers.

The needs assessment seeks to address all aspects of the commercial LEED rating systems, focusing primarily on LEED for New Construction (v2.2) and LEED for Core & Shell Development (v2.0) to create a LEED rating system for Distribution Centers, which herein shall be referenced as LEED-DC. Only the credits requiring modifications, clarifications or discussion are detailed in the body text.

Outcomes

We recognize many of the LEED Reference Documents are scheduled to change in the near future. However, because many of our meetings and discussions have referenced LEED-CS as the starting point for LEED-DC, we have based our point totals on LEED-CS v2.0. We anticipate when LEED-CS is updated to reflect changes in the LEED structure, the point totals for LEED-DC will also change in similar fashion. It is important to note that 36% of the prerequisites and credits in LEED-CS are affected by the issues detailed in this needs assessment.

Table 1 lists the modified scorecards for LEED-NC v2.2 and LEED-CS v2.0, and notes the credits affected by the issues identified in this needs assessment for LEED-DC.

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Table 1. LEED for Distribution Centers Needs Assessment Credit Checklist

Credit	Description	LEED-NC (v2.2) # points	LEED-CS (v2.0) # points	LEED-DC (proposed) # points	Notes
Sustainable Sites Total Possible Points		**14**	**15**	**17**	
Prereq. 1	Construction activity pollution prevention	Required	Required	Required	No modifications
SSc1.	Site selection	1	1	1	Modified
SSc2	Development density and community connectivity	1	1	1	Modified
SSc3	Brownfield redevelopment	1	1	**1-3**	Modified
SSc4.1	Alternative transportation: Public transportation access	1	1	1	Modified
SSc4.2	Alternative transportation: Bicycle storage and changing rooms	1	1	0	Eliminated
SSc4.3	Alternative transportation: Low emitting & fuel-efficient vehicles	1	1	1	Modified
SSc4.4	Alternative transportation: Parking capacity	1	1	1	Modified
SSc4.5	**Proximity to industrial infrastructure**	n/a	n/a	1	**NEW credit**
SSc5.1	Site development: Protect or Restore Habitat	1	1	1	No modifications
SSc5.2	Site development: Maximize open space	1	1	1	Modified
SSc6-SSc8	Various	5	5	5	No modifications
SSc9	Tenant Design & Construction	n/a	1	1	No modifications
Water Efficiency Total Possible Points		**5**	**5**	**5**	
WEc1.1 – Wec3.2	Various	5	5	5	No modifications
Energy & Atmosphere Total Possible Points		**17**	**14**	**14**	
EAp1	Fundamental commissioning of the building energy systems	Required	Required	Required	No modifications
EAp2	Minimum energy performance	Required	Required	Required	Modified
EAp3	Fundamental refrigerant management	Required	Required	Required	No modifications
EAc1	Optimize energy performance	1-10	1-8	1-4	Modified
EAc2	On-site renewable energy	1-3	1	1-5	Modified
EAc3-EAc6	Various	4	5	5	No modifications
Materials & Resources Total Possible Points		**13**	**11**	**11**	
MRp1-MRc7	Various	13	11	11	No modifications
Indoor Environmental Quality Total Possible Points		**15**	**11**	**9**	
EQp1-EQc3	Various	4	3	3	No modifications
EQc4.1-EQc4.4	Low-emitting materials	4	3	**1**	Modified

Credit	Description	LEED-NC (v2.2) # points	LEED-CS (v. 2.0) # points	LEED-DC (proposed) # points	Notes
EQc5-EQc6	Various	2	2	2	No modifications
EQc7	Thermal comfort	2	1	1	Modified
EQc8.1-EQc8.2	Daylight and Views	2	2	2	Modified
Innovation in Design Total Possible Points		**5**	**5**	**5**	
IDc1.1-1.4	Innovation in Design	4	4	4	Modified
IDc2	LEED Accredited Professional	1	1	1	No modifications
Total Possible Points		**69**	**61**	**61**	

Issues for Further Exploration

Though this assessment describes in detail the sections requiring technical modifications, clarifications or research, it also identifies four critical issues requiring the working knowledge and expertise of professionals in engineering, design, real estate, logistics, etc., beyond the concepts explained here.

1. **Energy Modeling.** The Energy and Atmosphere section of LEED-NC and LEED-CS requires submissions to demonstrate a percentage improvement in the proposed building performance rating compared to the baseline building performance per ASHRAE/IESNA Standard 90.1-2004 and the Building Performance Rating Model in Appendix G. Since a significant volume of a distribution center is unconditioned or semi-heated space, the building's energy performance will generally be higher, or have a lesser environmental impact, than buildings designed for occupancy, on a per unit basis. However, distribution centers can still improve their energy performance through increased efficiencies in systems such as building envelope and lighting. LEED-CS Credit Interpretation Request dated 26 July 2007 with a subsequent ruling dated 13 August 2007 (http://www.usgbc.org/LEED/Credit/CIRDetails.aspx?CIID=1853) addresses the discrepancy for one warehouse building case study.

   Action Items: Form a team of professionals with expertise in energy modeling and performance for distribution centers to review the CIR and determine its applicability to other projects and potential for use as a basis on which to create a new series of benchmarks and baseline building performance measures for LEED-DC.

2. **Logistics.** Much of the energy consumption and hence energy savings for distribution centers is due to inbound/outbound truck transportation, operations and the act of distributing goods to and from the buildings. Factors affecting logistics, notably site location and proximity to supply source and consumers, can significantly improve the environmental performance of a distribution center by reducing truck traffic and fuel consumption and using alternative transport modes such as railroads.

Action Items: Form a team of professionals with expertise in logistics to establish performance benchmarks for measures achievable through strategic logistics such as site location and proximity to multimodal transportation hubs that improve the project's energy and environmental performance.

3. Finished Spaces. LEED-DC must resolve how finished interior spaces, e.g., offices and lobbies, affect a distribution center's energy performance. The floor area of finished interior spaces is typically small relative to the floor area of warehousing space and storage. While the distribution centers often exceed 50,000 square feet in area, finished spaces typically occupy no more than 7 percent of the total floor plan. In addition, office spaces are rarely finalized until a tenant commits to leasing the space. By then, the interior fit-out becomes a design and construction entity separate from the design and construction of the distribution center, and may involve entirely different project teams. We propose a couple options on how LEED-DC can address finished office space and tenant fit-outs:

    a. Lease Mandates. For distribution centers designed to have finished interior spaces occupying 7% or less of the total floor area, building owners must issue lease mandates that require tenants to design and furnish office spaces to meet the performance requirements of LEED for Commercial Interiors. Owners who issue lease mandates will earn select credits in the Indoor Environmental Quality section of LEED-DC. See IEQ section below for further discussion.
    b. Independent Evaluations. For distributed centers designed to have finished interior spaces occupying more than 7% of the distribution center total floor area, building owners must issue lease mandates that tenants follow LEED-CI as a prerequisite to LEED-DC IEQ. Owners who issue lease mandates will also earn select credits in IEQ. Additionally, the individual tenants in the distribution center may seek a separate LEED certification based on LEED-CI for their fit-out. See IEQ section below for further discussion.

    Action Items: Form a team with expertise in commercial real estate to review proposed LEED-DC requirements for finished interior spaces. KSS Architects to contact real estate expert Mindy Lissner, Senior Vice President at CB Richard Ellis, to confirm typical ratios of office space to warehousing space.

4. Brownfields. Distribution centers can have a significant net environmental benefit because of their vast size and their potential to occupy remediated brownfield sites. As a result, these projects should earn additional credits based on the size and severity of the land remediated (far greater than the typical commercial office building), and their ability to redevelop lands with contamination levels unacceptable for building types with higher occupancy or residential uses. The number of points awarded could depend on the size and severity of the brownfields.

    Action Items: Form a team with expertise in civil and environmental engineering and brownfield site to develop a tiered LEED point system based on the lot's characteristics (e.g., size and severity) for either Sustainable Sites Credit 3 (SSc3): Brownfield Redevelopment.

I. Sustainable Sites (15 points possible)

SSc1: Site Selection (1 point)

Intent: Avoid development of inappropriate sites and reduce the environmental impact from the location of a building on a site.

Discussion: Beyond their large size, distribution centers have greater project scopes than many other building typologies. Project scopes may include the construction of infrastructure to handle high frequency truck transport and large-scale transportation modes, loading docks, parking lots, and access roads to highway interchanges. Distribution centers often require large parcels of contiguous land often strategically located near highways and interchanges that, in turn, use farmlands and wetlands as a buffer to residential communities. Similarly, distribution centers and their associated infrastructure are often located on the outskirts of densely populated areas on farmlands and near wetlands, leaving few opportunities to meet the requirements of LEED-CS SSc1 in addition to their needs of large lot size, site grading, and proximity to services and utilities. In areas of former industrial development, wetlands may have formed over time but, due to contamination, may stand to benefit if development preceded by remediation was permitted. Because distribution centers are generally clean buildings with no heavy manufacturing or processing, their contribution to pollution comes mostly from transportation to and from the building.

Proposed Modification to Requirements

Farmland and Greenfield Development
Allow the development of prime farmland or greenfield development to sites meeting the following requirements:

OPTION 1

- Site falls within area a governmental body has classified and zoned for industrial use and development, AND is part of a region or municipality-wide farmland preservation plan

OPTION 2

- For every acre of farmland or greenfield included in the project site, purchase and preserve 1.5 acre of land of equal or better farming condition adjacent to the site or within the city or township limits AND participate in the zoning of the new land to exclusive agricultural use. If development includes large tracts of farmland or farms, then submit description of participation and confirmation that the team has physically relocated farms acre-for-acre to an area with equal or better farming characteristics

Wetlands Development
Limit development on wetlands to areas meeting the following requirements:

- Wetlands are previously developed OR

- Wetlands are contaminated OR
- Wetlands meet the description of **ordinary resource value wetlands** (see below)
- Wetlands meet the description as **intermediate resource value wetlands** and development includes a 50-foot transitional buffer between the wetlands and project site

-AND-

Development meets all local and state regulations on land use and wetland development.

-AND-

For every 1 acre of wetlands, isolated or contiguous, provide **1.5 acres** of new, contiguous wetlands of equal or better quality on site. If onsite and "in-kind" mitigation is not possible, refer to the *EPA/U.S. Army Corps of Engineers Wetlands Compensatory Mitigation Rule* (http://www.epa.gov/wetlandsmitigation/) for proposal requirements.

Action Items

- Clarify the interpretation of the definitions for **prime farmland** and **wetlands**, as referenced in LEED-NC v2.2 and LEED-CS v2.0. One sentence requiring further clarification appears in the definition for farmland: "It has the soil quality, growing season, and moisture supply needed to *economically* produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods" (emphasis added). See Definitions below for full definition.
- Appoint a team with expertise in civil and environmental engineering and environment science to develop a classification system for wetlands and provisions by which **ordinary resource wetlands** can be developed and mitigated. Refer to the New Jersey's Dept. of Environmental Protection Land Use Administrative Code 7:7A Freshwater Wetlands Protection Act Rules as a potential guide to define wetlands. Consult with team to review and finalize mitigation requirements.

Definitions

From U.S. Code of Federal Regulations, Title 7, Volume 6, Parts 400 to 699, Section 657.5 (citation 7CFR657.5) (http://edocket.access.gpo.gov/cfr_2003/7CFR657.5.htm) :

Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is also available for these uses (the land could be cropland, pastureland, rangeland, forest land, or other land, but not urban built-up land or water). It has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed, including water management, according to acceptable farming methods. In general, prime farmlands have an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, acceptable salt and sodium content, and few or no rocks. They are permeable to water and air. Prime farmlands are not excessively erodible or saturated with water for a long period of time, and they either do not flood frequently or are protected from flooding. Examples of soils that qualify as

prime farmland are Palouse silt loam, 0 to 7 percent slopes; Brookston silty clay loam, drained; and Tama silty clay loam, 0 to 5 percent slopes.

From U.S. Code of Federal Regulations, 40 CFR, Parts 230-233, and Part 22 (http://www.epa.gov/wetlands/40cfr/), LEED Sec. 230.41 Wetlands Part (a)(1) :
"Wetlands consist of areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

From New Jersey's Department of Environmental Protection Land Use Administrative Code N.J.A.C.-7:7A-2.4 Classification of freshwater wetlands by resource value (http://www.state.nj.us/dep/landuse/7-7a.pdf) :

Ordinary resource value wetlands do not exhibit the characteristics of exceptional resource value wetlands and are: isolated wetlands that are not surface tributary systems of a lake, river, or stream and are more than 50 percent surrounded by development and less than 5,000 square feet in size; drainage ditches, swales or detention facilities.

Exceptional resource value wetlands are those which: 1) Discharge into FW-1 waters or FW-2 (trout production) waters (as defined in the DEP's Surface Water Quality Standards) and their tributaries. FW-1 waters are those within federal or state parks and lands that are to be maintained for the future in their natural state. FW-2 waters are trout production waters and their tributaries. These waters support trout spawning; 2) Provide, or documentation shows can provide, habitat for state and federally identified threatened and endangered species.

Intermediate resource value wetlands are all freshwater wetlands not defined as exceptional or ordinary.

SSc2: Development Density and Community Connectivity (1 point)

Intent: Channel development to urban areas with existing infrastructure, protect greenfields and preserve habitat and natural resources.

Discussion: Distribution centers require different zoning and land requirements and infrastructure systems than commercial buildings. LEED-CS requirements for development density and community connectivity are not particularly relevant to distribution centers because of their site characteristics. However, their sites do present unique opportunities to benefit development and become connected with an *industrial* community, one that allows the buildings to become a part of the regional, national, and even global supply chain of goods.

Proposed Modification to Requirements

OPTION 1 – ADAPTIVE REUSE

Construct or renovate distribution center on a site that was previously developed or is developed for industrial use.

OPTION 2 – INDUSTRIAL CONNECTIVITY

The project site must meet the following requirements to incorporate the site efficiently into the distribution center's supply chain to minimize inbound and outbound traffic:

Meet at least one of the following:

- Located within a planned industrial area with direct access to an existing, planned or funded spur of an active freight railway line
- Located within 5 miles of an existing, planned or funded multimodal transportation hub, such as a rail/truck ISO container transfer facility
- Located within 20 miles of an existing, planned or funded port with facilities for transferring standard ISO containers between trucks and ships or barges

-AND-

Meet at least one of the following options:

- Located within 1/2 mile of established truck stop
- Located within 15 miles of a residential area with a density of 5 units per acre
- Located within 15 miles of at least one health, safety or support service. These services may include the following: 1) Hospital or medical center; 2) Police; 3) Fire station; 4) Public safety; 5) Hotel/motel; 6) Communications center (telephone/Internet/GPS); 7) Vehicle service, repair or leasing; 8) Bank; 9) Post office
- Have one of the following industrial attributes: 1) Strong local market access (e.g., near a major metropolitan area) or 2) Access to an interstate highway.

Action Item

Establish a team with expertise in distribution logistics, urban planning and smart growth practices to review density, distance, and industrial connectivity requirements and metrics.

Definitions

A truck stop is a commercial facility that provides amenities and services for truck drivers such that they are able to shut off their vehicles' engines, leave their trucks, and rest or recharge. The facility should provide at a minimum fuel stations, parking, lounge area, communications center (phone/Internet), and restaurants/food services.

SSc3: Brownfield Redevelopment (1-3 points)

Intent: Rehabilitate damaged sites where development is complicated by environmental contamination, reducing pressure on undeveloped land.

Discussion: Many brownfields are located in former industrial and manufacturing areas near intermodal transportation facilities and urban areas that are desirable for distribution centers. The potential for distribution center projects to remediate, develop and reintroduce large tracts of undesirable land is great. Because of the nature of distribution centers, i.e., occupancy, use, size and location, the project site may contain contamination exceeding that allowable for residential or high-occupancy buildings. As a result, the net environmental benefit of a distribution center can significantly exceed that of a typical commercial office building. The number of potential points for this credit should be increased based on the extent of the brownfield size and severity that the project redevelops.

Proposed Modification to Requirements

Increase the number of points possible to 3 points. The number of points awarded will be dependent on a tiered system based on the size and severity of the brownfield site, as well as other conditions such as rehabilitation process, remediation plan, and restoration of site to public access or recreation.

Action Items

- Create a team with expertise in civil and environmental engineering and brownfield remediation to develop a tiered point system to award up to 3 points to the project based on:
  - The size of the brownfield site in acres
  - The severity of the brownfield's condition (see EPA definition of brownfield types: http://www.epa.gov/brownfields/html-doc/10902a3.htm#3.2).
- KSS Architects will contact their engineering consultant, Richard Burrow, P.E., at Langan Engineering and Environmental Services.

SSc4.1: Public Transportation Access (1 point)

Intent: Reduce pollution and land development impacts from vehicular use.

Discussion: Many distribution center employees commute from urban or suburban communities. However, many distribution centers are located on the outside edges of communities near interstate highways and limited access roads where few mass transit lines service.

Proposed Modification to Requirements

Provide a sheltered transportation stop located within 200 yards of a building entrance to function as a future drop-off/pick-up site for future shuttle services for employees.

Action Item
Confirm with a team with expertise in transportation and mass transit design and planning to detail additional requirements of the shuttle stop and its location on site.

SSc4.2: Bicycle Storage and Changing Rooms (Eliminate credit)

Intent: Reduce pollution and land development impacts from vehicular use.

Discussion: Because distribution centers are typically sited in remote areas adjacent to high-traffic roads and employ around-the-clock work shifts, bicycling will likely not be a common mode of transportation for employees. This point is not as applicable for this building type as it is for residential or commercial office buildings.

Proposed Modification to Requirements
Eliminate this credit.

Action Item
Eliminate this credit.

SSc4.3: Low Emitting & Fuel Efficient Vehicles (1 point)

Intent: Reduce pollution and land development impacts from vehicular use.

Discussion: Vehicular traffic for distribution centers consists of employee traffic and truck traffic. As a consequence of the constant flow of inbound and outbound truck traffic and trucks idling upwards of 8 hours to provide drivers heat, air conditioning and electricity, truck traffic at distribution centers has a significant environmental impact. In addition to the options listed in the requirements for LEED-CS, encourage sites to include measures to reduce the impact of trucking and eliminate the need for long-term idling.

Proposed Modification to Requirements
Add the following option to the existing LEED-CS credit requirements:

OPTION 3
Meet TWO of the following requirements:

- Provide shore power at all truck bays/loading docks for drivers to plug in their electrical systems into line power to reduce idling time
- Provide interior conditioned break rooms for drivers to provide opportunities to rest outside of trucks and reduce idling time
- Provide a central location on site with for-profit external cab services, such as IdleAire, which allow drivers to turn off their engines

- Select a site within **10 miles** of an existing or proposed freight village, which provides services and amenities in a common location to truck drivers and building users of many transportation and distribution centers within a region.
- On a regional basis, buy down and decommission regional polluting sources or contribute to regional truck stop electrification.

Action Item
- Confirm requirements and metrics with a team with expertise in logistics, site planning, and idling reduction systems.
- KSS Architects will contact Barry Hibbard, an expert in real estate, commercial and industrial marketing, to review credit requirements.

SSc4.5: Proximity to Industrial Infrastructure (1 point) (NEW)

Intent: Reduce pollution impact and energy consumption from inbound and outbound vehicular use and truck traffic.

Discussion: Freight truck transportation presents a great opportunity for energy savings. According to the U.S. Department of Transportation Federal Highway Administration's *2006 Status of the Nation's Highways, Bridges, and Transit: Conditions and Performance* (http://www.fhwa.dot.gov/policy/2006cpr/chap14.htm), trucks account for more than 30 percent of all vehicles on one-fifth the mileage of the Interstate Highway System, and significantly contribute to congestion in urban sites. This credit encourages the development of sites located in close proximity to highways and highway interchanges, intermodal facilities, and inbound and outbound points on the supply chain of goods, such as ports and end users.

Proposed Modification to Requirements:
Add this credit with the following options.

OPTION 1
Select a project site that is located within **15 miles** of at least one of the following: 1) Ports where goods stored at the building arrive; 2) End users/consumers of the goods stored in the building; 3) Intermodal facility that distributes or receives goods to or from the building.

OPTION 2
Select a project site that is within **3 miles** of an interchange to reduce truck traffic on minor arterials.

Exemplary performance
Projects may be awarded one innovation point for exemplary performance by achieving a reduction in truck distance traveled of 33 percent. Projects achieving a reduction greater than 66 percent may be awarded an additional innovation point.

Action Item

- Consult a team with expertise in freight transportation and logistics to review and/or provide additional metrics on reducing inbound or outbound truck travel through strategic site selection.
- KSS Architects to contact logistics consultant Tomkins Associates.

SSp5.2: Site Development: Maximize Open Space

Intent: Provide a high ratio of open space to development footprint to promote biodiversity.

Discussion: The development footprint of distribution centers can be reduced by designing buildings with higher internal clearances. State of the art distribution centers typically have an internal clear height of at least 36 ft, which is efficient for racking systems, storage capacity, and the installation of some fire suppression systems, such as Early Suppression Fast Response (ESFR).

Proposed Modification to Requirements

Add the following option to the existing LEED-CS credit requirements:

OPTION 4

Incorporate high-volume (high-cube) storage by efficiently using vertical space to obtain clear heights greater than or equal to 36 feet, thereby increasing the usage and effectiveness of the distribution center's footprint

Action Items

- Confirm with a team with expertise in distribution center design and storage the proposed credit requirements.

II. Water Efficiency (5 points possible)

No modifications required in this section.

III. Energy & Atmosphere (14 points possible)

See notes in paragraph on "Issues for Further Exploration" on discussion of energy performance and energy modeling of distribution centers.

EAp2: Minimum Energy Performance

Intent: Establish the minimum level of energy efficiency for the proposed building and systems.

Discussion: ASHRAE/IESNA Standard 90.1-2004 has limited applicability to the systems in a distribution center building type. Refer to LEED-CS CIR ruling dated 13 Aug. 2007, which discusses appropriate proposed and baseline systems for warehouse facilities. Lighting systems as described

by ASHRAE/IESNA 90.1-2004 may still apply. In that case, projects can demonstrate a reduction in the baseline performance for lighting. For buildings in which office space occupies more than 7% of the floor plan, the building performance modeling of the office space may follow LEED-CI or LEED-CS requirements. In addition, more recent energy technologies and innovations, such as radiant floor heating, may be incorporated into the point structure.

Action Items

- Create with a team with expertise in the energy performance of distribution center building systems to establish an appropriate baseline for this building type's energy performance.
- Consider developing a prescriptive list of national or regional standards and references for each individual building system if it better establishes the baseline performance of the building as a whole.
- KSS Architects to contact mechanical engineering consultant.

EAc1: Optimize Energy Performance (1-4 points)

Intent: Achieve increasing levels of energy performance above the baseline in the prerequisite standard to reduce environment and economic impacts associated with excessive energy use.

Discussion: Upon the establishment of an energy performance baseline standard for distribution centers, a team with expertise in energy modeling should create a tiered system of points similar to LEED-CS. However, a distribution center's minimally-conditioned spaces offer limited opportunities for additional energy savings with some exceptions being lighting systems and building envelope. What does offer great opportunity is the ability of distribution center to generate and use their renewable energy and supply net energy produced to outside communities. For example, their expansive flat roofs are potentially ideal surfaces for solar panels. Because of this opportunity, LEED-DC redistributes points from credit EAc1 to EAc2 to encourage buildings to pursue renewable energy generation and have a greater environmental benefit.

Proposed Modification

Reduce the number of possible points from 8 to 4 by modifying the values in percentage improvement of energy building performance. Revise the standard by which to calculate a baseline model appropriate for distribution centers. Refer to the discussion on energy modeling in "Issues for Further Exploration."

Action Item

Engage a team with expertise in the energy performance of distribution centers to establish revised increasing levels of energy performance above the baseline in the prerequisite standard that is determined appropriate for distribution centers.

EAc2: On-Site Renewable Energy (1-5 points)

Intent: Encourage and recognize increasing levels of on-site renewable energy self-supply in order to reduce environmental and economic impacts associated with fossil fuel energy use.

Discussion: See discussion for credit EAc1 above. Note the percentage of energy to be provided by renewable energy systems significantly differs from the 1% required in LEED-CS. LEED-DC's requirement is more applicable to the energy use of distribution centers and the ability of the project site and infrastructure to accommodate renewable energy systems.

Proposed Modification to Requirements to EAc2
Add the following to the LEED-CS requirements:

Achieve increasing percentages of building energy provided through on-site renewable energy systems to earn the corresponding number of points (5 points maximum). Note: The infrastructure and equipment supporting or producing renewable energy need not be owned by the building owner. For example, the building owner can enter an agreement with a third party to lease the space that will accommodate solar panels on a building rooftop, but not necessarily own, operate or maintain the solar panels. Demonstrating a valid agreement and documentation of the system installation AND verification of the renewable energy system's performance will earn the LEED credit. It is not necessary for the building owner to utilize the energy produced by the renewable energy systems, but it is required that the building tenants utilize the energy produced by the renewable energy systems.

1. For projects that plan to install renewable energy systems in the future, design and construct infrastructure and building structural systems to accommodate the proposed renewable energy system (e.g., roof structure sized for future installation of solar panels). (1 point)
2. Generate 35 percent of the building annual energy cost through on-site renewable energy systems. (1 point)
3. Generate 70 percent or more of the building annual energy cost through on-site renewable energy systems. (1 point)
4. Install an on-site renewable energy system designed to generate enough energy to exceed the building's energy consumption by 10 percent. Distribute the net energy produced to the power transmission system for use by outside communities. (1 point)
5. Install an on-site renewable energy system designed to generate enough energy to exceed the building's average energy consumption by 20 percent or more. Distribute the net energy produced to the power transmission system for use by outside communities. (1 point)

Action Item
Engage a team with expertise in distribution center energy requirements and the manufacturing, installation and performance of renewable energy systems (solar, wind, biomass, geothermal and hydro) to review and/or establish the metrics for renewable energy production.

IV. Materials and Resources (11 points possible)

No modifications required in this section.

V. Indoor Environmental Quality (9 points possible)

See notes in paragraph on “Issues for Further Exploration” on discussion of lease mandates.

EQc4: Low-Emitting Materials (1 point)

Intent: Reduce the quantity of indoor air contaminants that are odorous, irritating and/or harmful to the comfort and well-being of installers and occupants.

Discussion: If the distribution center is designed to accommodate finished office area covering 7% or less of the total building floor area, then developers may produce tenant guidelines that mandate future fit-outs comply with LEED-CS EQc4.1-4.4. Because the distribution center base building has minimal interior finishes prior to the move-in of tenants, the onus on the developer to meet the requirements of all four EQc4 credits is less than that for commercial office buildings or institutions.

Proposed Modification to Requirements

Meet the requirements of credits 4.1, 4.2, 4.3 and 4.4 in the design and construction of the distribution center base building. In addition, meet one of the following requirements:

OPTION 1
For distribution centers with office space occupying 7% or less of the total building floor area, include a lease mandate that tenant fit-outs meet the requirements of LEED-CI. The project may earn credits before the tenant office space is fitted out. (1 point)

OPTION 2
For office areas occupying more than 7% of the total building floor area, include a lease mandate that tenant fit-outs meet the requirements of LEED-CI. The project may earn credits before the tenant office space is fitted out. (1 point)

Note: In Option 2, individual tenants may submit for credits for separate LEED-CI certification.

Action Item

Engage a team with expertise in commercial real estate and development to review the proposed metrics for the credit.

EQc7: Thermal Comfort: Design (1 point)

Intent: Provide a comfortable thermal environment that supports the productivity and well-being of building occupants.

Discussion: Strategic thermal design is critical to conserving energy use in distribution centers because of their size and stratification of uses. Maintaining the same level of thermal comfort in storage and warehousing areas as that required in offices and other areas with high, continuous occupancy consumes unnecessary energy. However, provisions for the thermal comfort of occupants in storage and warehousing areas should remain. The credit, though applicable for conditioned commercial spaces meeting ASHRAE 90.1-2004, should be modified to promote energy conservation methods for maintaining an appropriate level of thermal comfort for semi-heated and unconditioned spaces. Because HVAC design often is part of the tenant fit-out design and not the design of the distribution center base building, the building owner may meet this requirement through lease mandates.

Proposed Modification to Requirements

The development and building must meet the following requirements, both of which the building owner can fulfill through lease mandates. However, several passive systems are more economical and efficient to be installed as part of the base building construction and during later phases, such as tenant fit-out.

- For finished and conditioned spaces such as offices, and areas with specialized conditioning requirements, such as battery storage, design HVAC systems and the building envelope per the requirements of LEED-CI EQc7 (meeting ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy). Consider installing passive ventilation systems in conditioned spaces, if it will be more energy efficient for conditioned spaces as well.

-AND-

- In warehousing and storage areas, employ passive systems and strategies for enhanced comfort for building occupants to provide a comfortable thermal environment appropriate for the use of the space. Examples of such systems and strategies that may also be employed include:

    - Passive systems (nighttime air, heat venting, windflow)
    - Destratification fans
    - Reflective roof systems
    - Nighttime/passive ventilation systems
    - Super-insulation
    - Localized active systems with refrigerants in high-occupancy areas
    - Active refrigerant-free systems
    - Heat exchange or roof-misting with stored rainwater
    - Groundwater cooling and dehumidification

Action Item
Engage a team with expertise in HVAC design for distribution centers to review the proposed modifications to LEED EQc7.

EQc8: Daylight and Views (combines LEED-CS EQc8.1 and LEED-CS EQc8.2)

Intent: Provide for the building occupants a connection between indoor spaces and the outdoors through the introduction of daylight and views into the regularly occupied areas of the building.

Discussion: LEED-CS' requirements for daylighting and views are not applicable for the warehousing areas of distribution centers. However, in critical task areas for this building typology, daylighting would likely help reducing energy consumption. Because the layout of the warehousing space is dependent on the tenant, it may be more efficient to consider daylighting strategies as part of the tenant fit-out design. However, it may be more efficient in terms of time, cost and materials to incorporate some daylighting methods, such as a clerestories, skylights and vertical windows, with the design and construction of the base building.

Proposed Modification to Requirements
In spaces that are regularly occupied, such as offices, meet the requirements for LEED-CS EQc8.1 and EQc8.2 during the design and construction of the base building or include as requirements in a lease mandate for tenant fit-outs. In addition, meet the following requirements:

OPTION 1
Provide daylighting to achieve a minimum lighting level of 10 footcandles in a minimum of 75% of all critical task areas for warehousing, such as cross aisles, laydown areas, picking and sorting areas. (1 point)

OPTION 2
Provide daylighting to achieve a minimum lighting level of 20 footcandles in a minimum of 75% of all critical task areas for warehousing, such as cross aisles, laydown areas, picking and sorting areas. (1 point)

Note: Critical task areas for warehouses do not include storage spaces, mezzanines, and racking areas.

Action Items
Engage a team with expertise in HVAC and thermal comfort design for distribution centers to review the proposed modifications, metrics and requirements for this credit.

VI. Innovation in Design (5 points possible)

IDc1-1.4: Innovation in Design (4 points possible)

Intent (modified): To provide design teams and projects the opportunity to be awarded points for exceptional performance above the requirements set in LEED-DC and/or innovative performance in Green Building categories not specifically addressed by the LEED-DC Green Building Rating System.

Discussion: Distribution centers and their sites provide significant opportunities for environmentally-responsible and sustainable design to go beyond the LEED-DC requirements. The projects' large scale and range of programs make them distinct from other building types and present opportunities for the exploration and development of sustainable design features scaled up for distribution centers.

Proposed Modification to Requirements

Consider including the following features, techniques and practices into the project or building site as innovative sustainable design elements that will benefit the environment. Encourage the incorporation of sustainable practices in distribution center design. Project teams are encouraged to participate in other strategies demonstrating innovation in sustainability.

- Net provider. For projects that become a net provider of resources to communities beyond the site boundary, document the degree to which the project exceeds the relevant credit, if applicable. Examples of such resources include:
  - Energy generated through renewable sources (credits EAc2 and EAc6)
  - Harvested stormwater or gray water for uses in the community such as irrigation, sewage conveyance, fire pump testing, heat reclamation (credits WEc1, WEc2 and WEc3)
- On-site truck stop facility. For projects with multiple distribution centers and buildings, such as an industrial park, include a central truck stop facility in the project's master plan.
- Daylight harvesting. Lighting consumes much of the distribution center's energy needs. Through daylighting strategies, such as harvesting, achieve a significant reduction in energy usage due to lighting as compared to the baseline model.
- Embodied Carbon Footprint. Achieve a reduction in the project's embodied carbon emissions. Engage a team with expertise in calculating embodied carbon in construction to compare the project's carbon footprint with that built using typical construction methods.
- Sustainability Awareness and Education. Implement a significant educational program to inform tenants on specific sustainable design benefits in the distribution center, including increased productivity, improved work environments and reduced operations costs. Encourage tenants to encourage sustainable practices within their operations, such as a carpooling incentive program.

Action Items

Engage a team with expertise in sustainable design, engineering and logistics of distribution centers to review the proposed modifications to Innovation in Design.